The Former Enterprise Networks Group
of Lucent Technologies

MultiPoint Conferencing Unit
Release 7.1

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Part 15: Class A Statement. This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio-frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his or her own expense.

To Users of Digital Apparatus in Canada: This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus as set out in the interference-causing equipment standard entitled, "Digital Apparatus," ICES-003 of the Department of Communications.

Cet appareil numérique respecte les limites de bruits radioélectriques applicables aux appareils numériques de Classe A prescrites dans la norme sur le matériel brouilleur: "Appareils Numériques," NMB-003 édictée par le ministre des Communications.

Part 68: Network Registration Number. This equipment is registered with the FCC in accordance with Part 68 of the FCC Rules. This equipment is identified by the FCC registration number AS5USA-75530-MF-E.

Prior to connecting this device, the following information should be given to the Telephone Company.

Facility Interface Code: 04DU9-DN

Service Order Code: 6.0P

Notice
The Canadian Department of Communications label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment. Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

CAUTION:
Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

Notice
The Load Number (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device, to prevent overloading. The termination on a loop may consist of any combination of devices subject only to the requirement that the total of the Load Numbers of all the devices does not exceed 100.

Load Number: Not applicable

Standard Connecting Arrangement: CA81A

Canadian Equipment Maintenance Facility:
Avaya Inc. Canada
3650 Victoria Park Avenue, Suite 700
Willowdale, Ontario M2H3P7
Telephone Number 416 756-5222

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Preventing Toll Fraud
Toll Fraud is the unauthorized use of your telecommunications system by an unauthorized party (for example, a person who is not a corporate employee, agent, subcontractor, or working on your company’s behalf). Be aware that there is a risk of toll fraud associated with your system and that, if toll fraud occurs, it can result in substantial additional charges for your telecommunications services.

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If you suspect that you are being victimized by toll fraud and you need technical assistance or support, call the Technical Service Center’s Toll Fraud Intervention Hotline at 1.800.643.2353.

Providing Telecommunications Security
Telecommunications security of voice, data, and/or video communications is the prevention of any type of intrusion to, that is, either unauthorized or malicious access to or use of, your company’s telecommunications equipment by some party.

Your company’s “telecommunications equipment” includes both this Avaya product and any other voice/data/video equipment that could be accessed via this Avaya product (that is, “networked equipment”).

An ”outside party” is anyone who is not a corporate employee, agent, subcontractor, or working on your company’s behalf. Whereas, a “malicious party” is Anyone, including someone who may be otherwise authorized, who accesses your telecommunications equipment with either malicious or mischievous intent.

Such intrusions may be either to/through synchronous (time-multiplexed and/or circuit-based) or asynchronous (character-, message-, or packet-based) equipment or interfaces for reasons of:
Utilization (of capabilities special to the accessed equipment)
Theft (such as, of intellectual property, financial assets, or toll-facility access)
Eavesdropping (privacy invasions to humans)
Mischief (troubling, but apparently innocuous, tampering)
Harm (such as harmful tampering, data loss or alteration, regardless of motive or intent)
Be aware that there may be a risk of unauthorized intrusions associated with your system and/or its networked equipment. Also realize that, if such an intrusion should occur, it could result in a variety of losses to your company, including but not limited to, human/data privacy, intellectual property, material assets, financial resources, labor costs, and/or legal costs).

Your Responsibility for Your Company’s Telecommunications Security
The final responsibility for securing both this system and its networked equipment rests with you - an Avaya customer’s system administrator, your telecommunications peers, and your managers. Base the fulfillment of your responsibility on acquired knowledge and resources from a variety of sources including but not limited to:
Installation documents
System administration documents
Security documents
Hardware-/software-based security tools
Shared information between you and your peers
Telecommunications security experts
To prevent intrusions to your telecommunications equipment, you and your peers should carefully program and configure your:
Avaya provided telecommunications systems and their interfaces
Avaya provided software applications, as well as their underlying hardware/software platforms and interfaces
Any other equipment networked to your Avaya products

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About This Document Set

This document set includes three manuals:

Administration: describes the Avaya MultiPoint Conferencing Unit (MCU) reservation, administration, and troubleshooting functions, along with the reports available to a telecommunications manager or an on-site MCU system administrator.

Installation and Test: provides the background information and procedures for the installation and testing of the Avaya MultiPoint Conferencing Unit (MCU) Release 7.1.

Maintenance: describes the maintenance procedures, commands, and alarms for the Avaya MultiPoint Conferencing Unit (MCU) Release 7.1. It is intended for use by engineering personnel, field technicians, and telecommunication managers.

Prerequisites

It is assumed that before using this document set you have knowledge about telecommunications equipment and an understanding of trunks and network services. A basic familiarity with point-to-point or multipoint video conferencing is helpful for prequalifying video endpoints and establishing conference parameters.

Intended Audience

This manual is intended for engineering personnel, field technicians, and authorized installers of the MCU.

Related Information

Use this document set in conjunction with the following Avaya MCU documents. You may also want to request additional information offered by Avaya to prevent toll fraud:

- *Avaya MultiPoint System Guide for the MultiPoint Conferencing Unit/Conference Reservation and Control System*

  Provides an overview of the MultiPoint Conferencing Unit (MCU) and Conference Reservation and Control System (CRCS), including their capabilities, features, and advantages to the customer.

- *Avaya Conference Reservation and Control System Installation Guide*

  Describes how to install the Conference Reservation and Control System (CRCS).

- *Avaya Conference Reservation and Control System Online Help*

  Online document that provides detailed information and procedures that a CRCS administrator or reservations agent can use to install CRCS, set up and manage CRCS databases, reserve conferences, and perform CRCS system administration.

Organization

The Administration manual contains the following chapters and appendices:

- Chapter 1, “MCU Conference Reservation Tools,” discusses the paper-based and PC-based (CRCS) scheduling systems and also the Conference Record screen and the Availability of Ports screens.
- Chapter 2, “MCU System Administration,” explains how to perform ongoing administration procedures, such as adding trunks and enabling features.
- Chapter 3, “Checking MCU Performance,” provides a list of MCU reports that can be displayed or printed to track MCU performance and the status of trunks.
- Chapter 4, “Conference Control Features,” discusses Universal Conference Control (UCC), conference control commands from the MCU-MT, and OpCenter, which is a component of the Conference Reservation and Control System (CRCS).
- Chapter 5, “Diagnosing and Solving Problems,” explains how to troubleshoot problems within MCU conferences.
- Appendix A, “Conference Command Summary,” discusses various conference scheduling, troubleshooting, and control commands.
- Appendix B, “Feature Descriptions,” provides a detailed explanation of the MCU/CRCS features, including the appropriate administration and relevant interactions and requirements.

- Appendix C, “Administration Commands,” provides a summary of the available MCU administration commands and their associated objects.

The Installation and Test manual contains six chapters and an appendix, including:

- Chapter 1, “Product Overview” describes the various MCU components, configuration examples, and high level operation of the system.
- Chapter 2, “Pre-Installation Procedures” discusses the checks you should make and the procedures you should follow before installing the MCU and its components.
- Chapter 3, “Installing the MCU and Components” explains how to install the MCU and its components.
- Chapter 4, “Connecting to the Network” provides the wiring and connections required for the MCU. It identifies the cross-connect fields, lists the hardware equipment room requirements, and provides procedures for installing cables.
- Chapter 5, “Activating the MCU” defines the steps necessary to “bring up” the MCU for subsequent administration.
- Appendix A, “Cable Connectivity” presents figures of the cables used for ESM connectivity.

This Maintenance manual contains the following ten chapters and one appendix:

- Chapter 1, “Maintenance Architecture” provides an overview of the maintenance objects, alarms and error reporting, and testing functions of the MCU.
- Chapter 2, “Hardware Configuration and Power” explains the MCU cabinet configuration, including power controls, circuit packs, and ports.
- Chapter 3, “Management Terminals” describes the MCU-MT, MCU Scheduling Terminal (MCU-ST), and the maintenance alarm terminal.
- Chapter 4, “Initialization and Recovery” explains the five system reset commands and how to recover from an MCU failure.
- Chapter 5, “Routine Maintenance Procedures” provides routine maintenance procedures and repair strategies to clear MCU-alarmed and some user-reported problems. It also includes instructions for upgrading the MCU software.

- Chapter 6, “Accessing Alarms and Errors” describes how the MCU generates and tracks alarms and errors.
- Chapter 7, “LED Interpretation” explains each status and alarm LED on the MCU circuit packs and power distribution units.
- Chapter 8, “Maintenance Object Repair Procedures” alphabetically lists MCU Maintenance Objects (MOs) and related maintenance information, including error log entries and tests to clear values. It also describes troubleshooting priorities based on the importance of reported alarms and errors.
- Chapter 9, “Packet Bus Fault Isolation and Correction” describes the fault isolation and correction procedures for the Packet Bus and for the various maintenance objects that use the Packet Bus.
- Chapter 10, “T.120 Maintenance From the ESM-MT” discusses how the ESM-MT is used for ESM maintenance and upgrade procedures. The appropriate terminal commands are included.
- Appendix A, “MCU Commands and Troubleclearing Aids” provides additional troubleclearing information for resolving both system-alarmed and user-reported troubles.

This document set also has a glossary and index.

Typographic Conventions

Several conventions are used to convey information quickly. These conventions are as follows:

- This *typeface* is used for references to titles of other documents and when referring to fields on screens.
- This **typeface** is used to identify commands and values for fields.
- This `typeface` is used when a word or phrase must be written on a paper form and when a message is returned by the MCU.

- The following icon:

WARNING:

emphasizes information that is important to your safety.

- The following icon:

CAUTION:

indicates information you need to prevent equipment damage.

- The following icon:

NOTE:

identifies additional information pertinent to the text preceding it.

Getting Help

If you need help with the procedures or other information in this document, and if you are a customer in the United States or Canada, be sure to call the Multimedia Collaboration Center (MCC) at 800 242-2121. If you are a customer outside of the US or Canada, call the international center at 303 804-3777. If you have purchased the MCU from an OEM channel, contact your respective OEM provider.

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of Lucent Technologies

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Administration

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MCU Conference Reservation Tools

1

Overview

This chapter briefly discusses the methods for scheduling MCU conferences. The chapter also discusses the Conference Record Form, which is a tool that allows you to schedule MCU conferences. For complete details on PC-based conference scheduling, refer to the appropriate Conference Reservation and Control System (CRCS) documentation.

Conference Scheduling Methods

There are two ways to schedule and reserve conferences on the MCU: PC-based scheduling and paper-based scheduling.

PC-Based Scheduling System

This optional PC-based scheduling system, the Avaya Conference Reservation and Control System (CRCS), automates the scheduling tasks and performs conflict resolution to ensure MCU resources are available and that selected endpoints have the ability to participate. It also allows time to be reserved on the MCU in advance of the scheduled conference date, and it automatically activates the conference on the day it is scheduled to begin. The PC-scheduling system offers additional scheduling options, including web-based reservation requests and rooms-only reservations for non-video conferences. For details on CRCS, refer to the appropriate CRCS documentation.

Paper-Based Scheduling System

The paper-based scheduling system tracks concurrent and overlapping conferences. Through this system, the number of MCU ports that are available is known and MCU time can be reserved in advance (more than 24 hours ahead of the planned start time) of the conference date.

The paper-based scheduling system requires accurate records of specific conference information, such as conferees' names and contact numbers, conference mode, date of conference, and start and stop times. A usage chart is included to track MCU resource availability and to prevent overbooking. It also requires a way to remind the agent when to reserve the conference (within 24 hours of the start and stop times).

Conferences are reserved by using the MCU Scheduling Terminal (MCU-ST). If a conference convener calls within 24 hours of the conference, the conference can be reserved while the convener is on the phone (provided the MCU resources and Meet-Me numbers are available for all conferees).

Another option is to dedicate resources of the MCU around-the-clock. This method reserves ports on the MCU so selected locations always have the ability to convene a conference at any time without making a reservation.

Adding and Changing Conferences

The Conference Record form is used to capture the information required by the MCU to reserve a conference.

Conference Record Form

An example of the Conference Record form appears as follows:

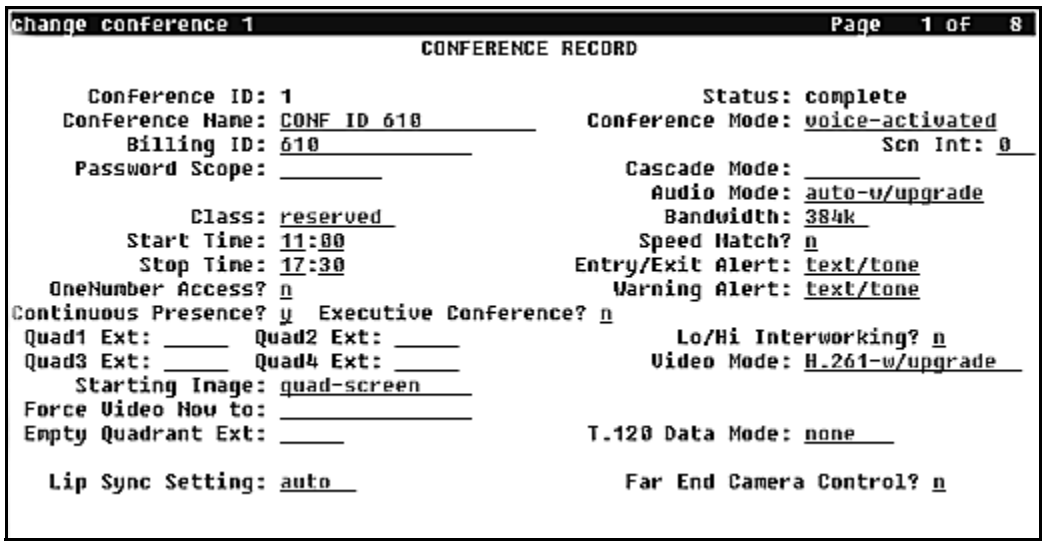


Figure 1-1. Conference Record Screen (Page 1 of 8)

NOTE:
All of the fields that can appear in the previous form are not shown. Also, all of the fields shown in the previous form do not necessarily appear each time the Conference Record is accessed and used. Refer to the following list for details.

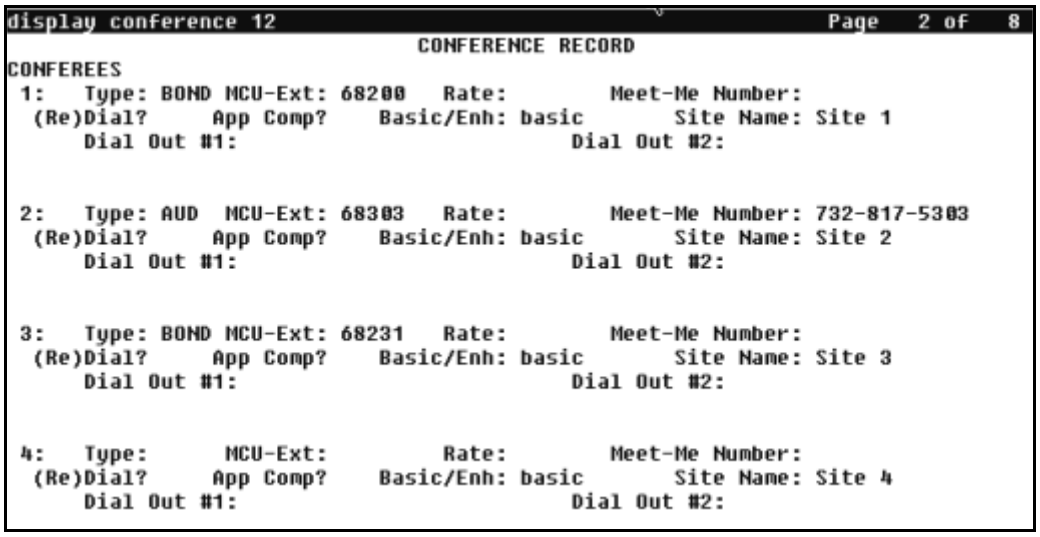


Figure 1-2. Conference Record Screen (Page 2 of 8)

NOTE:
Pages 2 through 7 of the screen have the same format of four entries per page. However, page 8 has just one entry.

The following list provides descriptions of the fields on the Conference Record form and their related values:

- *Conference ID*

  Display-only field that shows the number that identifies this conference.

- *Conference Name*

  Indicates the purpose of the meeting for identification purposes. Enter a maximum of 20 alphanumeric characters.

- *Billing ID*

  If applicable, enter the billing number for the conference. The number may contain a maximum of 15 alphanumeric characters.

- *Password Scope*

  Entries include **all** and **audio**. **Audio** indicates that the per-conference password is in effect and is required only for an audio-only endpoint. For value **all** or **audio**, the *Password* field on page 1 of the form is displayed. For value **all**, the per-user *Password Reqd?* field on pages 2 through 8 of the form is displayed.

NOTE:
This field must remain blank for a conference with any H.323 conferees administered on page 2 through 8. Since most H.323 video endpoints do not currently support password capability, the MCU is administered to block password protection from being enabled for a conference which has an H.323 conferee.

- *Password*

  Enter a maximum of 15 alphanumeric characters. For H.323 leave blank.

- *Class*

  There are three conference classes: **reserved**, **dedicated**, and **file**. A **reserved** conference is scheduled to begin within 24 hours of the current time. A **dedicated** conference is always available and can be joined at any time. A **file** conference is filed as a record for future use. The default is **reserved**.

- *Start Time*

  If value **reserved** or **file** is selected in the *Class* field, this field appears so you can enter the time the conference begins. The time is entered in ***hhmm*** format where ***hh*** is the hour (***00*** to ***23***) and ***mm*** is the minutes (***00*** to ***59***). This field is optional for file conferences.

- *Stop Time*

  If value **reserved** or **file** is selected in the *Class* field, this field appears so you can enter the time the conference ends. The time is entered in ***hhmm*** format where ***hh*** is the hour (***00*** to ***23***) and ***mm*** is the minutes (***00*** to ***59***). This field is optional for file conferences.

- *OneNumber Access*

  Use this field to administer the OneNumber Access feature, which allows multiple endpoints to use the same MCU-extension within the same conference. Enter **y** to enable the feature or **n** to disable it. This feature is supported by conferences with H.320 and/or H.323 conferees.

  NOTE:
  Changing the field value from **n** to **y** can be done only while Dynamic Conference Resizing is activated and the conference is not active. Changing the field value from **y** to **n** is not permitted whenever the conference is active or in use.

  If an MCU-extension is used for OneNumber Access, it cannot be used as a control extension for a Presentation or Broadcast/scan conference.

  If *Executive Conference* is set to **y**, this feature can use only audio-only endpoints.

- *Continuous Presence*

  This field is used to allocate Continuous Presence *Plus* resources to a conference. Whenever the field is set to **y,** the video processor resources are allocated once the conference starts, and the following six fields discussed in this list are displayed. Whenever the field is set to **n**, Continuous Presence *Plus* is not a part of the administered conference. Continuous Presence is supported in H.320-only, H.323-only and H.320/H.323 mixed conferences.

  NOTE:
  This field cannot be administered unless the *Continuous Presence/Executive Conf* or *Conferencing Suite* field in the Customer-Options form is set to a value greater than **0**. Also, this field cannot be administered unless the *Executive Conference* field is set to **n**.

  If *Far End Camera Control* contains **y**, this field must be disabled.

  Whenever *Continuous Presence* is set to **y** and *Speed Match* is set to **n**, the following lip synchronization fields appear: *Lip Sync <= 128K*, *Lip Sync 224/256K*, and *Lip Sync >= 336K*. This feature supports only the following rates: **1x56k, 1x64k,2x56k, 2x64k, 112k, 128k, 224k, 256k, 336k, 384k, 448k, 512k, 672k, and 768k.** also it supports only the H.261 and H.263 video modes: CTX, CTX+, MRV, SG$, $CIF and 16CIF H.263 video modes are not supported.

The following six fields appear whenever the *Continuous Presence?* field is set to **y**.

- *Quad (1-4) Ext*

  These fields are used to assign specific endpoints to a quadrant in the Continuous Presence *Plus* display. To assign an endpoint to a specific quadrant, enter its MCU-extension into the appropriate field. The MCU-extension for the quad must be valid and properly administered. If any field is left blank, the corresponding quadrant is considered “unassigned.” Endpoints are VAS-switched into the unassigned quadrants corresponding to such fields, as appropriate. An H.320 or H.323 endpoint can be reassigned from one quad to another and transitioned from full screen to quad through both UCC or control commands.

  NOTE:
  The MCU-extension for the quad cannot be a UCC, Audio Add-On, or OneNumber Access extension. Also, it cannot be a control extension in a Presentation mode conference.

  If *Continuous Presence* is set to **n**, and if *Executive Conference* is then set to **y**, the extensions that were previously entered into the *Quad (1-3) Ext* fields remain in the *Site (1-3)* fields.

- *Starting Image*

  Specifies the starting video composition for a CPP or Executive Conferencing conference. Values for CPP include **full**, **dual-panoramic**, **lower-panoramic**, **upper-panoramic**, and **quad** (default). Values for Executive Conferencing include **full** and **executive** (default). Value **dual-panoramic** presents a two-image screen layout where the top half of the screen displays one image and the bottom half of the screen also displays one image. Value **lower-panoramic** presents a three-image screen layout where the bottom half of the screen displays one image while the top half of the screen is segmented into two screen displays. Value **upper-panoramic** presents a three-image screen layout where the top half of the screen displays one image while the bottom half of the screen is segmented into two screen displays. Value **executive** presents a dual-panoramic screen layout to the three broadcaster endpoints in the conference, and it presents an upper-panoramic screen layout to the other endpoints in the conference.

  This field appears only whenever the *Continuous Presence* field or the *Executive Conference* field is set to **y**.

- *Force Video Now To*

  This field is used to toggle between three-image, quadrature, dual-screen, and full-screen video within a conference. This field appears only whenever the *Continuous Presence* field or the *Executive Conference* field contains **y**.

  Values for CPP include **full**, **dual-panoramic**, **lower-panoramic**, **upper-panoramic**, **quad**, and blank (default). Values for Executive Conferencing include **full** and **executive** (default). Whenever the Conference Record is submitted, the display change is applied to the conference and remains in effect until it is changed by another change conference command, Universal Conference Control (UCC), or the Conference Reservation and Control System (CRCS).

- *Empty Quadrant Extension*

  This field is used to provide a fill pattern in the Continuous Presence *Plus* display whenever there are fewer than four parties in the conference. The fill endpoint is an endpoint in the conference. This endpoint's MCU-extension is entered into this field. The MCU-extension for the empty quad must be valid and properly administered. If there are only two active endpoints in the conference, the video from the fill endpoint is displayed in the remaining two quadrants.

  NOTE:
  The MCU-extension for the empty quad cannot be a Universal Conference Control (UCC), Audio Add-On, or OneNumber Access extension. Also, it cannot be a control extension in a Presentation mode conference.

- *Executive Conference*

  This field is used to allocate Executive Conferencing resources to the conference including H.320-only, H.323-only, or H.320/H.323 mixed conferences. This feature supports only the following rates: **1x56k**, **1x64k**, **2x56k**, **2x64k**, **112k**, **128k**, **224k**, **256k**, **336k**, **384k**, **448k**, **512k**, **672k**, and **768k**. Also, it supports only the H.261 and H.263 video modes; CTX, CTX+, MRV, and SG4 video modes are not supported.

  NOTE:
  This field cannot be administered unless the *Executive Conference, Continuous Presence/Executive Conf,* or *Conferencing Suite* field in the Customer-Options form is set to a value greater than **0**. Also, this field cannot be administered unless the *Continuous Presence* field in the Conference Record form is set to **n**.

  This field cannot be administered unless *Conference Mode* is set to **voice-activated** or **chair**; it cannot be administered for value **presentation**, or **broadcast/scan**.

  If this field is set to **y**, the *H.263/H.261 Transcoding*, *Speed Match*, and *Far End Camera Control* fields must be set to **n**; also, the *Entry/Exit Alert* and *Warning Alert* fields can be set to no other value than **tone** or **none**.

  OneNumber Access can be used with this feature only for audio-only endpoints.

  Executive Conferencing cannot be dynamically enabled for an active conference. However, dynamic changes can be made to Sites 1 through 3 within an Executive Conferencing conference.

The *Site (1-3) Ext* fields, which are discussed next, and the *Starting Image* and *Force Video Now to* fields, which were discussed previously, appear whenever the *Executive Conference* field is set to **y**.

- *Site (1-3) Ext*

  These fields are used to assign the broadcaster endpoints (if desired) in an Executive Conferencing display. To assign an endpoint, enter its MCU-extension into the appropriate field. The MCU-extension must be valid and properly administered. If any field is left blank, a fill pattern is provided for the appropriate screen display.

  NOTE:
  Dynamic changes can be made to Sites 1 through 3 within an Executive Conferencing conference.

  If *Executive Conference* is set to **n**, and if *Continuous Presence* is then set to **y**, the extensions that were previously entered into the *Site (1-3) Ext* fields remain in the *Quad (1-3)* fields.

- *Far End Camera Control*

  Enter **y** to enable this feature. Enter **n** to disable it.

  NOTE:
  If the feature is enabled, the *Continuous Presence*, *Executive Conference*, and *T.120 Data Mode* fields must be set to **n**.

- *Lip Sync*

  NOTE:
  This field appears only whenever either *H.263/H.261 Transcoding* or *Continuous Presence* is set to **y** and *Speed Match* is set to **n**. Lip Sync settings do not currently effect H.323 endpoints.

  Use this field to establish Lip Synchronization mode for either H.263/H.261 transcoded conferences or CPP conferences without SM. One of two modes, Preserved Lip Sync Mode or Audio Priority, may be enabled.

  To enable Preserved Lip Sync Mode, enter one of two values into the field. Value **auto** enables a preselected MCU delay of a length determined by the endpoint type and/or audio standard. Preselected audio delays are defined within and uplinked by the TN2237 circuit pack. Value **custom** enables a delay of **0** to **1000** msecs in 20 msec increments. Entering this value brings up an associated *Value* field, which allows you to enter the appropriate msec value.

  To enable Audio Priority, enter value **none** into the field.

- *Lip Sync <=128K,...224/256K,...>=336K*

  NOTE:
  These fields appear only whenever *Speed Match* is set to **y**.

  Use these fields to establish Lip Synchronization mode for SM conferences at any of the three rate ranges indicated. One of two modes, Preserved Lip Sync Mode or Audio Priority, may be enabled.

  To enable Preserved Lip Sync Mode, enter one of two values into the field. Value **auto** enables a preselected MCU delay of a length determined by the endpoint type and/or audio standard. Preselected audio delays are defined within and uplinked by the TN2237 circuit pack. Value **custom** enables a delay of **0** to **1000** msecs in 20 msec increments. Entering this value brings up an associated *Value* field, which allows you to enter the appropriate msec value.

  NOTE:
  As a default, each *Value* field is automatically populated with the corresponding value administered in the Feature-Related System Parameters form. For details, refer to "Features-Related System Parameters Form" on page 2-49.

To enable Audio Priority, enter value **none** into the field.

- *Value*

  This field appears whenever any of the fields for Lip Synchronization identified in the previous two bullet items contain value **custom**. The field allows you to enter a Lip Sync delay value in msecs for an MCU conference. Values include **0** through **1000** in increments of 20. (Refer to the previous NOTE.)

- *Status*

  This display-only field reports the current status of a conference as it relates to the *Class* of the conference. A reserved conference can be **active, in-use**, **inactive**, or **complete**. **Active** means the conference is available to receive calls. **In-use** means the conference is in progress and one or more conferees has joined in. **Inactive** means the conference is not available to receive calls (for a reserved conference, the *Start Time* has not been reached). **Complete** means a conference has ended (the *Stop Time* has been reached). A dedicated conference is always **active** (available to receive calls). A file conference is always **inactive** (not available to receive calls).

- *Conference Mode*

  Depending on the MCU model, this field offers up to 4 conference modes. All four conference modes support H.320-only, H.323-only, or H.320/H.323 mixed conferences. Value **voice-activated** allows all conferees to have an active audio path so everybody hears what the other participants are saying. All video participants see the current speaker which means that the video source changes when another speaker begins talking. The current speaker sees return video of the last person who spoke. If the value in the **Scn Int** field is greater than 0, when the current broadcaster has been speaking for a pre-set period of time, the return video for the broadcaster is replaced with a scanning of all the conference's video participants; the other video participants continue to see the current speaker. Value **chair** allows the chairperson to determine which video-sending endpoint is broadcast to all of the other conferees. Value **presentation** allows one location to be viewed constantly by all conferees. If a conferee asks a question or makes a comment, the other conferees hear the speaker but continue to view the presenter. Value **broadcast/scan** allows one location to be viewed and heard constantly by all conferees. The broadcaster receives video (not audio) from all conferees on a rotating basis. Value **voice-activated** is the default.

NOTE:
Some field values can be used only if the required field in the Customer-Options form is set to **y**. The following table provides details

Conference Mode Field Value	Required Field(s) in System-Parameters Customer-Options Form
broadcast/scan	*Presentation/Broadcast?*
chair	*Chair Control Suite?*
presentation	*Presentation/Broadcast?*
voice-activated	*VAS* and/or one or more of the other fields identified in this column

The *Type* field cannot be set to **UCC** if *Conference Mode* is set to **broadcast/scan**.

For values **broadcast/scan** and **presentation**, the *Control Ext* field must be populated correctly.

The field must contain **voice-activated** or **chair** whenever *Executive Conference* is set to **y** or to enable both Speed Match and Continuous Presence *Plus* within a conference.

- *Control Ext.*

  This field appears only when the *Conference Mode* field contains either **presentation** or **broadcast/scan**. The control extension is the MCU-extension of the location that will be the presenter or broadcaster. Any H.320 or H.323 endpoint is eligible to be defined as the control extension provided that the cascade mode is not set to secondary. The control extension cannot be a OneNumber Access, Audio Add-On, or UCC extension.

  NOTE:
  This field must be populated correctly whenever the *Conference Mode* field is set to **presentation** or **broadcast/scan**.
  If *Cascade Mode* is set to **primary** or blank, the field must contain an extension for an H.320 (*Type* is set to **P64**), Dedicated Access (*Type* is set to **DA**), or BONDed (*Type* is set to **BOND**) endpoint or an extension for an H.323 (*Type* is set to H.323). If *Cascade Mode* is set to **secondary**, the field must contain an extension for a cascaded (*Type* is set to **CAS**) or BONDed-cascaded (*Type* is set to **BCAS**) endpoint.

- *Scn Int.*

  This field appears for all *Conference Modes.* If the value is 0, no scanning occurs (default setting for **voice-activated**, **presentation**, and **chair**. If the value is greater than 0, the scanning interval is the amount of time (in seconds) that the broadcaster will view each conferee before the MCU switches to the next conferee. The default setting for **broadcast/scan** is **15** seconds.

- *Cascade Mode*

  This mode must be either **primary** or **secondary** if the conference includes a CAS link and/or if a cascaded (*Type* is set to **CAS**) or BONDed-cascaded (*Type* is set to **BCAS**) endpoint is being added to the conference. However, an H.323 endpoint can only be defined as the MCU-extension when the *Cascade Mode* field is set to **primary**. On the other hand, if a cascaded endpoint cannot be administered, or if there are no cascaded or BONDed-cascaded endpoints in the conference, the mode must be **blank**. Finally, if the appropriate endpoints can be administered but the link is not enabled, the mode is **disabled**.

  NOTE:
  This field is not displayed unless the *Cascading* field in the Customer-Options form is set to **y**.

  The field cannot be set to **disabled**, **primary**, or **secondary** (and should be left blank) if *T.120 Data Mode* contains **any-mlp**.

- *Audio Mode*

  The default is **auto-w/upgrade**.

  This default value indicates that the MCU will automatically select either the **G.711**, **G.722** or **G.728** audio mode, depending on the bandwidth of the conference and of the participating video endpoints. (These three rates are fixed values.) When an H.323 endpoint is scheduled to join a conference, values of **G.711**, **G.722** and **G.728** or **auto** are permissible. However, when an endpoint of Type **H.323** is scheduled to join, only fixed audio modes for **G.711**, **G.722** and **G.728** are allowed. That is, a value type of **auto** is blocked if one or more administered conferees are of Type **H.323**. Also, this value indicates that the MCU will automatically upgrade a conference where the audio mode has been downgraded whenever the endpoint causing the downgrade drops out of the conference. Value **auto-down-only** indicates that the MCU will upgrade the audio mode only of a conference that has been downgraded and after all endpoints drop.

  NOTE:
  The field value determine which audio modes are eligible for changing in Dynamic Resizing conferences. For details, refer to "Dynamic Resizing" on page B-88.

  For T.120 conferences, if the field contains either **G.711** or **G.722**, the

MLP Rate field must contain either **6.4k** or **var_mlp**. Also, for such conferences, if the field contains either **auto-w/upgrade** or **auto-down_only**, the *MLP Rate* field must contain **6.4k**. Finally, for T.120 conferences, the field must contain **G.728** if the *MLP Rate* field contains a value *other than* ***6.4k***.

Speed-matched T.120 Data Conferencing conferences are allowed with MLP rate “fixed” (and not var_MLP).

- *Bandwidth*

  This field is used to specify the bandwidth selected for the conference. For H.323-only and H.320/H.323-mixed conferences, bandwidth values up to 768k are supported. If **1x56k** is selected, the conference will be a 1-channel 56k conference. If **1x64k** is selected, the conference will be a 1-channel 64k conference. If **2x56k** is selected, the conference will be a 2B-channel 56k conference (112k bandwidth). If **2x64k** is selected, the conference will be a 2B-channel 64k conference (128k bandwidth). If **384k** is selected, the conference will be a 1-channel **384k** (H0 or BONDed) conference. Other channel bandwidths include **112k, 128k, 168k, 192k, 224k, 256k, 280k, 320k, 336k, 448k, 512k, 672k, 768k, 1008k, 1152k, 1288k, 1344k, 1472k, 1536k, 1680k,** and **1920k**. Default is **2x56k**.

  NOTE:
  The field, the rate or the bandwidth cannot be administered unless the corresponding field within the Maximum Port Capacity area of the Customer-Options form has a value greater than 0. Also, sufficient resources for the endpoint type must be available for the requested time period.
  The following bandwidths are not allowed in the conference if *Type* contains **BCAS** or **BOND**: **1x56k**, **1x64k**, **2x56k**, **2x64k**, or a bandwidth *greater than* ***768k***.

  The *Lo-/Hi-Interworking* field *cannot* be administered with the following bandwidths: **1x56k**, **1x64k**, **2x56k**, and **2x64k**.

  Speed Match (SM) and Continuous Presence *Plus* (CPP) support only the following rates: **1x56k**, **1x64k**, **2x56k**, **2x64k**, **112k**, **128k**, **224k**, **256k**, **336k**, **384k**, **448k**, **512k**, **672k**, and **768k.**

- *Speed Match*

  Controls the allocation of speed-matching resources for the conference. Values include **n** (default) and **y**. The field must be set to **n** for H.323-only and H.320/H.323-mixed conferences or whenever the *Cascade Mode* field contains **secondary**.

  The field cannot be administered unless the *Speed Match* or *Conferencing Suite* field in the Customer-Options form is set to a value in the range **1** through **8**. Sufficient speed-matching resources must be available for the requested time period.

Also, the field cannot be administered unless various fields in the Conference Record form are populated correctly. The following list identifies these fields along with the appropriate values for Speed Match, and it provides any necessary commentary:

- *Status* — **inactive** (The field cannot be set for active or in-use conferences.)
- *Bandwidth* — **1x56k**, **1x64k**, **2x56k**, **2x64k**, **112k**, **128k**, **224k**, **256k**, **336k**, **384k**, **448k**, **512k**, **672k**, or **768k**
- *Executive Conference* — **n**
- *Video Mode* — Values for H.261-associated video modes, including **H.261-down_only**, **H.261-w/upgrade**, **H.261-CIF-Floor**, **H.261-CIF-Now**, or **H.261-QCIF-Now**
- *CIF Frame Rate* — **7.5 fps**, **10 fps**, **15 fps**, or **auto**
- *QCIF Frame Rate* — **7.5 fps**, **10 fps**, **15 fps**, or **auto**
- *MLP Rate* — If T.120 Data Conferencing is enabled, this field must contain one of the following values: **6.4k**, **8k**, **14.4k**, **16k**, **22.4k**, **24k**, **30.4k**, **32k**, or **38.4k**. However, for this RTU, whenever *Audio Mode* contains **auto-w/upgrade** or **auto-down_only**, only MLP rate **6.4k** is permitted. Variable rates (indicated by value “var_mlp”) are not allowed.

The following points regarding the Conference Record form also apply whenever you are enabling Speed Match:

- OneNumber Access is supported but only for Audio Add-On endpoints. Multimedia endpoints are not supported.
- UCC and Audio Add-On endpoints cannot be speed matched. Therefore, if the *Type* field on the form contains **UCC** or **AUD**, the corresponding *Rate* field must be blank.
- Rate of the Dedicated Access (DA) endpoints must be compatible with the administered endpoint rate. The rate of the specified access endpoints for the dial-out numbers contained in the *Dial-Out #1* and *Dial-Out #2* fields must be equal to or greater than the rate at which the endpoint is administered.
- 56k endpoints cannot be speed matched with Nx64k endpoints. Therefore, if *Rate* contains an Nx64k value, *MCU-Ext* cannot contain a value representing a 56k endpoint.
- *Type* field must contain **BOND** or **BCAS** if the *Rate* field contains **112k**, **128k**, **224k**, **336k**, **448k**, **672k** or **768k**, with one exception: the field can contain **Px64** for RS366 dialing.
- If the *Rate* field contains **2x56k** or **2x64k,** the *Dial-Out #2* field as well as the *Dial-Out #1* field must be populated. If the *Rate* field does not contain either of these values, the *Dial-Out #2* field must be blank.

NOTE:
Whenever *Speed Match* is set to **y**, the following fields relevant to Lip Synchronization appear on the form: *Lip Sync <= 128K*, *Lip Sync 224/256K*, and *Lip Sync >= 336K*.

- *Entry/Exit Alert*

  This field appears if your MCU model has the Notification Package feature. The field indicates via tones and/or on-screen display messages when conferees join or exit the conference. Enter **tone** (default) to provide the traditional audible tone. Enter **text** to provide the text message. Enter **ANI** to display the Automatic Number Information (ANI) code of the endpoint for the associated conferee. Enter **text/tone** to provide both the text message and the audible tone. Enter **ANI/tone** to provide both an audible tone and the ANI code of the endpoint for the associated conferee.

  NOTE:
  Values **text**, **text/tone, ANI,** and **ANI/tone** cannot be administered unless the conference is a non-SM CPP conference. Therefore, the *Speed Match* field must contain **n** and the *Continuous Presence* field must contain **y**. Also, these values cannot be administered whenever *Executive Conference* is set to **y**.

  Value **text/tone** for entry/exit alert is not allowed if OneNumber Access is being used in the conference for either Audio Add-On or multimedia endpoints.Enter **none** to provide no notification of a conferee joining or exiting the conference.

  NOTE:
  None of the values for the field can be changed dynamically during an active or in-use conference.

- *Warning Alert*

  This field appears if your MCU model has the Notification Package feature and if *Class* contains **reserved** or **file**. Enter **tone** (default) to provide the traditional 10-minute audible warning tone. Enter **text** to provide the text message for both the 10-minute and two minute warnings. Enter **text/tone** to provide both the text message and the audible tone for the 10-minute warning and just the text message for the two-minute warning.

  NOTE:
  Values **text** and **text/tone** cannot be administered unless the conference is a non-SM CPP conference. Therefore, the *Speed Match* field must contain **n** and the *Continuous Presence* field must contain **y**. Also, these values cannot be administered whenever *Executive Conference* is set to **y**.Enter **none** to provide no conference end notification.

NOTE:
None of the values for the field can be changed dynamically during an active or in-use conference. If the conference end time is extended dynamically during a conference in response to the 10-minute notification, and if the field contains a valid value other than **none**, a subsequent 10 minute notification followed by a two-minute notification are provided starting 10 minutes prior to the newly established conference end time.

- *Rate Adaptation*

  This field appears if the conference has a 2x64k bandwidth. It indicates whether or not a 56k/64k rate adaptation is allowed for the conference. Values include **yes** and **no**. This field is turned **off** when H.323 is administered in a conference.

  NOTE:
  The field cannot be enabled whenever *T.120 Data Mode* is set to **any-mlp**. Whenever *Cascade Mode* contains a non-blank value or *Video Mode* contains a non-H.261- or non-H.263-associated value, the field must be set to **n**. If Dynamic Resizing is enabled while the conference is active, the field cannot be changed from **y** to **n**. Finally, the field cannot be changed while the conference is active and Dynamic Resizing is not enabled.

- *Lo-/Hi-Interworking*

  NOTE:
  This field is turned **off** when H.323 is administered in a conference.

  This field indicates whether or not the conference supports Low-/High-Speed Interworking. Values include **yes** and **no**.

  NOTE:
  The field cannot be changed from **y** to **n** whenever the conference is active or in use.

  The field *cannot* be administered with the following bandwidths: **1x56k**, **1x64k**, **2x56k**, and **2x64k**.

- *Video Mode*

  — Values supported by H.323 conferees include **H.261-CIF-Now**, **H.261-QCIF-Now, H.263-QCIF-Now, H.263-CIF-Now, H.263-4CIF-Now** and **H.263-16CIF-Now.** Values include **H.261-down_only, H.261-w/upgrade, H.261-CIF-Floor, H.261-CIF-Now, H.261-QCIF-Now, H.CTX, H.CTX+, SG4, H.263/1-down_only, H.263/1-w/upgrade,** and **MRV-w/upgrade.** The default is **H.261-w/upgrade**. This value automatically upgrades a conference where the video mode has been downgraded

whenever the endpoint causing the downgrade drops out of the conference. Value **H.261-down_only** upgrades the video mode of the conference only after all endpoints drop from the conference. **H.261-CIF-Floor** forces the video format to Common Intermediate Format (CIF). A CIF Frame Rate floor may be specified via administration. **H.261-CIF-Now** forces the video to CIF, and it forces the CIF Frame Rate to a value specified via administration. **H.261-QCIF-Now** forces the video to Quarter Common Intermediate Format (QCIF), and it forces the QCIF Frame Rate to a value specified via administration.**H.263-CIF-Now** forces the video to CIF, and it forces the CIF Frame Rate to a value specified via administration.**H.263-4CIF-Now** forces the video to 4CIF, and it forces the Frame Rate to the value specified by the CIF Frame Rate field. **H.263-16CIF-Now** forces the video to 16CIF and it forces the Frame Rate to the value specified by the CIF Frame Rate field. **H.263-QCIF-Now** forces the video to Quarter Common Intermediate Format (QCIF), and it forces the QCIF Frame Rate to a value specified via administration. **H.CTX** requires a conference bandwidth *not greater than* 384k. **H.CTX+** requires a conference bandwidth *not less than* 336k. **H.263/1-down_only** indicates the highest common video mode that allows either its frame rate or video to be downgraded to H.261 video mode. Whenever an endpoint that caused a video downgrade disconnects from the conference, no attempt is made to upgrade video quality. This video mode can downgrade to H.261. The format and associated frame rates for the H.261 and H.263 video modes can also be downgraded. **H.263/1-w/upgrade** indicates the highest common video mode that allows either its frame rate or video to be either downgraded (to H.261) or upgraded (to H.263) depending on the capabilities of the endpoints currently in the conference. This video mode can downgrade to H.261. The format and associated frame rates for the H.261 and H.263 video modes can also be downgraded.

NOTE:
H.261-CIF-Now, **H.263-QCIF-Now, H.263-CIF-Now, H.263-4CIF-Now, and H.263-16CIF-Now** can only be set via administration. **H.261-QCIF-Now**, **H.263-QCIF-Now,** and **H.261-CIF-Floor** can be set via either administration or conference control.

NOTE:
H.CTX or **H.CTX**+ appears in this field only when the port capacity for the appropriate one of these video modes is nonzero.

Whenever SG4 is optioned (via an administered nonzero port capacity), the value **SG4** appears in this field.

NOTE:
H.263/1-down_only, H.263/1-w/upgrade**,** H.261-down_only, H.261-w/upgrade, H.261-CIF-Now, H.CTX, H.CTX+, and SG4 can be set only via administration. H.261-CIF-Floor and H.261-QCIF-Now can be set via administration and conference control.

Speed Match is supported only by H.261-associated video modes.

The field *cannot* be set to **H.263/1-w/upgrade** whenever *Continuous Presence* is set to **y**.

Dynamically changing from H.261 video mode to H.263 video mode is allowed only in non-SM full-screen conferences.

- *H.263/H.261 Transcoding*

  Enables H.263/H.261 transcoding for endpoints operating at the same transfer rate. Values include **y** and **n** (default). Value **y** indicates that H.263- and H.261-associated endpoints can coexist within the same conference. Value **n** indicates that H.263 and H.261 endpoints cannot coexist; therefore, the conference is downgraded to H.261 video mode if an endpoint having only H.261 video mode capability joins the conference at that rate.

  NOTE:
  The *Speed Match* and *Conferencing Suite* fields within the Customer Options form can be used to enable full-screen H.263/H.261 transcoding.

  This field appears only whenever the *Video Mode* field contains **H.263/1-down-only**, **H.263/1-w/upgrade, H.263-QCIF-Now, H.263-CIF-Now, H.263-4CIF-Now,** and **H.263-16CIF-Now**.

  The field can be administered only if the appropriate video processor resources are allocated via the *Speed Match* or *Conferencing Suite* field in the Customer-Options form and if both the *Continuous Presence* field and *Speed Match* field in the Conference Record form *do not contain* **y**. Also, the field must be set to **n** whenever *Executive Conference* is set to **y** or **H.323** endpoint is administered in a conference.

  If the field is activated, the *Lip Sync Setting* field appears.

  Changing the field from **y** to **n** de-allocates the video resources for full-screen non-SM conferences. Changing the field from **n** to **y** for in-use conferences is not allowed.

  Whenever *H.263/H.261 Transcoding* is set to **y**, the *Lip Sync* field appears.

- *T.120 Data Mode*

  If this field contains **any-mlp**, the MCU opens a var-MLP channel to each endpoint in the conference. If this field contains **none**, the MCU does not open an MLP channel to any of the endpoints in the conference.

  NOTE:
  If the field contains **any-mlp**, the *T.120* field in the Customer-Options form must be set to a value greater than **0**. If the *T.120* field is set to **0**, the *T.120 Data Mode* field can be set only to **none**.

  The field cannot be changed while the conference is active or if Dynamic Resizing is enabled while the conference is active. H.323 endpoints can join a T.120-enabled conference but cannot participate in the data collaboration portion of the conference as an H.323 type.

  If *Far End Camera Control* contains **y**, this field must be disabled, or vice versa.

- *MLP Rate*

  Indicates the data rate for T.120 Data Conferencing. Values include **var-mlp**, **6.4k, 8k, 14.4k, 16k, 22.4k, 24k, 30.4k, 32k, 38.4k, 40k,** and **46.4k**.

  NOTE:
  This field cannot be changed while the conference is active.

  MLP rates **40k** and **46.4k** for T.120 Data Conferencing are not allowed in Speed Match conferences.

  For T.120 conferences, if the *Audio Mode* field contains **G.711**, **G.722**, **auto-w/upgrade**, or **auto-down-only**, the *MLP Rate* field must contain **6.4k**.

- CIF Frame Rate

  This field appears whenever *Video Mode* is set to **H.261-CIF-Now**, **H.263-CIF_NOW**, or **H.261-CIF-Floor**. The field is used to specify the appropriate MPI rate. Values include **7.5 fps** (frames per second), **10 fps**, **15 fps**, **30 fps**, or **auto**. Value **auto** causes a negotiation to the highest frame rate; only a value of **fixed** may be used for H.263 video modes and when there are H.323 endpoints joining the conference.

  NOTE:
  Value **30 fps** is not supported in Speed Match conferences.

- *QCIF Frame Rate*

  This field appears whenever *Video Mode* is set to **H.261-QCIF-Now, H.263-QCIF-NOW, H.263-CIF-NOW, H.263-4CIF-NOW or H.263-16CIF-NOW**. The field is used to specify the appropriate MPI rate.

Values include **7.5 fps**, **10 fps**, **15 fps**, **30 fps**, or **auto**. Value **auto** causes a negotiation to the highest frame rate; only a value of **fixed** may be used for H.263 video modes and when there are H.323 endpoints joining the conference.

NOTE:
Value **30 fps** is not supported with Speed Match and H.261/H.263 transcoded conferences.

- *Type*

This field indicates the type of conferee. Possible values include **H.323** (audio and video), **P64** (multimedia), **AUD** (audio-only, including H.323-compliant IP phones), **CAS** (cascade link), **BOND** (BONDing), **DA** (Dedicated Access), **BCAS** (cascade BONDing), and **UCC** (Universal Conference Control). Dedicated Access endpoints include DS1 and data interface (DI) endpoints. DI endpoints include EIA-530, RS449, and V.35 endpoints. For access endpoints that support RS366 dialing, value **DA** or **P64** is valid. Also, these endpoints may participate in conferences either as dial-in or (for Dedicated Access endpoints only) dial-out conferees.

NOTE:
This field must be populated if *MCU-Ext* contains a value. Values of **DA**, **H.323**, and **P64** are always available and are not dependent on Customer-Options form RTU values. Other field values can be used only if the required field(s) in the Customer-Options form are populated correctly. The following table provides details.

***Type* Field Value**	**Required Field(s) and Corresponding Value in Customer-Options Form**
AUD	*Audio Add-On*: valid value *greater than **0***
BCAS	--- At least one of the *BONDing...* fields: valid value *greater than **0*** --- *Cascading*: **y**
BOND	At least one of the *BONDing...* fields: valid value *greater than **0***
CAS	*Cascading*: **y**
H.323	Minimum one H.323 RTU fields with a value *greater than 0*
P64	
UCC	*UCC:* valid value *greater than **0***

Value **UCC** is valid for no more than one extension within a conference. Also, the field can be set to **UCC** only if *Conference Mode* is set to **voice-activated** or **presentation**. Whenever *Cascade Mode* contains **secondary**, value **CAS** or **BCAS** is valid for no more than one extension within the secondary MCU.

If the field contains **AUD** or **UCC**, the associated extension must be an audio-only extension which can be either a universal IP or PSTN port to support H.323 compliant IP phones, traditional ISDN or analog phone. If the field does not contain either of these values, the associated extension cannot be an audio-only extension.
The following bandwidths are not allowed in the conference for value **BCAS** or **BOND**: **1x56k**, **1x64k**, **2x56k**, **2x64k**, or a bandwidth greater than **768k**. Bandwidths above **768k** are not allowed for value of Type H.323.

- *MCU-Ext*

  A different MCU-extension is required for each conferee in a conference unless the OneNumber Access feature is enabled. The extension must be valid and administered properly. Also, MCU-extensions (with or without OneNumber Access) cannot be changed even with Dynamic Resizing enabled.

  NOTE:
  A different MCU-extension is required whenever *Type* contains **DA**, **BOND**, **CAS**, **BCAS**, or **UCC**.

  With Speed Match enabled, OneNumber Access is allowed only for MCU-extensions for audio-only endpoints. If an MCU-extension is used for OneNumber Access, it cannot be used as a control extension for a Presentation or Broadcast/scan conference.

- Rate

  Specifies the rate at which the endpoint is joining the Speed Match conference. Values include **1x56k**, **1x64k**, **2x56k**, **2x64k**, **112k**, **128k**, **224k**, **256k**, **336k**, **384k**, **448k**, **512k**, **672k**, **768k**, and blank.

  The MCU allows a maximum of four rates at which an endpoint can join a Speed Match conference. Any rate entered into this field that exceeds this total is denied.

  NOTE:
  This field must be blank if *Speed Match* is set to **n**. The field must also be blank for UCC or Audio Add-On endpoints. The field may be blank for endpoints at the primary transfer rate as indicated in the *Bandwidth* field.

  If *Speed Match* is set to **y**, and if *Type* is set to **BOND** or **BCAS**, the field can be set only to one of the following rates: **112k**, **224k**, **336k**, **448k**, or **672k**. Also, if *Speed Match* is set to **y**, and if the field contains an Nx64k rate, 56k endpoints are not allowed.

- *Meet-Me Number*

  Whenever an MCU-extension has been entered in a previous Conference Record administration session, the MCU automatically displays the data entered on the MCU-Extension form for the associated Meet-Me Number field. The Meet-Me Number is usually the network number that the conferee dials to join a conference or the location of the conferee.

- *(Re)dial?*

  Values include **y**, **n** and blank. Value **n** indicates that the MCU will not dial out at the start of the conference. The field value can be changed if Dynamic Resizing is optioned. The field should be blank whenever the conference is not active or not in use, or if *Class* is set to **file**.

- *App Comp*

  Indicates the “Application Compliant” flag. If this flag is set to **y(es)**, and if the relevant endpoints support T.120 Data Conferencing and G.728 (LD-CELP), the MCU opens an MLP channel to the endpoint. If the flag is set to **n(o)**, and if the relevant endpoints support var-MLP and G.728 (LD-CELP), the MCU opens an MLP channel to the endpoint, but data sent to or received from the endpoint is blocked.

  NOTE:
  If the conference is active or in use, but Dynamic Resizing is not enabled, no changes can be made to the field. Also, if the conference is active, but Dynamic Resizing is not enabled, associated endpoints cannot be added or deleted.

  The field must be blank whenever *Type* and *MCU-Ext* are blank, or whenever *Type* is set to **AUD** or **UCC**. The field must be set to either **y** or **n** whenever *T.120 Data Mode* is set to a value *other than* ***none***. Finally, the fields for all the endpoints using the same MCU-extension (to enable OneNumber Access, for example) must have the same settings.

- *Basic/Enh*

  Value **basic** indicates that an H.261 endpoint supports only basic BAS commands/caps. Value **enhanced** indicates that an H.261 endpoint supports both enhanced and basic BAS commands/caps. Value **h263_enh** indicates that an H.263 endpoint supports both enhanced and basic BAS commands/caps.

  NOTE:
  Value **enhanced** is required for at least one endpoint in a non-cascaded, Chair conference. This usually applies to the Chair conferee.

  If value **h263_enh** is not set for an H.263 conference, an H.263-capable endpoint cannot exchange H.263 capabilities; therefore, the endpoint operates in H.261 mode.

The fields for all the endpoints using the same MCU-extension (to enable OneNumber Access, for example) must have the same settings.

- *Site Name*

  Name used to identify the user of the endpoint. Enter a maximum of 15 alphanumeric characters. Default is **Site *n***, where ***n*** is the conferee ID number (for example, **Site 3**).

  NOTE:
  This field may be blank except whenever *Entry/Exit Alert* is set to **text** or **text/tone**.

  This field can be overwritten by CRCS.

- *Dial-Out #1, Dial-Out #2*

  Network numbers that the MCU dials. These numbers are assigned to the endpoints. A maximum of 48 entries is allowed. The value must contain only digits **0**-**9**, *****, **#**, **~p** (pause), **~w** (wait), and/or **~m** (mark), and it must begin with a valid FAC, TAC, or extension.

  NOTE:
  If the Dial-Out feature is not enabled, these fields should be left blank.

  If *Dial-Out #2* is set, *Dial-Out #1* should also be set.

  The fields should not be populated with MCU-extensions that are repeated within a conference. Such MCU-extensions cannot be assigned as Dial-Out numbers.

  If *Bandwidth* and/or *Rate* contain **2x56k** or **2x64k**, *Dial-Out #2* must be specified. If *Bandwidth* and/or *Rate* contain a value other than **2x56k** or **2x64k**, *Dial-Out #2* should be left blank.

  If *Type* contains **AUD**, *Dial-Out #1* can contain a dial-out Audio Add-On number. If *Type* contains **DA**, *Dial-Out #1* must contain an access endpoint extension. If *Type* is **DA** and *Dial-Out #1* (or #2) contains a DI access endpoint extension, the value must be compatible with the conference bandwidth, and it must not exceed the system bandwidth limit for DI ports. If *Type* contains **DA** and the call occupies two channels, *Dial-Out #2* must contain a unique access endpoint extension.

  If *Type* contains **DA** and *Dial-Out #1* and *Dial-Out #2* contain access endpoints, these endpoints must be the same type of access endpoint (either DS1, V.35, RS-449, or EIA-530). (However, administration does not enforce this whenever you submit the Conference Record.)

Whenever *Speed Match* is set to **y**, the rate of the Dedicated Access (DA) endpoints must be compatible with the administered endpoint rate. The rate of the specified access endpoints for the dial-out numbers contained in the *Dial-Out #1* and *Dial-Out #2* fields must be equal to or greater than the rate at which the endpoint is administered.

- *Password Reqd?*

  Value **y** indicates that a per-conference password value is required. Value **n** indicates that such a value is not required. Password on a per-conference basis is not supported with Type H.323 video conferees.

  NOTE:
  There is no administrative validation to protect against the situation where an H.323 VoIP audio add-on attempts to dial into a universal audio add-on Meet-Me number in a password protected conference. In this case, the VoIP add-on will not successfully comply with the password security requirements and will be prevented from entering the conference.

MCU System Administration

2

Overview

This chapter describes the ongoing administration tasks performed by a telecommunications or video manager or an on-site MCU system administrator. The following table identifies these tasks alphabetically and provides the appropriate page reference.

Table 2-1. Checklist of MCU Administration Tasks

MCU Administration Task	Page Reference
Administering.....	
----- AAR and ARS Digit Analysis	2-147
----- AAR and ARS Digit Conversion	2-154
----- Access endpoints	2-180
----- Alphanumeric dialing	2-174
----- Automatic Alternate Routing	2-142
----- Automatic Route Selection	2-143
----- Call Detail Recording	2-45
----- Cascades	2-176
----- Continuous Presence *Plus*	2-207
----- Country options	2-54
----- Customer options	2-27
----- Data communications	2-175
----- Data modules ---------- 7500 ---------- Network control channel	 2-91 2-72
----- Dial-Out	2-42
----- Dial plans	2-142

Table 2-1. Checklist of MCU Administration Tasks — *Continued*

MCU Administration Task	Page Reference
----- Direct Connect endpoints	2-91
----- DS1 or UDS1 circuit packs	2-61
----- ESM	2-140
----- Executive Conferencing	2-216
----- Far-End Camera Control	2-244
----- Feature access codes	2-144
----- Feature-related system parameters	2-48
----- Full Tie-Trunk Capabilities Using BRI Trunks	2-253
----- H.263/H.261 Transcoding	2-239
----- H.323 Audio Add-on	2-221
----- International-based parameters	2-54
----- ISDN-BRI Trunk Interface	2-244
----- ISDN-PRI trunk groups	2-113
----- ISDN D-channels	2-80
----- ISDN services (new)	2-59
----- Lip Synchronization	2-233
----- Logins	2-19
----- Maintenance-related system parameters	2-84
----- Media Processor	2-221
----- Meet-Me numbers and MCU-extensions	2-96
----- Modem pool groups	2-210
----- Network facilities	2-59
----- Network service and access parameters	2-60
----- On-Screen Display	2-241
----- OneNumber Access	2-219
----- Route patterns	2-168
----- RS366 Dialing	2-243
----- Signaling groups	2-80
----- Speed Match conferences	2-235
----- Synchronization	2-71, 2-190
----- System features	2-48

Table 2-1. Checklist of MCU Administration Tasks — *Continued*

MCU Administration Task	Page Reference
----- T.120 Data Conferencing	2-218
----- Tie trunk groups	2-127
----- Trunk groups	2-111
----- Uniform Dial Plan	2-143, 2-103
----- Video modes	2-175
Assigning.....	
----- MCU-Extensions	2-106
Changing.....	
----- Administration permissions	2-23
----- Passwords	2-11
Checking.....	
----- Access endpoints	2-197
----- MMI circuit packs (status)	2-202
----- Video Processor circuit packs (status)	2-209
Collecting.....	
----- Endpoint data	2-16
Establishing.....	
----- Administered connections	2-77
----- Network control channels	2-72
Logging in from.....	
----- MCU-MT	2-7
----- MCU-ST (remotely)	2-7
Performing.....	
----- System backups	2-201
----- Video endpoint inventories	2-15
Recording.....	
----- Meet-Me Numbers and MCU-Extensions	2-17
Saving.....	
----- Translations	2-201
Setting.....	
----- Class of Restriction	2-36

Table 2-1. Checklist of MCU Administration Tasks — *Continued*

MCU Administration Task	Page Reference
----- Class of Service	2-40
----- System clock	2-12
----- Daylight Savings Time	2-14
Supporting.....	
----- MCU-ST, system printer, or CRCS	2-147

NOTE:
The Conference Record form and/or the Customer-Options form are required to administer some of the features and capabilities identified in the previous list. Refer to the "Conference Record Form" section in Chapter 1 of this document for details on the Conference Record form, and refer to the "Customer-Options Form" section in this chapter for details on the Customer-Options form.

Diagnostic and maintenance procedures are described in the MCU Maintenance document. Chapter 5, "Diagnosing and Solving Problems" provides conference troubleshooting procedures.

Using the MCU Management Terminal

The MCU Management Terminal (MCU-MT) is a 715GBCS-2 Terminal that is primarily used to perform administration and report functions, but can also be used to reserve conferences and to help diagnose problems reported about conferences.

A maximum of four MCU-MTs can be used simultaneously to issue administration and maintenance commands; however, each command must access a unique record. Therefore, for example, the **add conference 100** command and the **change conference 100** command cannot be issued simultaneously.

Keys and Functions

The keyboard of the MCU-MT is equipped with cursor keys, transaction keys and editing keys to enable data to be sent and received from the MCU. These keys and their functionality are described in the following list:

- ***Cursor Keys***

  Used to move the cursor between fields and pages on a screen form. The cursor must be positioned in a field on a form before information can be added or changed in that field.

- ***Editing Keys***

  BACKSPACE key and CLEAR are used to edit data in a field. BACKSPACE erases the character at the current cursor position. CLEAR must be used in combination with SHIFT to clear all data in a field. The cursor must be in the field you want to clear before CLEAR and SHIFT are pressed. You can use TAB to advance from field to field or use SHIFT and TAB together to reverse the direction.

- ***Transaction Keys***

  CANCEL, ENTER, and HELP perform special functions. CANCEL erases a form or command. ENTER stores data from the screen into the system's memory. HELP displays more information about the values or commands that can be entered for a particular field or form.

  PAGE UP and PAGE DOWN display the previous page and the next page of screens that have more than one page.

Logins and Permissions

The MCU-MT and MCU Scheduling Terminal (MCU-ST) use the following customer logins (shown in hierarchical order). Login names and permissions for newly installed systems are established at the time of the install. A customer-level login with super-user permissions is established so a customer can assign new logins and permissions.

Table 2-2. MCU Login Names/Permissions Retained from Pre r6.0 Upgrade

User	Login	Permissions
System administrator using MCU-MT	cust	Display administration and maintenance data Request system measurements Administer maintenance alarm terminals Administer trunks Administer MCU-extensions Administer features Administer conference records
System administrator using an MCU-MT or remote MCU-ST	rcust	Same as cust login
Reservations agent using an MCU-MT or remote MCU-ST	agent	Display administration data Administer Meet-Me numbers Administer conference records
Display only (using an MCU-MT or remote MCU-ST)	browse	Display administration and maintenance data

Logging In from the MCU-MT

To log in from the MCU-MT, follow these procedures:

1. From the MCU-MT, verify the screen displays: *Login:*
2. Enter **craft** or **OEM login.**

```
Login: craft

Password: (Using Maintenance Terminal Access, OEM or
Avaya Technicians)

Avaya Remote Access MCU Login


Challenge: 998-9190 Product ID: 1000000000

Response: xxxxxx
```

NOTE:
Customer level logins and craft level logins only require a password and will not get a Challenge requiring a Response.

3. Enter **password** or a **Response** to a Challenge, as appropriate.

   NOTE:
   For security purposes, your password is not displayed as you enter it. The MCU verifies the login and password. If an invalid password or response is entered, the screen displays: *login incorrect*. Try again.

4. Verify the software version.
5. Verify that the screen displays: *Terminal Type (Enter 715, 513, 4410, or 4425): [715]*
6. Choose the default by pressing RETURN.
7. The screen should now display: *Command*.

Logging In Remotely from the MCU-ST

You can perform administration and report functions from the remote MCU-ST. To log in to the MCU-ST, follow these procedures:

1. Enter **at**.
2. When the *OK* prompt appears, enter **atdt*code*** where ***code*** is the access code provided when the MCU is installed.
3. From the MCU-MT, verify the screen displays: *Login:*

4. Enter **craft** or **OEM login.**

```
Login: craft

Password: (Using Maintenance Terminal Access, OEM or
Avaya Technicians)

Avaya Remote Access MCU Login


Challenge: 998-9190 Product ID: 1000000000

Response: xxxxxx
```

NOTE:
Customer level logins and craft level logins only require a password and will not get a Challenge requiring a Response.

5. Enter **password** or a **Response** to a Challenge, as appropriate.

   NOTE:
   For security purposes, your password is not displayed as you enter it. The MCU verifies the login and password. If an invalid password or response is entered, the screen displays: *login incorrect.* Try again.

6. Verify the software version.
7. Verify that the screen displays: *Terminal Type* (Enter *715, 513, 4410,* or *4425): [715]*
8. Choose the default by pressing RETURN.
9. The screen should now display: *Command:*

Suggested Order of Translation When Adding a New MCU

NOTE:
Save translations frequently

The following lists the entry order of the translation forms for basic R7:

1. Enter **change daylight-savings rule** to change the setting to match your region (Default plan *1* is good for U.S.)
2. Enter **set time** to confirm the date and time settings.
3. Enter **change system-parameters customer-options** (per Right To Use purchased).
4. Enter **change dial plan**.
5. Enter **change features-access-codes**.
6. Enter **add data** *xxxx* (type: netcon channels *01 - 04*).
7. **Add hunt-group 1** (Name: *NETCON*, add primary netcon extensions not maintenance extensions).
8. **Add data** *xxxx* (type: PDM, PC reservations, ST terminal, CDR, System Printer TN2224 or TN2214B).
9. **Change system-parameters** “features/cdr/security.”
10. **Add ds1** xxxxx (TN2207 or TN767).
11. **Add bri-board1** xxxxx (TN2185 for CO BRI or DEFINITY BRI tie trunk, TN2198 for DEFINITY BRI tie trunk).
12. **Add access-endpoints** xxxx (TN767, TN2207 or TN2236B).
13. **Change synchronization**.
14. **Add signaling-group** *1 - 20* (Do not add more than 6 DS1s to a signal group, add signal-group for “IP” later).
15. **Add trunk-group** *1 - 99* (Only put two trunks from each span in the trunk group, until you know the ISDN signaling works and a two channel call can be placed over each signal group and or span. Add IP Trunk-groups later).
16. **Change ars analysis** *x*.
17. **Change aar analysis** *x*.
18. **Change udp** *xxxx*.
19. **Change partition-route-table** *1* (if you choose to use partitioning).
20. **Change route-pattern** *x*.
21. Add and duplicate **add mcu-extension** *xxxx* (Bandwidths: all, Nx56K, with or without meet-me numbers, audio for audio-add-on or ucc).

22. **Add data** *xxxx* (type: 7500 for ISDN-BRI TN556, pdm for 7400C DCP TN754 for 2 channel video, [R7 pdm for Polycom ViewStation DCP on. TN2224 or TN2214 international], type: wcbri can't be used in the MCU)
23. **Add modem-pool** *1*.
24. **Change system-parameters maintenance** (customer inads access).
25. **Add login** *xxxxx*.
26. **Change permissions** *xxxxx* (login name).
27. **Change password** (login name).
28. Add IP translations:
    a. **Change node-name** (pages 1 and 2)
    b. Change ip-interface
    c. **Add trunk-group next** (built just the base trunk-group pages 1 - 3, do not add trunk ports yet)
    d. **Add signal-group next** (if you are using gatekeeper with prefix use the Trunk Group for Channel Selection: built in step c. If you are using gatekeeper direct leave Trunk Group for Channel Selection: blank)
    e. **Add data-module** *xxxx* (for CLAN board port 17 type Ethernet)
    f. **Add signal-group next** (This second signal-group is only used for gatekeeper direct, use the Trunk Group for Channel Selection: built in step c. Leave the Far-end Node Name: blank and Far-end Listen Port: blank)
    g. **Change trunk-group** *x* (Trunk-group built in step c. add two trunks by typing the port address as just "ip" and appropriate signal-group for "gatekeeper w/prefix" step d. or "gatekeeper direct" step f.)
29. **Add conference** *1* (make one test call at 2x56, 2x64 for ISDN).
30. **Add conference** *2* (make one IP call).
31. Add the remaining ISDN and IP trunks to trunk groups and execute the test plan.
32. **Change system-parameters maintenance** (activate remote alarming to inads).
33. **Display alarms** (clear alarms).
34. **Clear errors**.
35. **Save translations**.

Changing Passwords

To log in to the MCU and to change the associated passwords, follow these procedures:

1. Login to either the MCU-MT or MCU-ST with a super-user login or your designated login name.
2. The MT should now display: *Command:*
3. To change the password, enter **change password *login*** where ***login*** is has change password permissions.

   NOTE:
   If it is necessary to void or deny access to a particular login, the login may be voided by changing the password of the login to **VOID**. After the login's password is **VOID**, the login is denied access to the MCU. The **VOID** password can then be changed or reinstated by a higher-level login (the order given in Table 2-1).

4. The Password Change form is displayed.
5. At the *Your Current Password* field, enter the current password you used to log in and press RETURN.
6. In the *New Password For Login Name* field, enter the new password (refer to the following **NOTE**) and press RETURN.

   NOTE:
   Valid passwords have four to eleven characters which contain at least one alphabetic and one numeric symbol; valid characters include letters, numerals, and !&*?:^(),.:- (exclamation mark, ampersand, star, question mark, semi colon, apostrophe, up arrow, oval brackets, comma, period, colon, dash). Passwords should be selected on the basis of local procedures and recorded in accordance with those procedures.

7. Reenter the new password in the *New Password (enter again)* field and press ENTER.
8. Verify that the MT displays: *Command successfully completed* followed by *command:*
9. To change the passwords for the other logins, repeat these steps.

Setting the System Clock

The time set on the MCU is critical for reserving conferences. In areas of the country that change to Daylight Savings Time, the system clock must be set to adjust the time forward or back an hour as appropriate. Previous releases of the MCU required Daylight Savings Time adjustments to be made manually but this release performs the change automatically if specified on the Set Date and Time form.

The 24-hour conference scheduling system uses the MCU system clock to know when to begin and end conferences. If the MCU is set for the wrong time, it may restore conference records from backup memory that are incorrectly scheduled. If the optional CRCS is installed, the date and time on the MCU and CRCS must be synchronized. Also, for a conference involving T.120 data, the clock on the ESM must be synchronized with the clock on the MSM via a heartbeat message sent by the MSM to the ESM.

The system clock is affected only when power is interrupted for more than two minutes. The optional Uninterrupted Power Supply (UPS) may be used to protect against power outages to the MCU.

Daylight Savings Rules

Use this screen to enter up to 15 customized Daylight Savings rules. You can specify the day, month, date, time and increment each Daylight Savings rule goes into effect and the day, month, date, and time it stops. Rule 0 makes no adjustment to the system clock for Daylight Savings and cannot be modified; Rule 1 is the default.

```
change daylight-savings-rules                              Page   1 of   2
                        DAYLIGHT SAVINGS RULES

 Rule          Change Day                  Month  Date   Time     Increment

  0: No Daylight Savings

  1: Start: first Sunday    on or after April     1    at 02:00    01:00
     Stop: first Sunday     on or after October   25   at 02:00
  2: Start: first _______   on or after _______ __   at __:__    __:__
     Stop: first _______    on or after _______ __   at __:__
  3: Start: first _______   on or after _______ __   at __:__    __:__
     Stop: first _______    on or after _______ __   at __:__
  4: Start: first _______   on or after _______ __   at __:__    __:__
     Stop: first _______    on or after _______ __   at __:__
  5: Start: first _______   on or after _______ __   at __:__    __:__
     Stop: first _______    on or after _______ __   at __:__
  6: Start: first _______   on or after _______ __   at __:__    __:__
     Stop: first _______    on or after _______ __   at __:__
  7: Start: first _______   on or after _______ __   at __:__    __:__
     Stop: first _______    on or after _______ __   at __:__
```

The form contains the following fields.

- *Rule*

  This display-only field indicates the Daylight Savings rule number.

- *Change Day (Start)*

  Enter the day of the week (**Sunday** through **Saturday**) you want the clock to move ahead to begin Daylight Savings Time. For example, in the eastern United States, Daylight Savings Time starts at 02:00 on the first Sunday in the month of April. If this field is blank, the clock will change on the exact date entered in the next 2 fields.

- *Month (Start)*

  Enter the month you want the clock to move ahead to begin Daylight Savings Time.

- *Date (Start)*

  Enter the day of the month (**0** to **31**) you want the clock to move ahead to begin Daylight Savings Time.

- *Time (Start)*

  Enter the hour (**0** to **23**) and minute (**0** to **59**) you want the clock to move ahead to begin Daylight Savings Time.

- *Increment (Start)*

  Enter the hour (**0** to **23**) and minute (**0** to **59**) you want the clock to move ahead to begin Daylight Savings Time and to move back to return to standard time.

- *Change Day (Stop)*

  Enter the day of the week (**Sunday** through **Saturday**) you want the clock to move back to return to standard time. For example, in the eastern United States, Daylight Savings Time ends at 02:00 on the last Sunday in the month of October. If this field is blank, the clock will change on the exact date entered in the next 2 fields.

- *Month (Stop)*

  Enter the month you want the clock to move back to return to standard time.

- *Date (Stop)*

  Enter the day of the month (**0** to **31**) you want the clock to move back to return to standard time.

- *Time (Stop)*

  Enter the hour (**0** to **23**) and minute (**0** to **59**) you want the clock to back to return to standard time.

Set Date and Time Form

The date and time are set using the Set Date and Time Form. To set the date and time, follow these procedures:

NOTE:
Be sure to obtain the accurate time by calling the National Bureau of Standard Time at **202 844-1234**.

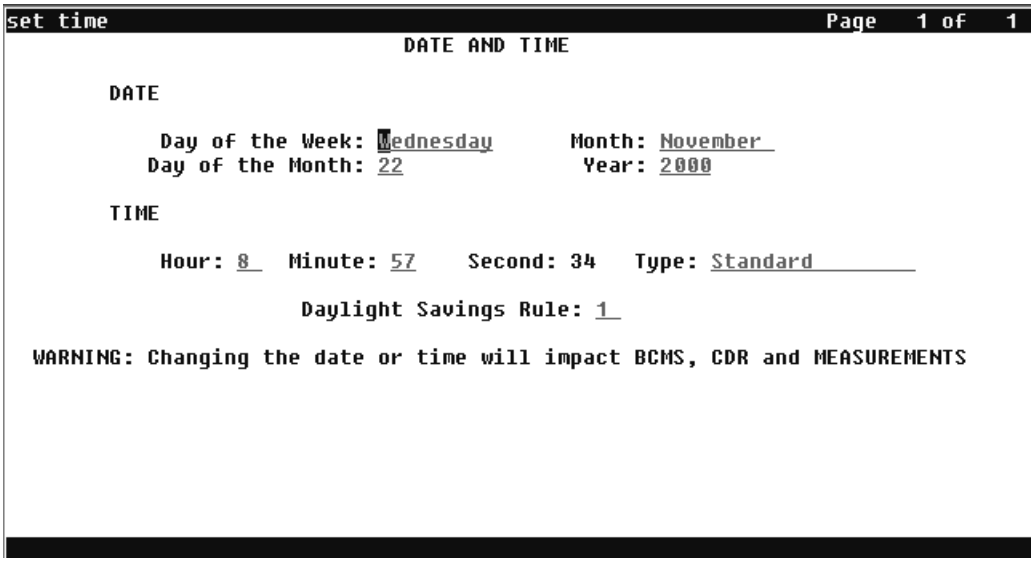


Figure 2-1. Set Date and Time Form

1. At the *command:* prompt, enter **set time**.
2. At the *Day of the Week* field, enter the day of the week.
3. At the Month field, enter the current month.
4. In the *Day of the Month* field, enter the current day (1 through 31).
5. In the *Year* field, enter the current year.
6. In the *Hour* field, enter the current hour in military time. (00 is midnight, noon is 12, and 23 is 11 p.m. The p.m. time is hour plus 12.)
7. In the *Minute* field, enter the current minute (0 through 59).

   NOTE:
   Seconds are reset to 00 for the minute selected.

8. In the *Type* field, enter **daylight-savings** if Daylight Savings Time is currently being observed; otherwise enter **standard** for standard time.

9. In the Daylight Savings Rule field, enter the appropriate rule number as defined on the Daylight Savings Rules screen.
10. Press ENTER.
11. When the MT displays: *Command successfully completed* followed by *command*:, enter **display time** to verify the setting.

Performing Endpoint Inventories

Performing an inventory of features and functionality for video endpoints that will participate in multipoint conferences helps to provide the optimum MCU video conference experience. Currently, video endpoints support different features offered in the H.320 standards. In some cases, such as with the Avaya Group Video System 4000, additional H.320 functionality has been added with each new software release of the same model. For example, the model 4000 software version 3.0P.03 does not support all the H.320 features supported in version 4.1P.

The following data should be collected for all video endpoints that will be joining conferences on the MCU:

NOTE:
There is no official ITU-T conformance testing body, nor is there a guide to arbitrate different interoperations of the standards by manufacturers of video products. Thus, as manufacturers implement the standards or add features and options, their products may change. Avaya will have no knowledge or control over any such changes made by other manufacturers in their H.320 implementation. As such, Avaya cannot guarantee the interoperability of its ITU-T implementation with untested versions of ITU-T compliant endpoints.

Refer to "Collecting Endpoint Data" on page 2-16 for a list of information that you should obtain about each participating endpoint. If your reservations agent is

using the paper-based scheduling system, you should provide some information on a Site Profile for the reservations agent to use.

Table 2-3. Sample Site Profile

Site Profile					
Location Name	**Time Zone**	**Bandwidths Available**	**Network Type**	**Room Location**	**Contact Name/Phone**
Site A	EST	all	private	G123	J. Gibson/215 555-1200
Site B	EST	56k 64k	private	1B-24	T. Lee/301 555-3231
Site C	MST	336k	private	457	C. Charles/303 555-9872
Site D	EST	768k	private	3G-104	D. Gilberg/908 555-7777
Site E	CST	1472k	public	28A	R. Prasad/312 555-1818
Site F	PST	224/256k	private	1150	A. Snow/619 555-2222

Collecting Endpoint Data

To prequalify an endpoint to participate in a multipoint video conference, the following information is needed:

- *Type of video endpoint (such as Avaya Group Video System or PictureTel™ Group Video System)*
- *Model name or number (such as Model 400, Model 70)*
- *Options installed*
- *Time zone where the video endpoint is located*
- *Encoding algorithms supported (for example, H.320 or a proprietary algorithm, such as SG4, H.CTX, etc.)*
- *Specific software version (such as 4.1, 1.1)*
- *Bandwidths supported*
- *Data capabilities of the system*
- *Network access (public through direct connection or private through a PBX)*
- *Network services supported (such as SDDN, ACCUNET SDS)*

  NOTE:
  The MCU and video endpoints joining a conference must be subscribers to the same network services. The MCU can be a subscriber to multiple services.

- *Name of the location or person associated with the video endpoint*

- *Name and number of the person responsible for setup and maintenance*
- *Name by which the video endpoint will be identified (such as the Sales Department in a particular city)*

Currently, most video endpoints have the ability to select between originating a 2B-channel 56k call or a 2B-channel 64k call. In general, video endpoints with ISDN-PRI access to the network are not constrained on the types of calls they can make. However, endpoints with robbed-bit signaling (RBS) network access trunks are restricted to originating and receiving only 56k or 56k-increment BONDed calls. Endpoints originating 64k calls are blocked if the MCU has access only to 56k facilities or when all 64k facilities are in use when the call arrives. Currently, 384k calls to the MCU require ISDN-PRI H0/multirate capability by both the MCU and each participating video endpoint. Also, any multirate or 64k-increment BONDed calls require ISDN-PRI.

Recording Meet-Me Numbers and MCU-Extensions

The MCU-Extensions Form should be completed after the trunks and network numbers are ordered for the MCU.

The form shows all MCU-extensions assigned to the MCU and their corresponding Meet-Me numbers (the phone number the conferee dials to join a conference).

The MCU-Extensions Form also includes the bandwidth per channel available with each MCU-extension and the Meet-Me numbers categorized by network type, either private or public. It should be updated whenever a Meet-Me number is added or removed (refer to "Assigning MCU-Extensions and Meet-Me Numbers" on page 2-106 for more information).

An MCU-extension is added to the system by entering at the prompt **add mcu-extension** and the appropriate MCU-extension (for example, **add mcu-extension** *75000*). The following version of the MCU-Extension form appears:

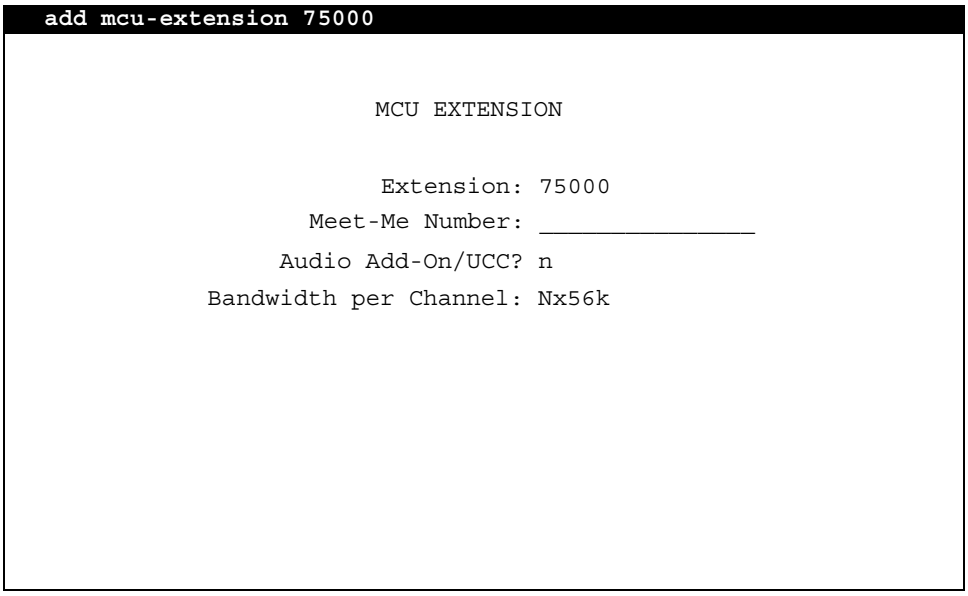


Figure 2-2. MCU-Extension Form for Add/Change/Remove/Display

NOTE:
Value “Nx56k” indicates that the endpoint is restricted to 56k-increment calls.

The following version of the MCU-Extension form appears when the **list mcu-extension** command is entered:

```
list mcu-extension

                        MCU EXTENSIONS

Ext.       Meet-Me Number       Bandwidth    Audio Add-On/UCC?

   72009       (700)737-5009        all              n
   75000       (700)737-5111        Nx56k            n
   75001       (700)737-5001        all              n
   75002       (908)560-5002                         y
   75004                            all              n
   75006                            all              n
   75007       (700)561-5007        Nx56k            n
   75008       (700)640-5008        all              n
   75010       (700)737-5010        all              n
   75106                            all              n
   75107       (700)561-5107        Nx56k            n
   75108       (700)640-5108        all              n
   76001       (700)737-5003        all              n
   78005       (700)737-5005        all              n
   78105       (700)737-5105        all              n
```

Figure 2-3. MCU-Extension Form for the List Command

Login Administration

When your MCU is delivered, one customer super-user login and password combination is already defined. You must administer additional logins and passwords, if needed. If you are the super-user, you have full customer permissions and can customize any login you create. The maximum number of customer logins is 11.

As super-user, you can establish permissions for the other logins in your system. You can block access to any object that may compromise switch security.

NOTE:
You cannot use a shortened form of the login ID for any of the following actions.

The following login administration commands are available.

Table 3-1. Login Administration Commands

Action	Object	Qualifier
add	login	xxxxxx (login-ID)
change	login	xxxxxx (login-ID)
change	permissions	xxxxxx (login-ID) [print or schedule]
display	login	xxxxxx (login-ID) [print or schedule]
list	logins	
remove	login	xxxxxx (login-ID)
status	login	

Adding a Login

To add a customer login, you must be a super-user with authority to administer permissions. To establish a login, first use the Login Administration form. An example of the form follows.

```
add login                                                    Page  1

                              LOGIN ADMINISTRATION

          Password of Login Making Change:


          LOGIN BEING ADMINISTERED
                             Login's Name:xxxxxxx
                               Login Type:
                            Service Level:




        LOGIN'S PASSWORD INFORMATION
                          Login's Password:
                   Reenter Login's Password:
        Password Aging Cycle Length (Days):


      LOGOFF NOTIFICATION
        Facility Test Call Notification? y       Acknowledgment Required? y
             Remote Access Notification? y       Acknowledgment Required? y
```

Figure 2-4. Login Administration Form

Once the login is established, set permissions using the Command Permission Categories form (discussed later in this section).

If you are adding a login, enter the new login name as part of the **add** command. The name must contain between three and six characters, and it can contain the characters 0-9, a-z, A-Z. If you add or remove a login, the Security Measurement reports are not updated until the next hourly poll or until you enter the **clear measurements security-violations** command.

The form contains the following fields.

- *Password of Login Making Change*

  You must enter your password in order to change any field on this form.

- *Login's Name*

  Displays the login name that you assigned when you entered the **add login** command.

- *Login Type*

  Indicates whether this login belongs to a customer or to Avaya services personnel. The default and only valid value for customer logins is **customer**.

- *Service Level*

  Indicates whether this user has super-user or non-super-user permissions. Default is **non-super-user**. You cannot change your own service level.

  The super-user login has access to the **add, change, display, list,** and **remove** commands for all customer logins and passwords. The super-user can administer any mix of super-user and non-super-user logins up to a total of eleven customer logins.

  "Non-super-user" permissions are limited by restrictions specified by the super-user when administering the non-super-user login. A non-super-user can change his or her password with permission set by the super-user; however, once a password has been changed, the non-super-user must wait 24 hours before changing the password again. A non-super-user cannot change other user passwords, login characteristics, or permissions.

- *Login's Password*

  You must assign the initial password for this login. The owner of the login should change the password immediately. Passwords must be four to 11 characters in length and contain at least one alphabetic and one numeric character. Valid characters include numbers, and **!&*?;'^(),.:-**. The password does not display on the screen as you type.

- *Reenter Login's Password*

  The login's password, as described in the previous bullet item, for verification. The password does not display on the screen as you type.

- *Password Aging Cycle Length*

  For security purposes, you should assign password aging to all logins. Enter the number of days that the password will remain valid. The system tracks a password from the day the login was created or the day the user last changed the password. If you enter a blank in this field, password aging does not apply to the login. Default is blank.

- *Facility Test Call Notification*

  If this field is **y**, the user receives notification at logoff that the facility test call feature access code is administered. Default is **y**. For security purposes, this field should be **y** for all logins.

- *(Facility Test Call Notification) Acknowledgment Required*

  If this field is **y**, the user is required to acknowledge that he or she wishes to log off while Facility Test Call is still administered. Default is **y**.

- *Remote Access Notification*

  If this field is set to **y**, the user receives notification at logoff that remote access is still administered. Default is **y**. For security purposes, this field should be **y** for all logins.

- *(Remote Access Notification) Acknowledgment Required*

  If this field is **y**, the user is required to acknowledge that he or she wishes to log off while remote access is still administered. Default is y.

Changing a Login's Attributes

To change a customer login's attributes you must be a super-user and have administration permissions.

Enter the **change login (login-ID)** command to access the Login Administration form. Make any necessary changes and press ENTER to record the changes in the system.

Displaying a Login

To display a specific login, enter the **display login (login-ID)** command and press the ENTER key. The system displays the Login Administration form with all information about the requested login except the password.

Listing Logins

To list all of the system logins and the status of each login, enter the **list logins** command. The system displays the following information for all current logins:

- *Name*
- *Service level*

- *Status (active, inactive, disabled, svn-disabled, void)*
- *Password aging cycle length*

The system displays only those logins with the same, or lower, service level as the user making the request.

Removing a Login

To remove a login from the system, you must use a super-user login.

1. Enter the **remove login (login-ID)** command. The system displays the Login Administration form with all of the information about the requested login except the password.
2. Press ENTER to remove the login, or press CANCEL to cancel the procedure without removing the login.

Forced Password Aging

Password aging is an option that you can activate while administering logins. The password for each login can be aged starting with the date the password was created, or changed, and continuing for a specified number of days (one to 99).

The user is notified at the login prompt seven days before the password expiration date that the password is about to expire. When the password expires, the user must enter a new password into the system before logging in. Once a non-super-user has changed his or her password, the user must wait 24 hours to change the password again.

Changing Administration Permissions

The Permission Administration form is used to change the Command Permission Categories that an authorized user (reservations agent, system administrator, and on-site technician) can access. Each is identified by a login name. Prior to installation, these passwords are voided; the Multimedia Collaboration Center (MCC) or Network Care Professionals must reinstate them with new customer-selected passwords.

Only the MCC and Network Care staff are authorized to change the *Administer Permissions* field. System administrators and reservation agents cannot change the default permissions for themselves or others unless the MCC or Network Care professional changes the *Administer Permissions* field to **y** for the customer.

NOTE:
Different levels of permissions can be established for each login according to the user's responsibility as an agent or administrator. If you upgraded from a previous release (post r6.0) there may be pre-defined logins, such as cust, rcust, browse, agent with pre-set permission levels.

.

Table 2-4. Default Permissions for Each Login

Login	Default Permissions
craft	All permission categories except Administer Permissions
Customer-assigned	Display administration and maintenance data, administer conferences, features, Meet-Me numbers, maintenance alarm terminals, and trunks

Use the following procedure to change permissions:

1. At the *command:* prompt, type **change permission *login*** then press RETURN.
2. Verify that the screen displays the Permission Administration screen.
3. From the *Display Admin. and Maint. Data?* field, use TAB and RETURN to advance to the fields you want to change. Type **y** or **n** as appropriate, followed by ENTER.
4. When the form is completed, verify the MT displays: *Command successfully completed* followed by *command:*
5. To verify the form, type **display permission *login*** then press RETURN.

Command Permission Categories Form

An example of page 1 of the Command Permission Categories form appears as follows.

```
change permissions cust                                    Page 1 of 1

                          COMMAND PERMISSION CATEGORIES

                                Login Name: cust


COMMON COMMANDS
              Display Admin. and Maint. Data? y
                         System Measurements? n
              System Mgmt Data Transfer Only? n

ADMINISTRATION COMMANDS

         Administer Stations? y                      Administer Features? y
           Administer Trunks? y                    Administer Permissions? n
  Administer Meet-me Numbers? y                 Administer Conference Records? y


MAINTENANCE COMMANDS
            Maintain Stations? n              Maintain Switch Circuit Packs? n
              Maintain Trunks? n              Maintain Process Circuit Packs? n
              Maintain System? n                        Maintain Enhanced DS1? n
```

Figure 2-5. Command Permission Categories Form (Page 1)

The following list identifies the fields on page 1 of the Command Permission Categories form. Enter **y** for each field you want the login to access; enter **n** for each field you do not want the login to access.

- *Login name*

  Displays the login for which the permissions are being changed.

- *System Measurements*

  Displays system measurement data.

- *Display Admin. and Maint. Data*

  Shows administration screens and maintenance data.

- *Administer Stations*

  Specifies whether or not this login is permitted to change maintenance phone assignments and extensions for the MCU.

- *Administer Trunks*

  Specifies whether or not this login is permitted to change trunk groups and assignments for the MCU.

- *Administer Meet-Me Numbers*

  Specifies whether or not this login is permitted to change Meet-Me number assignments.

- *Administer Features*

  Specifies whether or not this login is permitted to add or remove features from the MCU.

- *Administer Permissions*

  Specifies whether or not this login is permitted to change the command permissions for logins of the MCU. This permission only applies to super-user level logins.

- *Administer Conference Records*

  Specifies whether or not this login is permitted to administer conference records, including scheduling conferences and updating conference reservations.

- *Maintain Stations*

  Specifies whether or not this login can perform maintenance commands on the MCU maintenance phones.

- *Maintain Trunks*

  Specifies whether or not this login can perform maintenance tests on the MCU trunks.

- *Maintain System*

  Specifies whether or not this login can perform system maintenance tests on MCU processor circuit packs.

- *Maintain Switch Circuit Packs*

  Specifies whether or not this login can perform maintenance tests on the MCU circuit packs.

- *Maintain Process Circuit Packs*

  Specifies whether or not this login can perform maintenance tests on MCU processor circuit packs.

- *Maintain Enhanced DS1*

  You can enter **y** into this field only if *DS1 MSP* is set to **y** on the Customer-Options form. Allows users to perform enhanced DS1 maintenance.

Pages 2 and 3 of the form are identical.

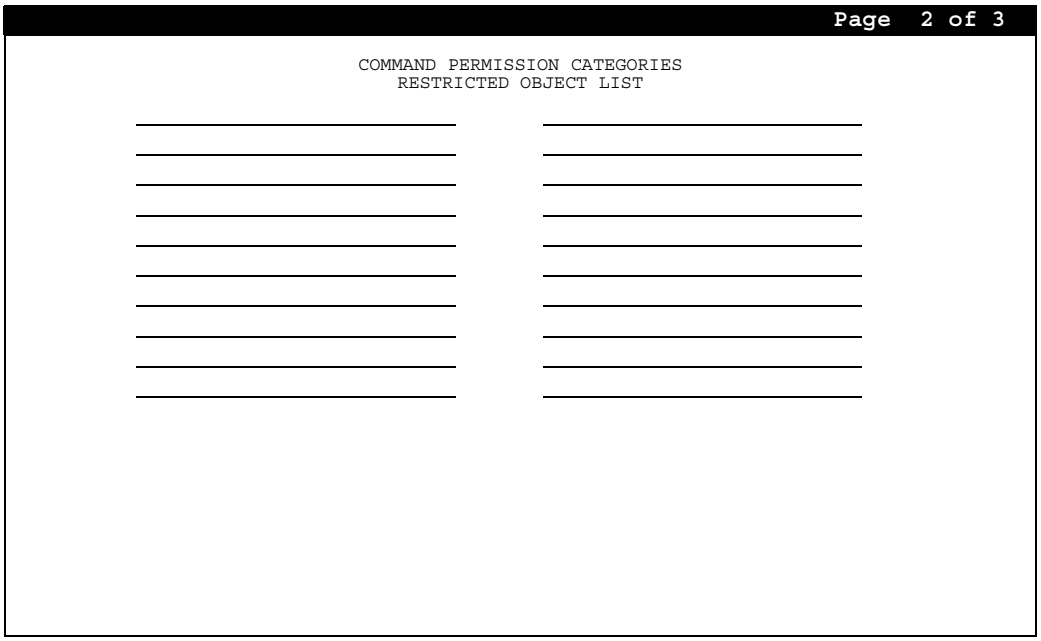


Figure 2-6. Command Permissions Categories Form (Page 2)

These pages allow you to specify certain objects that this user cannot access. If you want to limit a user's permissions beyond those on page 1, enter the objects into this list.

Selecting Customer Options

The Customer-Options form is used by approved Avaya personnel to administer MCU model changes. The form specifies the port capacity, optional features, and model name of the MCU.

Use the following procedure to change customer options:

1. At the *command:* prompt, type **change system-parameters customer-options** then press RETURN.
2. Verify that the screen displays the Customer-Options form.
3. From the *Model Name* field, use TAB and RETURN to advance to the fields you want to change.
4. When the form is completed, verify that the MT displays: *Command successfully completed* followed by *command:*

5. To verify the form, type **display system-parameters customer-options** and then press RETURN.

Customer-Options Form

The Customer-Options form appears as follows:

```
display system-parameters customer-options
                              CUSTOMER OPTIONS
            Model Name: DX
Presentation/Broadcast? y    Dynamic Resizing? y
                VAS? y  Notification Tones? y          Conferencing Suite: 0
   Chair Control Suite? y           Cascading? y      Continuous Presence/EC: 1
   BONDed Use Same DS1? n   Scheduler Adjunct? y    Executive Conference(EC): 0
             Dial-out? y    OneNumber Access: all                Speed Match: 1


 MAXIMUM PORT CAPACITY               BONDing 112/128K: 24      H.323 <= 128K: 0
    2B: 24            512K: 8        BONDing 168/192K: 24      H.323 <= 384K: 6
   128K: 24           768K: 8        BONDing 224/256K: 24      H.323 <= 768K: 20
   192K: 24      1008/1152K: 4        BONDing 280/320K: 24
   256K: 24      1288/1472K: 4        BONDing 336/384K: 24
   320K: 24      1344/1536K: 4        BONDing 448/512K: 8
   384K: 24      1680/1920K: 4        BONDing 672/768K: 8

         Audio Add-on: 24                UCC: 24         BRI Direct Connect: 0
                T.120: 24                SG4: 0          DCP Direct Connect: 0
                                      H.CTX/+: 0           DI Direct Connect: 0
       (NOTE: You must logoff & login to effect the permission changes.)
```

Figure 2-7. Customer-Options Form

The following list identifies the fields on the Customer-Options form and their possible values.

NOTE:
This form can be administered only by personnel approved by Avaya. Additional hardware may be required to support the features and capabilities that you administer on this form. For details, refer to the “Hardware Requirements” section in Appendix B for the appropriate features and capabilities.

- *Model Name*

  Depending on the customer’s order (shown by the model PEC associated with an order), enter **CX**, **DX**, **EX**, or **IX**.

- *Presentation/Broadcast*

  Shows a **y** to indicate that both Broadcast mode with Auto Scan and Presentation mode are supported. Broadcast mode allows one endpoint (known as the broadcaster) to be viewed for the entire conference by all participants. The broadcaster views a continual rotation of participating endpoints. No return audio is heard. Presentation mode is similar to broadcast mode except that the audio portion is a summation of all participating endpoints, not just the broadcaster.

- *VAS*

  Shows a **y** to indicate that the MCU supports Voice-Activated Switching, where the speaker is viewed by all parties except the speaking party; this party views the previous speaker.

- *Chair Control Suite*

  Shows a **y** to indicate that the MCU supports chair control or FECC where the conferee designated as the “chair” or the far-end camera controlling endpoint controls who is viewed by all parties.

- *BONDed Use Same DS1*

  Shows a **y** to indicate that higher BONDing port capacities can be used, assuming that all BONDed calls from the same endpoint arrive over the same DS1 facility.

- *Dial-out*

  Shows a **y** to indicate that the MCU can dial out to add video endpoints to a conference. The default setting is **n**.

- *Dynamic Resizing*

  Shows a **y** to indicate that the list of conferees scheduled to join a conference can be changed even during an active conference.

- *Notification Package*

  Set this field to **y** to enable the MCU to support the following:

  — Entry and exit text overlay messages as well as entry and exit tones whenever a conferee joins or disconnects from a multipoint conference

  — Warning text overlay messages and warning tones notifying conference participants whenever 10 minutes remain in an active conference

- *Cascading*

  Shows **y** to indicate that the MCU can be connected to another Avaya MCU to combine resources of up to 46 ports.

- *Scheduler Adjunct*

  Enter **y** if the customer ordered the optional Avaya Conference Reservation and Control System (CRCS) with or without Standalone OpCenter. This activates the Operations Support System Interface (OSSI). The default setting is **n**.

- *OneNumber Access*

  Enter the appropriate value to either disable this feature or enable it with specified parameters.

  The following list identifies the possible values and their meaning:

  — **none** — disables the feature.

  — **aud** — enables the feature only for Audio Add-On endpoints. H.320 and BONDed endpoints are not allowed.

  — **mrate/aud** — enables the feature for H.320 endpoints in multirate conferences and Audio Add-On endpoints in all conference types. H.320 endpoints in 2B conferences and BONDed endpoints are not allowed.

  — **all** — enables the feature for H.320 endpoints in 2B conferences, as well as for Audio Add-On and multirate endpoints in all conference types. BONDed endpoints are not allowed.

  NOTE:
  If a value to enable the feature is entered, any duplicate extensions administered for the feature must be of the type enabled via the value. Otherwise, such extensions are blocked via administration.

- *Conferencing Suite*

  Enter the number of full-screen (with or without H.263/H.261 transcoding) CPP, CPP with SM, or Executive Conferencing (EC) conferences for the MCU. Values include **0** through **8**.

  NOTE:
  The MCU supports a maximum of 10 Video Processor circuit packs. (However, only eight circuit packs can be used.) These circuit packs can accommodate a mixture of full screen-only Speed Match conferences, CPP Speed Match conferences, CPP-only conferences, H.263/H.261 transcoding (H.320 Translator) conferences, and Executive Conferencing conferences.

  The number of simultaneous conferences using some form of video processing is controlled by the number of each of the three right-to-use permissions as displayed on the Customer-Options form. In particular, the sum of the CPP-only, full screen Speed Match (SM), combination SM/CPP, H.263/H.261 transcoding, and Executive Conferencing right-to-use (RTU) permissions may not exceed eight since one dedicated Video Processor circuit pack is required to

support each of these conference types. CPP/EC permissions are valid only for non-Speed Match, single transfer rate CPP (or CPP-only) conferences or EC conferences. EC permissions are valid only for EC conferences. SM permissions are valid only for full screen SM conferences (with or without H.263/H.261 transcoding). However, Conferencing Suite permissions can be used to provide a CPP-only conference, a full screen-only SM conference, an SM conference that also provides CPP video to and from endpoints at various transfer rates, an H.263/H.261 transcoding conference, or an Executive Conferencing conference. Therefore, as long as all of the available Conferencing Suite right-to-use permissions have not been used, any such available permissions may be applied to administer a CPP-only, full screen-only SM, SM/CPP, H.263/H.261 transcoding, or Executive Conferencing conference.

A maximum of *eight* CPP, full screen Speed Match, CPP Speed Match, H.263/H.261 transcoding, and Executive Conferencing conferences *combined* are allowed. If both *Continuous Presence/EC* and *Conferencing Suite* contain **0**, CPP cannot be administered; if both *Speed Match (SM)* and *Conferencing Suite* contain **0**, full screen Speed Match cannot be administered; if *Executive Conference, Continuous Presence/Executive Conf,* and *Conferencing Suite* contain **0**, Executive Conferencing cannot be administered.

In addition, starting with Release 6.0, the right-to-use (RTU) for Speed Match also applies to full-screen H.263/H.261 transcoding (in addition to full-screen Speed Match). Similarly, the RTU for Conferencing Suite also applies to full-screen H.263/H.261 transcoding (in addition to full-screen Speed Match, CPP, CPP with SM, and Executive Conferencing).

The following table summarizes the RTUs for the aforementioned fields on the System-Parameters Customer-Options form

Table 2-5. RTUs for Several Options on the Customer-Options Form

Option (Field)	Meaning
Continuous Presence/ Executive Conf	--- Continuous Presence *Plus,* or --- Executive Conferencing
Speed Match (SM)	--- full-screen Speed Match, or --- full-screen H.263/H.261 Transcoding at Same Speed
Conferencing Suite	--- CPP, or --- full-screen Speed Match, or --- full-screen H.263/H.261 Transcoding at Same Speed, or --- CPP with Speed Match, or --- Executive Conferencing
Executive Conferencing	--- Executive Conferencing only

- *Continuous Presence/Executive Conf*

  Enter the number of CPP-only (non-speed-matched) or Executive Conferencing conferences for the MCU. Values include **0** through **8**.

- *Executive Conference*

  Enter the number of Executive Conferencing conferences for the MCU. Values include **0** through **8**.

- *Speed Match (SM)*

  Enter the number of full screen Speed Match conferences (with or without H.263/H.261 transcoding) for the MCU. Values include **0** through **8**.

The following fields are included within the *Maximum Port Capacity* section of the form.

- *2B*

  Enter the total number of ports in the configuration. Values include **0** through **96** in four port increments. The default setting is **0** ports.

- *128k*

  Enter the number of ports available for 128k conferencing**.** Values include **0** through **96** in four port increments. The default setting is **0** ports.

- *192k*

  Enter the number of ports available for 192k conferencing**.** Values include **0** through **96** in four port increments.

- *256k*

  Enter the number of ports available for 256k conferencing**.** Values include **0** through **96** in four port increments.

- *320k*

  Enter the number of ports available for 320k conferencing**.** Values include **0** through **96** in four port increments.

- *384k*

  Enter the number of ports available for 384k (H0) conferencing. These ports may be used for 2B conferences when they are not reserved for 384k conferences. The number of H0 ports is always less than or equal to the number of 2B ports installed. Values include **0** through **96** in four port increments. The default setting is **0**.

- *512k*

  Enter the number of ports available for 512k conferencing**.** Values include **0** through **72** in four port increments.

- *768k*

  Enter the number of ports available for 768k conferencing. Values include **0** through **48** in four port increments.

- *1008/1152k*

  Enter the number of ports available for 1008k and/or 1152k conferencing. Values include **0** through **28** in four port increments. The default setting is **0**.

- *1288/1472k*

  Enter the number of ports available for 1288k and/or 1472k conferencing. Values include **0** through **24** in four port increments. The default setting is **0**.

- *1344/1536k*

  Enter the number of ports available for 1344k and/or 1536k conferencing. Values include **0** through **24** in four port increments. The default setting is **0**.

- *1680/1920k*

  Enter the number of ports available for 1680k and/or 1920k conferencing. Values include **0** through **24** in four port increments. The default setting is **0**.

- *BONDing 112/128k*

  Enter the number of BONDing ports available for 112/128k BONDing. For flexible Dial-Out conferencing, enter a value from **0** through **96** in four port increments; for dial-in/non-CRCS conferencing, enter a value from **0** through **64** in four port increments.

- *BONDing 168/192k*

  Enter the number of BONDing ports available for 168/192k BONDing. For flexible Dial-Out conferencing, enter a value from **0** through **96** in four port increments; for dial-in/non-CRCS conferencing, enter a value from **0** through **64** in four port increments.

- *BONDing 224/256k*

  Enter the number of BONDing ports available for 224/256k BONDing. For flexible Dial-Out conferencing, enter a value from **0** through **96** in four port increments; for dial-in/non-CRCS conferencing, enter a value from **0** through **60** in four port increments.

- *BONDing 280/320k*

  Enter the number of BONDing ports available for 280/320k BONDing. For flexible Dial-Out conferencing, enter a value from **0** through **96** in four port increments; for dial-in/non-CRCS conferencing, enter a value from **0** through **56** in four port increments.

- *BONDing 336/384k*

  Enter the number of BONDing ports available for 336/384k BONDing. For flexible Dial-Out conferencing, enter a value from **0** through **96** in four port increments; for dial-in/non-CRCS conferencing, enter a value from **0** through **52** in four port increments.

- *BONDing 448/512k*

  Enter the number of BONDing ports available for 448/512k BONDing. For flexible Dial-Out conferencing, enter a value from **0** through **72** in four port increments; for dial-in/non-CRCS conferencing, enter a value from **0** through **44** in four port increments.

- *BONDing 672/768k*

  Enter the number of BONDing ports available for 672/768k BONDing. For flexible Dial-Out conferencing, enter a value from **0** through **48** in four port increments; for dial-in/non-CRCS conferencing, enter a value from **0** through **36** in four port increments.

- *H.323 128k*

  Enter the number of H.323 ports available for 128k. Enter a value from **0** through **96** in one port increments.

- *H.323 384k*

  Enter the number of H.323 ports available for 384k. Enter a value from **0** through **96** in one port increments.

- *H.323 768k*

  Enter the number of H.323 ports available for 768k. Enter a value from **0** through **48** in one port increments.

NOTE:
Combined total of H.323 ports cannot exceed **96** ports.

- *Audio Add-On*

  Enter the maximum number (**0**, **2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30,** or **32**) of audio-only ports per system. The default setting is **0**.

- *T.120*

  Enter the maximum number of T.120 ports (**0**, **4**, **8**, **12**, **16**, **20**, or **24**) that can be scheduled for a conference at the same time. The default is **0**. If the value is set to **0**, the T.120 feature is not optioned for the MCU. If the value is set to any valid number other than **0**, the T.120 feature is optioned for the MCU.

  NOTE:
  The maximum 2B port capacity must be greater than or equal to the maximum T.120 port capacity.

- *UCC*

  Enter the number of UCC ports (**0**, **1**, **2**, **4**, **8**, **12**, **16**, **20**, or **24**) available for UCC conferencing.

- *SG4*

  Enter the number of SG4 ports available for SG4 conferencing. Values include **0** through **96** in 16 port increments.

- *H.CTX/+*

  Enter the number of H.CTX or H.CTX+ ports available for H.CTX or H.CTX+ conferencing. Values include **0** through **96** in 16 port increments.

- *BRI Direct Connect*

  Enter the number of BRI Direct Connect ports (**0** to **36** in increments of 4) available for conferencing. Default is **0**. If this field contains value **0** and BRI ports are installed, system resources are reserved to allow nonblocking point-to-point calls for this port type.

- *DCP Direct Connect*

  Enter the number of DCP Direct Connect ports (**0** to **36** in increments of **4**) available for conferencing.

- *DI Direct Connect*

  This field reserves either time slots for each administered DI port using the 384k transfer rate or 12 time slots per DI port for estimating. Values for this field equate to the number of DI circuit packs (ports) possible for an MCU,

and they include the range of **0** through **32** in increments of one. The number of time slots to reserve per circuit pack (port) depends on the transfer rates in effect at the time.

NOTE:
The DI port capacity that is available at any one time is the same as the multirate capacity value (for example, a DI port rate of 1920k allows a maximum of 16 ports at a time). One TN2236B, version 5 or greater circuit pack is required for each DI access-endpoint that is administered in the MCU unless the DI access-endpoint requires 2B calling (2x56k or 2x64k); in such a case, one TN2236B, version 5 or greater circuit pack is required for each call.

Setting the Class of Restriction

The Class of Restriction (COR) feature is used to define the calling capabilities of MCU trunk groups, hunt groups, data modules, data extensions, and maintenance alarm terminals. You can assign one COR to all of these groups, or you can assign as many as necessary (up to 64) to effect the desired restriction.

For example, you may assign to the maintenance alarm terminals a COR with no outside calling privileges. Likewise, you could restrict MCU trunk groups to incoming calls only.

The following commands can be used to access the Class of Restriction (COR) form.

Table 2-6. Class of Restriction Administration Commands

Action	Object	Qualifier
change	cor	0 to 63
display	cor	0 to 63, print or schedule

Use the following procedure to change the COR:

1. At the *command:* prompt, type **change cor #** and then press RETURN.
2. Verify that the screen displays the Class of Restriction screen.
3. Use TAB or RETURN to advance to the fields you want to change.
4. When the form is completed, verify the MT displays: *Command successfully completed* followed by *command:*
5. To verify the form, type **display cor #** and then press RETURN.

Class of Restriction Form

The Class of Restriction form appears as follows:

```
change cor 1                                                Page   1 of   3
                              CLASS OF RESTRICTION

                 COR Number: 1
          COR Description: ____________________________________

                      FRL: 7                                APLT? y
                                        Calling Party Restriction: none_____
                                         Called Party Restriction: none_____
  Partitioned Group Number: 1       Forced Entry of Account Codes? n
          Priority Queuing? n
                                      Facility Access Trunk Test? n
      Restricted Call List? n


      Category For MFC ANI: 7
          Send ANI for MFE? n
             MF ANI Prefix: _____



                                   Grou  Controlled Restriction: inactive
```

Figure 2-8. Class of Restriction Form (Page 1)

```
change cor 1                                                Page   2 of   3
                              CLASS OF RESTRICTION

                    MF Incoming Call Trace? n
          Brazil Collect Call Blocking? n
                Block Transfer Display? n
```

Figure 2-9. Class of Restriction Form (Page 2)

The following list provides the fields on the COR form and their related values.

NOTE:
Keep the default setting for all the fields in this form.

Class of Restriction Form Page 1 of 3

- *COR Number*

  Display-only field when the form is accessed via a **change cor** or **display cor** command. Shows the COR number entered.

  NOTE:
  There is no need at this time to make changes to the COR form because administered extensions do not currently use the Class of Restriction features. Whenever you are administering the MCU, leave this field set at the default value of **1** for any administration forms (such as those for trunk groups, data extensions, etc.) that have access to the COR feature.

- *COR Description*

  Enter a description of the COR containing a maximum of 35 characters.

- *FRL*

  Provides a method of restricting users from originating calls to specified areas. There are eight levels of calling restrictions, “0” through “7”. “0” is the most restricting for a station, and “7” is the least restricting. A station user who has an FRL of “3” has all the calling privileges of FRLs “0” through “2” plus what is allowed on FRL “3.”

  Except for special cases, changes are not required on the MCU. Leave at default value of **7** on all COR forms.

- *Partitioned Group Number*

  This field is not used. Leave it at the default of **1**.

- *Priority Queuing*

  This field is not currently used. Leave it at the default setting of **n**.

- *Restricted Call List*

  This field is not currently used. Leave it at the default setting of **n**.

- *APLT*

  N/A for the MCU. Leave set to **y**.

- *Calling Party Restriction*

  N/A for the MCU. Leave it at the default of **none**.

- *Called Party Restriction*

  N/A for the MCU. Leave it at the default of **none**.

- *Forced Entry of Account Codes*

  N/A on the MCU. Leave it at the default setting of **n**.

- *Category for MFC ANI*

  N/A for the domestic MCU. Leave at default value **7**.

- *Send ANI for MFE*

  N/A for the domestic MCU; therefore, enter value **n**. If desired in Spain, enter value **y**.

- *MF ANI Prefix*

  Defines the prefix to apply to an extension number when ANI is sent to the CO. This prefix overrides any ANI prefix that is administered on the Multifrequency-Signaling-Related System Parameters form, except whenever ANI is tandemed through the PBX on tandem calls or whenever ANI for a PBX is sent. Values include one to seven digits. Default is blank.

- *Facility Access Trunk Test*

  This field is not currently used. Keep the default value **y**.

Class of Restriction Form Page 2 of 3

- *MF Incoming Call Trace*

  Keep the default value **n**.

- *Brazil Collect Calling Blocking?*

  Keep the default value **n**.

- *Block Transfer Display?*

  Keep the default value **n**.

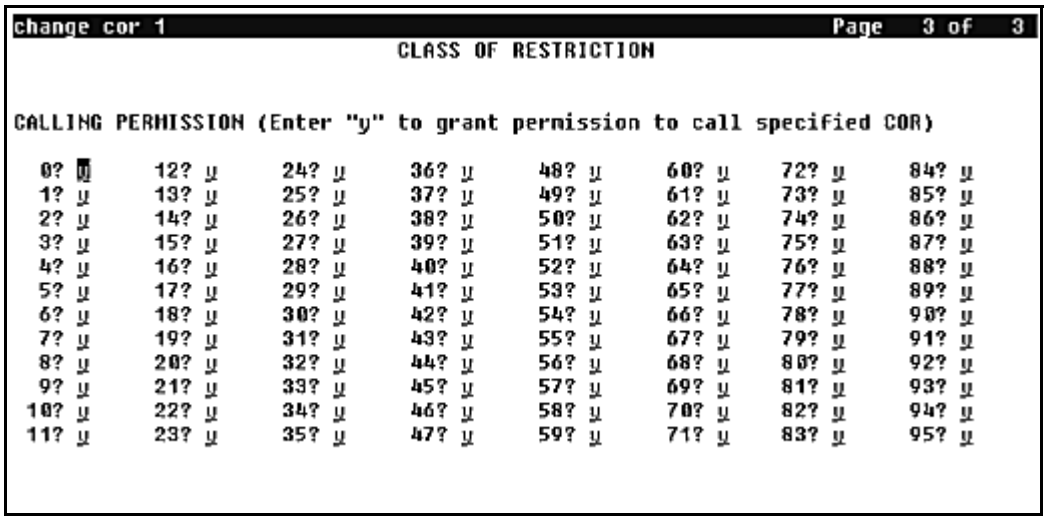


Figure 2-10. Class of Restriction Form (Page 3)

Class of Restriction Form Page 3 of 3

- *CALLING PERMISSION*

  Enter a value **y** to grant permission to call the specified COR.

Setting the Class of Service

The Class of Service (COS) feature is used to administer access permissions for call processing features that require a dial code and/or feature access button permission. COS does not apply to trunk groups. All COSs (**0** through **15**) have the same settings; all fields are defaulted to **n** except *Data Privacy*, which is set to **y**. Therefore, you can select **0** through **15** for any of the features that require a COS.

NOTE:
Do not change the defaults.

The following commands can be used to access the Class of Service (COS) form.

Table 2-7. Class of Service Administration Commands

Action	Object	Qualifier
change	cos	
display	cos	print or schedule

Use the following procedure to change the COS:

1. At the *command:* prompt, type **change cos** and then press RETURN.
2. Verify that the screen displays the Class of Service screen.
3. From the *Auto Callback* row, use TAB and RETURN to advance to the fields you want to change.
4. When the form is completed, verify that the MT displays: *Command successfully completed* followed by *command:*
5. To verify the form, type **display cos** and then press RETURN.

Class of Service Form

The Class of Service Form appears as follows.

```
change cos                                                  Page  1 of  1


                              CLASS OF SERVICE

                              0  1  2  3  4  5  6  7  8  9  10  11  12  13  14  15

Auto Callback                 n  y  y  n  y  n  y  n  y  n   y   n   y   n   y   n
Call Fwd-All Calls            n  y  n  y  y  n  n  y  y  n   n   y   y   n   n   y
Data Privacy                  n  y  n  n  n  y  y  y  y  n   n   n   n   y   y   y
Priority Calling              n  y  n  n  n  n  n  n  n  y   y   y   y   y   y   y
Console Permissions           n  n  n  n  n  n  n  n  n  n   n   n   n   n   n   n
Off-hook Alert                n  n  n  n  n  n  n  n  n  n   n   n   n   n   n   n
Client Room                   n  n  n  n  n  n  n  n  n  n   n   n   n   n   n   n




QSIG Call Offer Originations  n  n  n  n  n  n  n  n  n  n   n   n   n   n   n   n
```

Figure 2-11. Class of Service Form

The following list provides the fields on the COS form and their related values.

Class of Service Form Page 1 of 1

- *Auto Callback*

  This feature is not presently available. Leave all entries set to **n**.

- *Call Fwd-All Calls*

  This feature is not currently available. Leave all entries set to **n**.

- *Data Privacy*

  The MCU should be set for data privacy. All entries should be set to **y**.

- *Priority Calling*

  This feature is not currently available. Leave all entries set to **n**.

- *Console Permissions*

  This feature is not used. Leave all entries set to **n**.

- *Off-hook Alert*

  This feature is not currently available. Leave all entries at the default of **n**.

- *Client Room*

  This field is not currently used. Leave all entries set to **n**.

- *QSIG Call Offer Originations*

  For outgoing call offer call originations, set to **y**. Default is **n**.

Dial-Out Administration

The Dial-Out feature allows the Avaya MCU to automatically originate calls to video conferees to join a conference. The conferees' video terminals are not directly connected to the MCU; they gain access via data trunks. Administered connections are used to establish and terminate the call from the MCU to the endpoints. Therefore, the Dial-Out feature requires coordination among the video endpoints, trunks, and MCU.

Dial-out administration involves outgoing trunk groups, AAR/ARS routing patterns, and administered connections.

Use the following procedure to change the COR:

1. At the *command:* prompt, type **display administered-connection** and then press RETURN.
2. Verify that the screen displays the Administered Connection screen.
3. From the *FRL* field, use TAB and RETURN to advance to the fields you want to change.
4. When the form is completed, verify the MT displays: *Command successfully completed* followed by *command:*
5. To verify the form, type **display cor #** and then press RETURN.

Establishing Administered Connections

For dialing out, use the Administered-Connection form to establish a connection that is automatically reestablished whenever the MCU is restarted.

The following commands can be used to administer connections:

Table 2-8. Administered-Connection Administration Commands

Action	Object	Qualifier
add	administered-connection	1-600 or next
change	administered-connection	1-600 or next
display	administered-connection	1-600, next, print or schedule
duplicate	administered-connection	1-600 or next
list	administered-connection	1-600 or next
remove	administered-connection	1-600, count, print or schedule

Use the following procedure to establish administered connections:

1. At the *command:* prompt, type **add administered-connection x**, and then press RETURN.
2. Verify that the screen displays the Administered-Connection form.
3. From the *Enable* field, use TAB and RETURN to advance to the fields you want to change.
4. When the form is completed, verify the MT displays: *Command successfully completed* followed by *command:*
5. To verify the form, type **display administered-connection x**, and then press RETURN.

Administered-Connection Form

The following list identifies the fields on the Administered-Connection form and their related values:

- *Connection Number*

  This display-only field shows the Administered-Connection number.

- *Enable*

  Enter **y** to indicate that an attempt will be made to establish the administered connection whenever the MCU is restarted or the connection is due to be active. The default is **y**.

- *Originator*

  Displays the extension of the Meet-Me user who is currently using this administered connection.

- *Destination*

  Enter the address of the destination access or data endpoint (**0** through **9)**. This endpoint does not have to be local to the MCU. If a local endpoint is entered, it must be assigned to either an access or data endpoint. Up to 36 characters can be entered. The default is blank.

  NOTE:
  A FAC is restricted to AAR, ARS, and CDR account code dialing.

- *Name*

  Enter an optional name (up to 15 characters) for the connection, such as **MCU-ST.**

- *Continuous*

  Enter **y** if the administered connection is enabled whenever the MCU is restarted. Enter **n** if you want to schedule the connection to be active only during certain times. If you enter **n**, the following three fields are displayed.

- *Start Days (Sun through Sat)*

  Displays only when **n** is entered in the *Continuous* field. Enter a **y** for each day you want to establish the administered connection; otherwise, enter n. If you enter **y**, the administered connection begins on the day specified and continues for the duration set in the *Duration* field.

- *Start Time*

  Displays only when **n** is entered in the *Continuous* field. Enter the time of day when an attempt to make the connection should occur. Valid entries are **00:00** to **23:59**. The default is **00:00**.

- *Duration*

  Displays only when **n** is entered in the *Continuous* field. Enter the period of time that the scheduled administered connection should remain active. The maximum duration is one minute less than a week. Valid entries are **000** through **167** for hours; **00** through **59** for minutes. The default is **000:00**.

- *Alarm Type*

  Enter the type of alarm to be generated if the administered connection cannot be established or fails and cannot be reestablished and the number of failures equals the alarm threshold. The valid entries are **major**, **minor**, **warning**, or **none**. The default is **warning**.

- *Alarm Threshold*

  Enter the number of times an attempt to establish or reestablish a connection should be tried before an alarm is raised. Valid entries are **1** through **10.** The default is **5**.

- *Retry Interval*

  Enter the number of minutes between attempts to establish or reestablish the connection. Valid entries are **1** through **60**. The default is **2**.

- *Auto Restoration*

  Enter **y** to indicate that an attempt is to be made to reestablish the connection that has failed; otherwise, enter **n**. Auto restoration is only available for an administered connection that is established over ISDN-PRI and SDDN trunk groups. The default is **n.**

- *Priority*

  Enter a number in a range from **1** to **8** to determine the order in which the administered connections are to be established (the highest priority is **1**).

Administering the Call Detail Recording (CDR) Link

Call Detail Recording (CDR) allows specific information to be recorded about the multimedia conference. This information is useful for call costing, diagnostics, abuse detection, and network optimization. To enable CDR, the CDR link must be administered.

The following commands can be used to administer the CDR link:

Table 2-9. CDR Link Commands

Action	Object	Qualifier
change	system-parameters cdr	_____
display	system-parameters cdr	_____

Use the following procedure to establish administered connections:

1. At the *command:* prompt, type **change system-parameters cdr**, and then press RETURN.
2. Verify that the screen displays the CDR System Parameters form.
3. From the *Node Number* field, use TAB and RETURN to advance to the fields you want to change.
4. When the form is completed, verify that the MT displays: *Command successfully completed* followed by *command:*
5. To verify the form, type **display system-parameters cdr**, and then press RETURN.

CDR System Parameters Form

An example of the CDR System Parameters Form appears as follows:

```
change system-parameters cdr                                  Page  1 of  1

                                CDR SYSTEM PARAMETERS

 Node Number (Local PBX ID):                          CDR Date Format: month/day
      Primary Output Format: printer                Primary Output Ext: eia

           Use ISDN Layouts? n                     EIA Device Bit Rate: 9600
         Use Enhanced Formats? n
Modified Circuit ID Display? n

Suppress CDR for Ineffective Call Attempts? y
    Disconnect Information in Place of FRL? n









                                  Digits to Record for Outgoing Calls: dialed

    Primary - Digits to Hide: 0
```

Figure 2-12. CDR System Parameters Form

The following list discusses the fields in the CDR System Parameters form.

- *Node Number (Local PBX ID)*

  The DCS switch node number in a network of switches. This field is display-only.

- *CDR Date Format*

  Enter month/day or day/month (default) to select the format for recording CDR date information for timestamp date records of all formats. If using a customized format, make this a six-digit field to ensure the proper output.

- *Primary Output Format*

  Controls data presentation sent to the primary output device. Entering **customized** generates the second page of this form for the customized record administration. Other values are **59-char**, **expanded**, **lsu**, **lsu-expand**, **int-direct**, **int-isdn**, **int-process**, **printer**, **teleseer**, **unformatted**, and blank (default).

- *Primary Output Ext*

  Appears and is required when the *Primary Output Format* field contains a valid value. Enter the extension number assigned to the primary output device. Default is blank.

  NOTE:
  The first digit of the CDR extension number and the length of that number must agree with the first digit table of the dial plan.

- *Use ISDN Layouts*

  Enter y to use ISDN record layouts. This field applies to both the primary and secondary formats, if applicable. The “lsu” and “printer” output formats will be affected as well as any format with ISDN layouts, such as “teleseer.” Default is **n**. This field and *Use Enhanced Formats* cannot both be set to **y**.

- *EIA Device Bit Rate*

  Enter the bit rate of the CDR device connected to the EIA port. Valid entries are **300**, **1200**, **2400**, and **9600**.

- *Use Enhanced Formats*

  Enter **y** to enable the use of the enhanced version of the specified primary output format. This field applies to both the primary and secondary output formats if applicable; however, only the “expanded,” “teleseer,” “lsu,” “printer,” and “unformatted” output formats are affected. This field and Use *ISDN Layouts* cannot both be set to **y**.

- *Modified Circuit ID Display*

  Enter **y** to modify the format of the incoming and outgoing circuit ID from the 10’s, units, 100’s format (the default) to 100’s, 10’s, units. Only the “printer,” “teleseer,” and “59-character” output formats are affected.

- *Suppress CDR for Ineffective Call Attempts*

  Enter **y** (default) to ignore the reporting of ineffective call attempts. Ineffective call attempts are calls originated by a voice terminal user that are blocked because the user did not have sufficient calling privileges or because all outgoing trunks were busy. This includes the unavailable incoming or outgoing trunks due to trunk usage allocation for ISDN Call-by-Call Service Selection trunks and incoming calls rejected by the switch due to NSF mismatch. Enter **n** to report ineffective call attempts.

- *Disconnect Information in Place of FRL*

  Enter **y** to record disconnect information or **n** (default) to record the call’s FRL.

  NOTE:
  This field changes the Facility Restriction Level (FRL) field of the CDR record to record the reason for a disconnect of a call rather than the FRL. It is used for isolating problems between the MCU and the network.

- *Digits to Record for Outgoing Calls*

  Enter **dialed** or **outpulsed** to record the dialed or outpulsed digits in the Dialed Number field of the CDR.

- *Privacy — Digits to Hide*

  Enter the number of digits (**0** through **7**) to be blanked from the back (right to left) of the *Dialed Number* field on the CDR record. Default is **0**. For example, if **4** is entered into this field and the user dials “555-1234,” only “555” appears in the *Dialed Number* field of the CDR record. CDR Privacy must be enabled on the Station form.

Administering System Features

The Feature-Related System Parameters form sets parameters for various system-wide features. These parameters are administered at system initialization, and they may be changed for ongoing administration.

The following table provides the relevant commands.

Table 2-10. System Parameters Features Administration Commands

Action	Object	Qualifier
change	system-parameters features	
display	system-parameters features	print or schedule

To change the Feature-Related System Parameters form, follow these procedures:

1. At the *command:* prompt, type **change system-parameters features** and then press RETURN.
2. Verify that the screen displays the Feature-Related System Parameters screen.
3. Use TAB or RETURN to advance to the fields you want to change.
4. When the form is completed, verify that the MT displays: *Command successfully completed* followed by *command:*
5. To verify the form, type **display system-parameters features** and then press RETURN.

Features-Related System Parameters Form

The first page of the Features-Related System Parameters form appears as follows:

```
change system-parameters features                          Page   1 of   4
                      FEATURE-RELATED SYSTEM PARAMETERS
                 Conference Password Query Time-out (seconds): 60
                    Dial-out Failure Retry Interval (minutes): 1
                         Dial-out Overall Failure Retry Limit:
                  Dial-out Post Answer Failure Retry Limit: 4
                          Default Custom Lip Sync  <= 128K: 0
                          Default Custom Lip Sync 224/256K: 0
                          Default Custom Lip Sync  >= 336K: 0
                                AAR/ARS Dial Tone Required? y
                                   System Audio Preference: Mu-law
                              Audio Noise Suppression Threshold: 16
                                    MCU Pacer Interval(nsec): 2000

                                                 Forward AIM: y
                  Automatic Circuit Assurance (ACA) Enabled? n



                  Protocol for Caller ID Analog Terminals: Bellcore
```

Figure 2-13. Feature-Related System Parameters Form (Page 1)

The following list identifies and discusses the fields on the Features-Related System Parameters form.

Feature-Related System Parameters Form, Page 1 of 4

- *Conference Password Query Timeout (seconds)*

  Enter the number of seconds (**30** through **300**) that the MCU will wait for a conference password response before timing out. The default is **60**.

  NOTE:
  A value greater than **60** may be required for some BONDing conferences, which may take a long time to set up.

- *Dial-Out Failure Retry Interval (minutes)*

  Enter the number of minutes (**1** through **5**) that the MCU will wait between dial-out attempts. The default is **1**.

- *Dial-Out Overall Failure Retry Limit*

  Enter the sum of the pre-answer and post-answer retries (**0** through **200**) by the MCU. Once this number is reached, the MCU stops calling. The default is a blank entry, which indicates that there is no pre-answer limit.

- *Dial-Out Post-Answer Failure Retry Limit*

  Enter the number of times (**0** through **9**) that the MCU should attempt to redial an endpoint that answers but is then dropped. The default is **4**.

- *Default Custom Lip Sync <=128K*

  Enter in msec the desired Lip Synchronization delay for MCU conferences operating at the rate of 128k or lower. Values include **0** (default) through **1000** in intervals of 20.

- *Default Custom Lip Sync 224/256K*

  Enter in msec the desired Lip Synchronization delay for MCU conferences operating at the 224/256k rate. Values include **0** (default) through **1000** in intervals of 20.

- *Default Custom Lip Sync >=336*

  Enter in msec the desired Lip Synchronization delay for MCU conferences operating at the rate of 336k or higher. Values include **0** (default) through **1000** in intervals of 20.

- *AAR/ARS Dial Tone Required*

  Enter **y** when a second dial tone is required on an incoming tie trunk call that is routed by AAR/ARS.

- *System Audio Preference*

  Values include **mu-law** (default) and **a-law**. The effect of this field is system-wide and affects all cascade links.

  Enter **a-law** whenever the MCU is used to cascade to non-Avaya MCUs at the lower bandwidths (for example, 2x64k) to avoid media problems on the cascade link. The field value may need to change for conferences sending G.711 audio mode across a cascade link with a non-Avaya MCU. If both Avaya-to-Avaya MCUs and Avaya-to-non-Avaya MCUs are being used, setting the value to **a-law** does not cause any problems on the Avaya-to-Avaya MCU.

- *Audio Noise Suppression Threshold*

  Enter the Audio Noise Suppression threshold.

- *MCU Pacer Interval (msec)*

  Enter in msec the time delay for dropping MCU calls in general and for sending Dial-Out calls. Values include **2000** (default) through **10000**.

- *Forward AIM*

  Values include **y** (default) and **n**. Certain releases of endpoints produce an audible tone whenever they receive audio indicated mute (AIM). To prevent this audible tone, set this field to **n**. For value **y**, AIM is sent to an endpoint when all other connected sites in the conference have sent AIM to the MCU. The effect of the value in this field is system-wide and affects all conferences.

- *Automatic Circuit Assurance (ACA) Enabled*

  If Automatic Circuit Assurance is disabled, set to **n**, then associated ACA fields will not display. Enter **y** to have ACA measurements taken.

- *ACA Referral Calls*

  Indicates where ACA referral calls generate. Local allows local referral calls to generate, primary allows primary referral calls to generate on the local switch for remote switches as well as local switches, and remote allows remote referral calls to generate at another switch in a DCS network.

- *ACA Referral Destination*

  If the ACA Referral Calls field is set to local or primary, enter the referral destination extension.

- *ACA Short/Long Holding Time Originating Extension*

  If the ACA Referral Calls field is set to local or primary, enter an unassigned extension. Do not use the same extension number for both fields.

- *Protocol for Caller ID Analog Terminals: _____*

  Enter **Bellcore** for Bellcore protocol with 212 modem protocol tones. Used in the US and similar countries. Enter **V23-Bell** for Bellcore protocol with v.23 modem tones. Used in Bahrain and similar countries.

Feature-Related System Parameters Form, Page 2 of 4

NOTE:
Be sure to refer to "Call Detail Recording" on page B-32 for information on Call Detail Recording.

- *Printer Extension*

  Enter the data module extension number associated with the system printer, or enter **eia** when the DCE jack is used to interface with the printer.

- *EIA Device Bit Rate*

  Enter the required printer speed setting. Values include **1200**, **2400**, **4800**, and **9600**.

- *Lines Per Page*

  Specify the number of lines per page required for the report (**24** through **132**). The default is **60**.

```
change system-parameters features                              Page   2 of   4
                        FEATURE-RELATED SYSTEM PARAMETERS

SYSTEM PRINTER PARAMETERS
              Syston Printer Extension: _____              Lines Per Page: 60
                   EIA Device Bit Rate: 9600

SYSTEM-WIDE PARAMETERS
                            Switch Name: ____________________
```

Figure 2-14. Feature-Related System Parameters Form (Page 2)

- *Switch Name*

  Enter the name of the switch.

```
change system-parameters features                              Page   3 of   4
                        FEATURE-RELATED SYSTEM PARAMETERS

ISDN PARAMETERS

 Send Non-ISDN Trunk Group Name as Connected Name? n
 Display Connected Name/Number for ISDN DCS Calls? n
       Send ISDN Trunk Group Name on Tanden Calls? n
             CPN Replacenent for Restricted Calls: ________________
           CPN Replacement for Unavailable Calls: ________________
                               QSIG TSC Extension: _____
              Path Replacement with Measurements? y
     HWI - Number of Digits Per AUDIX Subscriber: 5

                            National CPN Prefix: _____
                       International CPN Prefix: _____
                       Pass Prefixed CPN to ASAI? n
   Unknown Numbers Considered Internal for AUDIX? n
```

Figure 2-15. Feature-Related System Parameters Form (Page 3 & 4)

Feature-Related System Parameters Form, Page 3 of 4

- *Send Non-ISDN Trunk Group Name as Connected Name*

  Enter **y** to send a name of the non-ISDN trunk group as the connected name when a call routes from ISDN to non-ISDN and the call is answered.

- *Display Connected Name/Number for ISDN DCS Calls*

  Enter **y** to display the connected name/number (if received) for ISDN DCS calls.

- *Send ISDN Trunk Group Name on Tandem Calls*

  Enter **y** to provide consistent display information regardless of trunk type. If set to **y**, provides only trunk group name.

- *CPN Replacement for Restricted Calls*

  Enter a text string (up to 15 characters) to replace the restricted numbers on the display.

- *CPN Replacement for Unavailable Calls*

  Enter a text string (up to 15 characters) to replace the unavailable numbers on the display.

- *QSIG TSC Extension*

  Enter any valid, unassigned extension as the phantom endpoint extension for QSIG Call Independent Signaling Connections (CISCs), which are similar to NCA Temporary Signaling Connections (TSCs) (both incoming and outgoing).

- *Path Replacement with Measurements*

  Enter **y** to allow QSIG path replacement or DCS with Reroute to be attempted on measured calls.

- *MWI - Number of Digits Per AUDIX Subscriber*

  Appears only if the Basic Supplementary Services field or the ISDN Feature Plus field on the System-Parameters Customer-Options screen is **y**. This field appears an indication of the number of digits per AUDIX subscriber.

- *National CPN Prefix*

  N/A for MCU.

- *International CPN Prefix*

  N/A for MCU.

- *Pass Prefixed CPN to ASAI*

  N/A for MCU.

- *Unknown Numbers Considered Internal for AUDIX*

  N/A for MCU.

Feature-Related System Parameters Form, Page 4 of 4

- *Automatic Exclusion by COS*

  N/A for MCU.

```
change system-parameters features                          Page   3 of   4
                      FEATURE-RELATED SYSTEM PARAMETERS

ISDN PARAMETERS

 Send Non-ISDN Trunk Group Name as Connected Name? n
 Display Connected Name/Number for ISDN DCS Calls? n
       Send ISDN Trunk Group Name on Tandem Calls? n
              CPN Replacement for Restricted Calls: _______________
            CPN Replacement for Unavailable Calls: _______________
                                QSIG TSC Extension: _____
                Path Replacement with Measurements? y
     MWI - Number of Digits Per AUDIX Subscriber: 5

                              National CPN Prefix: _____
                          International CPN Prefix: _____
                        Pass Prefixed CPN to ASAI? n
   Unknown Numbers Considered Internal for AUDIX? n
```

Figure 2-16. Feature-Related System Parameters Form (Page 4)

Administering International-Based Parameters

Parameters associated with specific international call characteristics can be implemented by completing the System Parameters Country-Options form. The following table lists the commands that can access the form.

Table 2-11. International-Based Parameters Commands

Action	Object	Qualifier
change	system-parameters country-options	____
display	system-parameters country-options	[‘print’ or ‘schedule’]*

* Brackets ([ ]) indicate that the qualifier is optional. Single quotes (‘ ’) indicate that the text inside the quote must be entered either exactly as shown or in the appropriate abbreviated form.

To administer international-based parameters, follow these procedures:

1. At the *command:* prompt, enter **change *system-parameters country-options***.
2. Verify that the screen displays the *Country-Options Form*.
3. Use TAB or RETURN to advance to the fields you want to change. (Refer to "Country-Options Form" on page 2-55 for a description of the fields and values.)
4. Submit the form.
5. To verify the form, type **display *system-parameters country-options***.

Country-Options Form

The Country-Options form appears as follows:

```
change system-parameters country-options                    Page   1 of   9
                    SYSTEM PARAMETERS COUNTRY-OPTIONS

            Companding Mode: Mu-Law          Base Tone Generator Set: 1
         440Hz PBX-dial Tone? n              440Hz Secondary-dial Tone? n



      Howler Tone After Busy? n   Disconnect on No Answer by Call Type? n

TONE DETECTION PARAMETERS
          Tone Detection Mode: 6
             Interdigit Pause: short
```

Figure 2-17. System-Parameters Country-Options Form (Page 1)

```
change system-parameters country-options                        Page   2 of   9
                              2 PARTY LOSS PLAN
          Digital Loss Plan: 1_                          Customize? n
                                        TO
            1   2   3   4   5   6   7   8   9  10  11  12  13  14  15  16  17
      1:    0   0   0   0   0   0   0   0   0   3   0   0   0   0   0   3   3
      2:    0   0   0   0   0   0   0   0   0   3   0   0   0   0   0   3   3
      3:    3   6   0   0   0   0   0   0   0   3   0   0   0   0   0   3   3
      4:    0   0  -3   0   0   3   3   3   2   3   0   0   0   0   2   3   3
      5:    0   0  -3   0   0   3   3   3   2   3   0   0   0   0   0   3   3
      6:    0   0  -3   3   3   6   8   6   5   5   5   3   3   3   5   3   3
  F   7:    0   0  -3   3   3   8   8   6   5   5   5   3   3   3   5   3   3
  R   8:    0   0  -3   3   3   6   6   6   3   5   3   3   0   0   3   3   3
  O   9:    0   0  -3   2   2   5   5   3   0   0   2  -3  -3  -3   0   3   3
  M  10:    3   3   0   3   3   5   5   5   0   0   3  -3  -3  -3   3   3   3
     11:    0   0  -3   0   0   5   5   3   2   3   0   0   0  -3   0   3   3
     12:    6   6   3   6   6   9   9   9   3   3   6   0   0   0   6   3   3
     13:    6   6   0   6   6   9   9   6   3   3   6   0   0   0   6   3   3
     14:    6   6   0   6   6   9   9   6   3   3   3   0   0   0   6   3   3
     15:    0   0  -3   2   0   5   5   3   0   3   0   0   0   0   0   3   3
     16:    3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3
     17:    3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3   3
```

Figure 2-18. System Parameters Country Options Form (Page 2)

```
change system-parameters country-options                        Page   3 of   9
                          TONE & CONFERENCE LOSS PLANS
          Digital Tone Plan: 1_                          Customize? n

                                        TO
              1   2   3   4   5   6   7   8   9  10  11  12  13  14  15  16  17
      Dial:   0   0   0   3   3   6   6   6   5   0   6   5   5   5   5   0   0
   Confirm:   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
   Reorder:   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
      Busy:   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
   Ringing:   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
 Spec Ring:   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
 Intercept:   0   0   0   0   0   0   0   0   1   0   0   1   1   1   1   0   0
   Waiting:   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
    Verify:   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
   Intrude:   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
       Zip:   3  -3  -3   3   3  -3  -3  -3  -3  -3  -3  -3  -3  -3  -3   0   0
     Music:   0   0   0   3   3   6   6   6   3   0   6   3   3   3   3   0   0

End-to-End total loss (dB) in a n-party conference:
 3: 15    4: 21    5: 26    6: 29
```

Figure 2-19. System Parameters Country Options Form (Page 3)

NOTE:
Pages 4 through 9 of the Country-Options form are virtually identical.

The following list identifies the fields on Page 1 and the possible values:

- *Companding Mode*

  Enter **A-law** (UK or Australia) or **Mu-law** (US or Canada) to identify the companding algorithm to be used by system hardware. Default is **Mu-law**.

- *Base Tone Generation Set*

  Enter a country code (either **1** for the US, **2** for Australia, **10** for the UK, or **13** for Germany) to identify the base tone generator set to be used. Default is **1**.

- *440Hz MCU-Dial Tone*

  Enter **y** or **n** to specify whether or not the MCU-dial tone will be changed to a continuous 440Hz/-17 tone. The default is **n**. This value implies that the tone will be administered either on a later page of the form or (if no individual definition is administered) as defined in the Base Tone Generator Set.

- *440Hz Secondary-Dial Tone*

  Enter **y** or **n** to specify whether or not the Secondary (CO) dial tone will be changed to a continuous 440Hz/-17 tone. The default is **n**. This value implies that the tone will be administered either on a later page of the form or (if no individual definition is administered) as defined in the Base Tone Generator Set.

- *Howler Tone After Busy*

  When set to **y** plays howler tone when users leave their phone off-hook for a long period of time.

- *Disconnect on No Answer by Call Type*

  When set to **y** enables the system to disconnect calls that are not answered**.**

The next two fields control tone detection on the system:

- *Tone Detection Mode*

  Enter a code [either **1** for Italy (precise), **2** for Australia (precise), **3** for the UK (precise), **4** for normal broadband (imprecise), **5** for wide broadband (imprecise), or **6** for the US (precise)] to specify the type of tone detection used on a Tone Detector circuit pack. Default is **1**.

- *Interdigit Pause*

  Enter short (5 to 30 ms) or long (20 to 20 ms) to specify the maximum length of the interdigit pause. Breaks lasting a shorter time than indicated in these ranges are bridged or ignored. Default is **short.**

Acceptable keywords include the following:

— 1-call-wait	— 2-call-wait
— 3-call-wait	— busy
— busy-verify	— call-wait-ringback
— conference	— confirmation
— disable-dial	— hold
— hold-recall	— immed-ringback
— intercept	— intrusion
— MCU-dial	— recall-dial
— recall-dont-ans	— redirect
— reorder	— rep-confirmation
— ringback	— secondary-dial
— whisper-page	— zip

The following list identifies the fields on Page 2 and the possible values:

- *Digital Loss Plan*

  Valid entries are 1 to 25 as described on the Country Code Table and indicate the values for digital loss plan and n-party conference loss.

- *Customize*

  Enter y to enable customization of the 2-party loss table.

- *From and To*

  Identify the variable digital loss values where the possible entries are **-3** to **15**. This unsigned number is a loss, while a number preceded by a minus sign is a gain.

The following list identifies the fields on Page 3 and the possible values:

- *Digital Tone Plan*

  Valid entries are **1** to **25** as described on the Country Code Table and indicate the values for tone loss for the selected country.

- *Customize*

  Enter **y** to enable customization of the 2-party loss table.

- *From and To*

  Identify the variable digital tone values where the possible entries are **-3** to **15**. This unsigned number is a loss, while a number preceded by a minus sign is a gain.

- *End-to-End total loss (dB) in a n-party conference*

  Valid entries are **0** to **99** where the higher the number listed for a call with a fixed display number of parties, the more loss the switch adds into a conference call with that number of parties; resulting in a quieter conference call.

Administering Network Facilities

All video calls connecting to the MCU are transported on Nx56k or Nx64k digital circuits. DS1 or UDS1 trunks must be used to connect the MCU to either a PBX or the public network (interexchange carrier or local exchange company). Provisioning the trunk parameters must be done in conjunction with ordering the network service, provisioning the network access facility, and provisioning call routing.

Defining New ISDN Services

The Network Facilities form allows you to define new ISDN services. The following command can be used with this form:

Table 19-2. ISDN-PRI Network Facilities Commands

Action	Object	Qualifier
change	isdn network-facilities	
display	isdn network-facilities	

Use the following procedure to change the Network-Facilities form when ISDN services are being used:

CAUTION:
Do not change this form unless instructed to do so by QPPCN or Avaya.

1. At the *command:* prompt, type **change isdn network-facilities** and then press RETURN.
2. Verify that the screen displays the Network-Facilities form.
3. From the *Name* field, use TAB and RETURN to advance to the fields you want to change.
4. When the form is completed, verify that the MT displays: *Command successfully completed* followed by *command:*
5. To verify the form, type **display isdn network-facilities** and then press RETURN.

Network Facilities Form

The following list shows the fields on the Network Facilities form and their related values.

- *Name*

  Specify the name of the indicated service/feature (up to 15 characters). Upper and lowercase characters are important; enter the name of the service or feature exactly as given.

- *Type*

  Value **0** indicates the associated entry is a feature. Value **1** indicates the associated entry is a service. Value **2** indicates an incoming call, and value **3** indicates an outgoing call.

- *Coding*

  Specify the encoding value of the associated feature or service.

Setting Network Service and Access Parameters

The trunk signaling used to access the network is a determining factor when subscribing to the network service and when planning the transfer rates to be supported. The MCU supports ISDN-PRI, Channel Associated Signaling (CAS), and Robbed-Bit Signaling (RBS) trunks. Based on the number of video ports configured, the MCU may have multiple T1 or E1 trunks. Based on the number of ISDN-PRI trunks configured, ISDN-PRI NFAS is supported for T1 trunks but not for E1 trunks, and D-channel backup features are supported domestically.

DS1 signaling is commonly categorized as RBS signaling (also known as out-of-band and common channel signaling). CAS signaling can be administered for the UDS1 TN2207 circuit pack with bit rate 2.048 and is the common channel signaling for E1 transmission facilities, which are used to facilitate international capabilities on the MCU.

NOTE:
CAS signaling can be used in a specific country only if it is approved there.

The TN2207 circuit pack does not support RBS.

In addition to this signaling type, other parameter settings on the DS1 or UDS1 circuit pack help determine what transmission speed is supported on the DS1 or UDS1.

The DS1 circuit pack provides a DS1 format, digital, multichannel interface between the MCU and T1 transmission facilities. Alternatively, the circuit pack can be directly connected to a local DS1 interface (behind a PBX or on a private network). The same is true for the UDS1 circuit pack, except that it can be used with both T1 and E1 transmission facilities. DS1 or UDS1 Trunk Service provides a set of digital trunks using the DS1 (TN767E) or UDS1 (TN2207) circuit pack that

support MCU communications. Digital interfaces are supported for the following types of trunks:

- ***ISDN-PRI***

  When the DS1 (UDS1) interface provides ISDN-PRI trunk group service, a TN767E DS1 (TN2207 UDS1) circuit pack can be used in conjunction with a TN794 NetPacket circuit pack. ISDN-PRI trunks provide end-to-end digital connectivity within the network and can provide national and international digital connectivity to other ISDNs that support the PRI standard. This mode of signaling supports 23 or 30 56k or 64k trunks for video transmission and one trunk for signaling.

- ***DS1 tie trunks***

  The TN767E DS1 circuit pack supports DS1 tie trunks in RBS mode. The RBS mode supports 24 trunks for transmission on the circuit pack because the least significant bit (robbed) in every sixth frame of data transmission is replaced by a signaling bit. This limits a trunk to support 56k bandwidth for each B-channel. The TN2207 DS1 circuit pack supports DS1 tie trunks in CAS mode.

- ***ISDN-BRI Trunk Interface***

  ISDN-BRI interfaces are supported by the TN2185 Trunk-side BRI circuit pack (for implementing the user-side of the BRI interface) and by the TN556B or TN556C ISDN-BRI Line circuit pack (for the network side of the BRI interface).

Administering DS1 or UDS1 Circuit Packs

DS1 circuit pack administration is required for all DS1 circuit packs that are installed in the MCU.

Two different types of DS1 circuit packs can be installed into the Avaya MCU, as follows:

- *TN767*

  This is a 24-channel DS1 that is used for data and voice in both non-ISDN and ISDN applications. This circuit pack can be used with both RBS and ISDN-PRI facilities. This circuit pack cannot be used whenever the ISDN-PRI over PACCON feature is administered.

- *TN2207*

  This is a 24- or 32-channel DS1 used for data and voice in non-ISDN and ISDN applications. This circuit pack is required whenever the ISDN-PRI over PACCON feature is administered. (Refer to "Administering ISDN-PRI over the NetPacket Circuit Pack" on page 2-84 for details.) The TN2207 circuit pack is also required for ESM installation. (Refer to "Administering the ESM from the MSM" on page 2-140 for details.)

The following table provides the commands that relate to the DS1 or UDS1 circuit pack.

Table 2-12. DS1 (UDS1) Circuit Pack Administration Commands

Action	Object	Qualifier
add	ds1	location*
change	ds1	location*
display	ds1	location*
list	measurements ds1[-log]	location*
remove	ds1	location*

* Where ***location*** is the DS1 (UDS1) circuit pack location obtained by entering the **list configuration all** command.

To administer parameters for the TN767E DS1 or TN2207 UDS1 circuit pack, follow these procedures:

1. At the *command:* prompt, enter **add ds1** ***location*** where ***location*** is the location of the TN767E DS1 or TN2207 UDS1 circuit pack in the carrier.
2. Verify that the screen displays the *DS1 Circuit Pack Form*.
3. Use TAB or RETURN to advance to the fields you want to change (refer to "DS1 (UDS1) Circuit Pack Form" on page 2-62 for a description of the fields and values).
4. Submit the form.
5. To verify the form, type **display ds1** ***location***.

DS1 (UDS1) Circuit Pack Form

The DS1 (UDS1) Circuit Pack form is used to administer parameters on the TN767E DS1 or TN2207 UDS1 circuit pack. The circuit pack must be installed before it can be administered.

Also, you must first administer a DS1 circuit pack before you can administer an access-endpoint that uses a DS1 circuit pack for connectivity. DS1 access endpoints connect to the MCU via non-signaled T1 or E1 facilities. Non-signaled endpoints connected to the MCU may be Multiplexers (MUXs), Digital Crosspoint Access Systems (DACSs), and/or H.320 direct T1/E1 codecs.

NOTE:
For more information on access endpoint administration, refer to "Administering Access Endpoints" on page 2-180.

When you are administering DS1s, ensure that both ends of the T1/E1 circuit are administered correctly. *If you have to make changes to the DS1 form, be sure to remove first all of the related administration forms, including the following: Signaling Group form, and Synchronization Plan form. Also, be sure to remove the trunk members that are associated with the DS1*.

NOTE:
Before you administer all of the translations that are associated with the DS1 circuit pack, it is recommended that you administer minimum translations and then test to see if the D-channel comes up at both ends.

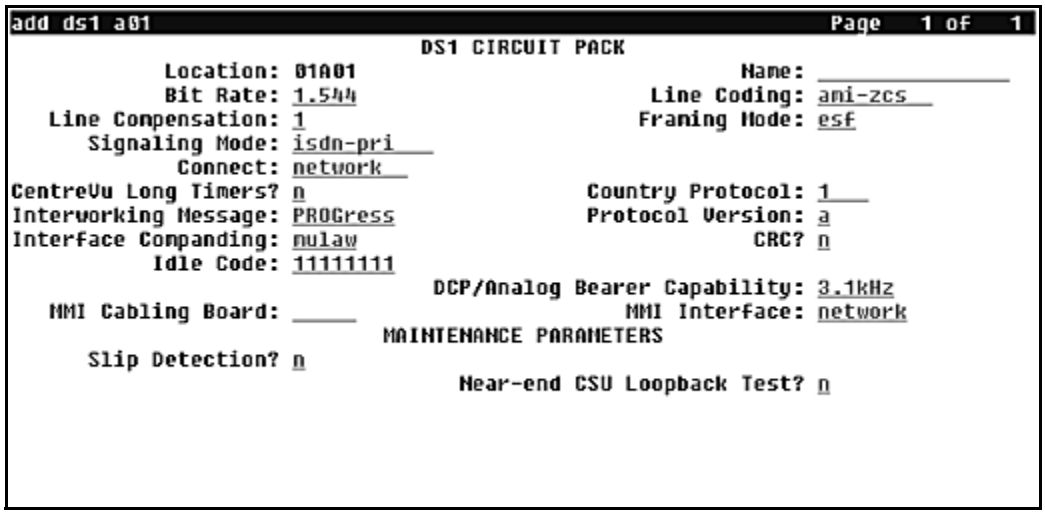


Figure 2-20. DS1 Circuit Pack Form—ISDN-PRI (Page 1 of 1)

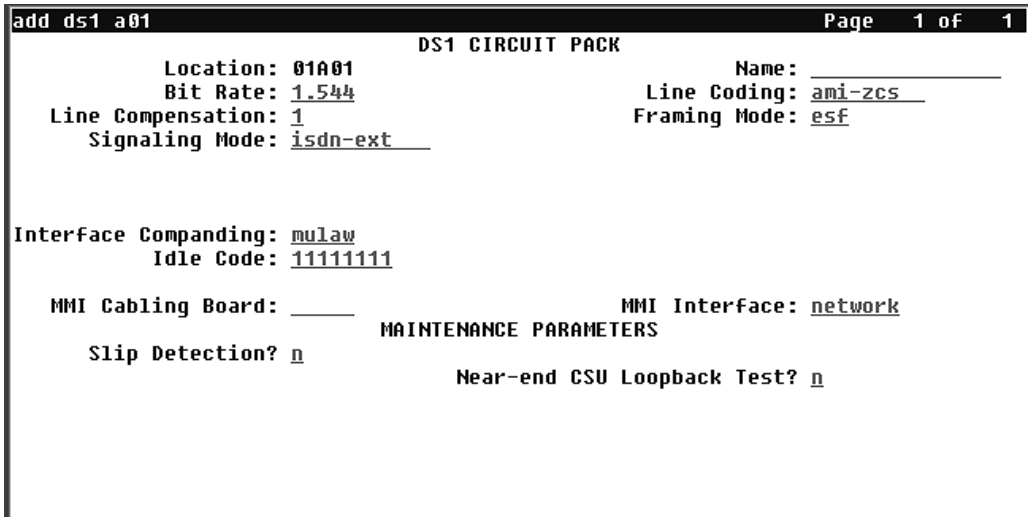


Figure 2-21. DS1 Circuit Pack Form (T1 Signaling and External D-Channel)

NOTE:
The *Slip Detection?* field should contain **y** for this variation of the form. Also, *Line Coding* contains **b8zs**. Whenever *Bit Rate* contains **2.048**, *Framing Mode* does not appear.

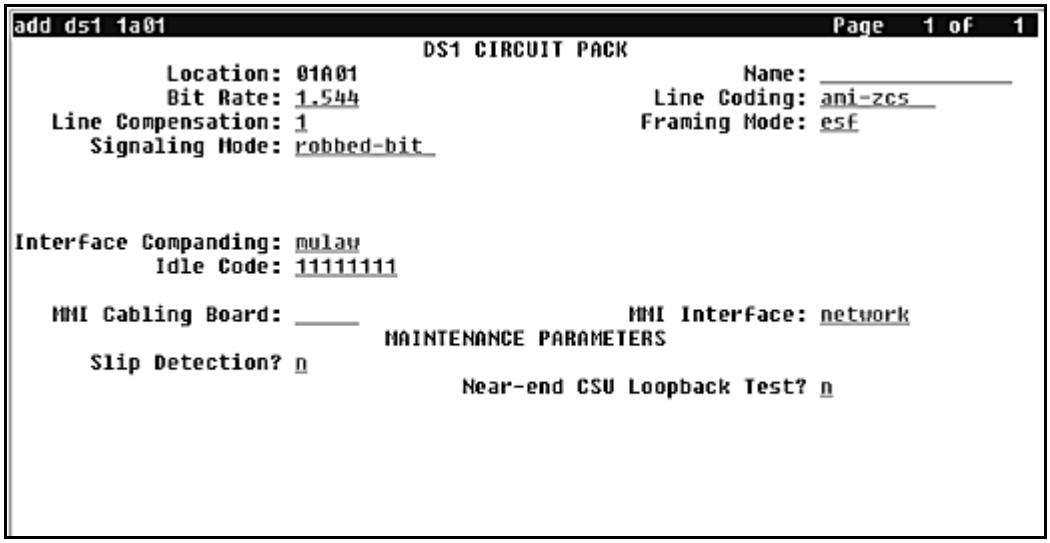


Figure 2-22. DS1 Circuit Pack Form (T1-RBS)

NOTE:
The *Slip Detection?* field must should contain **y** for this variation of the form.

```
add ds1 1a01                                          Page   1 of   1
                              DS1 CIRCUIT PACK
            Location: 01A01                          Name: _______________
            Bit Rate: 1.544                    Line Coding: ami-zcs
   Line Compensation: 1                        Framing Mode: esf
      Signaling Mode: isdn-pri
             Connect: network
CentreVu Long Timers? n                  Country Protocol: 1
Interworking Message: PROGress           Protocol Version: a
Interface Companding: mulaw                         CRC? n
           Idle Code: 11111111
                                 DCP/Analog Bearer Capability: 3.1kHz
   MMI Cabling Board: _____                    MMI Interface: esn
                           MAINTENANCE PARAMETERS
      Slip Detection? n
                                  Near-end CSU Loopback Test? n
```

Figure 2-23. DS1 Circuit Pack Form (ESM)

NOTE:
The *CRC?* field must contain **y** for this variation of the form. Also, it is recommended that the *Slip Detection?* field contain **y**. Finally, for international systems, *Country Protocol* must contain **1**.

The following list identifies the fields on Page 1 of the DS1 Circuit Pack form and the possible values.

NOTE:
Be sure to check the notes following the previous four figures regarding required or suggested values for some of the fields.

- *Location*

  This display-only field shows the location of the DS1 or UDS1 interface circuit pack. The first character identifies the network; the second character identifies the carrier; the third and fourth characters identify the slot number in the carrier; and the last two characters identify the circuit number.

- *Name*

  Enter the name of the DS1 or UDS1 link (up to 15 characters). This is usually the destination of the link (for example, **Access-Ept #2**).

- *Bit Rate*

  Enter **1.544** for the 24-channel DS1 or UDS1 rate. Enter **2.048** for the 30-channel DS1 rate.

  NOTE:
  If the field contains **2.048**, the *Framing Mode* field does not appear in the form.

- *Line Coding*

  This entry indicates which line coding format is used to ensure that the data meets T1- or E1-carrier requirements. For all bandwidths of 64k increments, enter **b8zs** for bipolar eight zero suppression. For a robbed-bit DS1 circuit pack, enter **ami-zcs** (also known as AMI). For 2.048 bit rates, enter **hdb3** or **ami-basic**. The selection must match the method used on the other end of the link. Value **b8zs**, **ami-basic**, or **ami-zcs** is allowed when *Bit Rate* is set to **1.544**.

  When the DS1 circuit pack is used for ISDN, the ISDN D-channel data is inverted when **ami-basic** or **ami-zcs** is entered, and it is not inverted when **b8zs** or **hdb3** is entered.

- *Line Compensation*

  Enter the appropriate number in the range of **1** through **5** as appropriate for the cable length. The cable length is one half the distance from the TN767E DS1 or TN2207 UDS1 circuit pack to the CSU.

  — **1** = 000 to 133 feet

  — **2** = 133 to 266 feet

  — **3** = 266 to 399 feet

  — **4** = 399 to 533 feet

  — **5** = 533 to 655 feet

  NOTE:
  This field appears only whenever *Bit Rate* contains **1.544**.

- *Framing Mode*

  The network type should indicate which choice is correct for the particular DS1/T1 span. Enter **d4** or **esf** to match the method used on the other end of the link. For bandwidths of 64k or greater, set this field to **esf**. For RBS, set this field to **d4.**

  NOTE:
  This field appears only whenever *Bit Rate* contains **1.544**.

- *Signaling Mode*

  For 56k increments, enter **robbed-bit**. For 56k or 64k increments, enter **isdn-ext.** This must match the other end of the circuit. Value **robbed-bit** supports in-band signaling, where 24 channels may be used for voice and the least significant bit of the eight-bit channel codes is “robbed” in every sixth frame to transmit signaling status. This value supports only 56k increments. For ISDN signaling, use **isdn-pri** if the DS1 trunk contains a D-channel. A total of 23 (T1) or 30 (E1) B-channels are provided on each circuit pack. Enter **isdn-ext** if NFAS is being used. ISDN extension signaling slaves off of another DS1 circuit pack for D-channel messages, and it allows all 24 DS0’s (T1) to be used as B-channels. NFAS using E1 (2.048k) can be supported between the MCU and a PBX for increased channel capacity if the PBX supports both E1 and the NFAS feature and if the MCU and PBX are connected back to back.

  NOTE:
  If NFAS is used with E1 (2.048) signaling, the 16th DS0 normally used for a D-Channel should never be used as a DS0. Skip over the 16th channel when administering the DS1.

  CAS signaling is the signaling mode for the international E1 (2.048) bit rate.

  NOTE:
  CAS can be used in a specific country only if it is available there.

- *Connect*

  This field appears only when **isdn-pri** is selected, and it specifies what is on the far end of the MCU in order to control Layer 3 protocol. Allowable entries are **network** and **pbx**. If the MCU is connected directly to the network, enter **network**. If the MCU is connected behind a PBX, enter **pbx**. Enter **line-side** to enable the switch to function as the network side of the ISDN-PRI.

- *CentreVu Long Timers*

  This field appears only when **isdn-pri** is selected, and is N/A for the MCU.

- *Interworking Message*

  This field appears only when **isdn-pri** is selected, and determines what message the switch sends when an incoming ISDN trunk call interworks (is routed over a non-ISDN trunk group). Possible values are **PROGress** (the typical setting) which asks the public network to cut through the B-channel and let the caller hear tones such as ringback or busy tone provided over the non-ISDN trunk and **ALERTing** which causes the public network in many countries to play ringback tone to the caller. Select this value only if the DS1 is connected to the public network, and it is determined that callers hear silence (rather than ringback or busy tone) when a call incoming over the DS1 interworks to a non-ISDN trunk.

- *MMI Cabling Board*

  This field displays the code for the MMI cabling board (for example, **01A10**). One MMI is required for each access endpoint using the 672k rate or higher.

- *Interface*

  This field appears only when the *Connect* field value is **pbx**. Values include **network** and **user**. Enter **network** to set the MCU to use the network end of the protocol. Enter **user** to set the MCU to use the protocol of the opposite end.

  NOTE:
  One end must be administered using **pbx/user**, the other end using **pbx/network**.

- *Country Protocol*

  This field appears if **isdn-pri** or **CAS** appears for *Signaling Mode*. The table at the end of this bullet list identifies the appropriate country code values, the associated country or region, and the protocol supported for each code.

  NOTE:
  If the field contains value **1**, **10**. **12**, **13**, or **99**, refer to the description for the *Protocol Version* field later in this list for additional administration.

- *MMI Interface*

  Possible values include **pac_esm** and **network** (default). A value of **network** indicates that the DS1 circuit pack is cabled to the H.221-MMI circuit pack. For access-endpoint DS1 connections, leave set to **network**. Value **pac_esm** indicates an ESM connection over the PACCON link.

- *Protocol Version*

  Enter **a**, **b**, or **c**, as appropriate. Refer to Table 2-13 on page 2-70. This field appears whenever the *Country* field on the Trunk Group form contains **1**, **10**, **12**, **13**, or **99**. Enter **a** for NI-1 and AT&T custom; enter **b** for NI-2. Enter **c** only when the country protocol is 1 (USA).

- *Interface Companding*

  Indicates the companding mode. Enter **mulaw** (default) for a domestic MCU; enter **alaw** whenever this is the required protocol.

  NOTE:
  This field appears only whenever a TN2207 circuit pack is being used.

- *CRC*

  Enter **y** to indicate that a cyclic redundancy check is to be performed on transmissions that the circuit pack receives.

- *Idle Code*

  Enter the 8-digit string (for example, **11111111**) to be sent out on idle DS0 channels. The string to be entered depends on the country where the trunk terminates. Default is **11111111** (US domestic setting).

- *DCP/Analog Bearer Capability*

  Displays when Signaling Mode is set to **isdn-pri**. This field is used to determine bearer capability encoding. Enter **3.1kHz** (default) or **speech**.

- *Slip Detection*

  Enter **y** to maintain a slip count record for each DS1 or UDS1 interface. The slip count determines if the T1- or E1-span is experiencing errors and, if so, the severity of the errors (type alarm).

- *Near-End CSU Type*

  Appears only when the DS1 circuit pack is a TN767E or later suffix model, *Bit Rate* is set to **1.544,** and *Country Protocol* is set to **1** (U.S.). Enter value **other** or **integrated**. Value **other** indicates that no CSU is attached to the DS1 facility or that the CSU is an external unit. No options are available for administering the CSU. Value **integrated** indicates that a 120A CSU module is attached to the DS1 circuit pack. This integrated CSU (ICSU) can accept software-administrable option downlinks and perform the enhanced ICSU functionality if the correct suffix of DS1 circuit pack (TN767E or later) is either administered via a Circuit Pack form or installed in the MCU. When you enter value **integrated**, a second page of the DS1 Circuit Pack form is available to administer CSU module options.

The following list identifies the fields on Page 2 of the DS1 Circuit Pack form and the possible values. Page 2 does not appear for all DS1 circuit packs. For those that support it, this page appears only when the value in the *Framing Mode* field is **esf** or the value in the *Near end CSU Type* field is **integrated**.

⚠ CAUTION:
Customers: Do not change fields on this page without assistance from Avaya or your network service provider.

- *Network Management Protocol*

  This field appears only if the Framing Mode is set to **esf**. The only valid entry, tabs, allows the data link to be remotely monitored.

- *Send ANSI-T1.403 One-Second Performance Reports*

  This field selects whether your DS1 circuit pack will send error reports to the far-end switch. These reports are useful for network management, and are sent at 1-second intervals when enabled. This field appears only if the Framing mode is set to esf. It is used only with circuit packs that have an integrated channel service unit (CSU). The default is **n** for no reports. Consult your Avaya representative if you think you may want to use these reports.

- *Far-end CSU Address*

  This field, which appears only if the Framing Mode field is set to **esf**, administers the transmit direction address used for the ESF data link command with both integrated and external channel service units (CSU). Valid entries are **a** and **b**; enter **b**.

Table 2-13. Country Protocols

Country Code	Country or Region	Protocol(s) Supported
1 - a	US and Canada	AT&T TR 41449/41459 (tested with AT&T network, Canadian network, and MCI network
1- b	US	Bellcore TR1268, NIUF.302, ANSI T1.607
1 - c	US	NORTEL DMS-250 BCS36/IEC01
2	Australia	AUSTEL TS014.1, Telecom Australia TPH 1856
3	Japan	NTT INS 1500
4	Italy	ETS 300 102
5	Netherlands	ETS 300 102
6	Singapore	ETS 300 102
7	Mexico	ETS 300 102
8	Belgium	ETS 300 102
9	Saudi Arabia	ETS 300 102
10 - a	United Kingdom	ETS 300 102 (for connection to DASS II/DPNSS through external converter)
10 - b	United Kingdom	ETS 300 102 (Mercury), British Telecom ISDN 30
11	Spain	Telefonica ISDN Specification
12 - a	France	VN4 (French National PRI)

Table 2-13. Country Protocols — *Continued*

Country Code	Country or Region	Protocol(s) Supported
12 - b	France	ETS 300 102 modified according to P10-20, called Euronumeris
13 - a	Germany	FTZ 1 TR 6 (German National PRI)
13 - b	Germany	ETS 300 102
14	Czech Republic, Slovakia	ETS 300 102
15	Russia (CIS)	ETS 300 102
16	Argentina	ETS 300 102
17	Greece	ETS 300 102
18	China	ETS 300 102
19	Hong Kong	ETS 300 102
20	Thailand	ETS 300 102
21	Macedonia	ETS 300 102
22	Poland	ETS 300 102
23	Brazil	ETS 300 102
98	National ISDN	ETS 300 102
ETSI - a	Europe, New Zealand, etc.	ETS 300 102
ETSI - b		ETS 300 102

Providing a Synchronization Plan

The Synchronization Plan form is used to assign primary and secondary external synchronization sources. It provides synchronization between the MCU and the digital facilities it uses. For details, refer to "Administering Synchronization" on page 2-190.

Administering Data Communications

For configurations that include an MCU-ST, various terminals, system printer, or the PC-based CRCS, use the procedures in the following sections.

Establishing Network Control Channel Data Modules

Network control (netcon) channel data modules provide asynchronous circuit-switched interfaces for the following: maintenance and administration terminals, system printer, CRCS, OpCenter, and CDR. These data modules are integrated into the TN777 Network Control circuit pack. You should assign four netcon data modules. Use the Data Module form to establish network control channel data modules.

NOTE:
Once you administer the netcon data modules, you must administer a hunt group with the four netcon data module extensions to provide a common number for access to the netcon channels.

The following commands relate to the data modules:

Table 23-3. Netcon Channel Data Module Administration Commands

Action	Object	Qualifier
add	data-module	xxxx (extension or next)
change	data-module	xxxx (extension)
display	data-module	xxxx (extension) print or schedule
list	data-module	starting extension number or count or print or schedule
remove	data-module	starting extension number or count or print or schedule

Use the following procedure to establish network control channels:

1. At the *command:* prompt, type **change data-module xxxx** and then press RETURN.
2. Verify that the screen displays the Data Module form.
3. From the *Type* field, use TAB and RETURN to advance to the fields you want to change.
4. When the form is completed, verify that the MT displays: *Command successfully completed* followed by *command:*
5. To verify the form, type **display data-module xxxx** and then press RETURN.

Data Module Form (Netcon Channels)

The Data Module form for establishing network control channels appears as follows:

NOTE:
Be sure to save translations on a regular basis to prevent loss of translations if system either loses power or resets with level 3 or higher.

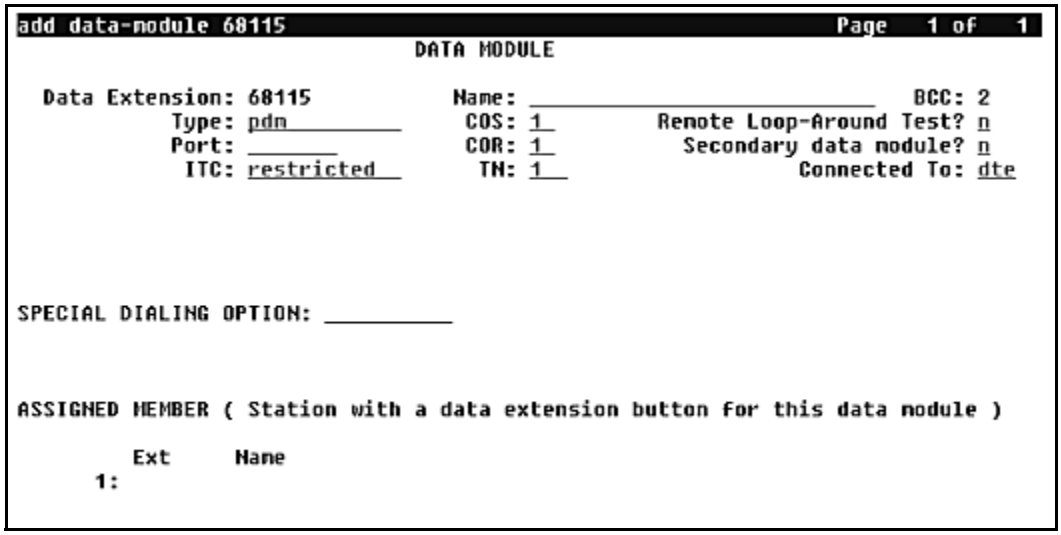


Figure 2-24. Data Module Form (Netcon Channels)

The following list identifies the fields on the Data Module form and the possible values.

- *Data Extension*

  This display-only field provides the extension assigned to the data module.

- *BCC*

  This display-only field provides the Bearer Capability Class (BCC) whenever ISDN-PRI is enabled on the Customer-Options form.

- *Type*

  Enter **netcon**.

- *ITC* (Information Transfer Capability) — Used to administer the type of traffic (restricted, unrestricted, or both) that is allowed to be carried by this routing preference. For value **rest** (restricted), only calls originating from restricted endpoints may access this route pattern. For value **unre** (unrestricted), only calls originating from unrestricted endpoints may access this route pattern. For value **both**, calls originating from both restricted and unrestricted endpoints may access the route pattern.

- *TN*

  N/A for the MCU. Leave the default value **1**.

- *Physical Channel*

  Enter the two-digit circuit number of the netcon port (**01** through **04**).

- *Ext*

  N/A for the MCU. Leave the default value **restricted**.

- *Name*

  Enter a string containing a maximum of 27 characters to identify the group (for example, **NETCON #2**).

- *COS*

  Enter the desired Class of Service. Leave at default value **1**.

- *COR*

  Enter the desired Class of Restriction. Leave at default value **1**.

- *Maintenance Extension*

  The maintenance extension is not used by the MCU; however, it must be administered when you are adding netcon channels.

  Enter an extension number that accommodates a number sequence vis-a-vis the value in the *Data Extension* field. For example, if the *Data Extension* field contains a value ranging from “6881” through “6884” for netcon ports “01” through “04,” enter a value ranging from **6885** through **6888** into the *Maintenance Extension* field for the four netcon ports.

- *Ext*

  N/A for the MCU. Leave blank.

- *Name*

  N/A for the MCU. Leave blank.

- *ethernet*

  Description goes here.

- *ppp*

  Description goes here.

- *wcbri*

  Description goes here.

Assigning Hunt Groups

Once you administer the netcon data modules, you must administer a hunt group. This hunt group allows you to dial one number to answer multiple calls. By including the four netcon channels that you previously administered, any of the netcon data modules that are not in use can be used by remote G3-MT terminals, Standalone OpCenterSP, or CRCS to access the MCU

Whenever it is answering calls, the system checks for the busy or idle status of extension numbers in a hunt group. For the Uniform Call Distribution (UCD) type, the system selects the “most idle” extension in the group when it is answering a new call. For the Direct Department Calling (DDC) type, the system selects the first available extension (in the administered sequence) when answering a new call.

NOTE:
This is the only hunt group that should be administered on the MCU.

Table 24-4. Hunt Group Administration Commands

Action	Object	Qualifier
add	hunt-group	1-32 or next
change	hunt-group	1-32
display	hunt-group	1-32, print or schedule
list	hunt-group	print or schedule
remove	hunt-group	1-32

Use the following procedure to add the hunt groups:

1. At the *command:* prompt, type **add hunt-group x** and then press RETURN.
2. Verify that the screen displays the Trunk Group form.
3. From the *Group Extension* field, use TAB and RETURN to advance to the fields you want to change.
4. When the form is completed, verify that the MT displays: *Command successfully completed* followed by *command:*
5. To verify the form, type **display hunt-group x** and then press RETURN.

Hunt Group Form

An example of page 1 of the Hunt Group form appears as follows.

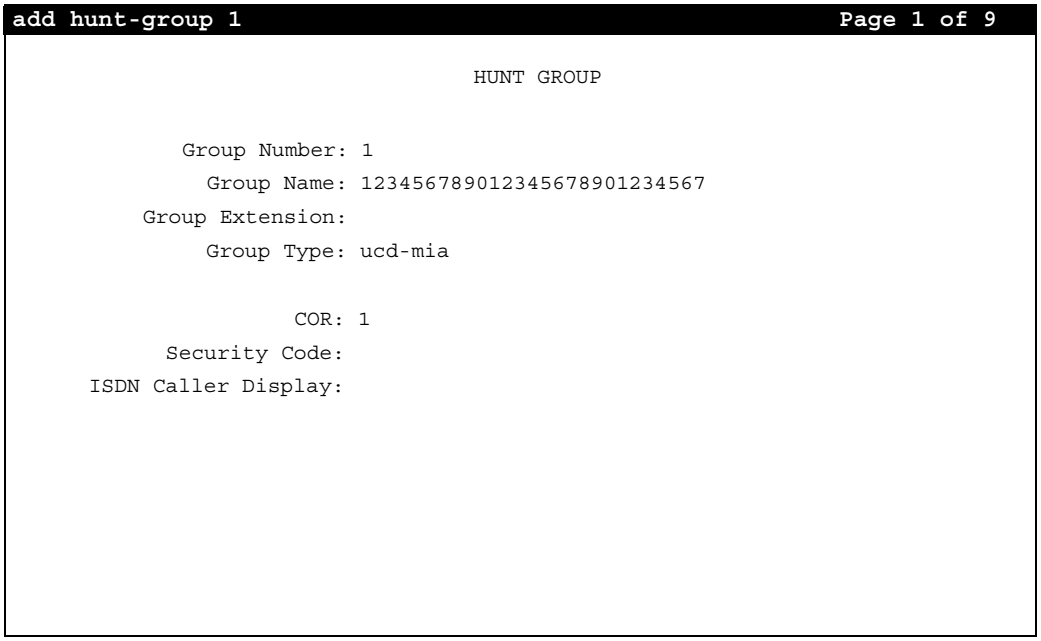


Figure 2-25. Hunt Group Form (Page 1)

The following list identifies the fields on the Hunt Group form and their related values:

Hunt Group Form, Page 1 of 6

- *Group Number*

  Displays the hunt group number (**1** through **75**).

- *Group Extension*

  Enter an unused extension number (including one to five digits) to be assigned to the associated hunt group.

- *Group Type*

  Values include **ddc** and **ucd-mia**.

- *Group Name*

  Enter a 27-character string to identify the group (for example, **remote admin**).

- *Security Code*

  N/A for the MCU. Leave blank.

- *COR*

  Indicates the Class of Restriction. Leave at the default value **1**.

- *ISDN Caller Disp*

  Leave this field blank.

Hunt Group Form, Pages 2 through 9

- *Ext (1: through 4:)*

  Enter the extension for each of the four netcon channel data modules that you previously administered in the Data Module form.

  NOTE:
  Do not use the maintenance extension numbers as members of the hunt group.

- *Name*

  This field is automatically populated with the names administered for the respective data-module extensions identified in the Data Module form after form is submitted.

Establishing Administered Connections

For the MCU-ST and CRCS, use the Administered-Connection form to establish a connection that is automatically reestablished whenever the MCU is restarted. An example of the form appears as follows.

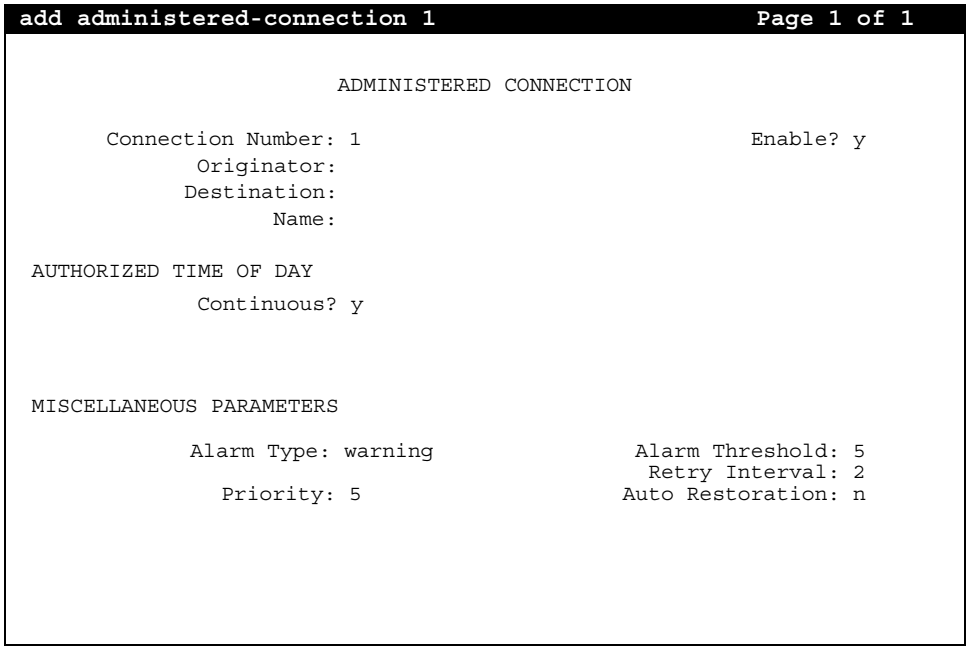


Figure 2-26. Administered Connection Form

The following commands can be used to administer connections:

Table 2-14. Administered-Connection Administration Commands

Action	Object	Qualifier
add	administered-connection	1-600 or next
change	administered-connection	1-600 or next
display	administered-connection	1-600, next, print or schedule
duplicate	administered-connection	1-600 or next
list	administered-connection	1-600 or next
remove	administered-connection	1-600, count, print or schedule

Use the following procedure to establish administered connections:

1. At the *command:* prompt, type **add administered-connection x** and then press RETURN.
2. Verify that the screen displays the Administered-Connection form.
3. From the *Enable* field, use TAB and RETURN to advance to the fields you want to change.

4. When the form is completed, verify that the MT displays: *Command successfully completed* followed by *command:*
5. To verify the form, type **display administered-connection x** and then press RETURN.

Administered-Connection Form

The following list identifies the fields on the Administered-Connection form and their related values:

- *Connection Number*

  This display-only field shows the Administered-Connection number.

- *Enable*

  Enter **y** to indicate that an attempt will be made to establish the administered connection whenever the MCU is restarted or the connection is due to be active. The default is **y**.

- *Originator*

  Enter the assigned extension of the originating access endpoint or data endpoint. The endpoint is a 7400B data module, the MCU-MT, the MCU-ST or CRCS. This endpoint must be local to the MCU. The default is blank.

- *Destination*

  Enter the address of the destination access or data endpoint (**0** through **9)**. This endpoint does not have to be local to the MCU. If a local endpoint is entered, it must be assigned to either an access or data endpoint. Up to 36 characters can be entered. The default is blank.

  NOTE:
  A FAC is restricted to AAR, ARS, and CDR account code dialing.

- *Name*

  Enter an optional name (up to 15 characters) for the connection, such as **MCU-ST.**

- *Continuous*

  Enter **y** if the administered connection is enabled whenever the MCU is restarted. Enter **n** if you want to schedule the connection to be active only during certain times. If you enter **n**, the following three fields are displayed.

- *Start Days (Sun through Sat)*

  Displays only when **n** is entered in the *Continuous* field. Enter a **y** in each day you want to establish the administered connection; otherwise, enter n. If you enter **y**, the administered connection begins on the day specified and continues for the duration set in the *Duration* field.

- *Start TIme*

  Displays only when **n** is entered in the *Continuous* field. Enter the time of day when an attempt to make the connection should occur. Valid entries are **00:00** to **23:59**. The default is **00:00**.

- *Duration*

  Displays only when **n** is entered in the *Continuous* field. Enter the period of time that the scheduled administered connection should remain active. The maximum duration is one minute less than a week. Valid entries are **000** through **167** for hours, **00** through **59** for minutes. The default is **000:00**.

- *Alarm Type*

  Enter the type of alarm to be generated if the administered connection cannot be established or fails and cannot be reestablished and the number of failures equals the alarm threshold. The valid entries are **major**, **minor**, **warning**, or **none**. The default is **warning**.

- *Alarm Threshold*

  Enter the number of times an attempt to establish or reestablish a connection should be tried before an alarm is raised. Valid entries are **1** through **10.** The default is **5**.

- *Retry Interval*

  Enter the number of minutes between attempts to establish or reestablish the connection. Valid entries are **1** through **60**. The default is **2**.

- *Auto Restoration*

  Enter value **y** to indicate that an attempt will be made to reestablish an AC that failed. Auto Restoration is available only for an AC that is established over an ISDN Software Defined Data Network (SDDN) trunk group. Value **y** (default) is ignored in all other situations.

Administering ISDN D-Channels

ISDN-PRI forms provide end-to-end digital connectivity instructions and support a wide range of services, including voice and non-voice services, to which users have access by a limited set of ITU-T-defined, standard multipurpose user-network interfaces.

Administering Signaling Groups

The MCU requires an interface between the ISDN-PRI D-channel and the MCU processor. To accomplish this, the MCU supports two types of signaling groups.

The Facility-Associated Signaling (FAS) interface allows a D-channel to convey signaling information for B-channels that are located on the same DS1 facilities as the one containing the D-channel. The Non-Facility Associated Signaling (NFAS) interface allows a D-channel to convey signaling information for B-channels that

are located on DS1 facilities other than the one containing the D-channel. With NFAS, the signaling group does not necessarily correspond to a single DS1 interface. (NFAS is currently not supported for E1 trunks.)

NFAS provides a backup D-channel on a separate PRI facility for the NFAS D-channel group. With NFAS, failure of the primary D-channel causes automatic transfer of call-control signaling to the backup D-channel. In such a case, the backup D-channel becomes the primary D-channel. When the failed channel returns to service, it becomes the backup D-channel.

NOTE:
D-Channel backup is not supported internationally for the E1 2.048 bit rate.

The Signaling Group form identifies groups of ISDN DS1 interface B-channels for which a given D-channel or D-channel pair will carry associated signaling information. A maximum of 26 signaling groups at a time can be administered.

The following table lists the commands that can be used with the Signaling Group form.

Table 2-15. Signaling Group Commands

Action	Object	Qualifier
add	signaling-group	1-30 or next
change	signaling-group	1-30
display	signaling-group	1-30, print, or schedule
list	signaling-group	1-30, print, or schedule
remove	signaling-group	1-30

To specify a signaling group, follow these procedures:

1. At the *command:* prompt, enter **add signaling-group *x*** where ***x*** is the signaling group number (**1** through **30**) or **next**.
2. Verify that the screen displays the *Signaling Group* form (refer to "Signaling Group Form" on page 2-82 for a list of fields and values).
3. Use TAB or RETURN to advance to the fields you want to change.
4. Submit the form.
5. To verify the form, enter **display signaling-group *x***.

Signaling Group Form

Two variations of the Signaling Group form appear as follows:

```
add signaling-group 30                                    Page   1 of   5
                              SIGNALING GROUP

Group Number: 30                    Group Type: isdn-pri
                      Associated Signaling? y      Max number of NCA TSC: 0
                         Primary D-Channel: _____  Max number of CA TSC: 0
                                                   Trunk Group for NCA TSC: ___
          Trunk Group for Channel Selection: ___
             Supplementary Service Protocol: a
```

Figure 2-27. Signaling Group Form (Option without NFAS)

```
add signaling-group next                                  Page 1 of 5

                              SIGNALING GROUP

Group Number: 1    Associated Signaling? n     Max number of NCA TSC: 0
                      Primary D-Channel: _____  Max number of CA TSC: 0
                    Secondary D-Channel:     Trunk Group for NCA TSC: _
         Trunk Group for Channel Selection: 99
            Supplementary Service Protocol: a

        Trunk Brd    Interface ID       Trunk Brd    Interface ID
        1: _____          ___           11: _____         ___
        2: _____          ___           12: _____         ___
        3: _____          ___           13: _____         ___
        4: _____          ___           14: _____         ___
        5: _____          ___           15: _____         ___
        6: _____          ___           16: _____         ___
        7: _____          ___           17: _____         ___
        8: _____          ___           18: _____         ___
        9: _____          ___           19: _____         ___
       10: _____          ___           20: _____         ___
```

Figure 2-28. Signaling Group Form (Option with NFAS)

The following list identifies the fields on the Signaling Group form and their related values.

- *Group Number*

  This is a display-only field that provides the signaling group number used as a qualifier in the commands listed in the previous table.

- *Group Type*

  This is a display-only field that provides the signaling group type selected.

- *Associated Signaling*

  Enter **n** to indicate NFAS; enter **y** to select FAS. (With FAS, the D-channel can carry signaling information only for B-channels on the same DS1 circuit pack. FAS is used for all E1 trunks.)

- *Max Number of NCA TSC*

  N/A for the MCU. Leave this field set to **0**.

- *Primary D-Channel*

  Enter up to six characters for the port number associated with the DS1 or UDS1 interface circuit pack port. For the DS1 circuit pack, port number 24 is used to assign the primary D-channel in the signaling group; for the UDS1 circuit pack, port 16 is used for the same purpose. Both FAS and NFAS are always the 24th port on the DS1 interface circuit pack.

  NOTE:
  An ESM DS1 port (if present) should not be administered as the primary D-channel.

- *Max Number of CA TSC*

  Leave this field set to **0**.

- *Secondary D-channel*

  When NFAS is selected, this field is displayed. Enter up to six characters for the port number associated with the DS1 interface circuit pack port used for secondary D-channel signaling.

  NOTE:
  An ESM DS1 port (if present) should not be administered as the secondary D-Channel.

- *Trunk Group for NCA TSC*

  This field is not used.

- *Trunk Group for Channel Selection*

  Enter the assigned trunk group number. (An ISDN-BRI trunk group may not be used.) Values include **1** through **99** and blank (default).

- *Supplementary Service Protocol*

  Enter **a** if AT&T Non-Call Associated Temporary Signaling Connections (NCA-TSCs) are being sent over the interface. Value **b** is not used for the MCU.

- *Trunk Brd*

  When using NFAS, enter a four-character DS1 interface circuit pack number that has trunk members belonging to this Signaling Group. The four characters are the port network number, carrier letter, and two-digit slot number (**01** through **18**). The default is blank.

  NOTE:
  An ESM DS1 circuit pack (if present) should not be administered as the primary D-Channel.

- *Interface ID*

  When using NFAS, enter an interface ID (**0** through **31**) for the corresponding DS1 interface circuit pack. The interface ID is referenced by both ends to determine which B-channel is to be used to establish a call; therefore, the interface ID numbers on both ends must be the same. The 4ESS™ switch must start with *Trunk Brd* 1 (which should be the primary D-channel) ID 0. If a secondary D-channel is used, it should be *Trunk Brd* 2 ID 1.

  NOTE:
  Pages 2 through 5 are not used.

Administering ISDN-PRI over the NetPacket Circuit Pack

The MCU supports ISDN-PRI over the NetPacket circuit pack (TN794). This increases the number of PRI links that are supported on the MCU. The TN2207 UDS1 circuit pack is required for this feature.

Maintenance-Related System Parameters Form

An example of the Maintenance-Related System Parameters form appears as follows:

```
change system-parameters maintenance                          Page   1 of   4
                  MAINTENANCE-RELATED SYSTEM PARAMETERS

OPERATIONS SUPPORT PARAMETERS
            Product Identification: 1234567890
       First OSS Telephone Number: _________________   Abbrev Alarm Report? y
      Second OSS Telephone Number: _________________   Abbrev Alarm Report? n
  Alarm Origination to OSS Numbers: neither
       Cleared Alarm Notification? n                 Suspension Threshold: 5
             Restart Notification? n
          Test Remote Access Port? n
       CPE Alarm Activation Level: none
       Sch Adj Alarm Activation Level: none

     Customer Access to INADS Port? y
       Repeat Dial Interval (mins): 7
SCHEDULED MAINTENANCE
                  Start Time: 01 : 00                 Stop Time: 06 : 00
           Daily Maintenance: daily              Save Translation: daily
```

Figure 2-29. Maintenance-Related System Parameters Form (Page 1)

```
change system-parameters maintenance                          Page   2 of   4
                  MAINTENANCE-RELATED SYSTEM PARAMETERS

MINIMUM MAINTENANCE THRESHOLDS ( Before Notification )
        TTRs: 4      CPTRs: 1      Call Classifier Ports: 0



ISDN MAINTENANCE
   ISDN-PRI Test Call Extension: 68937   ISDN-BRI Service SPID: __________

DS1 MAINTENANCE
   DS0 Loop-Around Test Call Extension: _____

SPE OPTIONAL BOARDS
                     Packet Intf1? y     Packet Intf2? y
```

Figure 2-30. Maintenance-Related System Parameters Form (Page 2)

```
change system-parameters maintenance                          Page   3 of   4
                    MAINTENANCE-RELATED SYSTEM PARAMETERS

          Modem Connection: internal
                 Data Bits: 8
                    Parity: none
```

Figure 2-31. Maintenance-Related System Parameters Form (Page 3)

```
change system-parameters maintenance                          Page   4 of   4
                    MAINTENANCE-RELATED SYSTEM PARAMETERS


IP MEDIA PACKET PERFORMANCE THRESHOLDS
   Roundtrip Propogation Delay (ms)    High: 800      Low: 400
                    Packet Loss (%)    High: 40       Low: 15
                    Ping Test Interval (sec): 20
   Number of Pings Per Measurement Interval: 10
```

Figure 2-32. Maintenance-Related System Parameters Form (Page 4)

The fields on the Maintenance-Related System Parameters form are defined in the following paragraphs. Specific entries can be obtained from the Avaya TAC, technical consultant (if available), and/or the customer.

Page 1: **Operations Support Parameters Area**

- *Product Identification*

  Identifies the MCU to an Operations Support System (OSS), such as INADS or System Network Management Protocol (SNMP). This field must be populated if you want to make changes to this form. The number must start with “1” and contain ten digits.

- *First OSS Telephone Number*

  The first number that the MCU uses for alarm origination. This number can also be used to dial a telephone number when an alarm is raised on the MCU. The number must be obtained from the National Customer Support Center (NCSC) or the Technical Support Center (TSC). Characters # and * are not allowed in the telephone number.

- *Abbrev Alarm Report*

  Enables the Abbreviated Alarm Report feature for the first OSS. Default is **y**.

- *Second OSS Telephone Number*

  The second number that the MCU uses for alarm origination. This number can also be used to dial a telephone number when an alarm is raised on the MCU. The number must be obtained from the National Customer Support Center (NCSC) or the Technical Support Center (TSC). Characters # and * are not allowed in the telephone number.

- *Abbrev Alarm Report*

  Enables the Abbreviated Alarm Report feature for the second OSS. Default is **y**.

- *Alarm Origination to OSS Numbers*

  Indicates one of four options for alarm origination. If this field is set to any value other than **neither** (default), the craft login has a 30-minute inactivity timeout.

  — For value **both**, all major and minor alarms result in an automatic call to both OSS telephone numbers. Both OSS telephone numbers must be administered.

  — For value **first-only**, all major and minor alarms result in an automatic call to the first OSS number only. The switch does not call the second OSS telephone number even if the number is administered. The first OSS telephone number must be administered.

  — For value **neither**, alarm origination does not take place. Warning alarms are not reported to either numbers.

— For value **second-as-backup**, all major and minor alarms result in an automatic call to the first OSS telephone number. If calling the first OSS telephone number fails four attempts, the switch starts to call the second OSS telephone number as a backup until calling the first OSS telephone number becomes successful. Both OSS telephone numbers must be administered.

- *Cleared Alarm Notification*

  Enables the MCU to originate a call to the alarm receiver and sends an alarm resolution message whenever all previously reported major and minor alarms are resolved. Alarm origination must be activated for *Cleared Alarm Notification* to work. Values include **y** and **n**.

- *Restart Notification?*

  Generates an automatic call to the OSS number if the MCU has a restart. Values include **y** and **n**

- *Test Remote Access Port*

  Indicates whether to test the remote access port on the Processor circuit pack.

- *CPE Alarm Activation Level*

  Indicates the level at which the customer premises equipment (CPE) alarm is activated. If the level is set to **major**, the CPE alarm is activated only on major alarms. If the level is set to **minor**, the CPE alarm is activated for both major and minor alarms. If the level is **warning**, the CPE alarm is activated for all alarms. If the level is set to **none**, the CPE does not activate for any alarm.

- *Sched Adj Alarm Activation Level*

  SCH-ADJ allows the MCU to originate an alarm to the alarm center whenever CRCS fails to communicate with the MCU for a given time period. This halt in communication may occur if the user powers down the CRCS, or if a problem occurs within the CRCS PC. If the user has a CRCS connected to the MCU, the CRCS logs into the MCU once every hour to display the time (this represents an attempt to synchronize the data and time for the MCU and CRCS). Once the CRCS logs into the MCU, the MCU knows that the CRCS is active. If, within the hour, the CRCS does not log into the MCU, an error is logged against SCH-ADJ. If the CRCS does not log into the MCU for three consecutive hours, an alarm is raised.

  Values for this field include **major**, **minor**, **warning**, and **none** (default). Only major or minor alarms automatically notify the alarm center.

- *Customer Access to INADS Port*

  Allows the user to prohibit access to system administration and maintenance interface via the INADS port when using customer login ID's. This field can be activated only by Avaya services via system-parameters maintenance administration. Values include **y** and **n** (default).

Page 1: Scheduled Maintenance Area

- *Start Time*

  Indicates the hour and minute the daily scheduled maintenance actions start. Enter a number from **0** to **23** for hours and **0** through **59** for minutes. The scheduled maintenance actions are: daily maintenance and save translation

- *Stop Time*

  Indicates the hour and minute when scheduled daily maintenance will stop running. If any daily maintenance operations are not completed by this time, the system notes where in the sequence it stopped, and it performs those operations during the next scheduled daily maintenance.

- *Daily Maintenance*

  Displays the status **daily** to indicate the maintenance tests are automatically run each day. This value cannot be changed.

- *Save Translation*

  Indicates if the MCU translation data should be automatically backed up on a specified day of the week (**sunday**, **monday**, etc.) all week (**daily**), or not at all (**no**).

Page 2: **Minimum Thresholds Area**

- *TTRs*

  Shows the minimum number of touchtone receivers (**1** through **200**) administered in the MCU. If fewer than this number are in service, a warning alarm is raised. Enter value **8** for each TN744 Call Classifier circuit pack in the MCU.

- *CPTRs*

  Shows the minimum number of call progress tone receivers (**1** through **200**) administered in the MCU. If fewer than this number are in service, a warning alarm is raised. Enter value **8** for each TN744 Call Classifier circuit pack in the MCU.

- *Call Classifier Ports*

  Shows the minimum number of call classifiers (**1** through **200**) administered in the MCU. If fewer than this number are in service, a warning alarm is raised. Enter value **8** for each TN744 Call Classifier circuit pack in the MCU.

Page 2: ISDN Maintenance Area

- *ISDN-PRI Test CALL extension*

  Defines the extension number for an ISDN test call. This test allows a far-end ISDN node to test the ISDN-PRI trunks between the far end and the MCU. Enter an unassigned DNIS extension number.

- *ISDN-BRI Service SPID*

  N/A for the MCU. Leave blank.

- *DS0 Loop-Around Test Call Extension*

  Indicates the extension used by the network service provider to set up a DS0 loop-around connection for testing non-ISDN DS1 trunks.

  This feature is used primarily for testing DS0 channels associated with non-ISDN-PRI trunks. The loop-around is activated by dialing the test extension number. Multiple DS0 Loop-Around connections can be set up by placing multiple calls to the loop-around extension.

  For more information, refer to the information about Facility Test Calls in the maintenance document for your system.

- *SPE OPTIONAL BOARDS*

  Specify if there is a packet interface 1 or 2.

Page 3:

- *Modem Connection*

  Indicates the type of modem connection. Values are **internal**, **external**, and **none**. Value cannot be **none** if *Alarm Origination to OSS Numbers* is enabled.

- *Data Bits*

  Enter the number of data bits. Values include **7** and **8**.

- *Parity*

  Display-only field. Value is **none**.

Page 4: Media Packet Performance Thresholds

- *Roundtrip Propogation Delay (ms)*

  Specify the high and low delay thresholds in milliseconds.

- *Packet Loss (%)*

  Specify the high and low thresholds for packet loss as a percentage.

- *Ping Test Interval (sec)*

  Set the interval in seconds for the ping test.

- *Number of Pings Per Measurement Interval*

  Set the number of pings per measurement interval.

Administering Direct Connect Endpoints

The BRI/DCP Direct Connect feature allows endpoints to connect directly to the MCU via ISDN-BRI and/or Digital Communications Protocol (DCP). A maximum of 36 Direct Connect endpoints can be supported simultaneously on the MCU. This total can include up to 36 BRI Direct Connect endpoints but no more than four DCP Direct Connect endpoints.

To administer Direct Connect endpoints, complete the fields in the forms identified in the following table. Appropriate page references to the forms are provided. Detailed instructions for completing the forms are provided after the table

Table 2-16. Required Forms and Fields for Direct Connect

Form	Field	Page Reference
Customer-Options	■ *Max. BRI Direct Connect Port Capacity* ■ *Max. DCP Direct Connect Port Capacity*	2-35
Data Module	■ Refer to the “Data Module Form (7500 Data Module)” section.	2-91

Customer-Options Form

Access the Customer-Option form by entering **change system-parameters customer-options**. For BRI connectivity, enter the maximum number of BRI ports that can be allocated in the system at the same time into the *Max. BRI Direct Connect Port Capacity* field (for this release, enter **0**, **12**, **24**, or **36**). For DCP connectivity, enter the maximum number of DCP ports that can be allocated in the system at the same time into the *Max. DCP Direct Connect Port Capacity* field (for this release, enter **0** or **36**). Then submit the form.

Data Module Form (7500 Data Module)

The 7500 data module provides support for ISDN-BRI Direct Connect endpoints via one or more TN556 ISDN-BRI circuit packs. Each ISDN-BRI terminal that is supported by the system has an associated Data Module form administered.

Each TN556 circuit pack supports a maximum of 12 Direct Connect ISDN-BRI endpoints. The MCU can support a maximum of three of these circuit packs and, therefore, a maximum of 36 BRI Direct Connect endpoints. The 7500 data module supports SPID initialization capabilities.

The following table gives the commands that relate to the 7500 data module.

Table 2-17. 7500 Data Module Administration Commands

Action	Object	Qualifier
add	data-module	xxxx (extension or next)
change	data-module	xxxx (extension)
display	data-module	xxxx (extension), print, or schedule
list	data-module	starting extension number, count, print, or schedule
remove	data-module	xxxx (extension)

To add a 7500 data module to provide a Direct Connect interface, follow these procedures:

1. At the *command:* prompt, enter **add data-module *xxxx***.
2. Verify that the screen displays the *Data Module* form (refer to the following list for a list of the fields and their values).
3. Use TAB or RETURN to advance to the fields you want to change.
4. Submit the form.
5. To verify the form, enter **display data-module *xxxx***.

The following list identifies the fields on the Data Module form and the possible values.

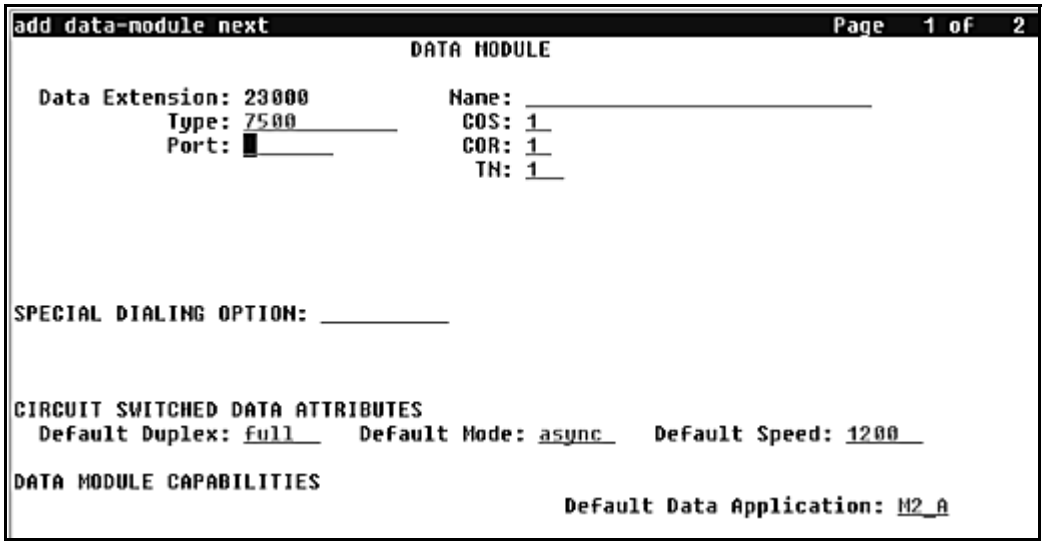


Figure 2-33. Data Module Form (7500), Page 1

Page 1:

- *Data Extension*

  This display-only field provides the extension assigned to the data module.

- *Type*

  Enter value **7500** for BRI Direct Connect endpoints.

- *Port*

  Enter the seven character port location for this endpoint.

- *Name*

  Enter a string containing a maximum of 27 characters to identify the group (for example, **BRI-EPT#1**).

- *COS*

  For the Class of Service, enter or leave the default value of **1**.

- *COR*

  For the Class of Restriction, enter or leave the default value of **1**.

- *TN*

  The Tenant Partition Number. Valid entries are **1** to **20**. The default value is **1**.

- *Special Dialing Option*

  Identifies the type of dialing for calls when this data module originates calls. Valid entries are **hot-line**, **default** or **blank**.

- *Default Duplex*

  N/A for the MCU. Leave at default value **full**.

- *Default Mode*

  N/A for the MCU. Leave at default value **async**.

- *Default Speed*

  N/A for the MCU. Leave at default value **1200**.

- *Default ITC*

  N/A for the MCU. Leave at default value **restricted**.

- *Default Data Application*

  N/A for the MCU. Leave at default value **M2_A**.

```
add data-module next                                    Page  2 of  2

                                DATA MODULE


BRI LINK/MAINTENANCE PARAMETERS

                  XID? y      Fixed TEI? n
           MIM Support? y     Endpt Init? y   SPID: 1009_____  MIM Mtce/Mgt? y
```

Figure 2-34. Data Module Form (7500), Page 2

Page 2:

- *XID*

  N/A for the MCU. Leave at default value **y**.

- *Fixed TEI*

  N/A for the MCU. Leave at default value **n**.

- *MIM Support*

  (Management Information Message Support). Used to support two types of capabilities: MIM endpoint initialization capability (SPID support) and other maintenance and management capability. Default is **y**.

  For BRI Direct Connect endpoints, set this field to value **n**. Setting this field to value **y** activates the next three fields, which are not needed for endpoint operation.

- *Endpt Init*

  Displays only if *MIM Support* is set to **y**. This field is used to indicate the terminal's endpoint initialization capability. Endpoint initialization is a procedure, required for multipoint operation, by which the User Service Order Profile (USOP) is associated with an endpoint on the ISDN-BRI. This association is made via the Service Profile Identifier (SPID) administered into the system and entered into the ISDN-BRI terminal. For an ISDN-BRI terminal to become operational in a multipoint configuration, both the administered SPID and the SPID programmed into the ISDN-BRI terminal must be the same. This means that the SPID of the new or reused terminals must be programmed to match the administered SPID value. Default is **y**.

- *SPID*

  Displays only if the *Endpt Init* field is set to **y**. The Service Profile Identifier (SPID) is a variable parameter containing a maximum of ten digits. If administered, the SPID must be different for all data modules. The SPID should always be assigned. Values include numeric strings in the range of **0** through **9999999999**. Default is the station's extension number.

- *MIM Mtce/Mgt*

  Displays only if *MIM Support* is set to **y** (default). Used to indicate if the terminal supports MIM maintenance and management capabilities other than endpoint initialization.

Supporting the System Printer, CDR, CRCS, and OpCenter

Processor data modules or 7400B Data Modules provide a Data Communications Equipment (DCE) interface for MCU connection to equipment such as the system printer, CRCS, OpCenter, and CDR output devices. These modules also provide a Digital Communications Protocol (DCP) interface to the MCU for a maximum of four Direct Connect DCP endpoints. Each such endpoint uses two ports on a TN754 circuit pack. Use the Data Module form to identify the extension number and related information about each remote adjunct that you administer.

The following commands relate to the data modules.

Table 34-5. Processor Data Module Administration Commands

Action	Object	Qualifier
add	data-module	xxxx (extension or next)
change	data-module	xxxx (extension)
display	data-module	xxxx (extension) print or schedule
list	data-module	starting extension number or count or print or schedule

Use the following procedure to add the processor data module:

1. At the *command:* prompt, type **add data-module xxxx** and then press RETURN.
2. Verify that the screen displays the Data Module screen.
3. From the *Type* field, use TAB and RETURN to advance to the fields you want to change.
4. When the form is completed, verify that the MT displays: *Command successfully completed* followed by *command:*
5. To verify the form, type **display data-module xxxx** and then press RETURN.

Administering MCU-Extensions, Meet-Me Numbers, and Connections

An MCU-extension is an extension on the MCU that corresponds to the number that either a conferee dials to join a multipoint video conference or the MCU dials to access conference endpoints. The Avaya MCU supports three types of MCU-extensions: Meet-Me (Dial-In), Dial-Out, and Audio Add-On/UCC.

A Meet-Me number is a network number that is assigned to the MCU and that corresponds to the MCU's location in the network. A conferee dials a Meet-Me number to access an MCU conference. Meet-Me (Dial-In) calls gain access to the MCU via DS1 trunks or specified data interfaces. Once the network delivers a call across these trunks or interfaces to the MCU, the MCU processes the incoming call digits and routes them to the proper MCU-extension. The MCU-extension associates the call to the proper conference, and the MCU selects the necessary resources from its resource pool to process the call. MCU ports are virtual entities internal to the MCU and are composed of different resources (unlike terminating calls at a voice terminal connected to a PBX).

Dial-Out calls are dialed out by the MCU to the appropriate endpoints. A Dial-Out call can use two different telephone numbers per endpoint.

The number of MCU ports is determined by the software administration of the 1x56k, 1x64k, 2x56k, 2x64k, 112k, 128k, 168k, 192k, 224k, 256k, 280k, 320k, 336k, 384k, 448k, 512k, 672k, 768k, 1008k, 1152k, 1288k, 1344k, 1472k, 1536k, 1680k, 1920k, BONDed 112/128k, 168/192k, 224/256k, 280/320k, 336/384k, 448/512k, and 672/768k, UCC, Continuous Presence *Plus*, and T.120 MCU ports and the hardware resources in the MCU. The MCU is shipped with a configuration of hardware resources appropriate for the model ordered.

As calls arrive at the MCU trunks, the network sends the dialed digits across the MCU access trunk. The Meet-Me number dialed is mapped to an MCU-extension, which in turn enables the MCU to allocate available resources for the call. If the incoming call is from a 2B-channel 56k/64k video endpoint, the MCU actually receives two incoming network calls for the same MCU-extension. On the other hand, if the incoming call is from a BONDed 336 (6 x 56k) video endpoint, the MCU receives six incoming calls for the same MCU-extension. Whatever the number of calls, the calls are joined by the MCU once they are placed, and the MCU assumes that they come from the same video endpoint.

An important function of call routing is the ability to manipulate the digits. This capability provides great flexibility when assigning numbers to users and connecting users to conferences. Digit manipulation can be done through the network, on the PBX (if the MCU is behind a PBX), on the MCU trunk group or in the MCU call routing table. This optional capability allows the MCU to handle any digit string matching the North American dial plan, a private network dial plan, or any multinational dial plan.

The Dedicated Access feature enables endpoints to participate in multipoint audio and video conferences via non-signaled T1 facilities or EIA-530, RS449, or V.35 data interfaces via the DI circuit pack. For this feature, the MCU can connect to a multiplexer (MUX), a Digital Access Crosspoint System (DACS), or to H.320 endpoints via DS1 facilities. A maximum of 20 DS1 connections to the MCU are supported. Also, a maximum of 32 data interface (DI) connections to the MCU are supported.

The MCU can also connect to an H.320, H.CTX, or SG4 codec via an EIA-530, RS449, or V.35 data interface by using RS366 Dialing. These data interfaces

allow endpoints either connected directly to the MCU or behind an encryption device or proprietary inverse multiplexor to participate in multipoint conferences at a rate in the range 112k to 1920k. RS366 Dialing can also use any of these data interfaces to enable H.323 endpoints connected behind H.323 gateways to participate in MCU conferences.

An Nx56k MCU-extension can be assigned to an Nx64k conference via Speed Match. Also, an MCU-extension greater than 56k can be assigned to a 56k conference. If a video endpoint with a bandwidth greater than 56k dials into a 56k conference, the MCU will notify the endpoint to switch to 56k bandwidth and will make it an audio-only source. If the endpoint responds that it has switched to 56k bandwidth, it will become a video source.

Finally, Low-Speed/Higher-Speed Interworking allows 56k and 64k endpoints to join a conference of a higher bandwidth as Audio Add-On endpoints.

Network Services

The MCU supports only digital trunks for the incoming and outgoing services used by MCU-extensions; therefore, only ISDN-PRI, robbed-bit DS1, or ISDN-BRI Trunk Interface facilities may be used to connect the MCU to the network.

ISDN-PRI facilities support 56k or 64k calls to and from the MCU. The MCU ISDN-PRI interface can support multiple DS1 facilities as well as non-facility associated signaling (NFAS) and D-channel backup. Robbed-bit DS1 facilities support only 56k calls to and from the MCU. ISDN-BRI Trunk Interface provides ISDN-BRI connections to the public network.

The MCU is viewed as an endpoint by the public network. If the MCU resides behind a PBX, the PBX serves as the public network endpoint. Endpoint users must subscribe to a network service that provides a digital transmission service.

The following table provides an overview of the most commonly used digital services.

Table 34-6. Network Services

Network Service	Number Dialed to Join Conference	Bandwidth	Comments
Switched Digital International (SDI)	700-56x-xxxx 700-737-xxxx 700-730-xxxx	56k 1B*, 2B^, 1-channel multirate+, BONDed# 1B*, 2B^, 1-channel multirate+, BONDed#	RBS network access ISDN-PRI% ISDN-PRI%
ACCUNET Switched Digital Service (SDS) SW56	700-56x-xxxx	56k	RBS network access
ACCUNET SDS SW56/64	700-737-xxxx	1B*, 2B^, 1-channel multirate+, BONDed#	ISDN-PRI%

Table 34-6. Network Services

Network Service	Number Dialed to Join Conference	Bandwidth	Comments
Software Defined Data Network (SDDN)	NNN-NNNN Nxx-xxxx N0/1x-Nxx-xxxx	56k 1B*, 2B^, 1-channel multirate+, BONDed# 1B*, 2B^, 1-channel multirate+, BONDed#	RBS network access ISDN-PRI% ISDN-PRI%
SDDN-Virtual Off-Net	700-56x-xxxx 700-737-xxxx	56k 1B*, 2B^, 1-channel multirate+, BONDed#	RBS network access ISDN-PRI%
Private Network (PBX)	1 to 7 digits		Based on PBX dial plan connecting to the MCU

x = any number from 0 through 9
N = any number from 2 through 9
* 56k, 64k
^112k, 128k
+128k, 192k, 256k, 280k, 320k, 336k, 384k, 448k, 512k, 672k, 768k, 1472k, 1536k, or 1920k
112/128k, 168/192k, 224/256k, 280/320k, 336/384k, 448/512k, or 672/768k
% NonBONDed

Administering the Dial Plan

Through administration of the dial plan, the MCU identifies calls from the network and routes them to available video ports. This is done through the Dial Plan Record form.

The commands in the following table can be used to access the Dial Plan Record form.

Table 2-18. Dial Plan Administration Commands

Action	Object	Qualifier
change	dialplan	
display	dialplan	print or schedule

To change the dial plan, follow these procedures:

1. At the *command:* prompt, enter **change dialplan**.
2. Verify that the screen displays the *Dial Plan Record* form (refer to "Dial Plan Form" on page 2-100 for a list of fields and values).

3. Use TAB or RETURN to advance to the fields you want to change.
4. Submit the form.
5. To verify the form, enter **display dialplan**.

Dial Plan Form

Page 1 of the Dial Plan form appears as follows:

```
change dialplan                                          Page   1 of   1
                              DIAL PLAN RECORD

                                                  Local Node Number: __

       Uniform Dialing Plan: 5-digit
  UDP Extension Search Order: local-extensions-first
FIRST DIGIT TABLE
First                                    Length
Digit  - 1 -      - 2 -      - 3 -      - 4 -      - 5 -      - 6 -
  1: misc
  2:                                                extension
  3:                                                extension
  4:                                                extension
  5:                                                extension
  6:                                                extension
  7:                                                extension
  8: fac
  9: fac
  0: attd
  *:
  #:
```

Figure 2-35. Dial Plan Form (Page 1)

The following list shows the fields on the Dial Plan Record and related values.

Dial Plan Form, Page 1 of 1

- *Local Node Number*

  N/A for the MCU. Leave blank.

  in New York.

- *Uniform Dialing Plan*

  Enter **4-digit** or **5-digit** to signify the use of a 4- or 5-digit dial plan, or none (default) if no Uniform Dialing Plan (UDP) is to be administered. Default is **none**. If **4-digit** or **5-digit** is entered, the *UDP Extension Search Order* field is displayed.

  NOTE:
  The Uniform Dialing Plan field must be enabled on the Customer-Options form before any entry other than none can be entered in this field.

The Uniform Dialing Plan is a separate form that must be administered if **4-digit** or **5-digit** is entered into this field.

CAUTION:
If the entry in the Uniform Dialing Plan field is changed from its previously administered value, all UDP extension codes will be lost.

The UDP provides a common 4- or 5-digit dial plan that can be shared among a group of switches. Interswitch dialing and intraswitch dialing both require 4- or 5-digit dialing. The UDP is used with Electronic Tandem Network (ETN), Main/Satellite/Tributary, and DCS configurations. Additionally, UDP can be used alone to provide uniform 4- or 5-digit dialing between two or more private switching systems without ETN, DCS, or Main/Satellite/Tributary configurations.

- *UDP Extension Search Order*

  Displays whenever *Uniform Dialing Plan* is set to **4-digit** or **5-digit**. Indicates where the system should look for a dialed extension first. Values include **local-extensions-first** (default) and **udp-table-first**. For the MCU, leave the default value **local-extensions-first**.

  For value **local-extensions-first**, the dialed extension is searched for in local translations first. If the extension is found, the call terminates to the local station. If the extension is not found locally, the UDP tables are searched for an off-switch (UDP) conversion. For value **udp-table-first**, the UDP tables are searched first.

- *First Digit Table*

  This table contains fields that establish each possible first digit and dialed number length for various extensions and codes. Values include **attd**, **pextension**, **extension**, **misc**, **fac**, and **dac**. Administration for values **extension**, **fac**, and **dac** is required on this form before you can administer the following: MCU-extensions, data extensions, hunt groups, access endpoints, trunk groups, and feature access codes. The following list discusses each value for this field, and it indicates where each one can appear in the form.

  — **pextension** — should not be administered on the MCU.

  — **extension** — used for administering MCU-extensions, data-modules, hunt groups, etc. The extension can have a first digit ranging from 0 through 9, and it can have a length of one to five digits. The rows in the form headed by *0*, *, and # row cannot contain this value. For example, if MCU-extensions 400 through 499 are required, enter value **extension** at the intersection of the fourth row and third column. Another example: if MCU-extensions 6000 through 6999 are required, enter value **extension** at the intersection of the sixth row and fourth column.

NOTE:
The extension cannot have the same first digit as the ARS or AAR facility access code (FAC).

— **fac** (feature access code) - Required before administering the ARS access code on the Feature Access Codes form discussed later in this chapter. The FAC can have a first digit ranging from 0 through 9 plus the * (star) and # (pound) symbols. A FAC can have a length of one to four digits in rows 0 through 9, and it can have a length of one to four digits in the rows headed by * and #. For FACs using the rows headed by * and #, * and # each count as a digit and must be the first digit. For example, *9 could be used to activate a feature when the FAC is administered as two digits in the row headed by *.

— **dac** (trunk access code) - Required before administering trunk groups (discussed later in this chapter). A TAC can have a first digit ranging from 0 through 9, and it can have a length of one to four digits.

— **attd** (attendant) - Defines how users call an attendant. An attendant access numbers can start with any number from 0 through 9, and it contain one or more digits.

NOTE:
An attendant group number can also be defined as a two-digit number. The first digit is defined as "misc" on the First Digit Table, and the second digit (0 through 9) is defined on the Second Digit Table screen.

— **misc** (miscellaneous code) - This code is used if more than one type of code should start with the same digit and be the same length. The dialed length can be one digit, and the first digit can be any digit from 0 through 9. Using a misc code requires that you also define a second digit table.

Second Digit Table

You must complete the Second Digit Table each time you enter value **misc** into the first column (representing digit length of “1”) of the “First Digit Table” in the Dial Plan form. The Second Digit Table is named for the row where **misc** appears. An example of the table appears as follows:

```
add second-digit 5                                          Page  1 of  1

                          SECOND DIGIT TABLE FOR DIGIT 5

SECOND DIGIT TABLE

Digit   Identification     Number of     Digit   Identification     Number of
                           Digits                                  Digits

    0: ____________          0             5: ____________          0
    1: ____________          0             6: ____________          0
    2: ____________          0             7: ____________          0
    3: ____________          0             8: ____________          0
    4: ____________          0             9: ____________          0


attd          dac              extension      fac
```

Figure 2-36. Second Digit Table

A Second Digit Table can exist for every first digit value.

Value **misc** can have a dialed length of 1, and it can have a first digit ranging from 0 through 9. Value **misc** specifies that the call types for this digit are actually determined in the Second Digit Table.

Administering the Uniform Dialing Plan

Use the Uniform Dialing Plan form to administer UDP.

Uniform Dialing Plan Form

Use the following commands to administer the Uniform Dial Plan form.

Table 2-19. Uniform Dialing Plan Administration Commands

Action	Object	Qualifier
change	udp	Enter 1-MAX digits between 0-9, ‘x’ or ‘X’
display	udp	Enter 1-MAX digits between 0-9, ‘x’ or ‘X’ [’print’ or ‘schedule’]
list	udp	Enter [’ext’ x][’to-ext’ x][’type’ x [[’dest’ x][to-dest’ x]]] [’print’ or ’schedule’]

Note: Brackets [ ] indicate the qualifier is optional. Single quotes (‘ ’) indicate the text inside the quote must be entered exactly as shown or an abbreviated form of the word may be entered. MAX is the maximum number available in your system configuration.

An example of the Uniform Dialing Plan form appears as follows:

```
change udp 2                                              Page  1 of  2


                              UNIFORM DIALING PLAN
                                 Ext Codes: 2ddx


                              Ext Code: 2xxx  Type:

dd    Type      dd    Type      dd    Type      dd    Type      dd    Type

0x:             1x:             2x:             3x:             4x:

00:             10:             20:             30:             40:
01:             11:             21:             31:             41:
02:             12:             22:             32:             42:
03:             13:             23:             33:             43:
04:             14:             24:             34:             44:
05:             15:             25:             35:             45:
06:             16:             26:             36:             46:
07:             17:             27:             37:             47:
08:             18:             28:             38:             48:
09:             19:             29:             39:             49:
```

Figure 2-37. Uniform Dialing Plan Form (Page 1)

```
change udp 2                                                  Page  2 of  2


                              UNIFORM DIALING PLAN
                                Ext Codes: 2ddx


                                Ext Code: 2xxx  Type:

dd    Type      dd    Type      dd    Type      dd    Type      dd    Type

5x:             6x:             7x:             8x:             9x:

50:             60:             70:             80:             90:
51:             61:             71:             81:             91:
52:             62:             72:             82:             92:
53:             63:             73:             83:             93:
54:             64:             74:             84:             94:
55:             65:             75:             85:             95:
56:             66:             76:             86:             96:
57:             67:             77:             87:             97:
58:             68:             78:             88:             98:
59:             69:             79:             89:             99:
```

Figure 2-38. Uniform Dialing Plan Form (Page 2)

Make assignments as required for the following fields on each page of the form.

- *Ext Codes*

  Displays a string of digits, "x" and "dd". The position of the “dd” shows which digit positions of the Ext Codes are being administered. For example, value **512dd** means that the last two digits of the Ext Codes, for the leading digits 512, are being administered on the form. The string “5ddxx” shows that the second and third digits of the Ext Codes, for the leading digit 5, are being administered on the form (these entries would all be wildcard entries).

- *Ext Code, Type (and associated data)*

  Displays what rules apply if the values on the form are not administered. For example, shows a form for Ext Codes starting with 512. If these entries are not administered, the entry for Ext Code 51xxx applies to these entries, and if Ext Code 51xxx is not administered, the entry for Ext Code 5xxxx applies to these entries. In a 5-digit UDP, these read-only fields display only if at least three digits are specified in the command-line key, although one set (the set on the left) of these fields would still display if two digits are specified in the command-line key. If only one digit is specified, or if ’x’ or ’X’ is specified in the command-line key, then neither of these sets of fields display, since there is no Ext Code more general than those listed on the form.

- *dd*

  Displays the two digits (or x's) representing the extension or group of extensions to be administered. For this field, "xx:" is repeated on both pages since it is the default for all other entries on both pages. Changing the type associated with this field on one page changes it on both pages.

- *Type*

  Specify the type of treatment for the extension (**AARCode**, **ENPNode**, **Local**, **TempOOS**, **UDPCode**, or blank). That is, specify whether the extension should receive intercept treatment, be converted to AAR, or be converted via ENP. The difference between AAR Location Codes and UDP Location Codes is that 7-digit AAR Numbers created from AAR Location Codes may be changed during AAR analysis by AAR digit conversion before being routed. Seven-digit AAR Numbers created from UDP Location Codes are not subject to digit conversion before being routed with AAR digit analysis. When an extension code that is displayed on the UDP form is not administrable because it conflicts with the translations in the first and/or second digit tables, then the type field for that extension code displays "NotInDP."

  The entry TempOOS indicates an extension is temporarily out-of-service. Calls to these extensions receive reorder. A blank entry indicates this Ext code is not administered. If no matching code can be found, then the call receives intercept treatment.

- *Location Code*

  Specify the 3-digit location code for Ext Codes administered with a type of AARCode or UDPCode. This field displays if the *Type* field is set to **AARCode** or **UDPCode**.

- *Node Number*

  Specify the node number for Ext Codes administered with a type of ENPNode. This field appears if the *Type* field is set to **ENPNode**.

  NOTE:
  This node number must not be the same as the local node number on the Dial Plan form.

Assigning MCU-Extensions and Meet-Me Numbers

The MCU is given a network number that corresponds to its location in the network. This number is the Meet-Me number that conferees dial to join a multipoint conference. Network numbers can be obtained from Network Services or, if the MCU is an SDDN or private network location, the Meet-Me numbers can be selected and assigned according to the existing dial plan. After the Meet-Me numbers are obtained, each number needs to be associated with an MCU-extension on the MCU.

NOTE:
Whenever possible, the last four digits of the MCU-extension should be the same as the last four digits of the corresponding Meet-Me number. This helps with troubleshooting so you can quickly relate a dialed Meet-Me number with the matching MCU-extension on the MCU. It is important to note, however, that an MCU-extension cannot begin with a **0**.

The following table provides the commands that can be used to administer MCU-extensions.

Table 2-20. MCU-Extension Administration Commands

Action	Object	Qualifier
add	mcu-extension	extension or next
change	mcu-extension	extension
display	mcu-extension	extension, count, print, or schedule
duplicate	mcu-extension	extension
list	mcu-extension	extension, count, print, or schedule
remove	mcu-extension	extension

NOTE:
An MCU-extension cannot be removed if it is assigned to a conference reserved on the MCU.

To add an MCU-extension, follow these procedures:

1. At the *command:* prompt, enter **add mcu *xxxx*** where ***xxxx*** is an extension number or **next**.
2. Verify that the screen displays the *MCU-Extension* form (refer to "MCU-Extension Form" on page 2-109 for a list of fields and values).
3. Use TAB or RETURN to advance to the fields you want to change.
4. Submit the form.
5. To verify the form, enter **display mcu *xxxx***.

   NOTE:
   Be sure to make the appropriate changes to the MCU-Extensions Form described in "Recording Meet-Me Numbers and MCU-Extensions" on page 2-17.

Considerations For Meet-Me Dial-In Numbers

You should obtain network (Meet-Me) numbers from the network provider. After you obtain these numbers, you need to associate each number with an MCU-extension on the MCU. Whenever possible, the last four digits of the MCU-extension should be the same as the last four digits of the corresponding Meet-Me number. This helps with troubleshooting in that you can quickly relate a dialed Meet-Me number with the matching MCU-extension on the MCU.

NOTE:
An MCU-extension cannot begin with “0.”

The MCU customer can assign either of two types of Meet-Me Numbers, as follows:

- *Per-Port Meet-Me Numbers*

  In this case, the customer assigns as many Meet-Me Numbers as there are bridge ports. For example, an MCU with a 2B capacity of 24 ports would require 24 Meet-Me Numbers from the provider for video calls.

- *Per-DS0 Meet-Me Numbers*

  In this case, the customer assigns a Meet-Me Number to each DS0. For example, an MCU with two ISDN-PRI DS1 spans would need 46 Meet-Me Numbers from the provider for video calls.

Whoever is ordering service for the MCU should request from the provider the required number of incoming numbers that they would like to administer on the MCU.

Considerations For Dial-Out Numbers

Dial-Out MCU-extensions are used to originate outgoing video and audio calls. Dial-out video calls originate in three different ways, as follows:

- *For all speeds of multirate calls, the MCU dials only one number.*
- *For 2B calls, the MCU makes two calls; it calls either one number twice or two separate numbers, depending on the far-end video numbers.*
- *For BONDed calls, the MCU makes a separate call for each DS0 required for the bandwidth of the call. The MCU is programmed to dial one number for a BONDed call and then let the far end answer and tell the MCU regarding what other numbers need to be dialed to complete the BONDed connection.*

You should administer at least one Dial-Out MCU-extension for each Meet-Me video MCU-extension that is administered on the MCU.

NOTE:
Audio Add-on Dial-Out calls use the same pool of extensions that is used for incoming Audio Add-on/UCC calls.

Considerations For Audio Add-On/UCC MCU-Extensions

Audio Add-On/UCC MCU-extensions can be used for both Audio Add-On and UCC endpoints. An incoming Audio Add-On or UCC party joins a multimedia conference in the same manner as a Dial-In Meet-Me endpoint. The Audio Add-On party is identified on the Conference Record form, and it is assigned a Meet-Me number that has been reserved for Audio Add-On use. The Audio Add-On participant in an MCU conference can also be part of an audio conference (for example, ALLIANCE, PBX, etc.). UCC endpoints are restricted to incoming only.

Be sure to order from the network provider, and then assign, one MCU-extension for each Audio Add-On and UCC port based on the corresponding port capacity that is administered in the Customer-Options form. By using information received from the network provider, the customer can usually specify the format of the called party numbers for audio calls that are delivered to the MCU. Typically, the network delivers the last four digits of the dialed number for both ISDN-PRI and DS1 robbed-bit service.

MCU-Extension Form

The MCU-Extension form appears as follows:

```
add mcu-extension 75000

                          MCU EXTENSION

                               Extension: 75000
                          Meet-Me Number: _______________
                       Audio Add-On/UCC? n
                  Bandwidth per Channel: Nx56k
```

Figure 2-39. MCU-Extension Form

The Avaya MCU supports three types of MCU-extensions: Meet-Me (Dial-In), Dial-Out, and Audio Add-On/UCC. The following list shows the fields on the MCU-Extension form and their related values.

- *Extension*

  A display-only field that shows the number assigned to the MCU-extension.

  NOTE:
  If this is a Meet-Me Audio Add-On/UCC or video number, the extension number being administered should match the digits being received from the service provider, if possible. This would eliminate digit manipulation on the MCU and make it easier to administer the system.

- *Meet-Me Number*

  Enter the network number *only* if this is a Meet-Me number or an Audio Add-On/UCC number. For video dial-out mcu-extensions, leave this field blank. This number should reflect the number dialed at the far end to reach this extension.

  NOTE:
  CRCS uses this field when the MCU-extension utility feature is used.

- *Audio Add-On/UCC*

  Enter **yes** or **no**, as appropriate**.** The default is **no**.

- *Bandwidth per Channel*

  If the Meet-Me Number supports the 56k- and 64k-interval bandwidths, enter value **all**. If the Meet-Me Number supports only the 56k-interval bandwidths, leave the default value **Nx56k**.

  NOTE:
  This field appears only if the *Audio Add-On/UCC* field is set to **no**.

Duplicate MCU-Extension Form

This form is used to administer MCU-extensions in groups of a maximum of 32 at a time, as opposed to administering one such extension per form. Meet-Me, Dial-Out and Audio Add-On MCU-extensions can be “duplicated.” Adding MCU-extensions via this form requires that all the numbers be administered with the same parameters (for example, all the extensions must be dial-out extensions).

To “duplicate” an extension, enter the following command:

duplicate mcu-extension *extension no.* start *[extension no.]* count *[X]*,

where:

- *First **extension no.** is the MCU-extension to be duplicated.*
- *Second **extension no.** is the first generated MCU-extension desired.*
- ***X** is the count (**1** through **32**) of generated MCU-extensions desired.*

For example:

duplicate mcu-extension *6835* start *6901* count *32*

The following list identifies and describes the fields in the Duplicate MCU-Extension form.

- *Ext*

  This display-only field provides the MCU-extensions being assigned per the count requested by the appropriate command entry.

- *Meet-Me-Number*

  This field identifies the number that must be dialed to reach the MCU-extension. This field can be left blank for dial-out MCU-extensions.

- *Audio Add-on/UCC?*

  This field allows the administrator to add both video and Audio Add-On MCU-extensions. Values include **y** and **n**. For value **y**, the *Bandwidth per Channel* field does not appear.

- *Bandwidth per Channel*

  This field allows the administrator to set the video capabilities to **56kbps** for 56k-interval video calls or to **all** for both 56k-interval or 64k-interval video calls. For value **all**, the network that is connected must be an ISDN-PRI network. For an RBS network, the MCU-extensions associated with that service must be set to value **Nx56k**.

  NOTE:
  This field appears only if the *Audio Add-on/UCC* field is set to **n**.

Administering Trunk Groups

The DS1 T1/E1 service provides digital trunks that support voice, video and data communications. Trunks are communication links that connect two switching systems. Trunks are grouped together via trunk group administration. Trunk group administration allows the system administrator to assign service characteristics to a group of trunks rather than to each trunk individually. Changes can be made and characteristics can be removed on a group basis. Also, changes can be made without taking trunks out of service.

Trunks and access endpoints consume the same resource. Therefore, the sum of the trunks and access endpoints cannot exceed the total number of trunks allowed for a particular MCU configuration.

The Avaya MCU supports Integrated Services Digital Network-Primary Rate Interface (ISDN-PRI) trunk groups and tie trunk groups (robbed-bit). Understanding the variety of ways in which trunks differ helps simplify decisions when implementing and administering a network.

ISDN-PRI trunk groups deliver ISDN service to the MCU for high-speed connectivity to the public switched telephone network and to other switches in a private or public network. PRI provides 24 64k channels arranged in the North American ISDN standard of 23B+D. This indicates that 24 channels are divided into 23 bearer B-channels at 64k for information transmission and one signaling D-channel at 64k for control and signaling. The MCU also supports the NFAS feature, which allows all 24 B-channels to be used along with the D-channel from another ISDN-PRI span for control and signaling. Outside of the US (except for MCU-to-MCU/DEFINITY ECS connections), the MCU also supports ISDN-PRI using the international E1 format, which provides the 30B+D standard.

Call-by-Call Service Selection enables a single ISDN-PRI trunk group to carry calls to a variety of services. This feature does not require that each trunk group be dedicated to a specific service; rather, it allows you to set up various voice and data services and features for a particular call.

Tie trunks (robbed-bit) carry communications between switches in a private network. The type of tie trunk installed depends upon the type of network established. Robbed-bit network facilities provide a DS1 T1 interface between the MCU and network provider. The DS1 interface supports tie trunks for incoming and/or outgoing calls. Robbed-bit DS1 trunk groups support all 24 DS0 channels for video, voice and data only at a speed of 56k per DS0.

Digital DS1 trunk administration requires the administration of a number of forms depending on the type of service that is used with the MCU. ISDN-PRI can use T1 and/or E1 service, while robbed-bit facilities supports only T1 service.

NOTE:
For both ISDN-PRI and robbed-bit service (RBS), the administrator needs to know what options the far end is using to administer the MCU. Coordination between the MCU administrator and the network provider is essential to ensure that the administration between both ends of the span is compatible.

Use the following procedures to administer ISDN-PRI and tie trunks for the MCU. The following table shows the commands that are used to administer trunk groups using the Trunk Group form.

Table 2-21. ISDN-PRI Trunk Group Commands

Action	Object	Qualifier
add	trunk-group	1-99 (next)
change	trunk-group	1-99 or TAC X
display	trunk-group	1-99 or TAC X, print, or schedule
list	trunk-group	print or schedule
remove	trunk-group	1-99 or TAC X
status	trunk-group	1-99 or TAC X

To add an ISDN or tie trunk group, follow these procedures:

1. At the *command:* prompt, enter **add trunk group *x*** where ***x*** is a trunk group number (**1** through **99**) or **next**.
2. Verify that the screen displays the Trunk Group form (refer to "Administering ISDN-PRI Trunk Groups" on page 2-113 or "Administering Tie Trunk Groups" on page 2-127 for a list of fields and values).
3. Use TAB or RETURN to advance to the fields you want to change.
4. Submit the form.
5. To verify the form, enter **display trunk-group *x***.

Administering ISDN-PRI Trunk Groups

The following list identifies the fields on the Trunk Group form and their values entered when administering ISDN-PRI trunk groups:

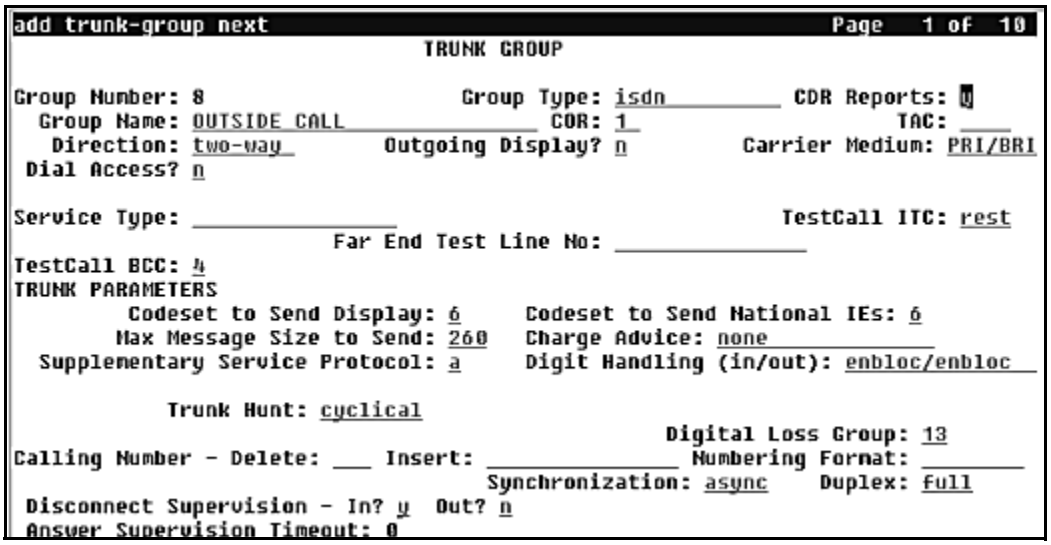


Figure 2-40. Trunk Group Form (Page 1)

Trunk Group Form, Page 1 of 10

- *Group Number*

  Display-only field that shows the number of the trunk group that is currently being accessed.

- *Group Type*

  Enter **isdn** to identify the trunk group.

- *CDR Reports*

  Enter **y** if tracking calls on this trunk group. Otherwise, leave value **n**.

- *Group Name*

  Enter a name of up to 27 characters to identify this trunk group (for example, **isdn to AT&T**, **circuit # of span**, etc.). The default is **OUTSIDE CALL.**

- *COR*

  Leave at the default of **1**.

- *TAC*

  Enter the trunk access code that matches the numbering plan assigned on the dial plan for the TAC. CDR uses the TAC to identify the trunk group on CDR reports. Allowable entries must match the dial plan.

- *Direction*

  Values include **incoming**, **outgoing**, and **two-way** (default), depending on how the associated trunk group is being used. (For example, if the far end is administered for outgoing calls on the trunk group, the field should be set to **incoming** for the MCU trunk group.)

- *Outgoing Display*

  N/A on the MCU. Leave at default value **n**.

- *Carrier Medium*

  Leave at default value **PRI/BRI.**

- *Dial Access*

  Enter **y** to allow this trunk group to be accessed via a TAC; otherwise, enter **n**.

- *Service Type*

  Indicates the service for which this trunk group will be dedicated. Values include those in the following table and any user-defined or selected service as administered on the Network Facilities form. Value **cbc** is recommended to allow for incoming and outgoing voice and video (data).

access	A tie trunk giving access to an Electronic Tandem Network
accunet	ACCUNET Switched Digital Service — part of ACI (AT&T Communications ISDN) phase 2.
cbc	Call-by-Call service — provides different dial plans for different services on an ISDN-BRI trunk group.
i800	International 800 Service — allows a subscriber to receive international calls without a charge to the call originating party.
inwats	INWATS — provides OUTWATS-like pricing and service for incoming calls.
mega800	MEGACOM 800 Service — an AT&T communications service that provides unbanded 800 service using special access (4ESS switch to switch) from an AT&T communications node.
multiquest	AT&T MULTIQUEST Telecommunications Service — dial 700 service. A terminating-user's service that supports interactive voice service between callers at switched-access locations and service provides directly connected to the AT&T Switched Network (ASN).

public-ntwk	Public network calls — It is the equivalent of CO (outgoing), DID, or DIOD trunk groups. If *Service Type* is **public-ntwrk**, *Dial Access* can be set to **y**.
sddn	Software Defined Data Network — provides a virtual private line connectivity via the AT&T switched network (4ESS switch). Services include voice, data, and video applications. These services complement the SDN service. Do not use for DCS with Rerouting.
sdn	Software Defined Network (SDN) — an AT&T communications offering that provides a virtual private network using the public switched network. SDN can carry voice and data between customer locations as well as off-net locations.
tandem	Tandem tie trunks integral to an ETN
tie	Tie trunks — general purpose

- *Test Call ITC*

  Controls the encoding of the ITC codepoint for the Bearer Capability IE in the SETUP message. Since the ISDN Testcall does not go through routing, it is never blocked due to an incompatible ITC. Values include **rest** for restricted (56k) and **unre** for unrestricted (64k).

- *Usage Alloc?*

  Displayed whenever the *Service Type* field is set to **cbc**. Leave this field set to **n**.

- *Far-End Test Line No:*

  Specify the number that is sent to the far-end ISDN test line extension. When test trunk is entered, this number is sent to the far-end to establish a call that tests the integrity of the trunk member under test. The number does not pass through routing or undergo digit manipulation. The digits entered here must be what the far end expects.

  This number should be supplied by the network provider for the associated trunk group. The network provider may be charged for using this feature.

- *TestCall BCC*

  Controls the encoding of the Bearer Capability IE (BCIE) in the SETUP message. Values include the following:

  — **0** — voice

  — **1** — DCP Mode 1 56k

  — **2** — Mode 2 async (19.2)

  — **3** — Mode 3 circuit (64k)

  — **4** — DCP Mode 0 (64k)

- *TestCall Service*

  Specifies the call-by-call selection for an ISDN-PRI test call. This field appears only if the Service Type field is set to **cbc**. Values are provided in the following table. “Sddn” or any new Facility Type of Type 0 (feature), Type 1 (service), or Type 3 (outgoing) that is defined by the user on the Network Specific Facility Encoding format are excluded.

accunet	ACCUNET Switched Digital Service — part of ACI (AT&T Communications ISDN) phase 2.
i800	International 800 Service — allows a subscriber to receive international calls without a charge to the call originating party.
inwats	INWATS — provides OUTWATS-like pricing and service for incoming calls.
ids	Long-Distance Service — part of ACI (AT&T Communications ISDN) phase 2.
mega800	MEGACOM 800 Service — an AT&T communications service that provides unbanded 800 service using special access (4ESS switch to switch) from an AT&T communications node.
megacom	MEGACOM Service — an AT&T communications service that provides unbanded long-distance services using special access (switch to 4ESS switch) from an AT&T communications node.
multiquest	AT&T MULTIQUEST Telecommunications Service — dial 700 service. A terminating-user’s service that supports interactive voice service between callers at switched-access locations and service provides directly connected to the AT&T Switched Network (ASN).
operator	Network Operator — provides access to the network operator.
outwats-bnd	OUTWATS Band — WATS is a voice-grade service providing both voice and low speed data transmission capabilities from the user’s location to defined service areas referred to as bands; the widest band is 5.

sdn	Software Defined Network (SDN) — an AT&T communications offering that provides a virtual private network using the public switched network. SDN can carry voice and data between customer locations as well as off-net locations.
sub-operator	Presubscribed Common Carrier Operator — presubscribed common carrier operator.
wats-max-bnd	Maximum Banded Wats — a WATS-like offering for which a user's calls are billed at the highest WATS band subscribed to by users.

- *Codeset to Send Display*

  Defines the codeset for sending the information element for the display. For the MCU, enter value **?**.

- *Codeset to Send TCM, Lookahead*

  Defines the codeset for sending the information element for Traveling Class Marks and Lookahead Interflow. For the MCU, enter value **?**.

  NOTE:
  A Traveling Class Mark (that is, the user's FRL or the user's trunk group FRL) is passed between tandem nodes in an ETN in the setup message only when the *Service Type* is set to **tandem**. It is then used by the distant tandem switch to permit access to facilities consistent with the originating user's privileges.

- *Max Message Size to Send*

  Defines the maximum byte size of the ISDN-PRI messages that the MCU can receive. Values include **260** (default), **256**, **244**, and **128**. Leave at the default value **260**.

- *Charge Advice*

  Allows you to accumulate and access charge information about a call. You must have already set *CDR Report* to "y"or "r" (ring-intvl) before changing this field from its default of **none**. You may specify one of the following options:

  — **automatic** — Advice of Charge is enabled automatically for all outgoing calls over this trunk group.

  — **during-on-request** — MCU will request information during and at the end of the call for each outgoing call over this trunk group.

  — **end-on-request** — MCU will request information at the end of the call for each outgoing call over this trunk group.

  — **none** — No Advice of Charge information is collected by the system.

For value **during-on-request**, the system performance is affected because this value increases message activity on the signaling channel, and this may reduce the maximum call capacity.

- *Supplementary Service Protocol*

  Indicates which supplementary service protocol should be used for services over this trunk group. *Supplementary Service protocols are mutually exclusive*.

  Enter one of the following Supplementary Service Protocols. Default is **a**.

  — **a** — national public network

  — **b** — ISO/ETSI QSIG Private Network

  — **c** — ETSI public network

  — **d** — European Computer Manufacturer's Association (ECMA) QSIG private network (supports only Name Identification and Additional Network Feature Transit Counter (ANF-TC))

  — **e** — DCS with Rerouting

  NOTE:
  Do not use this value if *Service Type* is set to **dmi-mos** or **sddn**.

- *Digit Handling*

  This field defines whether the overlap receiving and overlap sending features are enabled. Set the field to **overlap** when you want overlap receiving or overlap sending. Set the field to **enbloc** when you do not want these features enabled. The first field value indicates digit receiving and the second value indicates digit sending. There are 4 possible combinations: **enbloc/enbloc** (default), **enbloc/overlap**, **overlap/enbloc**, and **overlap/overlap**.

  Without overlap receiving or overlap sending enabled, the digits on incoming and outgoing calls are sent enbloc. If *Digit Handling* is set to **overlap/enbloc** or **overlap/overlap**, the following results:

  — Incoming Call Handling Treatment table does not appear.

  — *Digit Treatment* and *Digits* appear.

  — Warning message indicates that all Incoming Call Handling entries are removed when form is submitted.

  — When form is submitted with these values, all Incoming Call Handling entries are removed.

- *Trunk Hunt*

  Enter the order in which the MCU should find available trunks. Values are **descend**, **ascend,** and **cyclical**. The value should be the opposite from that for the other end of the trunk group.

- *Connected to Toll*

  N/A for the MCU. Leave at default value **n**.

- *DTT to DCO Loss* (Audio Only)

  Specifies the loss plan to be used for this trunk group. Leave this field set at the default value **normal**.

- *Calling Number - Delete: Insert: Numbering Format:*

  These three fields comprise the administrable fields for the Calling Line Identification Prefix feature. They display when *Direction* is set to **incoming** or **two-way**.

  — *Delete* — Number of digits to delete from the calling party number for all incoming calls on this trunk group. Values include any number from **1** through **15**, **all** or blank.

  — *Insert* — Specific digits prefixed to incoming calls when the calling party is a member of this trunk group. Values include any string of digits containing one through 15 digits or blank.

  — *Numbering Format* — TON/NPI encoding applied to CPN information modified by the CLI Prefix feature. This encoding does not apply to calls originating locally. *Numbering Format* applies to calls originated from this switch. If this field is blank, the DEFINITY ECS passes on the encoding received in the incoming setup message. If the incoming setup message did not contain CPN information, and if digits are added, the outgoing message contains these digits. If *Numbering Format* is blank in this case, the value defaults to **pub-unk**. If *Numbering Format* is also administered as **unknown**, the trunk group is modified to “unk-unk” encoding of the TON/NPI. Therefore, this field also must contain a value other than **unknown**.

  NOTE:
  The values for this field map to the Type of Numbering (TON) and Numbering Plan Identifier (NPI) values shown in the following table.

Numbering Format Valid Values	Type of Numbering (TON)	Numbering Plan Identifier (NPI)
blank	incoming TON unmodified	incoming NPI unmodified
intl-pub	international(1)	E.164(1)
lev0-pvt	local(4)	Private Numbering Plan — PNP(9)
lev1-pvt	Regional Level 1(2)	Private Numbering Plan — PNP(9)

Numbering Format Valid Values	Type of Numbering (TON)	Numbering Plan Identifier (NPI)
lev2-pvt	Regional Level 2(1)	Private Numbering Plan — PNP(9)
locl-put	local/subscriber(4)	E.164(1)
natl-pub	national(2)	E.164(1)
pub-unk	unknown(0)	E.164(1)
unk-unk	unknown(0)	unknown(0)

- *Numbering Format*

  This field appears if either *Send Calling Number* or *Send Connected Number* is set to **y** or **r**. This specifies the encoding of the "Numbering Plan Indicator" field for identification purposes in the Calling Number and/or Connected Number IEs and in the QSIG Party Number. Values include **public** (default), **unknown**, and **private**. Value **public** indicates that the number plan according to CCITT Recommendation E.164 is used and that *Type of Number* is set to **national**. Value **unknown** indicates that *Numbering Plan Indicator* is set to **unknown** and that *Type of Number* is set to **unknown**. Value **private** indicates that *Numbering Plan Indicator* is set to **PNP** and that the value for *Type of Number* is determined from the ISDN Private-Numbering form.

- *Synchronization*

  N/A for the MCU. Leave at default value **async**.

- *Duplex*

  N/A for the MCU. Leave at default value **full**.

- *Disconnect Supervision...In?*

  Displays when *Direction* is set to **incoming** or **two-way**. Values include **y** (default) and **n**. Internally, the field is set to **n** if *Direction* is set to **outgoing**. For the MCU, enter **y** to indicate that the far end can release a trunk when the calling party releases from a call and the system is able to recognize the release signal.

- *Disconnect Supervision...Out?*

  Displays when *Direction* is set to **outgoing** or **two-way**. Values include **y** and **n** (default). Internally, the field is set to **n** if *Direction* is set to **incoming**. Set to **n** for the MCU. If the field is set to **y**, a warning message appears to alert the user of possible trunk lockups.

  This field specifies whether trunks in this trunk group provide disconnect supervision when seized outgoing (that is, whether these trunks should be allowed to participate in outgoing trunk-to-outgoing trunk calls). This field is set independently of the trunk-to-trunk transfer system parameter, although both options must be set appropriately if outgoing trunk-to-outgoing trunk transfers are desired.

- *Answer Supervision Timeout*

  Used for all MCU trunk types to indicate the amount of time in seconds the system allows for a call to be answered before beginning a CDR record of a call. This interval begins as soon as the outgoing trunk is seized. Values include **0** through **250**; default is **10**.

  NOTE:
  This timeout does not override answer supervision sent from the network or other firmware (DS1 port circuit timers). DS1 firmware-sent answer supervision is administered in *Outgoing End of Dial (sec)* on the Administrable Timers page of the Trunk Group form.

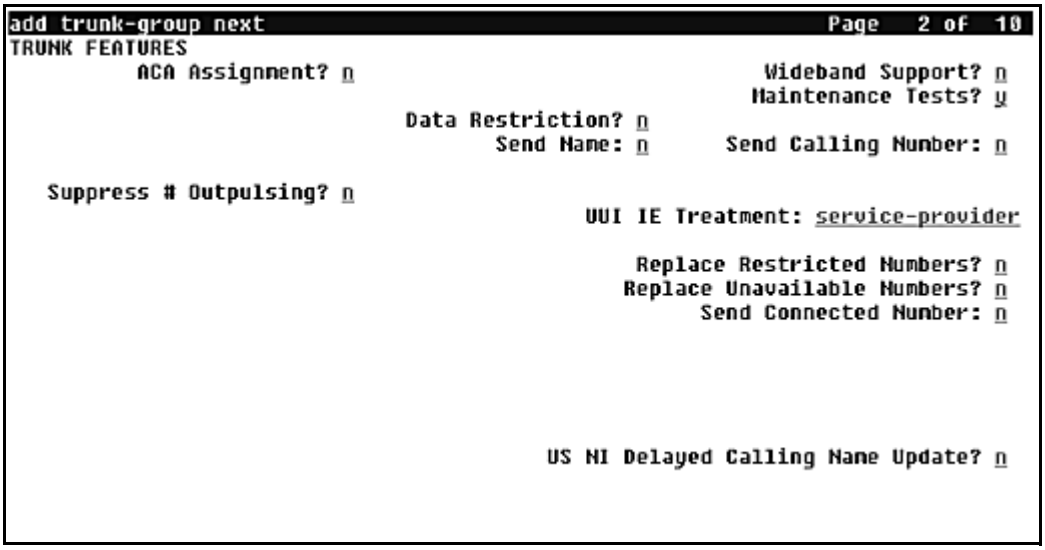


Figure 2-41. Trunk Group Form (Page 2)

Trunk Group Form, Page 2 of 10

- *ACA Assignment*

  N/A for the MCU. Leave the default value **n**.

- *Wideband Support*

  Indicates whether or not Wideband is supported on this trunk group. For 384k or 1536k bandwidth, set this field to **y**. (When Wideband is supported, page 3 of this form needs to be completed.)

- *Data Restriction*

  Leave this field set to **n**.

- *Send Name*

  N/A for the MCU. Leave at default setting **n**.

- *Send Calling Number*

  Specifies whether the calling party's number is sent on outgoing or tandemed ISDN calls. Values include **y**, **n** (default), and **r** (restricted). For value **y**, the ISDN Numbering - Public/Unknown Format form is accessed to construct the actual number to be sent, or the ISDN Numbering-Private form (based on *Numbering Format*) is used. For value **r**, the calling number is sent "presentation-restricted."

  NOTE:
  The ISDN Numbering - Public/Unknown Format form can override the value for *Send Calling Number* for any administrable block of extensions.

- *Send Connected Number*

  Specifies whether the calling party's number is sent on incoming or tandemed ISDN calls. Values include **y**, **n** (default), and **r** (restricted). For value **y**, the ISDN Numbering - Public/Unknown Format form is accessed to construct the actual number sent, or the ISDN Numbering-Private form (based on *Numbering Format*) is used. For value **r**, the connected number is sent "presentation-restricted."

  WARNING:
  *The AT&T Switched Network Protocol does not support restricted displays of connected numbers. Therefore, if you administer the **1a** country-protocol/protocol-version combination on the DS1 form, you should not administer Send Connected Number to **r** (restricted) on the ISDN-PRI Trunk Group form because this causes display problems.*

- *Maintenance Tests*

  Leave this field in its default setting of **y**.

- *Suppress # Outpulsing*

  Indicates end-to-end signaling begins with (and includes) the "#" when **y** is entered into this field. The final "#" is suppressed in cases where the system would normally outpulse it. This field should be set to **y** when the Central Office (for example, rotary) or any other facility treats "#" as an error; default is **n**.

- *UUI IE Treatment*

  Specifies whether the Information Element (IE) is shared. Enter value **shared** if the trunk is connected to a R6.0 or later MCU. Enter value **service-provider** (default) if the trunk is connected to a pre-R6.0 MCU or if service provider functionality is desired.

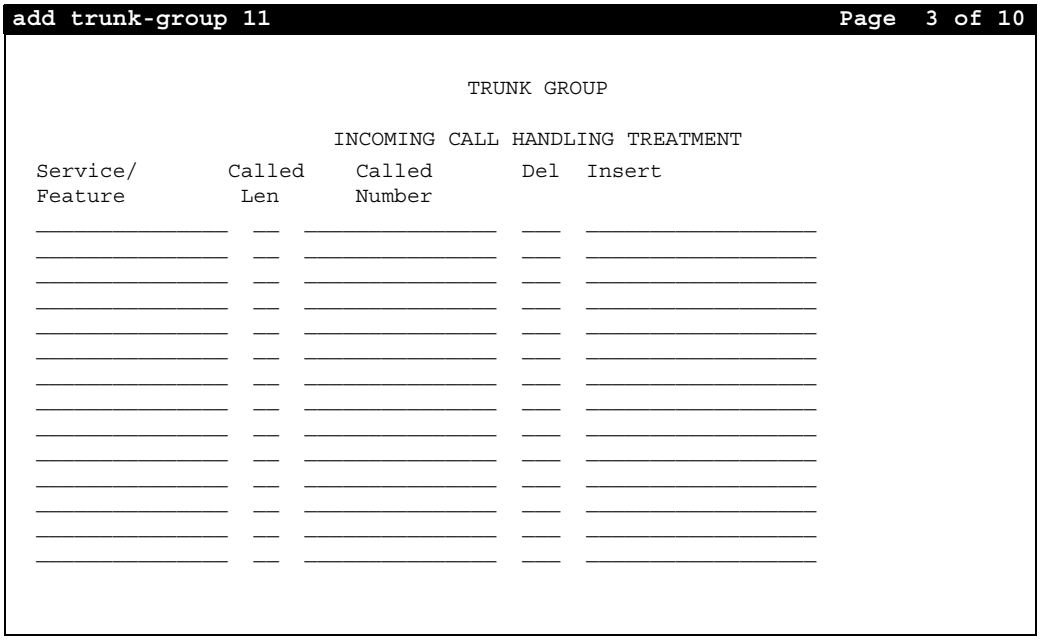


Figure 2-42. Trunk Group Form (Page 3)

Trunk Group Form, Page 3 of 10

- *Service/Feature*

  Specifies the ISDN Services/Features for an incoming call type. Refer to *Service Type* (on page 1 of the form) for a list of predefined Services/Features that can be received.

- *Called Len*

  Specifies the number of digits received for an incoming call. A blank entry is used as a “wild card” entry and, when used, means that any length of digits associated with the specified Service/Feature can match in this field. Valid entries are **0** to **21**, or leave blank.

- *Called Number*

  Specifies the leading digits received for an incoming call. A blank entry is used as a “wild card” entry and, when used, means that any number associated with the specified Service/Feature can match in this field. Valid entries are **1** to **16** digits, or leave blank.

- *Del*

  Specifies the number of leading digits to be deleted from the incoming Called Party Number. Calls of a particular type may be administered to be routed to a single destination by deleting all incoming digits and then administering the *Insert* field with the desired extension. Valid entries are **1** to **21**, **all**, or leave blank.

- *Insert*

  Specifies the digits to be prepended to the front of the remaining digits after any (optional) digit deletion has been performed. The resultant number formed from digit deletion/insertion is used to route the call. Values include up to 16 characters consisting of a combination of the following: 0 through 9, *, #, or leave blank.

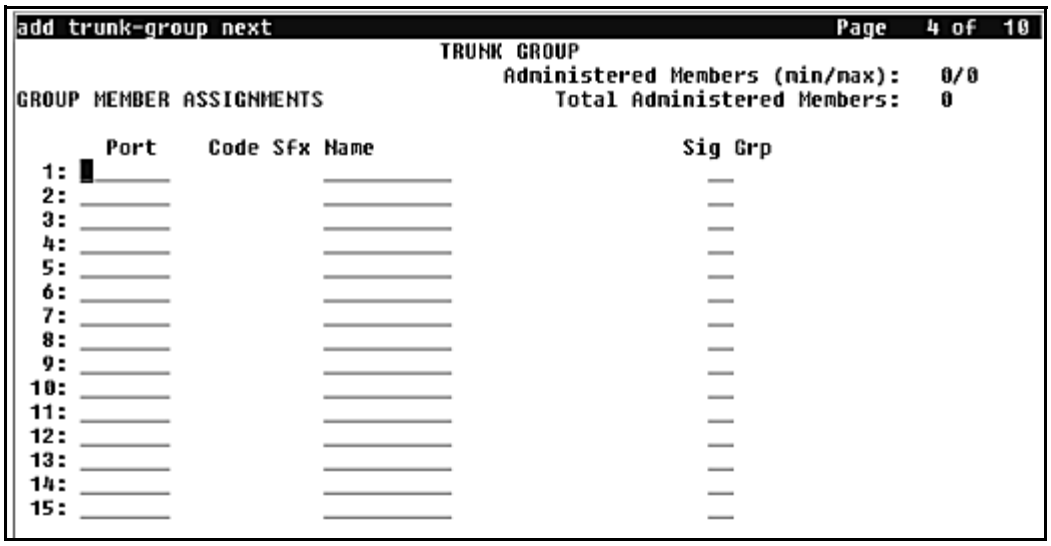


Figure 2-43. Trunk Group Form (Page 4)

Trunk Group Form, Page 4 of 10

- *Administered Members (min/max)*

  Displays on all member pages. Indicates the minimum and maximum number of members administered for this hunt group.

- *Total Administered Members*

  Displays on all member pages. Indicates the total number of members administered for this hunt group.

- *Port*

  Enter the trunk port number (up to six characters).

NOTE:
ESM DS1 ports (if present) should not be administered as members of any trunk group. These ports are hard-cabled to the ESM MMI ports.

- *Name*

  Enter the name of the member of the trunk group (up to 10 characters). The name can be the 7-digit telephone number or a 10-digit trunk circuit identification number (provided by the trunk supplier). The name identification is needed only for the first member of each DS1 circuit pack.

- *Sig Grp*

  Enter the signaling group number (**1** through **26**). If a DS1 interface appears in one and only one signaling group, then the number of that signaling group appears as a default in this field for any trunk on that interface.

NOTE:
The fields and values on pages 4 through 10 are continued from page 3. If *Wideband Support* is set to **n**, pages 4 through 9 appear. If *Wideband Support* is set to **y**, pages 5 through 10 appear.

```
add trunk-group next                                    Page  5 of  10
                                TRUNK GROUP
                                     Administered Members (min/max):   0/0
GROUP MEMBER ASSIGNMENTS                Total Administered Members:   0

      Port    Code Sfx Name                          Sig Grp
 16: _______           ___________                     __
 17: _______           ___________                     __
 18: _______           ___________                     __
 19: _______           ___________                     __
 20: _______           ___________                     __
 21: _______           ___________                     __
 22: _______           ___________                     __
 23: _______           ___________                     __
 24: _______           ___________                     __
 25: _______           ___________                     __
 26: _______           ___________                     __
 27: _______           ___________                     __
 28: _______           ___________                     __
 29: _______           ___________                     __
 30: _______           ___________                     __
```

Figure 2-44. Trunk Group Form (Page 5)

Trunk Group Form, Page 5 of 10

- *Wideband Support Options*

  For 384k bandwidth and service providers supporting NxDS0, enter **y** for *H0*. For 1472k or 1536k bandwidth, enter **y** for *H11*. For 1920k bandwidth (E1 international), enter **y** for *H12*. To specify the “N by DS-zero” multirate service, set *NXDS0* to **y**.

- *Contiguous*

  This field specifies whether to hunt contiguous NXDS0 channels. Values include **y** and **n**; the field should be set to **y**. This field appears only if *NXDS0* contains **y**.

  NOTE:
  All B-channels that are included in the wideband call must reside on the same ISDN-PRI facility.

Administering Tie Trunk Groups

The following list identifies the fields on the Trunk Group form and their values entered when administering tie trunk groups.

```
add trunk-group 2                                        Page   1 of  10
                                TRUNK GROUP

Group Number: 2                      Group Type: tie          CDR Reports: y
  Group Name: OUTSIDE CALL                COR: 1                      TAC: ____
   Direction: two-way          Outgoing Display? n Trunk Signaling Type: _______
Dial Access? n
                                                  Incoming Destination: _____
   Comm Type: rbavd

         BCC: 1                             ITC: rest
TRUNK PARAMETERS
   Trunk Type (in/out): _____________    Incoming Rotary Timeout(sec): 5
    Outgoing Dial Type: tone_____                 Incoming Dial Type: tone_____
                                             Disconnect Timing(msec): 500
       Digit Treatment: _____________                        Digits: ____
                                                   Sig Bit Inversion: none
     Analog Loss Group: 6                        Digital Loss Group: 11
    Incoming Dial Tone? y
                                     Synchronization: async    Duplex: full
 Disconnect Supervision - In? y  Out? n
                                          Receive Answer Supervision? n
```

Figure 2-45. Trunk Group Form (Tie Trunks), Page 1

Trunk Group Form, Page 1 of 10

- *Group Number*

  This is a display-only field that shows the number of the trunk group that is currently being accessed.

- *Group Type*

  Enter **tie** to identify the trunk group.

- *CDR Reports*

  Enter **y** if tracking calls on this trunk group. Leave value **n** if not tracking calls.

- *Group Name*

  Enter a name of up to 27 characters to describe this trunk group (for example, **isdn-pri to AT&T**, **circuit # of span**). The default is **OUTSIDE CALL.**

- *COR*

  Leave this field at the default value **1**.

- *TAC*

  Enter a number containing one to four digits (including #) for the trunk access code that matches the numbering plan assigned on the dial plan for the TAC. (Character # can be used as the first digit.) CDR uses the TAC to identify the trunk group on CDR reports. Allowable entries must match the dial plan.

- *Direction*

  Values include **incoming**, **outgoing**, and **two-way** (default), depending on how the associated trunk group is being used. (For example, if the far end is administered for outgoing calls only on this trunk group, the field should be set to **incoming** for the MCU trunk group.)

- *Outgoing Display*

  N/A on the MCU. Leave at default value **n**.

- *Trunk Signaling Type*

  Specifies the kind of signaling to use for members in the trunk group; if the field is administered to a non-blank value, it severely restricts the ports that can be administered in the trunk group. If *Group Type* is set to “tie,” values include **cont** (continuous), **dis** (discontinuous), **tge**, **tgi**, and **tgu**. Value **cont** or **dis** indicates that only ports from a TN2140 Italian tie trunk may be administered as trunk group members. Value **tge**, **tgi**, or **tgu** indicates that only ports from a TN497 Italian Tie trunk can be administered as trunk group members. If the field is blank, ports from any other tie trunk circuit pack may be added as trunk group members.

- *Dial Access*

  Enter **y** to allow this trunk group to be accessed via a TAC; otherwise, enter **n**.

  NOTE:
  Access via ARS should be used for all calls regardless of this field value.

- *Comm Type*

  Set this field to **rbavd** for DS1 T1 service RBS trunks.

- *BCC*

  This field indicates barrier capabilities. Possible values include **0** (voice), **1** (56k robbed-bit), **2** (up to 19.2 [modem is set up]), **3** (restricted 64k), or **4** (64k clear).

- *ITC (Information Transfer Capability)* — Used to administer the type of traffic (restricted, unrestricted, or both) that is allowed to be carried by this routing preference. For value **rest** (restricted), only calls originating from restricted endpoints may access this route pattern. For value **unre** (unrestricted), only calls originating from unrestricted endpoints may access this route pattern. For value **both**, calls originating from both restricted and unrestricted endpoints may access the route pattern.

- *Trunk Type (in/out):*

  Identifies the physical type of incoming and outgoing trunks. Values include **auto/auto**, **auto/delay**, **auto/immed**, **auto/wink**, **delay/auto**, **delay/delay**, **delay/immed**, **delay/wink**, **immed/auto**, **immed/delay**, **immed/immed**, **immed/wink**, **wink/auto**, **wink/delay**, **wink/immed**, and **wink/wink**. The far end must be compatible with the MCU. (For example, value **wink/wink** can be used at both ends; value **wink/delay** at one end requires value **delay/wink** at the other end.)

- *Incoming Rotary Timeout (sec)*

  Specify the number of seconds before an incoming rotary call is timed out. Leave at default value **5**.

- *Outgoing Dial Type*

  Leave at default value **tone**. Values **mf** and **rotary** are not used on the MCU.

- *Incoming Dial Type*

  Leave at default value **tone**. Values **mf** and **rotary** are not used on the MCU.

- *Disconnect Timing*

  Specify in milliseconds the disconnect time. Leave at default value **500** (milliseconds).

- *Digits*

  If either **insertion** or **absorption** was administered in the *Digit Treatment* field, this field should contain either the digits, *****, or **#** that need to be inserted, or the number of digits (**1** through **5**) that needs to be absorbed. If *Digit Treatment* was left blank, this field should be left blank (default).

- *Digit Treatment*

  If inserting digits at the trunk group level, set this field to **insertion**. If absorbing digits at the trunk group level, enter **absorption**. Otherwise, leave blank (default).

- *Sig Bit Inversion*

  This field allows the user to administer the signaling bit inversion (the A-bit and B-bit inversion) on a per-port basis, and it applies only to TN464B or later circuit packs. The CCITT standards define on-hook to be “1” in the A-bit and off-hook to be “0.” This definition is the reverse of the EIA definition. The default in the TN464 firmware for signaling bit inversion is to use the CCITT standard for 32-channel mode and to use the EIA standard for 24-channel mode. Values include **A**, **B**, **A&B**, and none (default).

- *DTT to DCO Loss*

  Specifies the loss plan to be used for the associated trunk group. This field should be left at the default value **normal**.

- *Connected to Toll*

  N/A for the MCU. Leave this field set to **n**.

- *Incoming Dial Tone*

  Leave this field set to **y**.

- *Synchronization*

  N/A for the MCU. Leave this field set to **async**.

- *Duplex*

  N/A for the MCU. Leave this field set to default value **full**.

- *Disconnect Supervision...In?*

  Displays when *Direction* is set to **incoming** or **two-way**. Values include **y** (default) and **n**. Internally, the field is set to **n** if *Direction* is set to **outgoing**. For the MCU, enter **y** to indicate that the far end can release a trunk when the calling party releases from a call and the system is able to recognize the release signal.

- *Disconnect Supervision...Out?*

  Displays when *Direction* is set to **outgoing** or **two-way**. Values include **y** and **n** (default). Internally, the field is set to **n** if *Direction* is set to **incoming**. Set to **n** for the MCU. If the field is set to **y**, a warning message appears to alert the user of possible trunk lockups.

This field specifies whether trunks in this trunk group provide disconnect supervision when seized outgoing (that is, whether these trunks should be allowed to participate in outgoing trunk-to-outgoing trunk calls). This field is set independently of the trunk-to-trunk transfer system parameter, although both options must be set appropriately if outgoing trunk-to-outgoing trunk transfers are desired.

- *Answer Supervision Timeout*

  Used for all trunk types to indicate the amount of time in seconds that the system allows for a call to be answered before beginning a CDR record of a call. This interval begins as soon as the outgoing trunk is seized. Values include **0** to **250**; default is **10**.

  NOTE:
  This timeout does not override answer supervision sent from the network or other firmware (DS1 port circuit timers). DS1 firmware sent answer supervision is administered in *Outgoing End of Dial (sec)* on the Administrable Timers page of the Trunk Group form.

- *Receive Answer Supervision?*

  Specifies whether the network provides answer supervision for the trunks. Answer supervision refers to notification from the far end that the called party has gone off-hook to answer the call. When answer supervision is not provided, the originating switch can classify a call as answered using the *Answer Supervision Timeout* field entry (for domestic circuit packs) or, for circuit packs that take administrable timers, by using *Outgoing End of Dial (sec)*. For trunks over which answer supervision is provided by the network, set this field to **y** (default) and *Answer Supervision Timeout* to **0** to disable the firmware timeout. The firmware timeout is set automatically to **0** on circuit packs that take the administrable *Outgoing End of Dial (sec)* field. *Receive Answer Supervision* must be set to **n** if *Direction* is set to **incoming**.

```
add trunk-group next                                        Page  2 of 10

                                    TRUNK GROUP

TRUNK FEATURES
          ACA Assignment? n
                                                      Maintenance Tests? y
                                Data Restriction? n




   Suppress # Outpulsing? n
                     Seize When Maintenance Busy: neither-end


Incoming Tone (DTMF) ANI: no
         Connected to CO? n
```

Figure 2-46. Trunk Group Form (Tie Trunks), Page 2

Trunk Group Form, Page 2 of 10

- *ACA Assignment*

  N/A for the MCU. Leave the default value **n**.

- *Data Restriction*

  N/A for the MCU. Leave the default value **n**.

- *Suppress # Outpulsing*

  Leave this field set to **n**.

- *Maintenance Tests*

  Values include **y** and **n**. Value **y** enables hourly maintenance tests to be performed automatically on the associated trunk group.

- *Seize When Maintenance Busy*

  This field is effective only for ports on the TN767 and TN464C (or later release) circuit packs. It indicates whether an outgoing seize is generated when a trunk is maintenance-busied, and whether the far-end switch is administered to do likewise. This supports the Electronic Tandem Network Busyout feature. The intended use of this feature is to prevent the far-end switch from reporting problems concerning a trunk that has been removed

from service at the near end. Setting this field has no effect on the behavior of the far-end machine; it controls the behavior of the near-end switch and the expected far-end behavior.

If the administered value of this field is either **near-end** or **both-ends**, an outgoing seize will be initiated whenever a trunk in this trunk group is maintenance-busied. The seize is maintained until the maintenance busyout is released. This action will likely cause alarms at the far-end switch, perhaps leading to a far-end maintenance busyout, unless the far-end switch is administered to expect this behavior.

If the administered value of this field is either **far-end** or **both-ends**, any abnormally long incoming seize (including failure to drop from a completed call) is assumed to be the result of a far-end maintenance busy condition. Note that this assumption may be incorrect, since the abnormally long seize may actually be due to a transient or permanent failure of the trunk circuit. Regardless of the cause of the abnormally long seize, the near-end responds by (1) generating a warning alarm indicating that the trunk is assumed to be maintenance busy at the far-end; (2) removing the trunk from service; and, (3) keeping the trunk out of service until a far-end disconnect is received. The values allowed depend on the value in the *Direction* field. When *Direction* is set to **incoming**, the values are **far-end** and **neither-end**.

When *Direction* is set to **outgoing**, the values are **near-end** and **neither-end**. When Direction is set to **two-way**, the values are **both-ends**, **far-end**, **near-end**, and **neither-end**.

- *Incoming Tone (DTMF) ANI*

  Displays only when *Incoming Dial Type* on page 1 of the form is set to **tone**. Values include ***ANI*DNIS***, **ANI*DNIS***, and **no** (default). For value ***ANI*DNIS***, the far end must provide a leading " * ." For value **ANI*DNIS***, the far end does not provide a leading " * ." These ANI digits are printed on a CDR record, passed to the AUDIX Intuity and ASAI interface, and displayed on the station set (and on tandem calls if the outgoing trunk requires ANI). Then this received ANI is sent to the outgoing trunk.

- *Connected to CO*

  Displays when *Group Type* is set to **tie**. Permits overlap sending to a Central Office. Values include **y** and **n** (default).

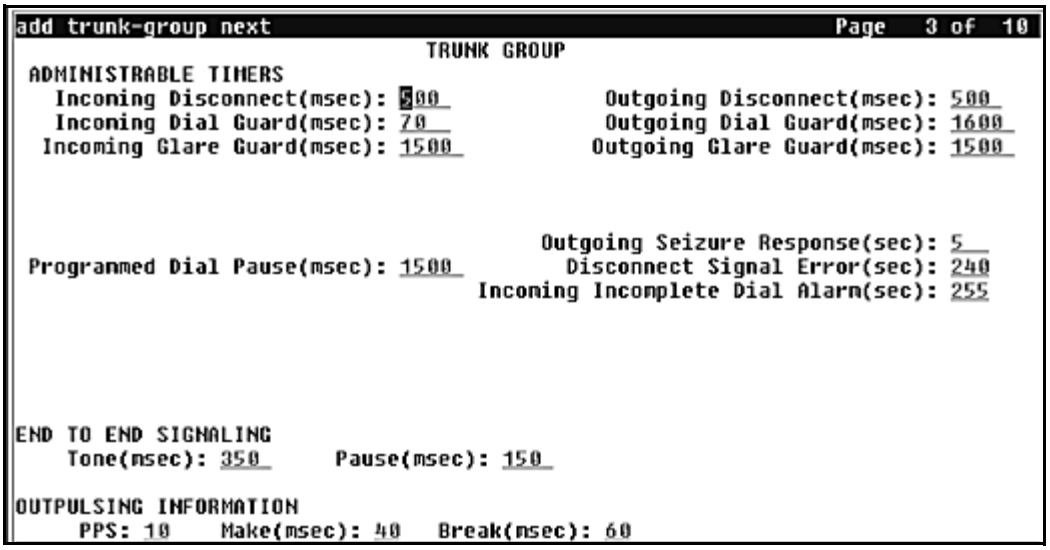


Figure 2-47. Trunk Group Form (Tie Trunks), Page 3

Trunk Group Form, Page 3 of 10

- *Incoming Disconnect (msec)*

  A disconnect signal on an incoming call is considered valid only if it continues at least for the time specified by this timer. Valid entries are **50** through **2550** in increments of 10. The field cannot be blank; default is **500**. The field appears only for an incoming or two-way trunk group when *Trunk Signaling Type* is either blank or **cont**.

- *Incoming Dial Guard (msec)*

  Enter the interval between the detection of an incoming seizure and the acceptance of the first digit. The MCU will not accept digits before this timer expires. Valid entries are **10** through **2550** in increments of 10; default is **70**.

- *Incoming Glare Guard (msec)*

  Enter the minimum time (in msec) between the time an incoming trunk is released and the same trunk can be seized for an outgoing call. This guard time ensures that the far-end has released all equipment after the incoming trunk is released. Valid entries are **100** to **25500** in increments of 100. The field cannot be blank. Default is **1500**. This field only appears when the trunk group *Direction* is **two-way**.

- *Outgoing Disconnect (msec)*

  A disconnect signal on an outgoing call is considered valid only if it continues at least for the time specified by this timer. This timer begins timing when a disconnect signal has been detected on an outgoing call over the trunk, and it resets when the signal is no longer detected. If the timer times out, the trunk drops. Valid entries are **50** to **2550** in increments of 10. The field cannot be blank. Default is **500**.

- *Outgoing Dial Guard (msec)*

  This timer specifies the minimum time between seizure acknowledgment of a trunk and the outpulsing of digits. For trunks that do not provide seizure acknowledgment, the timer specifies the minimum time between seizure and the outpulsing of digits. Any digit that is dialed by the station user after the user lifts the receiver, but before the timer times out, is not outpulsed until the timer expires. Valid entries are **100** to **25500** in increments of 100. The field cannot be blank. Default is **1600**.

- *Outgoing Glare Guard (msec)*

  Enter the minimum time (in msec) between the time an outgoing trunk is released and the same trunk can be seized for another outgoing call. This guard time will ensure that the far-end has released all equipment after the outgoing trunk is released. Valid entries are **100** to **25500** in increments of 100. The field cannot be blank. Default is 1500. This field appears only for outgoing and two-way trunk groups.

- *Programmed Dial Pause (msec)*

  Enter the length (in msec) of a pause during abbreviated dialing, ARS outpulsing, and terminal dialing operations. This timer is administrable for all outgoing and two-way trunk groups. Valid entries are **100** to **25500** in increments of 100. Default is **1500**. This timer is sent to the TN2207 and TN767 circuit packs. All CO circuit packs that accept administrable timers accept this timer.

- *Outgoing Seizure Response (sec)*

  Enter a maximum time (in sec) by which the MCU should receive the proceed-to-dial indication from the far-end after sending the seize signal. If the indication is not received in this time, a seizure failure response is uplinked. Valid entries are **1** to **255** in increments of 1. Default is **5**. This timer is sent to the TN2207 and TN767 circuit packs.

- *Disconnect Signal Error (sec)*

  Enter the time (in sec) within which a disconnect signal from the far-end is expected after the internal party (a station or a tie trunk) goes on-hook. If the timer expires, the system can assume a disconnect failure and take an appropriate action (such as an error message). This field appears for ground-start trunk groups. Valid entries are **1** to **255** in increments of 1; default is **240**.

- *Incoming Incomplete Dial Alarm (sec)*

  Enter the maximum time (in sec) allowed between incoming seizure and receipt of all digits. Intervals greater than this generate an inline error. Valid entries are **1** to **255** (default) in increments of 1. Only the TN2207 and TN767 circuit packs accept this timer.

- *Tone (msec)*

  Enter the length of a DTMF tone sent in response to a button depression at a hybrid station set. Valid entries are **20** to **2550** in increments of 10; the default is **350**. This field appears only if *Trunk Signaling Type* is blank. This timer is only sent to the TN2207 and TN767 circuit packs.

- *Pause (msec)*

  Enter the minimum length of a pause between tones being sent in response to button depressions at a hybrid station set. It is administrable only if the *Trunk Signaling Type* is blank. Valid entries are **20** to **2550** in increments of 10; default is **150**. This timer is only sent to the TN2207 and TN767 circuit packs.

- *PPS*

  Enter either **10** or **20** to specify the PPS (pulses per second) assigned to rotary dial pulse trunk groups. Valid entries are **10** (default) and 20.

  NOTE:
  The TN767 circuit pack can do only 10pps.

- *Make (msec)*

  Enter the duration of the make interval (the pause between pulses) while the system is outpulsing digits using dial pulse signaling. If *PPS* is **10**, the sum of *Make (msec)* and *Break (msec)* must equal **100**. Valid entries are **20** to **80** in increments of 5. The field cannot be blank. The default is **40**. If *PPS* is **20**, the sum of *Make (msec)* and *Break (msec)* must equal **50**. Valid entries are **10** to **40** in increments of 5. The field cannot be blank. The default is **20**.

- *Break (msec)*

  Enter the duration of the break interval (the pulse duration) while the system is outpulsing digits using dial pulse signaling. If *PPS* is **10**, the sum of *Make (msec)* and *Break (msec)* must equal **100**. Valid entries are **20** to **80** in increments of 5. The field cannot be blank. The default is **60**. If *PPS* is **20**, the sum of *Make (msec)* and *Break (msec)* must equal **50**. Valid entries are **10** to **40** in increments of 5. The field cannot be blank. The default is **30**.

```
add trunk-group next                                          Page  4 of 10


                                        TRUNK GROUP
                                           Administered Members (min/max):  0/0
GROUP MEMBER ASSIGNMENTS                       Total Administered Members:  0

         Port     Code Sfx Name                       Mode      Type  Ans Delay
     1: _______           ___________                _________ _______ ____
     2: _______           ___________                _________ _______ ____
     3: _______           ___________                _________ _______ ____
     4: _______           ___________                _________ _______ ____
     5: _______           ___________                _________ _______ ____
     6: _______           ___________                _________ _______ ____
     7: _______           ___________                _________ _______ ____
     8: _______           ___________                _________ _______ ____
     9: _______           ___________                _________ _______ ____
    10: _______           ___________                _________ _______ ____
    11: _______           ___________                _________ _______ ____
    12: _______           ___________                _________ _______ ____
    13: _______           ___________                _________ _______ ____
    14: _______           ___________                _________ _______ ____
    15: _______           ___________                _________ _______ ____
```

Figure 2-48. Trunk Group Form (Tie Trunks), Page 4

Trunk Group Form, Page 4 of 10

- *Administered Members (min/max)*

  Displays on all member pages. Indicates the minimum and maximum number of members administered for this hunt group.

- *Total Administered Members*

  Displays on all member pages. Indicates the total number of members administered for this hunt group.

- *Port*

  Enter the trunk port number (up to six characters).

- *Name*

  Enter the name of the member of the trunk group (up to 10 characters). The name can be the seven- or 10-digit telephone number or trunk circuit identification number (provided by the trunk supplier). The name identification is required only on the first member of each DS1 circuit pack.

- *Mode*

  N/A for the MCU. Leave blank.

- *Type*

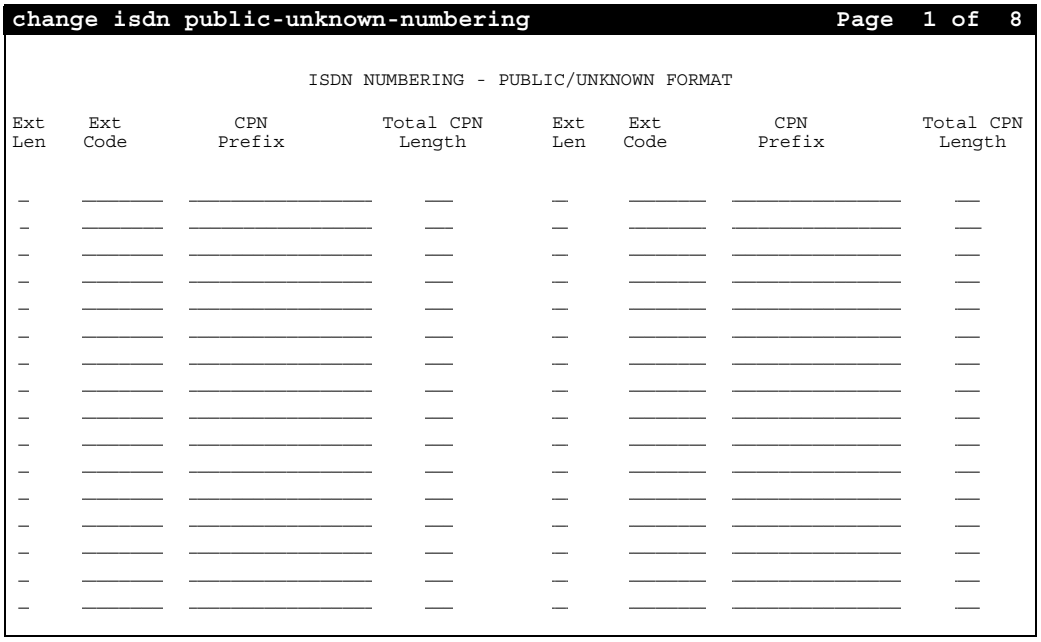
  N/A for the MCU. Leave blank.

- *Ans Delay*

  N/A for the MCU. Leave blank.

ISDN Numbering — Public/Unknown Format Form

The ISDN Numbering — Public/Unknown Format form is used to construct the actual calling number to be sent for incoming, outgoing, or tandemed ISDN calls. To access the form, enter the **change isdn public-unknown-numbering** command. An example of the form appears as follows:



```
change isdn public-unknown-numbering                          Page  1 of  8

                        ISDN NUMBERING - PUBLIC/UNKNOWN FORMAT

Ext    Ext          CPN            Total CPN      Ext    Ext          CPN            Total CPN
Len    Code         Prefix           Length       Len    Code         Prefix           Length

_      _______      ________________   __         _      _______      ________________   __
_      _______      ________________   __         _      _______      ________________   __
_      _______      ________________   __         _      _______      ________________   __
_      _______      ________________   __         _      _______      ________________   __
_      _______      ________________   __         _      _______      ________________   __
_      _______      ________________   __         _      _______      ________________   __
_      _______      ________________   __         _      _______      ________________   __
_      _______      ________________   __         _      _______      ________________   __
_      _______      ________________   __         _      _______      ________________   __
_      _______      ________________   __         _      _______      ________________   __
_      _______      ________________   __         _      _______      ________________   __
_      _______      ________________   __         _      _______      ________________   __
_      _______      ________________   __         _      _______      ________________   __
_      _______      ________________   __         _      _______      ________________   __
_      _______      ________________   __         _      _______      ________________   __
_      _______      ________________   __         _      _______      ________________   __
_      _______      ________________   __         _      _______      ________________   __
```

Figure 2-49. ISDN Numbering - Public/Unknown Format Form

The following list discusses the fields in the form.

- *Ext Len*

  Specifies the number of digits the extension can have. Enter a number from **0** through **5** that corresponds to the extension lengths allowed by the dial plan, or leave blank.

- *Ext Code*

  Allows for groups of extensions to be administered. The value can contain a maximum of five digits based on the value in the *Ext Len* field.

- *CPN Prefix*

  Specifies the number that is added to the beginning of the extension to form a 10-digit CPN number.

- *Total CPN Length*

  Enter the total number of digits to send. Values include **0** through **15**, or leave blank.

ISDN Numbering — Private Format Form

This form supports Private Numbering Plans (PNPs). It allows you to specify the digits to be put into the Calling Number IE, the Connected Number Information Element (IE), and the QSIG Party Number for extensions in the Private Numbering Plan. To access the form, enter the **change isdn private-numbering** command. An example of the form appears as follows.

```
change isdn private-numbering                          Page  1 of  1

                      ISDN NUMBERING - PRIVATE FORMAT

          Network Level: _
           Level 2 Code: _____            Deleted Digits: 0
           Level 1 Code: _____
```

Figure 2-50. ISDN Numbering — Private Format Form

The following list discusses the fields in the form.

- *Network Level*

  N/A on MCU. Leave blank.

- *Level 2 Code*

  N/A on MCU. Leave blank.

- *Level 1 Code*

  N/A on MCU. Leave blank.

- *Deleted Digits*

  N/A on MCU. Leave blank.

Administering the ESM from the MSM

To administer the ESM from the MSM, you must first establish the MSM-ESM link and then enable T.120 data transfer within the conference. You can administer the ESM for a connection over the PACCON link.

To enable T.120 data transfer within the conference, access the Conference Record by entering **change conference *xxx***, where ***xxx*** is the conference number. Then populate each field in the following list with the value specified.

- *T.120 Data Mode:* ***any-mlp***
- *App Comp?:* ***y*** *(for each endpoint)*

Submit the form.

Procedure For Connection Over the PACCON Link

To administer the ESM from the MSM with a connection over the PACCON link, complete the fields in the forms identified in the following table. Appropriate page references to the forms are provided. Detailed instructions for completing the forms are provided after the table

Table 2-22. Required Forms For ESM Administration over the PACCON Link

Form	Field	Page Reference
Set Date and Time	■ All	2-14
Customer Options	■ *Max. T.120 Port Capacity*	2-35
DS1 Circuit Pack	■ (Refer to the following list.)	2-65
Signaling Group	■ (Refer to the following list.)	2-82
Conference Record	■ *Audio Mode*	1-12
	■ *T.120 Data Mode*	1-19
	■ *MLP Rate*	1-19
	■ *App Comp?*	1-22

Establish the MSM-ESM link as follows:

1. Verify that the time setting on the MSM is correct by entering the **display time** command. If you need to correct the time, enter the **set time** command and complete the fields in the Set Date and Time form.
2. Access the Customer-Options form by entering **change system-parameters customer-options**. Enter the maximum number of T.120 ports that can be allocated in the system at the same time into the *Max. T.120 Port Capacity* field. Then submit the form.
3. Access the DS1 (UDS1) Circuit Pack form by entering **change ds1 *location***, where ***location*** is the location of the DS1 circuit pack in the carrier. Ensure that the MMI cabling board is administered, and populate each field in the following list with the value specified:
   - *Bit Rate*: **2.048**
   - *Line Coding*: **hdb3**
   - *Signaling Mode*: **isdn-pri**
   - *Connect*: **pbx**
   - *Interface*: **network**
   - *MMI Cabling Board*: (location of this item; for example, **1A10**)
   - *MMI Interface*: **pac_esm**
   - *CRC*: **y**
   - *Slip Detection*: **y**

   Submit the form.
4. Access the Signaling Group form by entering **add signaling-group *x***, where ***x*** is either the signaling group number (**1** through **8**) or **next**. Ensure that channel 16 is represented in the *Primary D-Channel* field (for example, **A0816**, where A08 is the location of the UDS1 circuit pack). Then complete the form according to the directions provided in the “Signaling Group Form” section in this chapter. Finally, submit the form.

To enable T.120 data transfer within the conference, access the Conference Record by entering **change conference *xxx***, where ***xxx*** is the conference number. Then populate each field in the following list with the value specified.

- *T.120 Data Mode:* ***any-mlp***
- *App Comp?:* ***y*** *(for each endpoint)*

Submit the form.

Administering Dial Plans

The MCU internal dial plan is the system's guide to digit translation. The dial plan is designed to give greater flexibility to digit translations. The entire dial plan is dependent on the first digit dialed. The first digit can be one of 11 possible characters, including 1 through 9, *, and #.

When a digit is dialed, the system must know what to expect, based on that digit. For example, if a data module user dials a "4," the system must know how many more digits to expect and what code type to expect before it can process the call.

The dial plan is administered at system initialization by the system administrator.

Dial plans are available for Automatic Alternate Routing (AAR), Automatic Route Selection (ARS), and the Uniform Dialing Plan (UDP).

Automatic Alternate Routing (AAR)

Automatic Alternate Routing (AAR) provides alternate routing choices for private on-network calls. AAR also provides digit modification to allow on-network calls to route through the public network when on-network routes are not available. Before the forms necessary to enable AAR can be administered, either the Private Networking or Uniform Dialing Plan option on the Customer-Options form must be enabled.

To implement AAR, complete the fields in the forms identified in the following table. Appropriate page references to the forms are provided.

Table 2-23. Required Forms and Fields for AAR

Form	Field	Page Reference
Dial Plan Record	■ All	2-100
Class of Restriction	■ *FRL*	2-38
Feature Access Code	■ *AAR Access Code* ■ *ARS Access Code*	2-146 2-146
AAR and ARS Digit Analysis Table	■ All	2-148
AAR and ARS Digit Conversion Table	■ All	2-156
Route Pattern	■ All	2-169
Feature-Related System Parameters	■ AAR/ARS Dial Tone Required	2-50

Automatic Route Selection (ARS)

Automatic Route Selection (ARS) allows calls to be routed over the public network according to the preferred (usually the least expensive) route available at the time you place the call. Before the necessary forms can be administered to enable ARS, the ARS option on the Customer-Options form must be enabled.

To implement ARS, complete the fields in the forms identified in the following table. Appropriate page references to the forms are provided.

Table 2-24. Required Forms and Fields for ARS

Form	Field	Page Reference
Class of Restriction	■ *FRL*	2-38
Feature Access Code	■ *ARS Access Code* ■ *AAR Access Code*	2-146 2-146
AAR and ARS Digit Analysis Table	■ All	2-148
AAR and ARS Digit Conversion Table	■ All	2-156
Route Pattern	■ All	2-169
Feature-Related System Parameters	■ *AAR/ARS Dial Tone Required*	2-50

Uniform Dial Plan (UDP)

The Uniform Dial Plan (UDP) provides a common 4- or 5-digit dial plan that can be shared among several switches. Interswitch dialing and intraswitch dialing are enabled via 4- or 5-digit dialing. UDP is used with Electronic Tandem Networks (ETNs) and Main/Satellite/Tributary configurations. Also, UDP can be used alone to provide uniform 4- or 5-digit dialing between two or more private switching systems without Main/Satellite/Tributary or DCS configurations.

To implement UDP, complete the fields in the forms identified in the following table. Appropriate page references to the forms are provided.

Table 2-25. Required Forms and Fields for UDP

Form	Fields	Reference
Dial Plan	*Uniform Dialing Plan*	2-100
AAR Analysis	All	2-148
AAR and AAR Digit Conversion	All	2-156
AAR and ARS Digit Analysis	All	2-148
Route Pattern	All	2-169

Administering Feature Access Codes

Feature Access Codes (FACs) are used to activate or deactivate certain system features. The following commands are used to administer the Feature Access Code form.

Table 2-26. System Parameters Features Administration Commands

Action	Object	Qualifier
change	feature-access-codes	
display	feature-access-codes	print or schedule

Use the following procedure to change the FAC to activate or deactivate certain system features:

1. At the *command:* prompt, type **change feature-access-codes** and then press RETURN.
2. Verify that the screen displays the *Feature Access Code* screen.
3. Use TAB or RETURN to advance to the fields you want to change.
4. When the form is completed, verify that the MT displays: *Command successfully completed* followed by *command:*
5. To verify the form, type **display feature-access-codes** and then press RETURN.

Feature Access Code Form

The Feature Access Code form appears as follows:

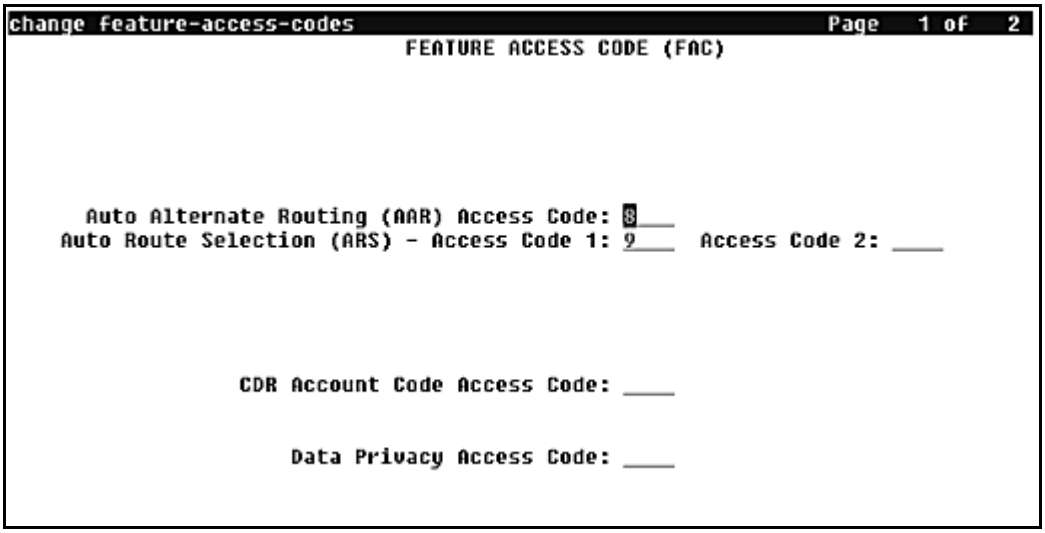


Figure 2-51. Feature Access Code Form (Page 1)

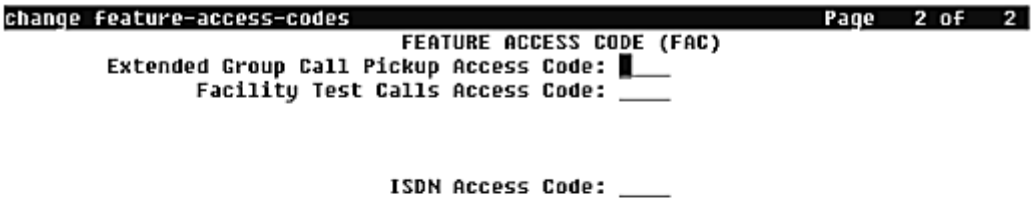


Figure 2-52. Feature Access Code Form (Page 2)

The following list provides the fields on the Feature Access Code form and their related values.

NOTE:
Before you can use this form, you must administer the value for the FAC on the Dial Plan form.

Page 1:

- *Auto Alternate Routing (AAR) Access Code*

  Enter a 1- to 4-digit number to be used to access AAR. Character * or # may be used as the first digit.

- *Auto Route Selection (ARS)-Access Code 1*

  Enter the digits required to access this feature. This field is usually set to **9** unless this digit is required by the MCU for incoming extension numbers from the network (DNIS digits).

- *Auto Route Selection (ARS)-Access Code 2*

  Enter the digits required to access this feature. Generally, this field is not used.

  NOTE:
  This field could be used if two different customers are using the MCU and need to use separate trunk facilities for dialing out. However, this would not be supported by CRCS.

- *CDR Account Code Access Code*

  This field can be used prior to entering an account code for CDR purposes.

- *Data Origination Access Code*

  This field can be used if RBS DS1 service is in effect and if remote access is used with modem pooling on the MCU. A caller using the RBS trunks would have to use the access code to have the MCU insert the modem pool onto the call.

- *Data Privacy Access Code*

  Used to isolate a data call from call waiting or other interruptions.

Page 2:

- *Extended Group Call Pickup Access Code*

  N/A for the MCU. Leave blank.

- *Facility Test Calls Access Code*

  N/A for the MCU. Leave blank.

- *ISDN Access Code*

  Used to place an ISDN call without using ARS, AAR, or UDP. Enter a 1- to 4-digit number; * or # may be used as the first digit.

Administering AAR and ARS Digit Analysis

AAR Digit Analysis and ARS Digit Analysis are used to map customer-dialed strings to route patterns.

ARS Digit Analysis analyzes digits that are dialed for a public network call. The digits are analyzed for routing information. The feature compares the dialed digits to entries in the ARS Digit Analysis table and maps the digits to a specific route pattern. This is done as follows:

- *Dialed digits that are entered are matched in digit analysis and mapped to a specific route pattern.*
- *Flexible dialing permits dialed strings containing a maximum of 18 digits to be analyzed so that the proper route can be determined.*
- *Wild cards can be used in digit analysis to simplify the administration of complex networks.*
- *Selected route patterns are used to route the call.*

Use the following commands to administer the AAR and ARS Digit Analysis Table form.

Table 2-27. Commands for AAR and ARS Digit Analysis

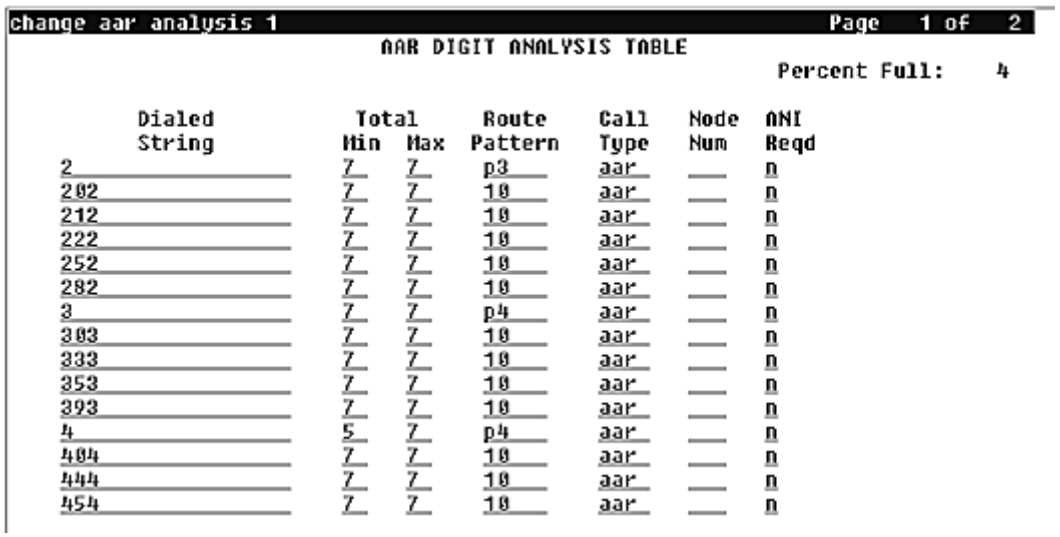
Action	Object	Qualifier*
change	aar analysis ars analysis	Enter digits between 0 to 9, ‘x’ or ‘X’ (dialed string) [‘partition’ 1-8] [‘min’(1-28)]
display	aar analysis ars analysis	Enter digits between 0 to 9, ‘x’ or ‘X’ (dialed string) [‘partition’ 1-8] [‘min’ (1-28)] [’print’ or ’schedule’]
list	aar analysis ars analysis	[‘start’ string] [‘count’ 1-2000] [‘route’(1-254 or r1-r32)], [‘partition’ (1-8)], [‘node’ (1-999)], [‘to-node’ (1-999), [‘print’ or ’schedule’]
list	aar route-chosen ars route-chosen	Enter dialed number, [‘partition’ (1-8)], [’print’ or ’schedule’]

* Some qualifiers are available only with recent MCU configurations. Brackets [] indicate the qualifier is optional. Single quotes (‘’) indicate the text inside the quote must be entered exactly as shown or an abbreviated form of the word may be entered. MAX is the maximum number available in your system configuration.

AAR and ARS Digit Analysis Tables

The AAR and ARS Digit Analysis forms are organized into two parts. The left side of the form displays values that are already administered for routing calls. The right side of the form is a reproduction of the left side except that the fields are blank. If additional administration is required, you can do this by populating the blank fields on the right side of the form. This checks any new administration with existing ARS analysis translations, and it prevents duplicate entries. By using the information that is provided on the left side of the form, you can check any new administration for duplication.

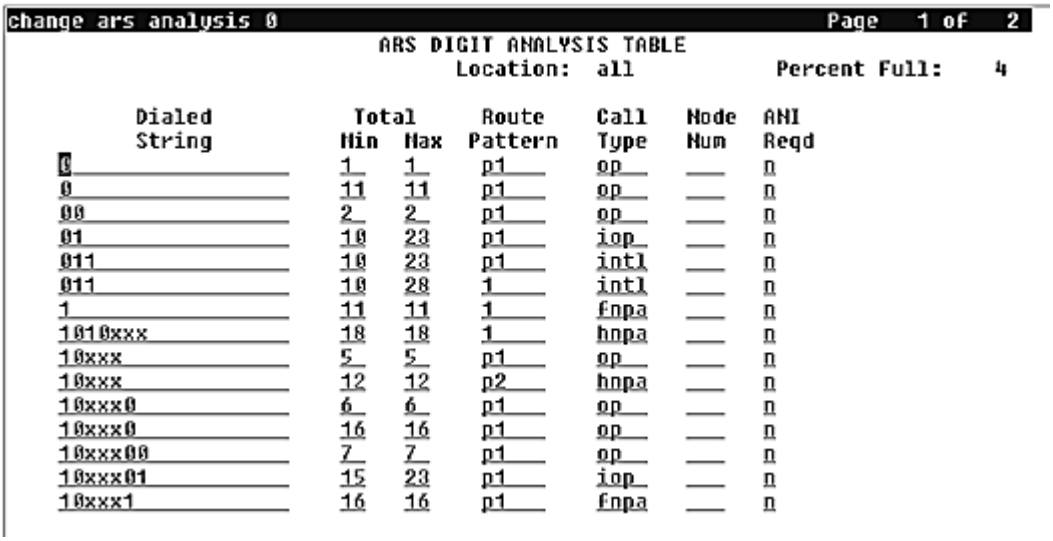
The forms appear as follows:



```
change aar analysis 1                                        Page   1 of   2
                          AAR DIGIT ANALYSIS TABLE
                                                        Percent Full:    4

      Dialed          Total      Route    Call    Node   ANI
      String          Min  Max   Pattern  Type    Num    Reqd
2                     7    7     p3       aar     ___    n
202                   7    7     10       aar     ___    n
212                   7    7     10       aar     ___    n
222                   7    7     10       aar     ___    n
252                   7    7     10       aar     ___    n
282                   7    7     10       aar     ___    n
3                     7    7     p4       aar     ___    n
303                   7    7     10       aar     ___    n
333                   7    7     10       aar     ___    n
353                   7    7     10       aar     ___    n
393                   7    7     10       aar     ___    n
4                     5    7     p4       aar     ___    n
404                   7    7     10       aar     ___    n
444                   7    7     10       aar     ___    n
454                   7    7     10       aar     ___    n
```

Figure 2-53. AAR Digit Analysis Table



```
change ars analysis 0                                        Page   1 of   2
                          ARS DIGIT ANALYSIS TABLE
                                Location:  all          Percent Full:    4

      Dialed          Total      Route    Call    Node   ANI
      String          Min  Max   Pattern  Type    Num    Reqd
0                     1    1     p1       op      ___    n
0                     11   11    p1       op      ___    n
00                    2    2     p1       op      ___    n
01                    10   23    p1       iop     ___    n
011                   10   23    p1       intl    ___    n
011                   10   28    1        intl    ___    n
1                     11   11    1        fnpa    ___    n
1010xxx               18   18    1        hnpa    ___    n
10xxx                 5    5     p1       op      ___    n
10xxx                 12   12    p2       hnpa    ___    n
10xxx0                6    6     p1       op      ___    n
10xxx0                16   16    p1       op      ___    n
10xxx00               7    7     p1       op      ___    n
10xxx01               15   23    p1       iop     ___    n
10xxx1                16   16    p1       fnpa    ___    n
```

Figure 2-54. ARS Digit Analysis Table

Complete the forms as follows:

- *Percent Full* — Display-only field. Displays the percentage of the system's memory resources that has been used. A common pool of memory resources is shared between the ARS and AAR Analysis tables.
- *Dialed String* — Enter the dialed string of digits. A maximum of 18 ARS characters consisting of the digits **0** through **9** or ***** are allowed. Use a wildcard letter (**9x** or **X0**) to substitute for any digit occurring in the dialed string at the character position where used.

  NOTE:
  The user-dialed digits are matched to the `Dialed String` entry that most closely matches the dialed number (referred to as the longest match). For example, if a user dials 297-1234 and the AAR or ARS Analysis Table has dialed string entries of 297-1 and 297-123, the match is on the 297-123 entry. In addition, an exact match is made on dialed string entries of the same number of digits in cases where wildcard characters are used. For example, if 957-1212 is dialed and the table has dialed string entries of 957 and X97, the match is on the 957 entry.

- *Min* — Enter the minimum number of digits needed to validate and route the call. Default is blank.
- *Max* — Enter the maximum number of digits to collect, between `Min` and **28**. Default is blank.

  NOTE:
  Keep the ARS Analysis Table as simple as possible. For example, set digit 1 to min 11 max 11; this would take the place of setting digits 120 to min 11 max 11; 121 to min 11 max 11, etc. Setting 1 with min 11 max 11 would allow all 10-digit calls starting with a prefix of '1' for long distance.

- *Route Pattern* — Enter the route number you want to use for this dialed string: **p1** to **p2000** specifies the route index number established on the Partition Routing Table, **1** to **640** specifies the route pattern used to route the call, **r1** to **r32** specifies the remote home number plan area table (used if RHNPA translations are required for the corresponding dialed string; **node** designates node number routing, or **deny** to block the call.

  You should administer some sequence of route patterns on the MCU. For example, you might administer a simple network with either all calls going out over one route pattern or a toll call going out on one route pattern and local calls going out on another route pattern, etc.

- *Call Type* (for AAR only) — Enter **aar** for regular AAR calls. Enter **haar** for home AAR calls. Enter **intl** or **pubu** if the administered route pattern contains preferences that are public network ISDN trunks requiring Type of Number (TON) encodings "international" or unknown, respectively. Enter **lev0**, **lev1**, or **lev2** or leave blank (default) to specify Private Numbering Plan (PNP) number formats.
- *Call Type* (for ARS only) — Valid call types/values include the following:

Call Type/ Value	Description	China #1 Call Type
alrt	Alerts attendant console for emergency	normal
emer	emergency call	normal
fnpa	10-digit North American Numbering Plan (NANP) call **NOTE**: There are 11 digits if prefix digit "1" is used.	attendant
hnpa	7-digit NANP call	normal
intl	public network international number	toll-auto
iop	international operator	attendant
locl	public network local number	normal
lpvt	local private	normal
natl	non-NANP **Note**: This value ignores the *NPA* and *Prefix Mark* fields in the Route Pattern form; therefore, you may need to insert or delete digits.	normal
npvt	national private	normal
nsvc	national service	normal
op	operator	attendant
pubu	international public network number (for example, E.164)	normal
svcl	national (2)	toll-auto
svct	national (2)	normal
svfl		
svft		

For a domestic MCU, enter value **hnpa** for 7-digit calls, value **fnpa** for 10-digit calls, and value **int** for international calls. The remaining call types are generally not used for a domestic MCU.

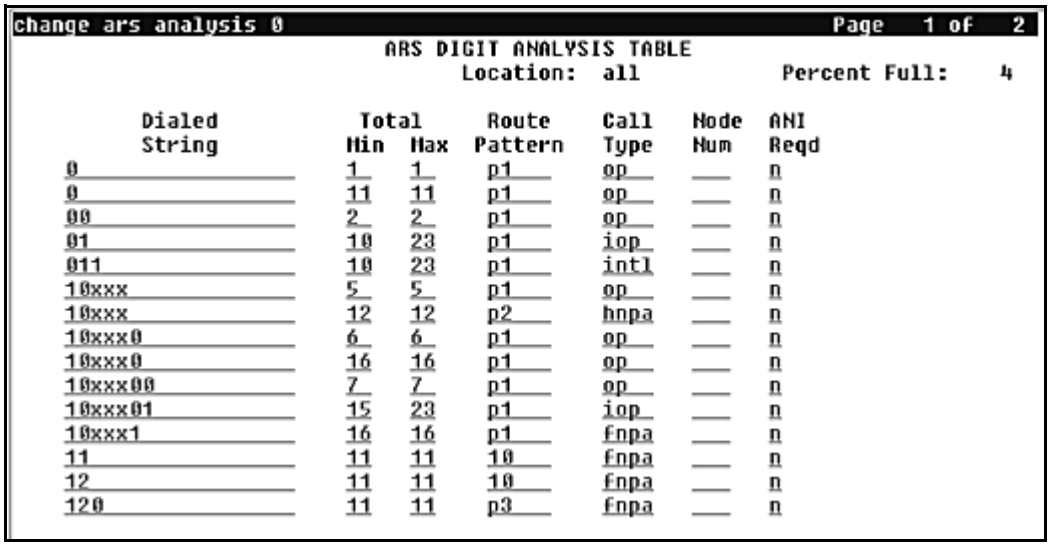
- *Node Num* — Identifies the number of the destination node if node number routing or DCS is used.
- *ANI Reqd* — Enter **y** if ANI is required on incoming R2-MFC or Russian MF ANI calls. Default is **n**. This field applies only if the Request Incoming ANI (non-AAR/ARS) field on the Multifrequency-Signaling-Related System Parameters form is set to **n**.

AAR and ARS Digit Analysis Default Translations

You can delete the defaults by entering **change ARS analysis 0**. Then blank out all of the Dialed Strings with spaces. For service outside of North America, these defaults should be deleted.

ARS Digit Analysis Table

You can list information pertaining to dialed strings and route patterns by issuing the list ars analysis command. An example of the report produced is provided in the following figures



change ars analysis 0 Page 1 of 2

ARS DIGIT ANALYSIS TABLE
Location: all Percent Full: 4

Dialed String	Total Min	Total Max	Route Pattern	Call Type	Node Num	ANI Reqd
0	1	1	p1	op		n
0	11	11	p1	op		n
00	2	2	p1	op		n
01	10	23	p1	iop		n
011	10	23	p1	intl		n
10xxx	5	5	p1	op		n
10xxx	12	12	p2	hnpa		n
10xxx0	6	6	p1	op		n
10xxx0	16	16	p1	op		n
10xxx00	7	7	p1	op		n
10xxx01	15	23	p1	iop		n
10xxx1	16	16	p1	fnpa		n
11	11	11	10	fnpa		n
12	11	11	10	fnpa		n
120	11	11	p3	fnpa		n

Figure 2-55. ARS Digit Analysis Table (Report) — Page 1

Administering Partition Route Tables

Use the Partition Route Table form to identify routing for partition groups associated with an ARS Analysis entry.

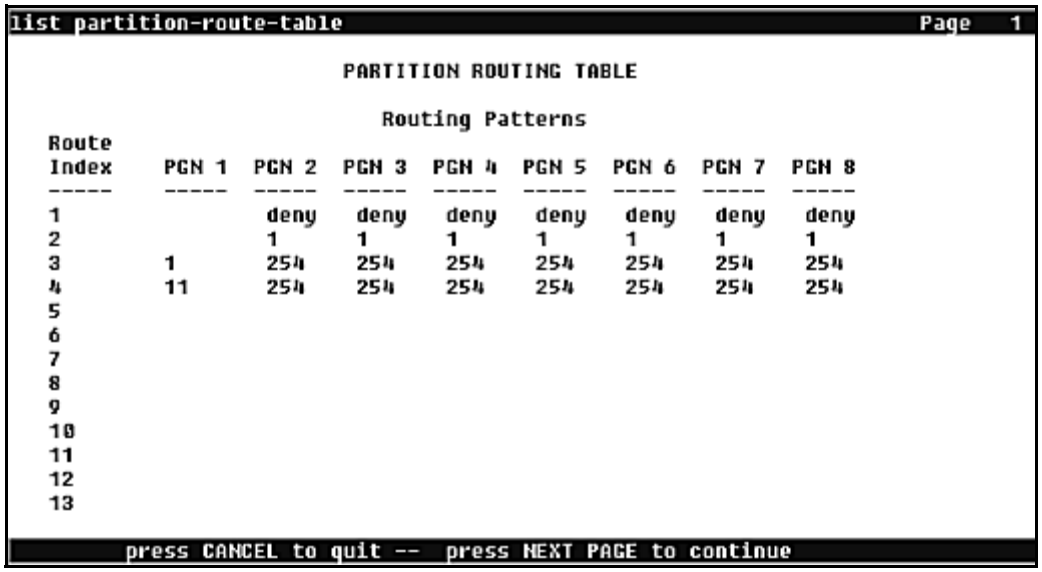


Figure 2-56. Partition Routing Table

Page 1:

- *PGN 1 (through PGN 8)*

  Enter the routing for each partition group associated with each route index number. Valid entries are **1** to **640** to specify the route pattern used to route the call, **r1** to **r32** to specify the remote home number plan area (RHNPA) table used to route the call, **node** which designated node number routing or **deny** which blocks the call.

Administering AAR and ARS Digit Conversions

You can convert private-network numbers to other private-network numbers, to public-network ARS numbers, or to extensions in the network. Similarly, you can convert public-network ARS numbers to other public-network numbers, to private-network numbers, or to extensions in the network.

NOTE:
However, whenever AAR is not activated, digits can only be converted from a public network number to another public network number or to a local extension

Accordingly, by using the AAR and ARS Digit Conversion tables, you can do the following:

- *Steer some AAR calls to other switches in the private network*
- *Change the dialed string to a public-network number and route the call via the ARS feature*
- *Block or intercept certain private-network calls to the attendant group*
- *Route unauthorized public-network calls to an attendant or give them intercept tone*

The form allows for the replacement of all or part of a dialed string with a modified string and/or change of analysis type. The modified string represents an alternative equivalent address and results in call analysis according to the network type. The table is accessed during call-processing.

Digit conversion enhances the capabilities of the AAR and ARS features so that outgoing public-network calls and private-network calls can be changed to local, private, or public network destinations. The calls are then analyzed by the UDP, AAR, or ARS features and routed according to the associated route patterns.

Digit conversion always takes precedence over digit analysis. The conversion process allows all or parts of digits dialed to be modified. The modified string is then further analyzed and routed via analysis or may be further converted.

When the station user dials a collection of digits, the MCU looks for a match in ARS digit conversion and in ARS digit analysis. If a match is found in ARS digit conversion, the MCU does the following:

1. Verifies the minimum and maximum values of the digits received
2. Looks for the best digit string match (route or convert)
3. Looks for the most specific match
4. Deletes the specified number of digits and, if required, replaces these digits with the specified string of digits

5. Determines the network in which to reanalyze the new digits, ARS, AAR, or extension
6. Checks if further conversion is requested (a maximum of seven conversions are permitted)

Use the following commands to administer the AAR and ARS Digit Conversion Table form.

Table 2-28. Commands for Administering AAR and ARS Digit Conversions

Action	Object	Qualifier*
change	aar digit-conversion ars digit-conversion	Enter digits between 0 - 9 '*' or 'X'
display	aar digit-conversion ars digit-conversion	Enter digits between 0 - 9 '*' or 'X' ['print' or 'schedule']
list	aar digit-conversion ars digit-conversion	Enter ['start' matching pattern]['count' (1-400)] ['print' or 'schedule']

* Brackets [ ] indicate the qualifier is optional. Single quotes (' ') indicate the text inside the quote must be entered exactly as shown or an abbreviated form of the word may be entered. MAX is the maximum number available in your system configuration.

AAR and ARS Digit Conversion Tables

The forms appear as follows:

```
change aar digit-conversion 0                                  Page  1 of  2

                          AAR DIGIT CONVERSION TABLE
                                                          Percent Full: 2
Matching Pattern     Min   Max   Del    Replacement String     Net  Conv ANI Req

________________      __    __    __    ________________       _    ___      n_
________________      __    __    __    ________________       _    ___      n_
________________      __    __    __    ________________       _    ___      n_
________________      __    __    __    ________________       _    ___      n_
________________      __    __    __    ________________       _    ___      n_
________________      __    __    __    ________________       _    ___      n_
________________      __    __    __    ________________       _    ___      n_
________________      __    __    __    ________________       _    ___      n_
________________      __    __    __    ________________       _    ___      n_
________________      __    __    __    ________________       _    ___      n_
________________      __    __    __    ________________       _    ___      n_
________________      __    __    __    ________________       _    ___      n_
________________      __    __    __    ________________       _    ___      n_
________________      __    __    __    ________________       _    ___      n_
________________      __    __    __    ________________       _    ___      n_
________________      __    __    __    ________________       _    ___      n_
```

Figure 2-57. AAR Digit Conversion Table

```
change ars digit-conversion 0                                  Page  1 of  2

                          ARS DIGIT CONVERSION TABLE
                                                          Percent Full: 2
Matching Pattern     Min   Max   Del    Replacement String     Net  Conv ANI Req

________________      __    __    __    ________________       _    ___      n_
________________      __    __    __    ________________       _    ___      n_
________________      __    __    __    ________________       _    ___      n_
________________      __    __    __    ________________       _    ___      n_
________________      __    __    __    ________________       _    ___      n_
________________      __    __    __    ________________       _    ___      n_
________________      __    __    __    ________________       _    ___      n_
________________      __    __    __    ________________       _    ___      n_
________________      __    __    __    ________________       _    ___      n_
________________      __    __    __    ________________       _    ___      n_
________________      __    __    __    ________________       _    ___      n_
________________      __    __    __    ________________       _    ___      n_
________________      __    __    __    ________________       _    ___      n_
________________      __    __    __    ________________       _    ___      n_
________________      __    __    __    ________________       _    ___      n_
________________      __    __    __    ________________       _    ___      n_
```

Figure 2-58. ARS Digit Conversion Table

NOTE:
When the form is accessed via a **display** or **change** command, the entries are sorted separately in the order of the matching pattern. Specific digits are sorted before the characters "*," "x," or "X."

Complete the forms as follows:

- ***Percent Full*** — *3-character display-only field. Displays the percentage of the used system's memory resources. A common pool of memory resources is shared between the ARS and AAR Digit Conversion tables.*

  If this field indicates that the system memory resources are in jeopardy of becoming full (100%), perform any of the following to free-up memory resources:

  — Delete unnecessary entries from any of the shared resources tables

  — Reduce `Dialed String` entries to shortest possible length that accomplishes the desired function

- **Matching Pattern** — Enter a one- to 18-digit string to be matched against a dialed number. Matching Pattern entries must be unique within the table. The string may contain the digits 0-9 or a * and wildcard characters "x" or "X." These are used to match any digit in the range of 0 through 9 or *. If a Prefix Digit is required for 10-digit DDD numbers, then the Prefix Digit "1" must be present in the Matching Pattern string for the match to succeed.

  If the associated `Replacement String` has an entry, `Matching Pattern` must also have an entry.

- ***Min*** — *Enter the minimum number of digits in the dialed string.*
- *Max — Enter the maximum number of digits to collect. Value must be between the value for Min and value 28, inclusive.*
- *Del — Enter the number of digits to delete from the beginning of the dialed string.*
- ***Replacement String*** — *Enter a 0- to 18-digit dialed string that replaces the deleted portion of the dialed number. The dialed string may contain the digits 0–9 or *, a "#" character, or be blank. The "#" character, when used, must be at the end of the digit-string and is used to indicate end-of-dialing.*
- ***Net*** — *Identifies the network in which to analyze the resulting number. Enter value **ext**, **aar**, or **ars**. The resulting digit string is analyzed as an extension number, an AAR address, or an ARS address, respectively.*
- ***Conv*** — *Values include **y** and **n**. To allow further conversion, enter value **y**.*
- ***ANI Req*** — *Enter **y** if ANI is required on incoming R2-MFC or Russian MF ANI calls. Default is **n**. This field applies only if the Request Incoming ANI (non-AAR/ARS) field on the Multifrequency-Signaling-Related System Parameters form is set to **n**.*

Administering AAR for MCUs Behind a PBX

The Automatic Alternate Routing (AAR) Analysis form must be changed when the MCU is being connected behind a PBX. Use the form to specify the home AAR code.

Table 2-29. AAR Analysis Administration Commands

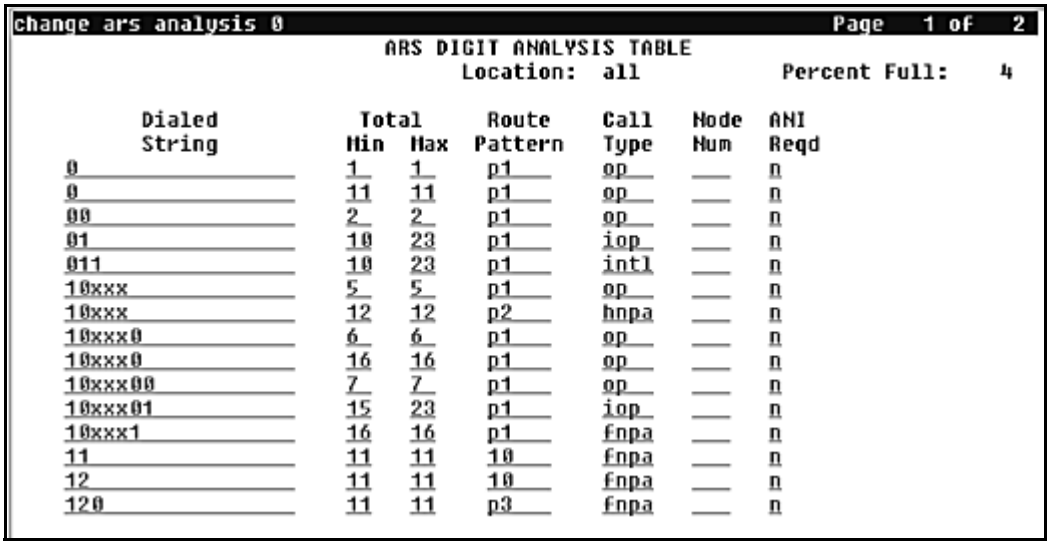
Action	Object	Qualifier
change	aar analysis	0-9, x or X (dialed string)
display	aar analysis	0-9, x or X (dialed string)
list	aar analysis	start dialed string, count, rp, part, print or schedule

Use the following procedure to change AAR when the MCU is connected behind a PBX:

1. At the *command:* prompt, type **change aar analysis #** and then press RETURN.
2. Verify that the screen displays the AAR Analysis screen.
3. Use TAB or RETURN to advance to the fields you want to change.
4. When the form is completed, verify that the MT displays: *Command successfully completed* followed by *command:*
5. To verify the form, type **display aar analysis #** and then press RETURN.

AAR Digit Analysis Form

The AAR Digit Analysis form appears as follows:



```
change ars analysis 0                                        Page   1 of   2
                          ARS DIGIT ANALYSIS TABLE
                                  Location:  all          Percent Full:    4

      Dialed          Total      Route    Call   Node  ANI
      String          Min  Max   Pattern  Type   Num   Reqd
0                     1    1     p1       op           n
0                     11   11    p1       op           n
00                    2    2     p1       op           n
01                    10   23    p1       iop          n
011                   10   23    p1       intl         n
10xxx                 5    5     p1       op           n
10xxx                 12   12    p2       hnpa         n
10xxx0                6    6     p1       op           n
10xxx0                16   16    p1       op           n
10xxx00               7    7     p1       op           n
10xxx01               15   23    p1       iop          n
10xxx1                16   16    p1       fnpa         n
11                    11   11    10       fnpa         n
12                    11   11    10       fnpa         n
120                   11   11    p3       fnpa         n
```

Figure 2-59. AAR Digit Analysis Form

The following list provides the fields on the AAR Analysis form and their related values.

- *Percent Full*

  Displays the percentage of the system's memory resources that have been utilized.

- *Dialed String*

  Enter the dialed string of significant digits. Up to 18 characters (**0** through **9, ***) are allowed. A wildcard character (**x** or **X**) may be used as a substitute for any digit occurring in the string at the character position where used. The default is blank.

- *Min*

  Enter the minimum number of digits needed to validate and route the call. Valid entries are from **1** to the maximum number allowed. The default is blank.

- *Max*

  Enter the maximum number of digits that can be used to validate and route the call. Valid entries are **1** through **28**. The default is blank.

- *Route Pattern*

  Enter the route number you want to use for this dialed string: **p1** to **p2000** specifies the route index number established on the Partition Routing Table, **1** to **640** specifies the route pattern used to route the call, **r1** to **r32** specifies the remote home number plan area table (used if RHNPA translations are required for the corresponding dialed string; node designates node number routing, or deny to block the call.

- *Call Type*

  Enter **aar** for AAR address to indicate the call will be terminated locally instead of routing to another node. If the location code is deleted from the dialed number, the remaining digits are used to route the call to a local extension. Enter **intl** or **pubu** if the administered route pattern contains preferences that are public network ISDN trunks requiring Type of Number (TON) encodings "international" or unknown, respectively. Enter **lev0**, **lev1**, or **lev2** or leave blank (default) to specify Private Numbering Plan (PNP) number formats.

- *Nd Num*

  Identifies the number of the destination node if node number routing or DCS is used.

- *ANI Rq*

  Enter **y** if ANI is required on incoming R2-MFC or Russian MF ANI calls. Default is **n**. This field applies only if the *Request Incoming ANI* (non-AAR/ARS) field on the Multifrequency-Signaling-Related System Parameters form is set to **n**.

Administering Terminals and Modules

Use the Station form to assign buttons to various terminals and modules.

The following commands can be used to administer various terminals.

Table 59-7. Station Administration Commands

Action	Object	Qualifier
add	station	extension or next
change	station	extension
display	station	extension
list	station	extension, type, count, port, print, or schedule
remove	station	extension

To add a maintenance alarm terminal, follow these procedures:

1. At the *command:* prompt, enter **add station *xxxx*** where ***xxxx*** is an extension number or **next**.
2. Verify that the screen displays the *Station* form (refer to "Station Form" on page 2-162 for a list of fields and values).
3. Use TAB and RETURN to advance to the fields you want to change.
4. Submit the form.
5. To verify the form, enter **display station *xxxx***.

Station Form

Page 1 of the Station form appears as follows:

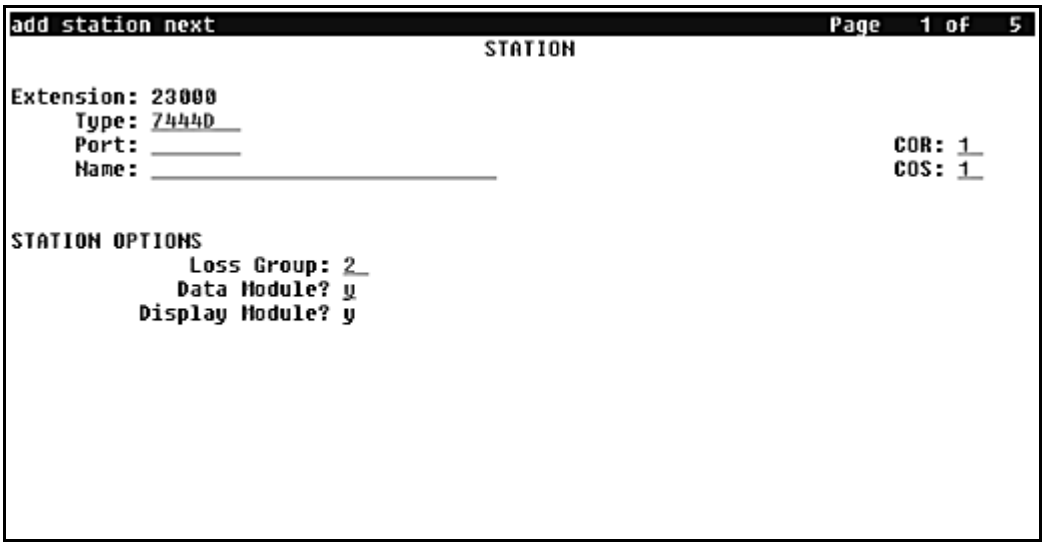


Figure 2-60. Station Form (Page 1)

The following list shows the fields on page 1 the Station form and their related values.

- *Extension*

  A display-only field that shows the extension number of the terminal being administered.

- *Type*

  This field shows the model terminal assigned to this extension.

- *COR*

  The Class of Restriction assigned to this terminal. This should be assigned to the same COR as any other terminal.

- *Port*

  Specify the MCU port that is associated with this terminal.

- *COS*

  The Class of Service assigned to this terminal should be the same as the COS assigned to any other terminal.

- *Name*

  A label that identifies this terminal.

- *Data Module*

  When **y** is entered, a 7400B data module must be administered for the terminal.

- *Display Module*

  Set to **y** if the terminal has a display.

Station Form, Page 2 of 5

```
add station next                                        Page   2 of   5
                                    STATION
SITE DATA
      Room: _________                                Headset? n
      Jack: _____
     Cable: _____




BUTTON ASSIGNMENTS
 1: call-appr_                      6: _________
 2: call-appr_                      7: _________
 3: call-appr_                      8: _________
 4: _________                       9: _________
 5: _________                      10: _________
```

Figure 2-61. Station Form (Page 2)

- *Room*

  Specify the room number where this maintenance alarm terminal is located.

- *Headset*

  This field is not used. Leave it set to **n**.

- *Jack*

  Specify the jack number where the terminal is connected.

- *Cable*

  Enter the cable number that connects the jack to the MCU.

- *Button Assignments*

  Assign the desired features on the appropriate buttons. The following table lists the recommended terminal button assignments for buttons 1 through 10.

Table 61-8. Terminal Button Assignments (1 through 10)

Button	Assignment	Button	Assignment
1	call-appr	6	ac-alarm
2	call-appr	7	cdr1-alrm
3	call-appr	8	pr-sys-alm
4	lsvn-call	9	trk-ac-alm
5	aca-call	10	verify

Station Form, Page 3

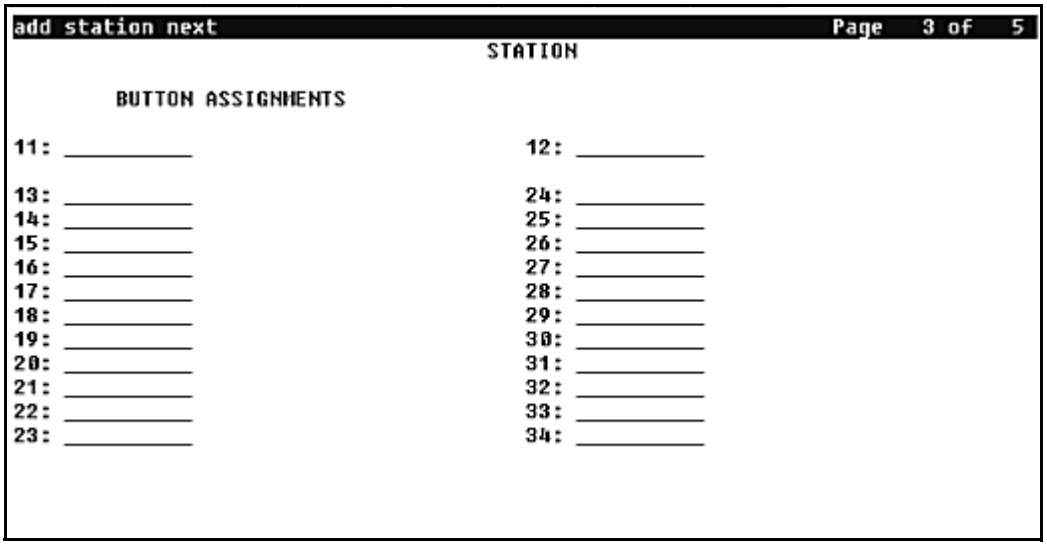


Figure 2-62. Station Form (Page 3)

- *Button Assignments*

  Use this continuation of screen 2 to assign features to the appropriate buttons. The following table lists the recommended terminal button assignments for buttons 11 through 34.

Table 62-9. Terminal Button Assignments (11 through 34)

Button	Assignment	Button	Assignment
11		23	
12		24	link-alarm Lnk #: 1
13	major-alrm	25	link-alarm Lnk #: 2
14	minor-alrm	26	link-alarm Lnk #: 3
15	warn-alrm	27	link-alarm Lnk #: 4
16	mmi-cp-alm	28	
17	vc-cp-alm	29	
18	ds1-alarm	30	
19		31	
20		32	
21		33	
22		34	

Station Form, Page 4

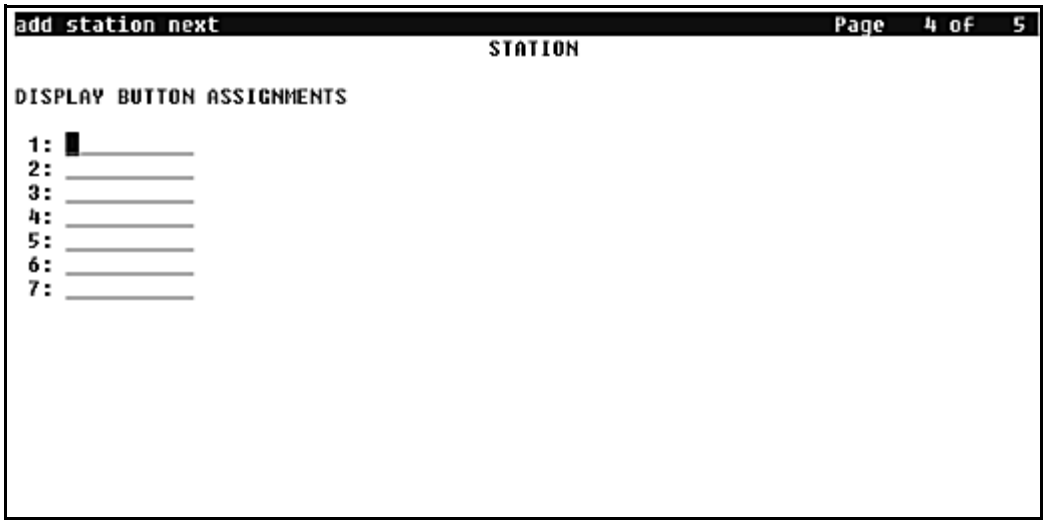


Figure 2-63. Station Form (Page 4)

- *Display Button Assignments*

  Assign the display button appearances to the appropriate buttons as shown in the following table.

Table 2-30. Display Button Assignments

Button	Assignment
1	normal
2	inspect
3	trk-id
4	trunk-name
5	date-time
6	timer
7	

Station Form, Page 5

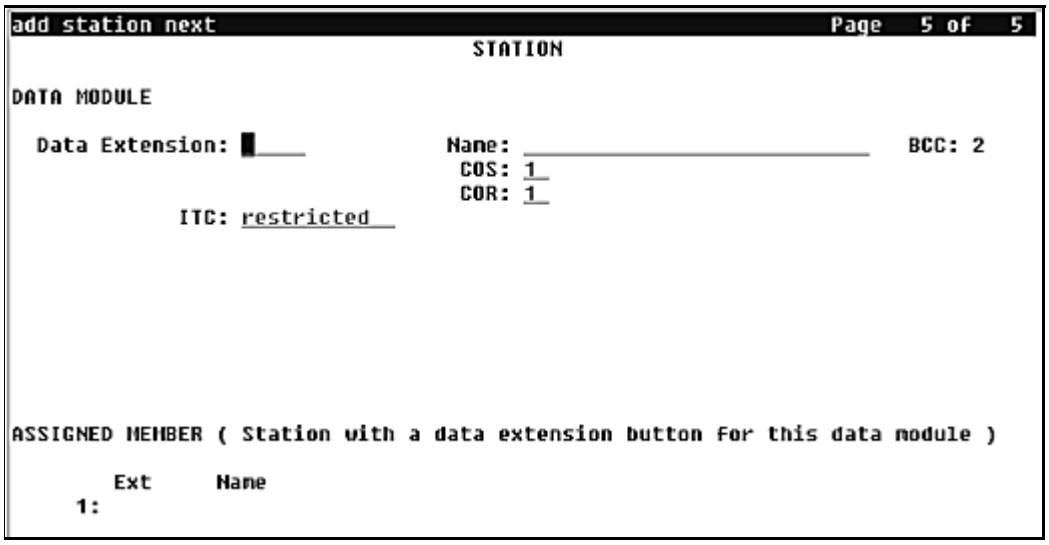


Figure 2-64. Station Form (Page 5)

NOTE:
This screen displays only when **y** is entered in the *Data Module* field on the first screen.

- *Data Extension*

  Enter the extension assigned to the data module.

- *Name*

  Optional name for identification.

- *BCC*

  Leave this field set to **2.**

- *COR*

  The Class of Restriction assigned to this extension.

- *COS*

  The Class of Service assigned to this extension.

- *ITC*

  Information Transfer Capability used for routing calls according to the endpoint's ITC. Default is **restricted**.

- *Ext Name*

  The terminal with a data extension button for this data module.

Administering Routing Patterns

Route patterns direct outgoing calls to a trunk group so that calls can route over a trunk that terminates at switches with different dial plans on a pattern and preference basis. More than one combination of dialed digits can point to the same route pattern. Available trunks can be selected, on a priority basis, as alternate facilities to route the call.

The digit translations performed by the AAR Digit Analysis Table and by the ARS Digit Analysis Table on a public destination number cause a specific route pattern to be selected for routing the call. The route pattern can contain a sequence of trunk groups on which an attempt is made to route the call.

The route patterns specified on the Route Pattern form are used by the following features: AAR, ARS, GRS, Call-by-Call (CBC) Service Selection, and Facility Restriction Level (FRL).

GRS is an enhancement to AAR/ARS. GRS performs routing based on call attributes, such as Bearer Capability Classes (BCCs). CBC allows you to reach multiple services via the same ISDN B-channel. This eliminates the need to dedicate each trunk or channel to a specific service.

Before a call is routed, the MCU checks the following:

- *Facility Restriction Level (FRL) to ensure that the calling party's FRL is greater than or equal to the routing preference's FRL*
- *Calling party's BCC matches the BCC specified for the routing preference (ISDN calls only)*
- *Facility type is okay for the call type*
- *There is an unused circuit (trunk port) available in the selected trunk group*

Call-by-Call Service Selection uses the same route patterns and route preferences that are used by AAR, ARS, and GRS. The service or facility used on an outgoing CBC Service Selection call is determined by information assigned in the AAR/ARS/GRS route patterns.

You can allow a variety of services to use a single trunk group. The system obtains trunking efficiency by distributing traffic over all the available trunks. You can then assign services that are used on incoming and outgoing CBC Service Selection calls.

NOTE:
Whenever the MCU is connected to a 5ESS-type central office (CO), all of the services that are supported under the Avaya and NI-2 country options are available.

Each route pattern has six preferences available for each of 254 route patterns on the MCU. ARS and AAR share route patterns.

To track how a call is routed, issue the **list ARS route-chosen** command. This command displays the minimum and maximum digits dialed, route pattern, and the call type that the MCU software will use for a specific dialed number.

When all checks are completed and compatibility is ensured, digits are sent over the network to connect the call.

Use the following commands to administer the Route Pattern form

Table 2-31. Routing Pattern Commands

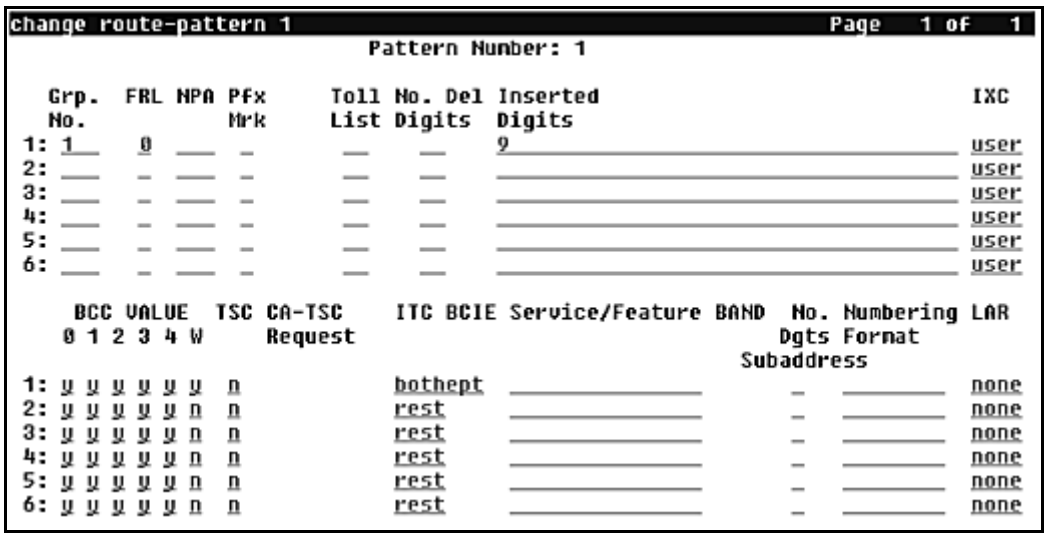
Action	Object	Qualifier*
change	route-pattern	1-254
display	route-pattern	1-254 [print]
list	route-pattern	Enter [‘trunk’ (1-99)] [‘service’/feature name string] [‘print‘ or ‘schedule’]

* Brackets [ ] indicate the qualifier is optional. Single quotes (‘ ’) indicate the text inside the quote must be entered exactly as shown or an abbreviated form of the word may be entered. MAX is the maximum number available in your system configuration.

Route Pattern Form

The Route Pattern form implements one route pattern. Each route pattern can contain alternate trunk groups.

The Route Pattern form appears as follows:



```
change route-pattern 1                                    Page   1 of   1
                              Pattern Number: 1

   Grp.  FRL NPA Pfx     Toll No. Del Inserted                          IXC
   No.           Mrk     List Digits  Digits
1: 1     0                            9                                 user
2:                                                                      user
3:                                                                      user
4:                                                                      user
5:                                                                      user
6:                                                                      user

     BCC VALUE  TSC CA-TSC    ITC BCIE Service/Feature BAND  No. Numbering LAR
     0 1 2 3 4 W     Request                                 Dgts Format
                                                          Subaddress
1: y y y y y y   n            bothept                                   none
2: y y y y y n   n            rest                                      none
3: y y y y y n   n            rest                                      none
4: y y y y y n   n            rest                                      none
5: y y y y y n   n            rest                                      none
6: y y y y y n   n            rest                                      none
```

Figure 2-65. Route Pattern Form (Page 1)

Make assignments as required for the following fields on the form:

- **Pattern Number** — This is a display-only field when the form is accessed using an administration command such as **change** or **display**.
- **Grp No.** — Enter the desired trunk group number to specify which trunk-group will be associated with the entries on this line of the form.
- **FRL** — Enter the FRL (**0** through **7**) to be assigned this routing preference (this line of parameters on the form). Value **0** is the least restrictive and value **7** is the most restrictive. Trunk group FRLs are changeable from pattern to pattern. The calling party's FRL must be greater than or equal to this FRL to access the associated trunk-group.
- **NPA**— This entry is not required for AAR. For ARS, enter the NPA of the distant end (terminating endpoint). For tie trunks, the NPA field is left blank. Values include three digits in the form: first digit (**2**–**9**), second digit (**0**–**9**), third digit (**0**– **9**). Default is blank.
- **Pfx Mrk** — Because some, but not all, calls need to outpulse digit "1," the route pattern must distinguish between which of these routing preferences will outpulse digit "1" and which will not outpulse this digit. This field is used for this purpose. In general, this field applies only to the hnpa and fnpa call types. Values include **0** through **4** and blank (default).

NOTE:
However, prefix marks **2** and **3** *are not used on the MCU* because it is easier to insert digits on 7-digit toll calls then it is to populate the toll tables. Use only prefix marks **0**, **1**, and **4**.

0 Suppresses a user-dialed digit “1” for 10-digit FNPA calls and sends a user-dialed digit “1” for 7-digit hnpa calls.

1 Outpulses a “1” for 10-digit calls and does not outpulse a "1" for 7-digits calls. Use prefix mark “1” whenever HNPA calls do not require dialing digit “1” and a user dials a “1” on HNPA calls.

2 N/A for the MCU. Outpulses a “1” for all toll calls including 10 digits or seven digits, whether or not the user dials a “1.” Typically, 7-digit hnpa toll calls are indicated as toll calls on the ARS toll table. If the digits are toll digits, the digit “1” is sent.

3 N/A for the MCU. Outpulses a “1” for all toll calls and keeps or inserts the NPA to ensure that all toll calls are ten digits. (Use digit insertion on MCU.)

4 Always suppresses a user-dialed prefix digit “1.” For example, an SDN/MEGACOM call could go directly to a 4ESS (toll switcher), and the 4ESS would reject this call because it starts with “1.”

Default value blank provides the same treatment as prefix mark **0**.

- **Toll List** — N/A for the MCU. Leave blank.
- **No. Del. Digits** — Enter the total number of digits to be deleted from the dialed string when selecting this trunk group for call routing. Default is blank.

  Any non blank value in this field (including **0**) causes any user-dialed IXC code to be deleted in addition to the number of digits specified.

NOTE:
Use the *Prefix Mark* field on this form to suppress toll prefixes following user-dialed IXC codes. This capability is useful when the call is routed via ISDN-PRI trunks to a 4ESS office. The 4ESS will reject a call if the IXC code is sent along with the address digits.

- **Inserted Digits —** Enter the actual digits to be inserted. A maximum of 52 digits may be outpulsed. This includes 36 digits that you enter here plus up to 18 digits that were originally dialed. When they are used, special symbols count as two digits each. The special characters used in route patterns are described in the following table.

Special Character	Description
*	CO or PBX feature
#	Signals end of dialing
,	1.5 second pause
+	Wait for dial tone up to the Off Premises Tone Detection Timer and then either outpulse or intercept tone based on `Out Pulse Without Tone y/n` (Feature-Related System Parameters form). Outpulsed DTMF digits are sent at the rate specified by the End-to-End Signaling Tone and Pause parameters (Trunk Group Administrable Timers form).
%	Start End-to-End Signaling. Send digits as DTMF inband tones at the rate specified by the End-to-End Signaling tone and Pause parameters (Trunk Group Administrable Timers form).

- **IXC —** Displays when `ISDN-PRI` is enabled on the Customer-Options form. For ISDN Preference trunks, enter the last two to four digits to represent an equal access inter-exchange carrier (IXC) code number (such as 10XX or 10XXX).

  NOTE:
  This length should match the format established on the IXC Codes form.

  This field is used by all calls that route via an IXC; it is also used for Call Detail Recording (CDR). If an IXC is not specified, a call is transmitted by the presubscribed common carrier.

  NOTE:
  The IXC field must be **none** for non-ISDN trunk groups and for Bellcore NI-2 Operator Service Access. If you need to send an IXC code for a non-ISDN trunk group, then enter this IXC value into the `Inserted Digits` field.

- **BCC Value** (required by GRS feature) — Displays when `ISDN-PRI` is enabled on the Customer-Options form. Enter **y** (default) or **n** in the appropriate BCC column (0, 1, 2, 3, 4, or W) to specify whether the BCC is valid for the associated route. The following defines the BCC values:

BCC Value	Description
0	Voice-Grade Data and Voice
1	56k Data (Mode 1)
2	64k Data (Mode 2)
3	64k Data (Mode 3)
4	64k Data (Mode 0)
W	128k to 984k Data (Wideband)

- **CA-TSC Request** — N/A for the MCU. Leave set to value **n**.
- **ITC** (Information Transfer Capability) — Used to administer the type of traffic (restricted, unrestricted, or both) that is allowed to be carried by this routing preference. For value **rest** (restricted), only calls originating from restricted endpoints may access this route pattern. For value **unre** (unrestricted), only calls originating from unrestricted endpoints may access this route pattern. For value **both**, calls originating from both restricted and unrestricted endpoints may access the route pattern.

  NOTE:
  This field must be set to **unre** or **both** if `BCC W` is set to **y**.

- **BCIE** (Bearer Capability Information Element) — Used to determine how to create the ITC codepoint in the BCIE of the setup message. This field applies only to ISDN trunks and is displayed and administrable only if `ITC` is set to **both**. Values include **ept** (endpoint) and **unr** (unrestricted). Default is **ept**.
- **Service/Feature** (required by the Call-by-Call Service Selection feature) — Displays when `ISDN-PRI` is enabled on the Customer-Options form. Enter up to 15 characters that represent the Service/Feature carried by a call in this route pattern. Default is blank. Values include **accunet**, **i800**, **inwats**, **lds**, **mega800**, **megacom**, **multiquest**, **operator**, **outwats-bnd**, **sdn**, **sub-operator**, and **wats-max-bnd**.
- **Band** — This field appears when the Services/Feature field is **outwats-bnd** and when ISDN-PRI or ISDN-BRI Trunks field is y on the System-Parameters Customer Options screen.

- **No. Dgts Subaddress** — Allows a caller to reach a number where switch digit processing deletes the dialed number and inserts the listed directory number (LDN). The LDN is then sent to the destination address and the dialed extension is sent in the calling party subaddress information element (IE). At the receiving end, the call terminates to the user indicated by the subaddress number instead of the attendant. Administrable when the ISDN Feature Plus field is set to **y** on the System-Parameters Customer-Options screen.
- **Numbering Format** — For a domestic MCU, leave blank.
- **LAR** — N/A for the MCU. Leave value at **none**.

Administering Alphanumeric Dialing

This feature allows a system administrator to change a mapped string (the actual digit dialing string) to an alpha name associated with the string. It is used to replace extension numbers with easier to remember alpha characters. For example, you could replace the netcon hunt group extension assigned for remote administration with the alpha name **CRCS**.

The Alphanumeric Dialing Table form consists of 68 paired alpha name and/or mapped string fields. Entries may be made in any order on the form; however, before the form is displayed for changing or reviewing, the entries are sorted alpha-numerically by alpha name. All entries are moved to the beginning of the table, leaving any blank entries at the end.

The following administration commands access the Alphanumeric Dialing Table form.

Table 65-10. Station Administration Commands

Action	Object	Qualifier
change	alphanumeric-dial-table	
display	alphanumeric-dial-table	print

Follow the procedure below to use the alphanumeric dialing feature:

1. At the *command:* prompt, type **change alphanumeric-dial-table** and then press RETURN.
2. Verify that the screen displays the Alphanumeric Dialing Table form.
3. From the *Alpha-name* field, enter the first alpha name associated with a mapped string (refer to "Alphanumeric Dialing Table Form" on page 2-175 for details). Use TAB or RETURN to advance to the next field.
4. When the form is completed, verify that the MT displays: *Command successfully completed* followed by *command:*

5. To verify the form, type **display alphanumeric-dial-table** and then press RETURN.

Alphanumeric Dialing Table Form

The following list shows the fields on the Alphanumeric Dialing Table form and their related values.

Alphanumeric Dialing Table Form, Page 1 through 6 of 6

- *Alpha-Name*

  This field accepts up to 8 alphanumeric characters that must begin with an alpha character and may not have any blank spaces between characters. All alpha names in the table must be unique and cannot be referenced in their own mapped string. The alpha names can be used in any other mapped string and multiple times in a mapped string. The default is blank.

- *Mapped String*

  Enter from 1 to 24 characters containing alphanumeric, readability, delimiters and/or special characters. This entry is used to generate the final dialing string and can include Feature Access Codes. Numbers 0 through 9, letters a through z (uppercase letters are mapped to lowercase), and character delimiters (such as / and -) are permitted. A mapped string may not contain an alpha name whose mapped string also contains an alpha name.

Administering Video Modes

The Avaya MCU supports the following standard video modes:

- *H.261 and its variations, including H.261-down_only, H.261-w/upgrade, H.261-CIF-Floor, H.261-CIF-Now, and H.261-QCIF-Now*
- *H.263 and its variations (which involve H.263/H.261 transcoding), including H.263/1-down_only and H.263/1-w/upgrade*
- *H.323 audio and video*

The MCU also supports the following proprietary video modes:

- *H.CTX/H.CTX+*
- *SG4*
- *MRV-w/upgrade*

The video modes in the previous lists are administered via the *Video Mode* field in the Conference Record form, which is discussed in Chapter 1 of this document. Refer to the “Video Mode” bullet item on page 1-16 for details on administering video modes.

As suggested previously, the MCU supports H.263/H.261 transcoding. For complete details on administering this feature, refer to "Administering H.263/H.261 Transcoding" on page 2-239.

NOTE:
Refer to the following sections in Appendix B of this document for a complete discussion of the supported video modes, including feature interactions: "H.263 Video Mode and H.263/H.261 Transcoding" on page B-98, "H.CTX Video Mode" on page B-102, "MultiRate Video (MRV)" on page B-117, and "SG4 Video Mode" on page B-139.

In addition, for information on feature interactions with video modes, be sure to refer to the appropriate discussion within the section for each of the following features: Continuous Presence *Plus* (page B-63), On-Screen Display (page B-122), Speed Match (page B-141), T.120 Data Conferencing (page B-150), and Universal Conference Control (page B-154).

Administering Cascades

Cascading is the linking of two MCUs to allow both MCUs to participate in the same conference. One MCU can be programmed to set up a link with another MCU by populating the appropriate fields in several forms. The resulting MCU-MCU link is called a cascade link. Once the cascade link is established, it is maintained by one of the MCUs in the cascaded MCU pair for the duration of the conference.

To enable cascading, one MCU must be established as the dial-out MCU and the other MCU as the dial-in MCU. Also, one MCU must be established as the primary MCU and the other MCU as the secondary MCU.

NOTE:
The types attributed to an MCU (dial-out or dial-in and primary or secondary) are not MCU-specific, but conference-specific. In other words, an MCU is assigned the appropriate types according to the requirements of each conference. Therefore, for example, an MCU might be a dial-out MCU in one conference but a dial-in MCU in another conference.

To administer cascading, complete the fields in the forms identified in the following table. Appropriate page references to the forms are provided. Detailed instructions for completing the forms are provided after the table

Table 2-32. Required Forms and Fields for Cascading

Form	Field	Page Reference
Customer-Options	■ *Cascading*	2-29
Conference Record	■ *Cascade Mode*	1-12
	■ *Type*	1-20
	■ *Dial-out #1*	1-23
	■ *Dial-out #2*	1-23
	■ *MCU-Ext*	1-21

Customer-Options Form

Access the Customer-Options form and enter **y** into the *Cascading?* field.

Conference Record Form

Access the Conference Record form to populate the required fields for cascading, as discussed in the following sections.

Establishing the Primary and Secondary MCUs

In a cascaded conference, one MCU is administered as the primary MCU and the other as the secondary MCU. This is done to make the MCU feature interactions as transparent as possible to the user. Generally, this administration can be performed to accommodate the requirements at the customer site.

To establish a primary MCU and a secondary MCU, do the following:

1. Access the Conference Record form for the MCU that is to serve as the primary MCU, enter value **primary** into the *Cascade Mode* field on page 1, and submit the form.
2. Access the Conference Record form for the MCU that is to serve as the secondary MCU, enter value **secondary** into the *Cascade Mode* field on page 1, and submit the form.

Procedure for Cascaded Conferences in Broadcast with Auto-Scan or Presentation Mode

Always ensure that an H.320 endpoint connects to the *primary* MCU if the endpoint is one of the following:

- *Broadcaster in broadcast with auto-scan mode*
- *Presenter in presentation mode*

With this setup, the secondary MCU must be configured by accessing the Conference Record form for this MCU, typing the MCU-extension of the cascade link in the *Control Ext* field on page 1 of the form, and then submitting the form.

Establishing the Dial-Out and Dial-In MCUs

At the start of a cascaded conference, one MCU launches a call (that is, dials out) to another MCU to establish a cascade link. The MCU that launches the call is called the dial-out MCU. The MCU that receives the call is called the dial-in MCU. Both MCU types can be established by populating the appropriate fields on page 2 of the Conference Record form for each MCU.

To establish the dial-out MCU, do the following:

1. Access the Conference Record form for the MCU that is to serve as the dial-out MCU.
2. On page 2 of the form, enter value **CAS** (cascade) or **BCAS** (BONDed cascade) into the first *Type* field (for Conferee 1).
3. In the *Dial-out # 1* field for Conferee 1, enter a number that reaches the dial-in MCU. If this is a 2B conference, enter the same number into the corresponding *Dial-out # 2* field**.**

The following figure is an example of page 2 of a completed Conference Record form for a dial-out MCU:

```
display conference 12                                    Page   2 of   8
                              CONFERENCE RECORD
CONFEREES
 1:   Type: BOND MCU-Ext: 68200   Rate:        Meet-Me Number:
  (Re)Dial?     App Comp?    Basic/Enh: basic       Site Name: Site 1
      Dial Out #1:                          Dial Out #2:


 2:   Type: AUD  MCU-Ext: 68303   Rate:        Meet-Me Number: 732-817-5303
  (Re)Dial?     App Comp?    Basic/Enh: basic       Site Name: Site 2
      Dial Out #1:                          Dial Out #2:


 3:   Type: BOND MCU-Ext: 68231   Rate:        Meet-Me Number:
  (Re)Dial?     App Comp?    Basic/Enh: basic       Site Name: Site 3
      Dial Out #1:                          Dial Out #2:


 4:   Type:      MCU-Ext:         Rate:        Meet-Me Number:
  (Re)Dial?     App Comp?    Basic/Enh: basic       Site Name: Site 4
      Dial Out #1:                          Dial Out #2:
```

Figure 2-66. Conference Record Form for a Dial-Out MCU (Page 2)

4. Save the Conference Record form.

NOTE:
If you access the Conference Record form by entering the **add conference** command (as is appropriate for administering cascading), the *Meet-Me Number* field is blank. However, if you access the form by entering the **change conference** command, and if the Meet-Me Number(s) corresponding to the appropriate MCU-extension are administered on the MCU-Extension form, the Meet-Me Number(s) appear(s) within the *Meet-Me Number* field.

To establish the dial-in MCU, perform the following steps:

1. Access the Conference Record form for the MCU that is to serve as the dial-in MCU.
2. On Page 2 of the form, enter value **CAS** (cascade) or **BCAS** (BONDed cascade) into the first *Type* field (for Conferee 1).
3. In the *MCU-Ext* field for Conferee 1, enter the extension (usually the last four digits) of one of the CAS- or BCAS-type dial-out numbers assigned to the corresponding dial-out MCU.
4. Save the Conference Record form.

Administering Star Cascading

Star Cascading allows a maximum of 25 cascaded endpoints per MCU, as opposed to one such endpoint in previous releases. As such, this feature merely requires the administration of additional cascaded endpoints within the Conference Record form. All other administration is identical to conventional Cascading.

Administering Access Endpoints

The Access Endpoints feature allows endpoints to participate in multipoint conferences via the following:

- *Non-signaled DS1 (T1 or E1) facilities (DS1 interface option)*
- *EIA-530, RS449, and V.35 data interfaces (data interface option)*

The port designated for each access endpoint is dedicated to that endpoint.

The MCU can use Non-Signaled T1 or E1 facilities to connect to a multiplexer (MUX), a digital Access Crosspoint System (DACS), or to H.320 endpoints via DS1 facilities. A maximum of 25 DS1 connections of all types to the MCU are supported.

The MCU can also use an EIA-530, RS449, or V.35 data interface along with RS366 dialing to connect to an H.320, H.CTX, or SG4 codec. Each of these data interfaces (DIs) allows endpoints that are either connected directly to the MCU or behind an encryption device or proprietary inverse multiplexor to participate in multipoint conferences at a rate in the range of 112k to 1920k. RS366 dialing can also use any of these data interfaces to enable H.323 endpoints connected behind H.323 gateways to participate in MCU conferences.

The MCU requires administration of access endpoint forms for both DI and DS1 access endpoints. Additionally, DS1-type access endpoints require administration of an associated DS1 form prior to the administration of the access endpoint.

To administer Access Endpoints, complete the fields in the forms identified in the following table. Appropriate page references to the forms are provided. Detailed instructions for completing the forms are provided after the table

Table 2-33. Required Forms and Fields for Access Endpoints

Form	Field	Page Reference
DS1 Circuit Pack (DS1 interface option only)	■ All	2-62
Customer-Options (DI interface option only)	■ *DI Direct Connect*	2-35
Conference Record	■ *Type*	1-20
Access Endpoint	■ (Refer to the following “Access Endpoint Form” section.)	2-182 (DI) 2-187 (DS1)
Synchronization Plan	■ (Refer to the following “Synchronization Plan Form” section.)	2-191 (DI) 2-194 (DS1)

DS1 Circuit Pack Form

To administer the DS1 interface option only, refer to page 2-62 for instructions on populating the DS1 Circuit Pack form.

Conference Record Form

Access the Conference Record Form. The *Type* field on page 2 of the Conference Record form supports two types of access endpoints: DS1 endpoints and data interface (DI) endpoints. Ensure that the *Type* field contains **DA**, unless the access endpoint supports RS366 dialing. In such a case, valid field values include **P64** and **DA**.

Access Endpoint Form

From the console, bring up the Access Endpoint form by entering either **add access-endpoint *xxxx*** or **change access-endpoint *xxxx***, where ***xxxx*** is the endpoint extension.

Data Interface Option

To administer an EIA-530, RS449, or V.35 interface, complete the steps in this section. A sample form for administering an RS449 data interface appears as follows:

```
change access-endpoint 68500                                  Page   1 of   1
                                ACCESS ENDPOINT

          Extension: 68500                              Name: RAD1- V.35
     Interface Type: RS449                   (Starting) Port: 01A0201
     Bandwidth Type: maxinum                  Bandwidth Rate: 384k
                COR: 1                                 COS: 1
MMI Cabling Board:                    H.221 Framing Timer: disabled
        Timing Mode: DCE                         DSR (DCE): alway-on
          DCD (DCE): during-conference           CTS (DCE): during-conference
          DTR (DTE): during-conference           RTS (DTE): during-conference
Encryption Resync: off



     RS-366 Dialing? y

        Send Timing: standard
     Receive Timing: standard
    Terminal Timing: standard                Line Loop Test: off
```

Figure 2-67. Access Endpoint Form (RS449 Interface)

1. Once the Access Endpoint form appears, complete (where necessary) the following fields:

   - *Extension*

     Display-only field that shows the extension number specified in the command line. This extension number is used to access the access endpoint.

   - *Name*

     Enter up to 11 alphanumeric characters to identify the endpoint. Default is blank.

- *Interface Type*

  Defines the type of interface to be administered for the current access endpoint. Enter **V.35**, **RS449**, or **EIA-530**.

  NOTE:
  Value **DS1** (default) is used to administer non-signaled DS1 facilities.

  Value **V.35**, **RS449**, or **EIA-530** turns off the following form fields: *Communication Type*, *Width*, and *ITC*. Also, the value turns on the following fields: *Bandwidth Type*, *Bandwidth Rate*, *Timing Mode*, *DSR (DCE)*, *MMI Cabling Board*, and *DCD (DCE)*. Values **EIA-530** and **RS449** turn on the *Encryption Resync* field. For a change operation, the interface type must not already be in use on a conference call, and it must not already be administered on the System Synchronization plan.

- *(Starting) Port*

  Indicates the location of the circuit pack and the circuit to which the endpoint will be connected.

  Enter the appropriate seven values according to the breakdown in the following table.

Character Position	Meaning	Value
1-2	Network number	01
3	Carrier	A through E
4-5	Slot number	01 through 20
6-7	Circuit Number	01

  NOTE:
  The associated endpoint must not already be in use. Also, the associated circuit pack must be installed or administered, and it must correspond to the interface type.

  For a change operation, the port must not already be administered on the System Synchronization plan.

- *Bandwidth Type*

  Identifies how the rate provided in the *Bandwidth Rate* field is to be used. Values include **maximum** (default) and **fixed**.

NOTE:
For a change operation, the associated endpoint must not already be in use on a conference call, and it must not already be administered on the System Synchronization plan.

- *Bandwidth Rate*

  Indicates the maximum bandwidth speed. (Endpoints can operate at a lower bandwidth.) Default is **56k**.

  NOTE:
  For a change operation, the associated endpoint must not already be in use on a conference call, and it must not already be administered on the System Synchronization plan.

- *COR*

  For the Class of Restriction, leave at default value **1**.

- *COS*

  For the Class of Service, leave at default value **1**.

- *MMI Cabling Board*

  This field identifies the Multimedia Interface (MMI) circuit pack to which this board is cabled. Enter the 5-character board number according to the breakdown in the following table.

Character Position	Meaning	Value
1-2	Network number	01
3	Carrier	A through E
4-5	Slot number	01 through 20

  NOTE:
  For rate 672k or greater, the MMI Cabling Board must be installed and administered, and it must not already be in use.

  For a change operation, the DI circuit pack must not already be administered on the System Synchronization plan.

- *H.221 Framing Timer*

  Set as **enabled** or **disabled**.

- *Timing Mode*

  Indicates how the MCU will operate [as either Data Communication Equipment (DCE) or Data Terminal Equipment (DTE)] for the given port and also whether the clocking is supplied internally or externally from the MCU. Values include **DCE**, **DCE-Extclock**, **DCE-Extended**, **DCE-TA**, **DTE** (default), and **DTE-Intclock**. Value **DCE-TA** drops the clock rate to 56k whenever the call is not up.

  For connections to a port on an IMUX, the field contains **DTE**. For connections to a port on a codec, the field contains **DCE** or **DCE-TA**. For connections to a port on an H.323 gateway, the field contains **DCE**.

  The DCE side of the interface provides the synchronous transmit and receive clock signals to the DTE.

  The MCU system clock is based on the active synchronization source. Whenever the MCU is configured as a DCE, the MCU supplies the clock signals based on timing derived from the MCU's system clock. In DCE external clock mode, the MCU system clock is used to provide the receive timing signal and to clock the received data. Also, the port accepts the transmit clock external (TT) from the connected equipment for received data timing. This setting prevents data loss due to phase shifts between the MCU and the DTE. The MCU should be configured as a DCE whenever video conferencing endpoints are directly connected to the MCU via the V.35 interface.

  Whenever the MCU is configured as a DTE, the MCU accepts both the transmit and receive clock signals from the connected DCE. In DTE internal clock mode, the received data is timed on the receive timing signal, but the output data is timed from the MCU system clock.

  The MCU is usually configured as a DTE whenever it is connected to a KG encryption device or to a terminal adapter.

  NOTE:
  For a change operation, the timing mode must not already be in use on a conference call.

- *DSR (DCE)*

  Indicates whether DSR (DCE) is either on during the conference or always on. Values include **during-conference** (default) and **always-on**. For Encryption Resync applications, enter **always-on**.

- *DCD (DCE)*

  Indicates whether DCD (DCE) is either on only during the conference or always on. Values include **during-conference** (default) and **always-on**. For Encryption Resync applications, enter **always-on**.

- *CTS (DCE)*

  Indicates whether CTS (DCE) is either on during the conference or always on. Values include **during-conference** (default) and **always-on**. For Encryption Resync applications, enter **always-on**.

- *DTR (DTE)*

  Indicates whether DTR (DTE) is either on during the conference or always on. Values include **during-conference** (default) and **always-on**. For Encryption Resync applications, enter **always-on**.

- *RTS (DTE)*

  Indicates whether RTS (DTE) is either on during the conference or always on. Values include **during-conference** (default) and **always-on**. For Encryption Resync applications, enter **always-on**.

- *Encryption Resync*

  Indicates whether encryption will be used on the associated port to enable loss of framing controls. Values include **off** (default), **KG-level**, **KG-pulse**, and **KIV-7**.

  NOTE:
  This field is not displayed unless the *Interface Type* field is set to **EIA-530** or **RS449**.

- *Resync Interval*

  Indicates the time in seconds (**0** through **15**) needed by the exterior device to resync with the MCU after the MCU sends a resync pulse. This is intended to prevent sending a second resync pulse before the exterior system has time to resync with the MCU. Default is value **8**.

  NOTE:
  This field appears only if the *Encryption Resync* field contains **KG-Pulse** or **KIV-7**.

- *RS-366 Dialing*

  Enter **y** to enable RS-366 Dialing or **n** to disable it. Default is blank.

- *Send Timing*

  Controls the timing detection protocol. Values include **standard** and **inverted**. (These values indicate detection modes.)

- *Receive Timing*

  Refer to the description for *Send Timing*.

- *Terminal Timing*

  Refer to the description for *Send Timing*.

- *Line Loop Test*

  Enables a loopback test. Value include **off** and **on**. For value **on**, a loopback occurs on both sides of the DI circuit pack, within the internal part of the TDM bus, and back to the endpoint. This results in isolating the DI circuit pack for trouble detection other than on the DI circuit pack.

  NOTE:
  This field is always turned off during a translation load (reset system 3 or greater).

DS1 Interface Option

To administer a DS1 interface, complete the steps in this section. A sample form appears as follows:

```
change access-endpoint 68500                              Page   1 of   1
                          ACCESS ENDPOINT

            Extension: 68500                          Name: RAD1- V.35
       Interface Type: DS1____                (Starting) Port: 01A0201
Communication Type: 56k-data_______
                  COR: 1                                  COS: 1
                  ITC: restricted__    H.221 Framing Timer: disabled
```

Figure 2-68. Access Endpoint Form (DS1 Interface)

1. Once the form appears, complete (where necessary) the following fields:

   - *Extension*

     Display-only field that shows the extension number specified in the command line. This extension number is used to access the access endpoint.

   - *Name*

     Enter up to 11 alphanumeric characters to identify the endpoint (for example, **Access-Endpoint #1**). Default is blank.

- *Interface Type*

  Defines the type of interface to be administered for the current access endpoint. Enter **DS1** (default).

- *(Starting) Port*

  Indicates the location of the circuit pack and the circuit to which the endpoint will be connected.

  Enter the appropriate seven values according to the breakdown in the following table.

Character Position	Meaning	Value
1-2	Network number	01
3	Carrier	A through E
4-5	Slot number	01 through 20
6-7	Circuit Number	01 through 31

NOTE:
The port must not already be in use. Also, the associated circuit pack must be installed or administered, and it must correspond to the interface type.

For a change operation, the port must not already be administered on the System Synchronization plan.

- *Communication Type*

  Indicates the type of DS1 protocol that is to be used. For a DS1 access endpoint, enter **56k-data** (default), **64k-data**, or **voice-grade-data**, as appropriate. Value **64k-data** is not permitted for robbed-bit trunks. For a Wideband Access Endpoint (WAE), enter **wideband**.

NOTE:
Value **56k-data**, **64k-data**, or **wideband** turns on the *ITC* field. Value **voice-grade-data** turns off the *ITC* field.

- *Width*

  This field is displayed only if *Communication Type* contains **wideband**. Beginning with the specified starting port, enter the number of adjacent DS0 ports (**2** to **30**) that comprise the WAE. Value **6** (default) defines a 384k WAE. This field cannot be blank.

NOTE:
If value **24** (T1) or **30** (E1) is entered, all lower video rates (including 768k, 384k, and 128k) are also supported for this endpoint.

- *COR*

  For the Class of Restriction, leave at the default value **1**.

- *COS*

  For the Class of Service, leave at the default value **1**.

- *ITC* (Information Transfer Capability)

  NOTE:
  This field is displayed whenever *Communication Type* contains “56k-data,” “64k-data,” or “wideband.” This field is not used whenever RBS is administered.

  The field is used to determine the type of transmission facilities to be used for ISDN calls originated from the corresponding endpoint. Valid entries are **restricted** (default for “56k-data”) and **unrestricted** (default for “64k data” and “wideband”).

  The value **unrestricted** indicates that only unrestricted facilities are to be used to complete the call. An unrestricted facility is a transmission facility that does not enforce “1’s” density digital transmission (that is digital information is sent exactly as is). Always enter **unrestricted** for Wideband and 64k data access endpoints.

  The value **restricted** indicates that either restricted or unrestricted transmission facilities will be used to complete the call. A restricted facility is a transmission facility that enforces “1’s” density digital transmission (that is, a sequence of eight digital “0’s” will be converted to a sequence of seven “0’s” and a digital “1”).

- *H.221 Framing Timer*

  N/A for MCU. Leave at the default value **disabled**.

  Whenever an access endpoint is added with the ITC administered as “unrestricted,” the endpoint’s associated port must be a channel of a DS1 circuit pack with the *Zero Code Suppression* field administered as “B8Zs.” Otherwise, form submission is rejected with the appropriate error message. On the other hand, whenever an access endpoint is added with the ITC administered as “restricted,” the endpoint’s associated port can be a channel from a DS1 circuit pack with the *Zero Code Suppression* field administered as either “ZCS” or “B8ZS.”

For an existing access endpoint, the field can be changed from “restricted” to “unrestricted” only if its associated port is a channel of a DS1 circuit pack with its *Zero Code Suppression* field administered as “B8ZS.” Otherwise, form submission is rejected with the appropriate error message.

2. Submit the Access Endpoint form.

Administering Synchronization

The term “synchronization” refers to an arrangement whereby digital facilities operate from a common clock. Whenever digital signals are transmitted over a communications link, the receiving end must be synchronized with the transmitting end to read the digital signal properly.

The Synchronization Plan form is used to assign primary and secondary external synchronization sources. The information in the form provides synchronization between the MCU and the digital facilities it uses. The MCU must be synchronized to the incoming data rate of 8,000 frames per second. This timing information reference may be derived from DS1 or data interface (DI) facilities.

The clock and the software monitor the synchronization signal. If a loss of synchronization signal (frame slip rate) is detected, the signal source switches from the primary synchronization sources to the secondary synchronization sources. If both of these synchronization sources are lost, the MCU switches to the TN768, TN780, or TN2181 Tone Clock circuit pack source. Loss of the reference signal, excessive phase changes, and variation in timing frequency can cause loss of data or dropped data connections.

The following table provides the commands that relate to the synchronization plan.

Table 2-34. Synchronization Plan Administration Commands

Action	Object	Qualifier
change	synchronization	
display	synchronization	print or schedule

Use the following procedure to change the synchronization assignments:

1. At the *command:* prompt, enter **change synchronization**.
2. Verify that the screen displays the *Synchronization Plan* form.
3. Use TAB or RETURN to advance to the fields you want to change (refer to "Data Interface Option" on page 2-191 or "DS1 Interface Option" on page 2-194 for a list of fields and values).
4. Submit the form.

5. To verify the form, enter **display synchronization**.

Data Interface Option

Use the information in this section to provide synchronization between the MCU and a data interface. The following figure provides an appropriate example of the Synchronization Plan form.

```
change synchronization                                    Page 1 of 2


                                SYNCHRONIZATION PLAN
       Stratum: 4     Circuit Type: DI_    Primary: 01B0201     Secondary: 01B0501
DS1 SYNCHRONIZATION SOURCES                    DI SYNCHRONIZATION SOURCES
Location     Name       Slip       Port   Rate  Mode    Timing     Ext     Name
  01A15                   n      01B0101 56k   max  DCE-Extclock 20000 eia530 one
  01A16                   n      01B0201 56k   fix  DTE          20001 RS449 test
  01A13  ESM ds1          y      01B0301 1920k max  DTE          20002 V.35 tests
                                 01B0401 56k   max  DTE          20003 rs-449 two
                                 01B0501 56k   fix  DTE          20004 Fifth circ









          NOTE:  DS1 and DI stratum 4 source is type II synchronization
```

Figure 2-69. Synchronization Plan (Source from DI Facilities)

NOTE:
Before a DI port can be assigned to the synchronization plan, it must be administered as an access endpoint with bandwidth type “fixed” and timing mode “DTE.”

- *Stratum*

  Display-only field shows value **4** (default) to define the level or quality of the synchronization clock.

  NOTE:
  Value **4** turns off the *Port Network* field, and it turns on many of the other fields.

- *Circuit Type*

  Enter **DI** to indicate the type of circuit pack that is to be used for the synchronization clock.

  NOTE:
  Default value **DS1** is used to administer synchronization for DS1 facilities.

  For value **DI**, the *Location*, *Name*, and *Slip* fields headed by "DS1 SYNCHRONIZATION SOURCES" are not applicable.

- *Primary*

  Identifies the DI circuit pack providing the primary stratum 4 clock. Enter the appropriate 7-character alphanumeric value according to the breakdown provided in the following table.

Character Position	Meaning	Value
1-2	Network number	01
3	Carrier	A through E
4-5	Slot number	01 through 20
6-7	Circuit Number	01

  NOTE:
  The DI circuit pack must be installed and administered. Also, the port circuit (network number) must be 01. Finally, the associated port must be available, its corresponding *Mode* field must be set to **fix**, and its corresponding *Timing* field must be set to **DTE**.

- *Secondary*

  Identifies the DI circuit pack that will provide the stratum 4 clock if the primary DI circuit pack fails. Enter the appropriate 7-character alphanumeric value according to the breakdown provided in the following table.

Character Position	Meaning	Value
1-2	Network number	01
3	Carrier	A through E
4-5	Slot number	01 through 20
6-7	Circuit Number	01

NOTE:
The secondary DI circuit pack must be installed and administered, and it must not be the same as the primary DI circuit pack. Also, the port circuit (network number) must be 01. Finally, the associated port must be available, its corresponding *Mode* field must be set to **fix**, and its corresponding *Timing* field must be set to **DTE**.

The following fields are headed by "DI SYNCHRONIZATION SOURCES." and are relevant only whenever a data interface is administered via the Access Endpoint form.

- *Port*

  Display-only field. Identifies the location of DI ports that have been administered as access endpoints. Default is blank.

- *Rate*

  Display-only field. Indicates the bandwidth for the associated DI port as administered on the Access Endpoint form. Values include **56k** through **1920k** (excluding **1288k**) and blank (default).

- *Mode*

  Display-only field. Indicates the bandwidth mode of the bandwidth in the *Rate* field. Values include **fix(ed)**, **max(imum)**, and blank.

- *Timing*

  Display-only field. Indicates the value for the *Timing Mode* field in the Access Endpoint form for DI circuit packs. Values include **DCE**, **DCE-Extclock**, **DTE-Extended**, **DTE**, **DTE-Intclock**, and blank.

- *Ext*

  Display-only field. Identifies the 5-digit extension of the access endpoint for which the associated DI port is administered.

- *Name*

  Display-only field. Identifies the name given to the circuit when it was administered. For DI facilities, this name is taken from the Access Endpoint form. Default is blank.

DS1 Interface Option

Use the information in this section to provide synchronization between the MCU and a DS1 interface. The following figure provides an appropriate example of the Synchronization Plan form.

```
change synchronization                                    Page 1 of 2


                                SYNCHRONIZATION PLAN
        Stratum: 4     Circuit Type: DS1     Primary: 01B12   Secondary: 01B13
DS1 SYNCHRONIZATION SOURCES                    DI SYNCHRONIZATION SOURCES
Location     Name       Slip       Port  Rate  Mode    Timing     Ext     Name
 01A15  DS1 one           n
 01A16  DS2 two           n
 01A13  ESM ds1           y


           NOTE:  DS1 and DI stratum 4 source is type II synchronization
```

Figure 2-70. Synchronization Plan (Source from DS1 Facilities), Page 1

```
change synchronization-plan                                  Page 2 of 2

                                SYNCHRONIZATION PLAN

DS1 SYNCHRONIZATION SOURCES                    DI SYNCHRONIZATION SOURCES
Location     Name          Slip          Port  Rate Mode Timing   Ext     Name
   ____  ________________  _
   ____  ________________  _
   ____  ________________  _
   ____  ________________  _
   ____  ________________  _
   ____  ________________  _
   ____  ________________  _
   ____  ________________  _
   ____  ________________  _
   ____  ________________  _
   ____  ________________  _
   ____  ________________  _

          NOTE:  DS1 and DI stratum 4 source is type II synchronization
```

Figure 2-71. Synchronization Plan (Source From DS1 Facilities), Page 2

NOTE:
Before a DS1 port can be assigned to the synchronization plan, a DS1 circuit pack must be administered.

The following list identifies the fields on the form and the related values.

- *Stratum*

  Display-only field shows value **4** to define the level or quality of the synchronization clock.

- *Circuit Type*

  Display-only field containing value **DS1** (default). Indicates the type of circuit pack that is to be used for the synchronization clock.

  NOTE:
  Value **DS1** uses the *Primary* and *Secondary* (board) fields.

- *Primary*

  Identifies the DS1 circuit pack providing the primary stratum 4 clock. Enter the appropriate 5-character alphanumeric value according to the breakdown provided in the following table.

Character Position	Meaning	Value
1-2	Network number	01
3	Carrier	A through E
4-5	Slot number	01 through 20

NOTE:
The DS1 circuit pack must be installed, administered, and available.

- *Secondary*

  Identifies the DS1 circuit pack that will provide the secondary stratum 4 clock if the primary DS1 circuit pack fails. Enter the appropriate 5-character alphanumeric value according to the breakdown provided in the following table.

Character Position	Meaning	Value
1-2	Network number	01
3	Carrier	A through E
4-5	Slot number	01 through 20

NOTE:
The secondary DS1 circuit pack must be installed, administered, and available. It must also not be the same as the primary DS1 circuit pack.

The following fields are headed by “DS1 SYNCHRONIZATION SOURCES.” and are relevant only whenever a DS1 circuit pack is administered in the DS1 Circuit Pack form.

- *Location*

  Display-only field. Identifies the location of the administered DS1 circuit pack.

- *Name*

  Display-only field. Identifies the name given to the circuit when it was administered. For DS1 facilities, this name is taken from the DS1 form.

- *Slip*

  Display-only field. Indicates if slip detection is enabled. Values include **y** and **n**.

Checking Access Endpoints

This section presents and discusses the report for checking access endpoints.

Access Endpoint Report

The Access Endpoint report is used to gather information on DI and DS1 access endpoints. To access the report, enter the **list access-endpoint [*xxxxx*]** command, where ***xxxxx*** is the access endpoint number and optional.

An example of the report appears as follows.

```
list access-endpoint

                                ACCESS ENDPOINT

                                          ------- DS1 -------  -------- DI -------
                          Interf          Communication        Band Band  Timing
Ext    Port    Name       Type     COR COS Type          Width  Rate Type  Mode

12345 01A0101 DS1 exampl DS1      63  15   wideband       6
56789 01A1001 DI example V.35     1   1                         1920K fix  DCE
11111 01A0301 DS1-type   DS1      9   3    wideband       6
55555 01A1201 DI-type    EIA-530  1   1                         768K  max  DTE
55000 01A0501 DI-brd     RS449    11  11                        1920K fix  DCE-Extc
```

Figure 2-72. Access Endpoint Report (Page 1)

```
status access-endpoint 6776                                  Page 2 of 2

                    DI CIRCUIT PACK STATUS INFORMATION


    DTE LEADS:    DTR: 0        RTS: 0
    DCE LEADS:    DCD: 0        DSR: 0          CTS: 0          RING IND: 0


    DTE Send Timing Input: 0___K            Internal Clock Rate: 384_K
 DTE Receive Timing Input: 0___K             Receive Timing PPM: 0___K
DCE Terminal Timing Input: 0___K                      FIFO Rate: 0 B

                 Input    Output   Loop Active: n  Using Terminal Timing: n
  FIFO Overflow: 0        0        Using Cable: n            Timing Mode: DTE
 FIFO Underflow: 0        0        Cable Ready: y             Restricted: n
     FIFO State: reset__  reset__
      FIFO Size: empty__

                --------  STATUS BYTES  --------
           00  00  00  00  00  1C  EE  00  00  08  00  00
           00  00  00  00  30  00  00  00  00  00  00  3F
```

Figure 2-73. Access Endpoint Report (Page 2)

The following list shows the data collected for the report.

- *Ext*

  Lists the extension number specified in the command line. This extension number is used to access the trunk endpoint.

- *Port*

  Lists the location of the circuit pack and the circuit to which the endpoint will be connected.

- *Name*

  Lists the alphanumeric characters used to identify the endpoint.

- *Interf(ace) Type*

  Lists the type of interface administered for the current access endpoint.

- *COR*

  Lists the appropriate class of restriction (COR) number.

- *COS*

  Lists the appropriate class of service (COS) number.

- *DS1 Communication Type*

  Lists the data rate and/or transmission medium for the access endpoint.

- *DS1 Width*

  Lists the channel width for the access endpoint.

- *DI Band Rate*

  Lists the data rate for the access endpoint.

- *DI Band Type*

  Identifies whether the transmission rate provided is fixed or the maximum.

- *DI Timing Mode*

  Indicates how the MCU will operate (as either DCE or DTE) for the given port and also whether the clocking is supplied internally or externally from the MCU.

- *DTE LEADS:...DTR:...RTS:*

  Indicates whether the specified DTE lead(s) (DTR and/or RTS) are enabled. (The DTE side is responsible for raising the DTR and RTS.) Value **1** indicates that the lead(s) are enabled, and value **0** indicates that the lead(s) are not enabled.

- *DCE LEADS:...DCD:...DSR...CTS...RING IND:*

  Indicates whether the specified DTE lead(s) (DCD, DSR, CTS, and/or RING IND) are enabled. (The DCE side is responsible for raising the DCD, DSR, and CTS.) Value **1** indicates that the lead(s) are enabled, and value **0** indicates that the lead(s) are not enabled.

- *DTE Send Timing Input*

  Indicates a clock rate detected by the DI circuit pack from the other side. Values include **0k**, **56k**, **64k**, **112k**, **128k**, **336k**, **384k**, **512k**, and **768k**.

- *DTE Receive Timing Input*

  Indicates a clock rate detected by the DI circuit pack from the other side. Values include **0k**, **56k**, **64k**, **112k**, **128k**, **336k**, **384k**, **512k**, and **768k**.

- *DCE Terminal Timing Input*

  Indicates a clock rate detected by the DI circuit pack from the other side. Values include **0k**, **56k**, **64k**, **112k**, **128k**, **336k**, **384k**, **512k**, and **768k**.

- *Internal Clock Rate*

  Indicates the rate that the MCU is generating (that is, the rate that the MCU will put on any output time lead). Values include **0k**, **56k**, **64k**, **112k**, **128k**, **336k**, **384k**, **512k**, and **768k**.

- *Receive Timing PPN*

  Indicates the clock rate and, indirectly, the clock count on the receive timing lead. Values include **56k**, **64k**, **112k**, **128k**, **336k**, **384k**, and **1920k**. To get the actual clock count, divide the appropriate value by .512. This count is used for synchronization whenever the MCU is in DTE mode.

- *FIFO Rate*

  Indicates the number of B-channels that are currently in use. Values include **1B**, **2B**, **3B**, **4B**, **5B**, **6B**, **8B**, and **12B**.

- *FIFO Overflow/FIFO Underflow:...Input...Output*

  Indicates whether the input and output data buffer (FIFO) overflow buffers are slipping. A data buffer slips whenever it becomes full; in such a case, all the data is lost, and the data buffer is reset. These fields are frequently cleared by firmware.

  Slipping is more likely to occur whenever the MCU is in DTE mode and the MCU's synchronization source clock differs from the clock provided by the DCE. If a value greater than **0** (and up to **15**) appears in the *FIFO Overflow...Input* field, the DCE device clock is faster than the MCU synchronization source clock. If a value greater than **0** (and up to **15**) appears in the *FIFO Underflow...Input* field, the MCU synchronization source clock is faster than the DCE device clock. Value **0** in each of these fields indicates that the clocks are synchronized.

  If a value greater than **0** (and up to **15**) appears in the *FIFO Underflow...Output* field, the DCE device clock is faster than the MCU synchronization source clock. If a value greater than **0** (and up to **15**) appears in the *FIFO Overflow...Output* field, the MCU synchronization source clock is faster than the DCE device clock. Value **0** in each of these fields indicates that the clocks are synchronized.

- *FIFO State/FIFO Size...Input...Output*

  Identifies the state of the input and output data buffers (FIFOS). Values include **held reset**, **enabled**, **never enabled**, l**ess than 1/8 full**, **at least 1/8 full**, **at least 3/8 full**, **full**, and **empty**. Where appropriate, a corresponding rate indication is also provided.

- *Loop Active*

  Indicates whether various internal loops are active toward the endpoint. Values include **y** and **n**. Value **y** indicates that the line loop, TDM loop, and FIFO loop are active. The line loop and TDM loop can be activated via the Access Endpoint form.

- *Using Cable*

  Indicates whether the DI/MMI cable is being used. Values include **y** and **n**.

- *Cable Ready*

  Indicates whether the DI/MMI cable is connected and whether the DI circuit pack can communicate with the MMI circuit pack via the cable. Values include **y** and **n**.

- *Using Terminal Timing*

  Indicates whether terminal timing is being used within the system. Values include **y** and **n**.

- *Timing Mode*

  Indicates how the data interface is configured. Values include **DTE** and **DCE**.

- *Restricted*

  Indicates whether or not the call is restricted. Values include **y** and **n**. Value **n** indicates that the call is unrestricted.

NOTE:
The “STATUS BYTES” area at the bottom of page 2 of the form is reserved for technical personnel and is intended for troubleshooting purposes.

Performing System Backups and Saving Translations

The **save translations** command copies the current system translations onto the memory card located on the Network Control circuit pack. One system memory card is included with the MCU. A backup memory card may be purchased optionally.

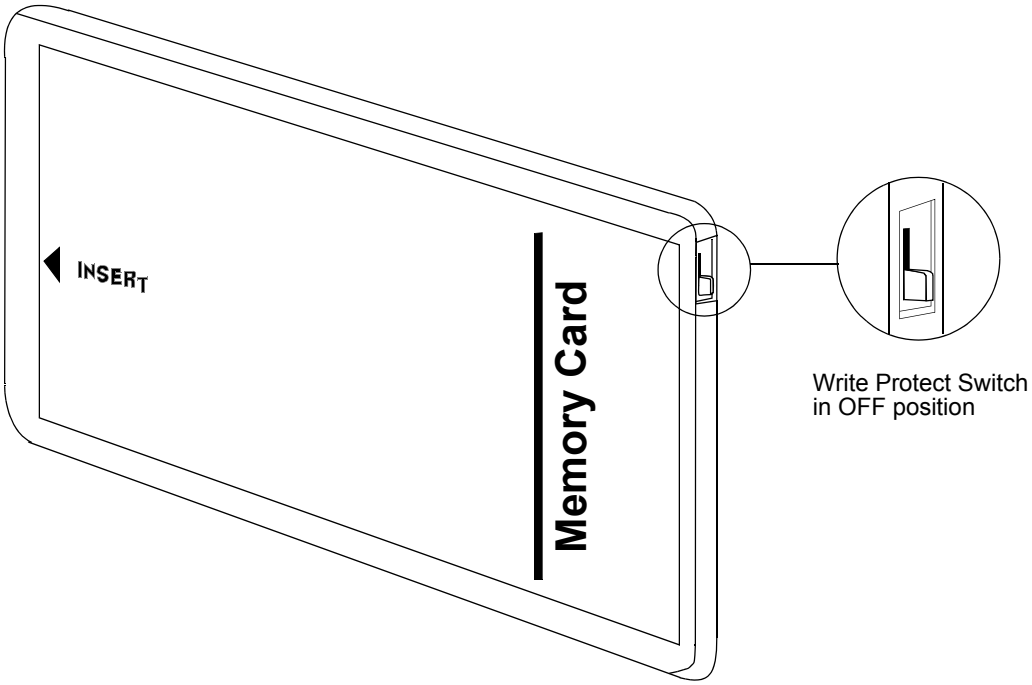


Figure 2-74. Memory Card

To save translations on the original system memory card and to make a backup memory card, follow these procedures:

1. Be sure the system memory card is inserted in the Network Control circuit pack with the write-protect switch in the OFF position.
2. Log in as **cust** on the MCU-MT.
3. At the *command:* prompt, enter **save translation** and press RETURN.
4. Check for a **0** in the *Error Code* column; a **0** indicates the save translation was successfully completed.

   NOTE:
   If a number other than **0** appears, the save translation process did not complete. Record the number in the *Error Code* field along with any *Error Message,* then call either the Avaya Technical Assistance Center at **800 242-2121** or the International Technical Assistance Center (ITAC) at **303 804-3777**.

5. If the save translation procedure is successful, remove the system memory card and insert the backup memory card (if you have purchased one). Repeat Steps 2 and 3 and then swap the memory cards. Place the backup memory card in a safe place.

NOTE:
Translations can also be saved during scheduled maintenance by using the Maintenance-Related System Parameters form.

Checking Status of the MMI Circuit Packs

The MMI Boards form provides information on all the MMI circuit packs within the MCU system. Specifically, the form identifies MMI circuit packs connected to DI circuit packs as well as to DS1 circuit packs.

The following table provides the command used to access the form.

Table 2-35. MMI Administration Commands

Action	Object	Qualifier
list	mmi	-----

To access the form, follow this procedure:

1. At the *command:* prompt, enter **list mmi**.
2. Verify that the screen displays the *MMI Boards* form (refer to "MMI Boards Form" on page 2-205 for a list of the fields and their values).

List MMI/MP

The List MMI/MP screen appears as follows:

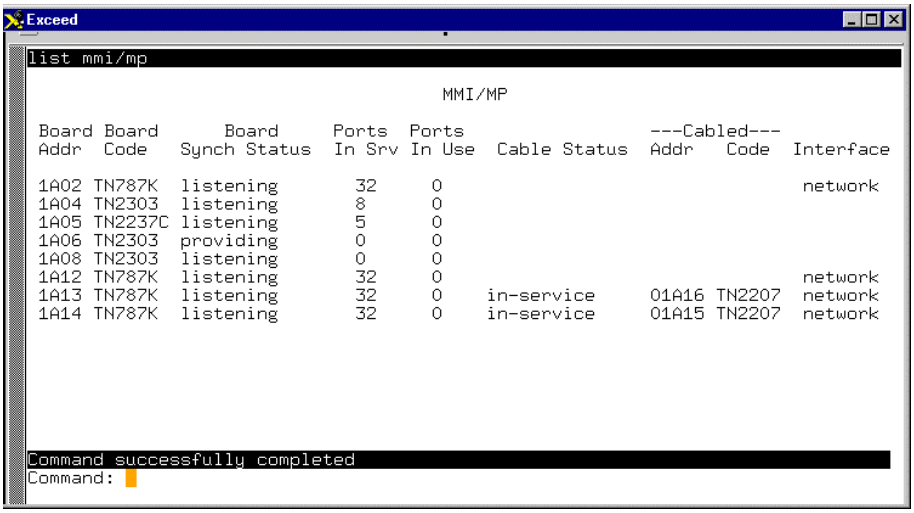


Figure 2-75. List MMI/MP screen

The following describes fields on the List MMI/MP screen:

- *Board Addr*

  Physical board address - example in <IPReference>Figure 75 shows 01A02

- *Board Code (TN)*

  Values for this field are board codes, TN787K, Tn2303 and Tn2237C.

- *Board Sync Status*

  Identifies if the board providing or listening to sync. If the Media Processor board is present then it will provide the sync if no other board is providing sync. All other boards (MMI, remaining Media Processor, and Viper boards) will listen to sync.

NOTE:
If there is no Media Processor and an MMI board is present, MMI will provide sync.

- *Ports In Service*

  Number of ports/resources in service for that board.

- *Ports In Use:*

  Number of ports/resources in use for that board.

- *Cable Status:*

  In-service or OOS state of MMI cabled to a DS1 board

- *Cabled Addr*

  Board address of DS1 cabled to MMI

- *Cabled Code:*

  TN Code of DS1 board which is cabled to the MMI board

- *Interface*

  Type of cable interface – ESM, or Network

MMI Boards Form

The MMI Boards form appears as follows:

```
list mmi                                                        Page 1


                                  MMI BOARDS

MMI    MMI       MMI      Ports  Ports                ---Cabled---
Addr   Code  Synch Status In Srv In Use  Cable Status Addr   Code    Interface

1A02 TN787K listening      24     0  in-service     01A10 TN2207   ESM
1A07 TN787K providing      32     0  out-of-service 01A04 TN2207   network
1A10 TN787K listening      32     0  in-service     01A11 TN2207   network
```

Figure 2-76. MMI Boards Form

The following list identifies the fields on the MMI Boards form and the possible values.

- *MMI Addr*

  Indicates the address of the MMI port circuit pack.

- *MMI Code*

  Indicates the “TN” code for the MMI port circuit pack (for example, TN787K).

- *MMI Synch Status*

  Indicates the synchronization status of the MMI circuit pack. Values include **providing**, **listening**, and **out-of-synch**.

- *Ports In Srv*

  Indicates the total number of MMI resources in service per circuit pack. Values range from **0** to **32** for the MSM and **0** to **24** for the ESM.

  NOTE:
  This field applies to MMI ports that are not in a maintenance-busy state and are therefore available for use.

- *Ports In Use*

  Indicates the total number of MMI resources being used per circuit pack. Values range from **0** to **32** for the MSM and **0** to **24** for the ESM.

  NOTE:
  This field applies to MMI ports that are either reserved or being used. Even if the “Appl Compliant” flag is set to “no,” the ports are reserved. This is true even in the case where the ports are not in use due to the flag being changed from “no” to “yes” while the conference is active.

- *Cable Status*

  Indicates the status of the cable linking the DS1 and MMI circuit packs. Values include **in-service**, **out-of-service**, and **maint-busy**.

- *Cabled Addr*

  Identifies the address of the DS1 or DI circuit pack that is cabled to the corresponding MMI board.

- *Cabled Code*

  Identifies the “TN” code of the circuit pack to which the MMI board is connected. Possible values displayed are “TN767,” “TN2207,” and “TN2236.”

- *Interface*

  Indicates whether the MMI circuit pack is cabled to the network-DS1 circuit pack (**network**) or to the ESM-DS1 circuit pack (**ESM**).

Administering Continuous Presence *Plus*

Continuous Presence *Plus* is a customer option that enables a multipoint video conference to compose a picture consisting of the video from a maximum of 16 H.320 sites participating in the conference. CRCS and Universal Conference Control can be used only to control the composition of the picture.

The following are required to enable this feature:

- *Inclusion of a single TN2237C, version 16 or higher Video Processor circuit pack*
- *Administration of the appropriate fields in the Customer-Options form*
- *Administration of the appropriate fields in the Conference Record form*

To administer Continuous Presence *Plus*, complete the fields in the forms identified in the following table. Appropriate page references to the forms are provided. Detailed instructions for completing the forms are provided after the table

Table 2-36. Required Forms and Fields for Continuous Presence *Plus*

Form	Field	Page Reference
Customer-Options	■ *Conferencing Suite*	2-30
	■ *Continuous Presence/Executive Conf*	2-32
Conference Record	■ (Refer to the following “Conference Record Form” section.)	1-3

To administer CPP conferences, populate the forms described in the following sections as directed.

NOTE:
Continuous Presence *Plus* is discussed in detail in Appendix B.

Customer-Options Form

The system administrator must set the *Continuous Presence/Executive Conf* and/or *Conferencing Suite* field(s) to a value between **0** and **8** that, when combined with the values within the *Speed Match (SM)* and *Executive Conference* fields, does not exceed a total of eight (corresponding to the maximum number of possible Video Processor circuit packs within the system).

NOTE:
Actually, there are 10 VP circuit packs in the system; however, only eight VP circuit packs can be used. If one of the circuit packs has a problem, one of the two remaining “spare” circuit packs is used.

Conference Record Form

Complete the following steps:

1. Ensure that the *Continuous Presence* field contains **y**.
2. Use the *Quad (1—4) Ext* fields to assign specific endpoints to a quadrant in the Continuous Presence *Plus* display. To assign an endpoint to a specific quadrant, enter its MCU-extension into the appropriate field. If any field is left blank, the corresponding quadrant is considered “unassigned.” Endpoints are VAS-switched into the unassigned quadrants corresponding to such fields, as appropriate. The MCU-extension cannot be a Universal Conference Control (UCC), Audio Add-On, or control extension in a Presentation or Chair mode conference.
3. Use the *Starting Image* field to specify the starting video composition for the CPP conference. Values include **full**, **dual-panoramic**, **lower-panoramic**, **upper-panoramic**, and **quad** (default). This field appears only whenever the *Continuous Presence* field contains **y**.
4. Use the *Force Video Now To* field to toggle between 3-image, quadrature, and full-screen video within a conference. Values include **dual-panoramic**, **lower-panoramic**, **upper-panoramic**, **full**, **quad**, and blank (default). This field appears only whenever the *Continuous Presence* field contains **y**. Whenever the Conference Record is submitted, the display change is applied to the conference and remains in effect until it is changed by another change conference command, UCC, or CRCS.
5. Use the *Empty Quadrant Extension* field to provide a fill pattern in the Continuous Presence *Plus* display whenever there are fewer than four parties in the conference. The fill endpoint is an endpoint in the conference. This endpoint’s MCU-extension is entered into this field. If there are only two active endpoints in the conference, the video from the fill endpoint is displayed in the remaining two quadrants. The MCU-extension cannot be a UCC, Audio Add-On, or control extension in a Presentation mode conference.

Checking the Status of the Video Processor Circuit Packs

The List Video Processors form provides information on all the administered Video Processor circuit packs within the MCU system. To access the form, enter **list video-processors** at the command prompt. The form appears as follows.

```
list video-processors

                              VIDEO PROCESSORS

VP                  Service                          Sync        Alloc In
Addr Application     State                            Status      Conf


01A10 vp-plus        in-service                       listening
01A11 vp-plus        out-of-service                   out-of-synch
01A07 vp-plus        in-service                       listening
```

Figure 2-77. List Video Processors Form

The following list identifies the fields on the forms and the possible values:

- *VP Addr*

  Indicates the address of the Video Processor circuit pack.

- *Application*

  Indicates the Continuous Presence *Plus* application performed by the Video Processor circuit pack. Value **cp-plus** indicates the TN2237 Video Processor Plus circuit pack mixer and adapter application.

- *Service State*

  Indicates the service state of the Video Processor circuit pack. Values include **in-service** and **out-of-service**.

- *Sync Status*

  Indicates the synchronization status of the circuit pack. Values include **listening** and **out-of-sync**. The circuit pack derives synchronization from the providing MMI circuit pack.

- *Alloc in Conf*

  If the field contains a number, indicates that the Video Processor circuit pack is active in a conference. The number displayed is the ID of the active conference.

Administering Modem Pool Groups

The MCU supports the Combined Modem Pooling solution. The required hardware is called a *combined conversion resource*. It includes a separate Trunk Data Module and modem administered as a unit. The Trunk Data Module component of the conversion resource is a 7400A Data Module. The module connects to a digital port using Digital Communications Protocol (DCP); the modem connects to an analog port. The MCU supports the Combined Modem Pooling Solution for use in remote connectivity between the MCU and the two CRCS modules, ResCenter and OpCenter, whenever all these components are not collocated.

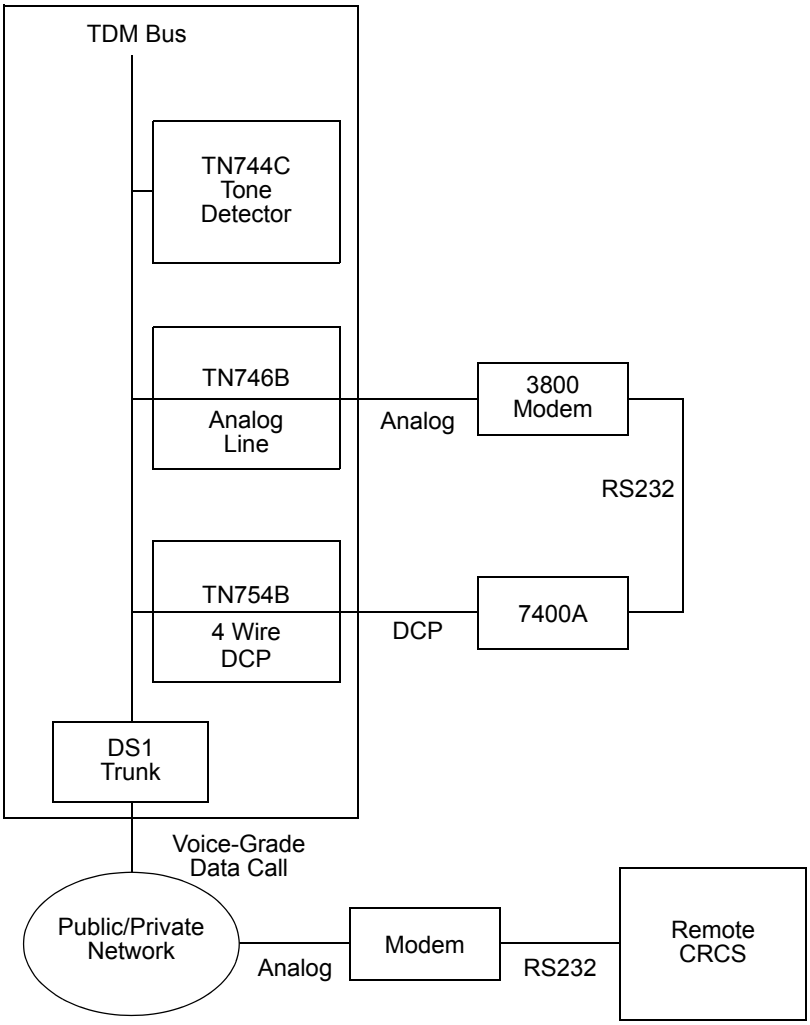


Figure 2-78. MCU/CRCS Combined Modem Pool Configuration

The commands in the following table can be used to access the Modem Pool Groups form.

Table 78-11. Modem Pool Group Commands

Action	Object	Qualifier*
add	modem-pool num	1 - 5
change	modem-pool num	1 - 5
display	modem-pool num	1 - 5, print or schedule
list	modem-pool num	print or remove
remove	modem-pool num	1 - 5

* Qualifier “maximum” is the maximum number available in your system configuration.

To change information associated with modem pool groups, follow these procedures:

1. At the *command:* prompt, enter **change modem-pool num**.
2. Verify that the screen displays the Modem Pool Groups form. (Refer to "Modem Pool Groups Form" on page 2-212 for a list of fields and values.)
3. Use TAB or RETURN to advance to the fields you want to change.
4. Submit the form.
5. To verify the form, enter **display modem-pool num.**

Modem Pool Groups Form

The “add” Modem Pool Groups form appears as follows:

```
add modem-pool 2                                                Page  1 of  1


                                  MODEM POOL GROUP
                        Group Number: 2                        Group Type: combined
                          Modem Name: _______                Hold Time(min): 5
                      Time Delay(sec): 0                          Direction: two-way
     Answer Supervision Timeout(sec): 0

         Speed: LOW/300/1200           Duplex: full          Synchronization: async

   PORT PAIR ASSIGNMENTS
      Analog   Digital     Analog Digital      Analog Digital      Analog Digital
   1:                    9:                 17:                 25:
   2:                   10:                 18:                 26:
   3:                   11:                 19:                 27:
   4:                   12:                 20:                 28:
   5:                   13:                 21:                 29:
   6:                   14:                 22:                 30:
   7:                   15:                 23:                 31:
   8:                   16:                 24:                 32:
```

Figure 2-79. Modem Pool Groups Form (“Add” Option)

The “list” Modem Pool Groups Form appears as follows:

```
list modem-pool

                                  MODEM POOL GROUPS

Group    Group         Group    Modem    Hold     Duplex  Sync    Modem   Group
Number   Type          Size     Name     Time     Mode    Mode    Speed   Direction
------   ------        ------   ------   ------   ------  ------  ------  ----------
1        combined      0                 5        full    async   9600
```

Figure 2-80. Modem Pool Groups Form (“List” Option)

The following list identifies and describes the fields on the Modem Pool Groups form.

- *Group Number*

  Enter a group number whenever you are completing a paper form. This is a display-only field whenever the form is accessed via an **add** or **change** administration command.

- *Group Type*

  Enter **combined**.

- *Modem Name*

  Enter a 1- to 6-digit alphanumeric character string to indicate the name of the modem pool.

- *Hold Time (min)*

  Enter the maximum number of minutes (**1** through **99**) that a conversion resource in the group may be held while a call waits either in a queue or reserved after Data Call Preindication. Default is **5**.

- *Time Delay*

  Enter the time delay in seconds (**0** through **255**) to insert between sending the ringing to the modem and the off-hook alert to the data module. Default is **0**. (This field displays only when *Group Type* is **combined**.)

- *Direction*

  Enter the direction (**incoming**, **outgoing** or **two-way**) of the call for which a modem pool will operate. Default is **two-way**. (This field displays only when *Group Type* is **combined**.)

- *Answer Supervision Timeout*

  Used for all MCU trunk types to indicate the amount of time in seconds that the system allows for a call to be answered before beginning a CDR record of a call. This interval begins as soon as the outgoing trunk is seized. Values include **0** through **250**; default is **10**.

  NOTE:
  This timeout does not override answer supervision sent from the network or other firmware (DS1 port circuit timers). DS1 firmware-sent answer supervision is administered in *Outgoing End of Dial (sec)* on the Administrable Timers page of the Trunk Group form.

The following three fields can be assigned for the Combined Modem Pooling solution:

- *Speed*

  Enter one, two, or three communication speeds in bits per second of the conversion resources in the group. Speeds include **LOW**, **0** to **300** blind sampled, **300**, **1200**, **2400**, **4800**, **9600**, or **19200**. Separate entries with more than one speed with slashes (for example, **300/1200/2400**, which indicates a maximum of three running speeds). For CRCS connectivity, enter **9600**. Default is **LOW/300/1200**.

- *Duplex*

  Enter **full** or **half** to indicate the duplex mode of the conversion resources in the group. For CRCS connectivity, enter **full**. Default is **full**.

- *Synchronization*

  Enter **sync** or **async** to indicate the synchronization mode of the conversion resources in the group. For CRCS connectivity, enter **async**. Default is **async**.

  The Port Pair Assignments area contains the following field:

- *Analog Digital*

  Enter the port numbers of the modem/TDM pair in a conversion resource. Two port entries are required. Include seven characters for each entry. Use the following breakdown:

Character Position	Meaning	Value
1-2	Cabinet number	01 through 03
3	Carrier	A through E
4-5	Slot number	01 through 20
6-7	Circuit Number	01 through 32

Administering Executive Conferencing

Executive Conferencing is a customer option that enables a conference to compose a picture of two or three “other” sites (endpoints) for each conference participant. With this feature, no endpoint ever sees itself.

To administer Executive Conferencing, complete the fields in the forms identified in the following table. Appropriate page references to the forms are provided. Detailed instructions for completing the forms are provided after the table

Table 2-37. Required Forms and Fields for Executive Conferencing

Form	Field	Page Reference
Customer-Options	■ *Conferencing Suite*	2-30
	■ *Continuous Presence/Executive Conf*	2-32
	■ *Executive Conference*	2-32
Conference Record	■ (Refer to the following “Conference Record Form” section.)	1-3

To administer Executive Conferencing conferences, populate the forms described in the following sections as directed.

NOTE:
Executive Conferencing is discussed in detail in Appendix B.

Customer-Options Form

The system administrator must set the *Executive Conference*, *Continuous Presence/Executive Conf*, and/or *Conferencing Suite* field(s) to a value between **0** and **8** that, when combined with the value within the *Speed Match (SM)* field, does not exceed a total of eight (corresponding to the maximum number of possible Video Processor circuit packs within the system).

Conference Record Form

Complete the following steps:

1. Ensure that the *Executive Conference* field contains **y.**
2. Use the *Site (1—3) Ext* fields to assign specific endpoints in the Executive Conferencing display. To assign an endpoint, enter its MCU-extension into the appropriate field.

These fields can be left blank. If any field is left blank, the corresponding screen display is considered “unassigned” and is provided with a fill pattern. This means that the corresponding conference participant is not established as a video source for the broadcast set. For example, if an extension is administered for Site #1 and Site #2 but no extension is provided for Site #3, then, in Executive Conferencing Mode: Site #1 sees a panoramic image of Site #2, along with a blue fill pattern in the other half of the screen; Site #2 sees Site #1 in panoramic view, along with a blue fill pattern in the other half of the screen; Site #3 sees a dual-panoramic image of Sites #1 and #2, and Sites #4 through #25 see a panoramic view of Site #1, along with a quad view of Site #2 and a blue fill pattern in the remaining quadrant. You can recover from this situation by using either the Dynamic Resizing capability to administer a broadcast extension for Site #3 or UCC to go to full screen or to assign a conference participant to be Broadcaster #3.

3. Use the *Starting Image* field to specify the starting video composition for the Executive Conferencing conference. Values include **full** and **executive** (default). This field appears only whenever the *Executive Conference* (or *Continuous Presence*) field contains **y**.
4. Use the *Force Video Now To* field to toggle between 3-image and full-screen video within a conference. Values include **full** and **executive** (default). This field appears only whenever the *Executive Conferenc*e (or *Continuous Presence*) field contains **y**. Whenever the Conference Record is submitted, the display change is applied to the conference and remains in effect until it is changed by another change conference command, UCC, or CRCS.

Administering T.120 Data Conferencing

To administer T.120 Data Conferencing, complete the fields in the forms identified in the following table. Appropriate page references to the forms are provided. Detailed instructions for completing the forms are provided after the table

Table 2-38. Required Forms and Fields for T.120 Data Conferencing

Form	Field	Page Reference
Customer-Options	■ *Max. T.120 Port Capacity*	2-35
Conference Record	■ *Audio Mode*	1-12
	■ *T.120 Data Mode*	1-19
	■ *MLP Rate*	1-19
	■ *App Comp?*	1-22
Set Date and Time	■ All	2-14
DS1 Circuit Pack	■ (Refer to "Administering the ESM from the MSM" on page 2-140.)	2-65
Data Module	■ (Refer to "Administering the ESM from the MSM" on page 2-140.)	2-140
Signaling Group	■ (Refer to "Administering the ESM from the MSM" on page 2-140.)	2-82

To administer T.120 Data Conferencing, populate the forms described in the following sections as directed.

Customer-Options Form

The system administrator must set the *Maximum Port Capacity: T.120* field to the appropriate value in the range of **4** to **24** in intervals of four.

Conference Record Form

Populate the form as follows:

1. Set the *T.120 Data Mode* field to **any-mlp**. This value indicates that the conference has data applications. Endpoints that have MLP capabilities are primary endpoints, and they have video capabilities. Endpoints that do not have MLP capabilities are secondary endpoints, and they have no video capabilities.
2. Populate the *MLP Rate* field to indicate the data rate for T.120 Data Conferencing. Values include **var-mlp**, **6.4k, 8k, 14.4k, 16k, 22.4k, 24k, 30.4k, 32k, 38.4k, 40k,** and **46.4k**.

   NOTE:
   MLP rates **40k**, **46.4k**, and **var-MLP** for T.120 Data Conferencing are not allowed in Speed Match conferences.

   For T.120 conferences, if the *Audio Mode* field contains **G.711**, **G.722**, **auto-w/upgrade** or **auto-down_only**, the *MLP Rate* field must contain **6.4k**.

3. Set the *App Comp* (Application Compliant) field to **y**.

Forms For Administering the MSM-ESM Link

Complete the steps provided in the “Administering the ESM from the MSM” section earlier in this chapter.

Administering OneNumber Access

To administer OneNumber Access, complete the fields in the forms identified in the following table. Appropriate page references to the forms are provided. Detailed instructions for completing the forms are provided after the table

Table 2-39. Required Forms and Fields for OneNumber Access

Form	Field	Page Reference
Customer-Options	■ *OneNumber Access*	2-30
Conference Record	■ *OneNumber Access*	1-5

Customer-Options Form

Access the Customer-Options form, and enter the appropriate value from the following list into the *OneNumber Access* field to enable the feature appropriately.

- Value **aud** enables the feature only for Audio Add-On endpoints. H.320 and BONDed endpoints are not allowed.
- Value **mrate/aud** enables the feature for H.320 endpoints in multirate conferences and Audio Add-On endpoints in all conference types. H.320 endpoints in 2B conferences and BONDed endpoints are not allowed.
- Value **all** enables the feature for H.320 endpoints in 2B conferences, as well as for Audio Add-On and multirate endpoints in all conference types. BONDed endpoints are not allowed.

NOTE:
If a value to enable the feature is entered, any duplicate extensions administered for the feature must be of the type enabled via the value. Otherwise, such extensions are blocked via administration.

Conference Record Form

Access the Conference Record form and set the *OneNumber Access* field to **y**. This allows multiple endpoints to use the same MCU-extension within the same conference. Setting the field to **n** denies this capability. The field can be modified only from **n** to **y** while Dynamic Conference Resizing is activated.

Administering the Media Processor

H.323 video and VoIP for audio add-on endpoints require IP media processing which is performed by the TN2303 Media Processor board. In addition to the TN2303, you must also administer a TN799B C-LAN circuit pack.

The TN2303 Media Processor board supports both 802.1p and DiffServ Quality of Service (QoS) protocols. QoS tools can be administered by an IT manager through setting the appropriate DiffServ values for audio and video streams on this form.

Defining IP Parameters

Access the IP Parameters form to set QoS priorities and audio codec preferences:

- *Audio Codec Preferences*

  Enter the audio codec set preference. Valid values are **G.711MU** (mu-law), **G.711A** (a-law), **G.723.1-5.3K**, **G.723.1-6.3K**, **G.729** and **G.729B**.

```
change ip-parameters                                    Page   1 of   1

                          IP Media Parameters

   Audio Codec
   Preferences              ------- Audio -------     ------- Video -------

1: G.711MU
2: G.711A                  DiffServ PHB Value: 0     DiffServ PHB Value: 0
3: G.723-6.3K
4: G.729                     802.1p/Q Enabled? y       802.1p/Q Enabled? y
5: G.729B                     802.1p Priority: 0        802.1p Priority: 0
                                  802.1Q VLAN: 0            802.1Q VLAN: 0


   UDP Port Range

   Min: 2048
   Max: 65535
```

- *DiffServ PHB Value*

  Enter the decimal equivalent of the DiffServ PHB value. Valid entries are **0**-**63**. The default is **0**.

- *802.1p/Q Enabled*

  Enter **y** if you want to enable 802.1p MAC-layer prioritization or 802.1Q Virtual LAN specification.

- *802.1p Priority*

  If 802.1p/q is enabled (set to **y**) then this field appears. Specify the 802.1p priority value. Valid values are **0**-**7**. Default is **0**.

- *802.1Q VLAN*

  If 802.1p/q is enabled (set to y) then this field appears where you need to specify the 802.1p priority value. Valid values range from **0**-**4095**.

- *UDP Port Range (Min)*

  Enter the lowest port number of the UDP port used for audio transport. Valid values range from **2**-**65534**.

- *UDP Port Range (Max)*

  Enter the highest port number of the UDP port used for audio transport. Valid values range from **3**-**65535**.

Assigning Node Names

The Node Names form allows the MCU to register with the H.323 Gatekeeper with a single H.323 Prefix. The Gatekeeper's IP address and the MCU's H.323 Prefix are administered on page 1 of the Node Names form.

NOTE:
On CRCS, the H.323 Prefix field is displayed automatically on the Defaults window after you perform a Query MCU Parameters.

Page 2 through 6 lists the C-LAN, IP Media Processor, SATs and CRCS PCs that are assigned to the gatekeeper. A Node Name and IP address must be entered for each C-LAN and Media Processor in the MCU; while up to 8 SATs and CRCS may be assigned.

NOTE:
Although up to 8 SAT/CRCS assignments are permitted, a maximum of 4 IP connections and one local connection are allowed to be logged in at the same time.

The Node Name corresponds to the *Remote Node* field on the MCU's IP Services form. The SAT or CRCS must first be identified on the Node Names form before being added to the IP Services form.

Perform the following step to add an adjunct or interface to the Node Names form:

- Enter **change node-names**. On page 2, add the adjunct or interface name and corresponding IP address.

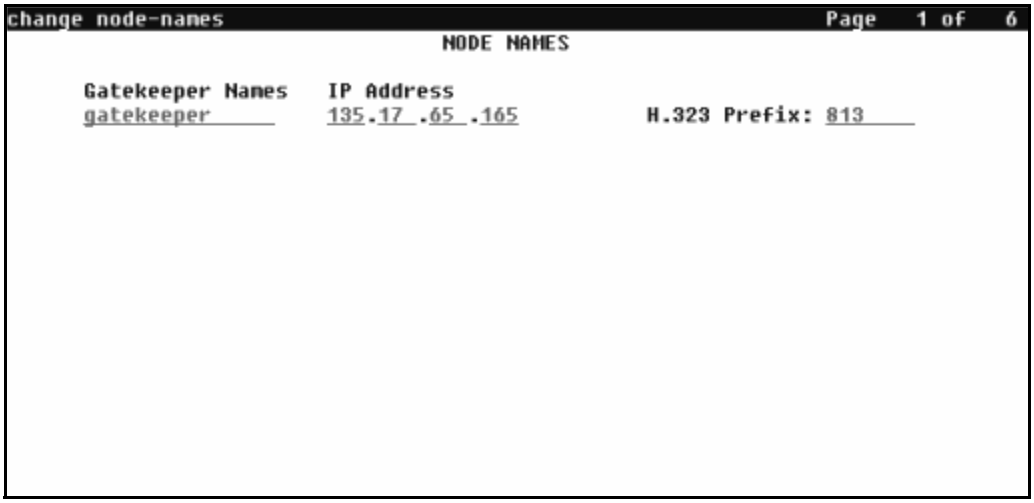


Figure 2-81. Node Names Form (page 1)

The following list shows the Node Names form fields and possible values.

Page 1 of 6

- *Gatekeeper Names*

  Enter a name to identify the gatekeeper. This field may not be left blank.

- *IP Address*

  Enter the IP address of the gatekeeper.

- *H.323 Prefix*

  Enter the MCU's H.323 prefix (a string from 1 to 7 digits; no symbols allowed).

NOTE:
These fields cannot be changed or set to blank if the Gatekeeper Node Name is on an active signaling group; the signaling group must be busied out or removed first.

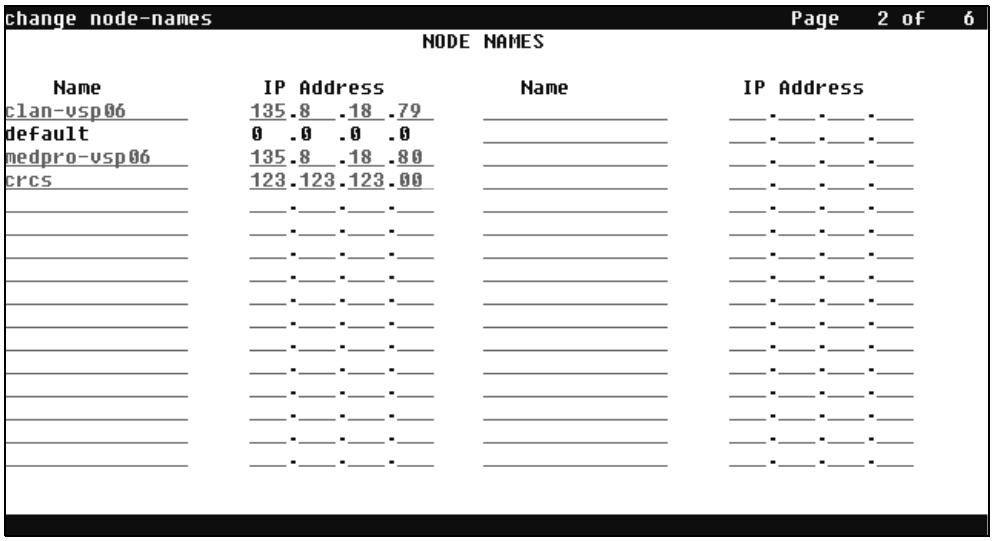


Figure 2-82. Node Names From (page 2)

Page 2 of 6

- *Name*

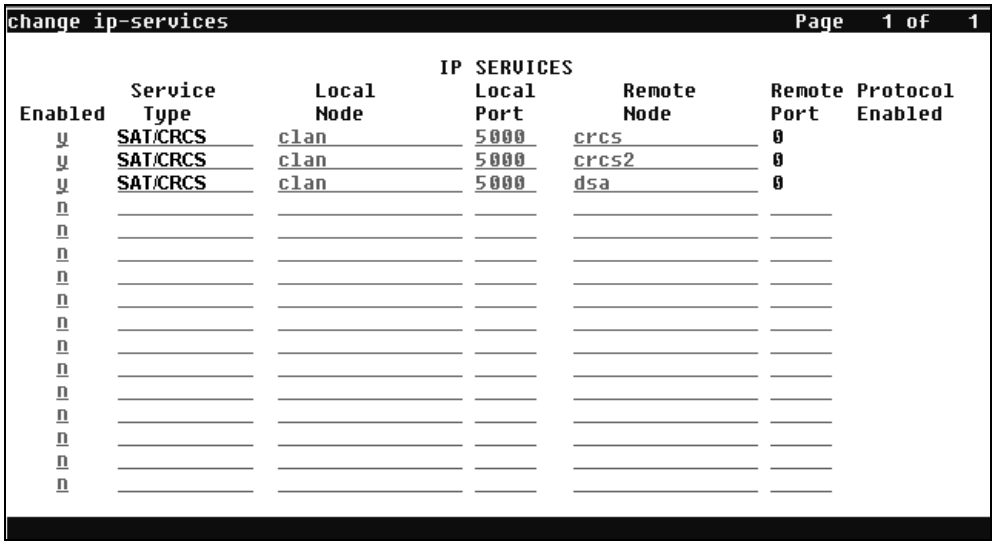
  Enter the interface or adjunct name.

- *IP Address*

  Enter the unique 32-bit IP address of the interface or adjunct. A unique IP address is assigned to each port on any IP device that is used for a connection.

Defining IP Services

The IP Services form defines the asynchronous link connections. The type of service determines whether the connection to the remote application is as a server or client. An asynchronous Telnet session is supported over the TN799 C-LAN board for MCU system and conference administration over a networked PC using the DEFINITY System Administration (DSA) tool or as a LAN-based OSSI link between the MCU and CRCS.



```
change ip-services                                          Page   1 of   1

                                    IP SERVICES
          Service          Local          Local          Remote          Remote Protocol
Enabled     Type           Node           Port           Node            Port   Enabled
   y     SAT/CRCS       clan           5000           crcs            0
   y     SAT/CRCS       clan           5000           crcs2           0
   y     SAT/CRCS       clan           5000           dsa             0
   n
   n
   n
   n
   n
   n
   n
   n
   n
   n
   n
   n
   n
   n
```

Figure 2-83. IP Services form (page 2)

- *Service Type*

  Defines the service provided. Valid entry is **SAT/CRCS**.

- *Enabled*

  Enter **y** to enable IP service.

- *Local Node*

  Enter an ethernet interface node name. For the MCU, enter **clan**.

- *Local Port*

  Specify the originating port number. For CRCS, you must specify port **5000**. Valid entries are **5000** to **9999**.

- *Remote Node*

  Select **any** to allow access by all defined node names listed on the Node Name form or choose a specific node name as listed on the Node Names form (for example, CRCS) which will limit access to that interface or adjunct only.

NOTE:
Select a specific node name to provide added security.

- *Remote Port*

  Display only field set to **0**.

- *Protocol Enabled*

  Not used

Assigning a Link to the LAN via an Ethernet Data Module

This procedure administers an ethernet data module for the connection between the C-LAN board's ethernet port (port 17) and the LAN. The data module associates a link number and extension number with the C-LAN ethernet port location. This association is used by the MCU processor to set up and maintain signaling connections for multimedia call handling.

NOTE:
The C-LAN ethernet port is indirectly associated with the C-LAN IP address via the slot location (which is part of the port location) on the IP Interfaces form and the Node Name, which is on both the IP Interfaces form and the Node Names form.

```
change data-module 70200                                    Page   1 of   1
                                  DATA MODULE

  Data Extension: 70200            Name: USP-17 Ethernet Data Module
            Type: ethernet
            Port: 01B0717
            Link: 17



Network uses 1's for Broadcast Addresses? y
```

Figure 2-84. Data Module Form (page 1)

Page 1 of 1

- *Data Extension*

  Displays the data extension number.

- *Name*

  Displays the name as it appears in lists generated by **list data module** command.

- *Type*

  Indicates the data module type for this link (ethernet).

- *Port*

  Ethernet connections must be assigned to port 17 of the C-LAN circuit pack.

- *Link*

  A link number between **1** to **25** that is not previously assigned on the MCU.

Administering the H.323 Signaling Group

Each H.323 trunk must be assigned to a signaling group. This procedure creates a signaling group which will be associated with H.323 trunks that connect the MCU to the IP network. One or more unique signaling groups must be established for each far-end node that the MCU is connected to via H.323 trunks.

The H.323 signaling group (323-SGRP) is a signaling channel that physically rides on a C-LAN port (socket) and the IP network. Unlike ISDN D-channels, the H.323 channel may actually come up and down on a call by call basis. The H.323 channel is actually a TCP/IP signaling channel. Layers 1 and 2 of this signaling channel are monitored by IP ping testing.

To specify a signaling group, follow these procedures:

1. At the *command:* prompt, enter **add signaling-group *x*** where ***x*** is the signaling group number (**1** through **30**) or **next**.
2. Verify that the screen displays the *Signaling Group* form (refer to "Signaling Group Form" on page 2-82 for a list of fields and values).
3. Use TAB or RETURN to advance to the fields you want to change.
4. Submit the form.
5. To verify the form, enter **display signaling-group *x***.

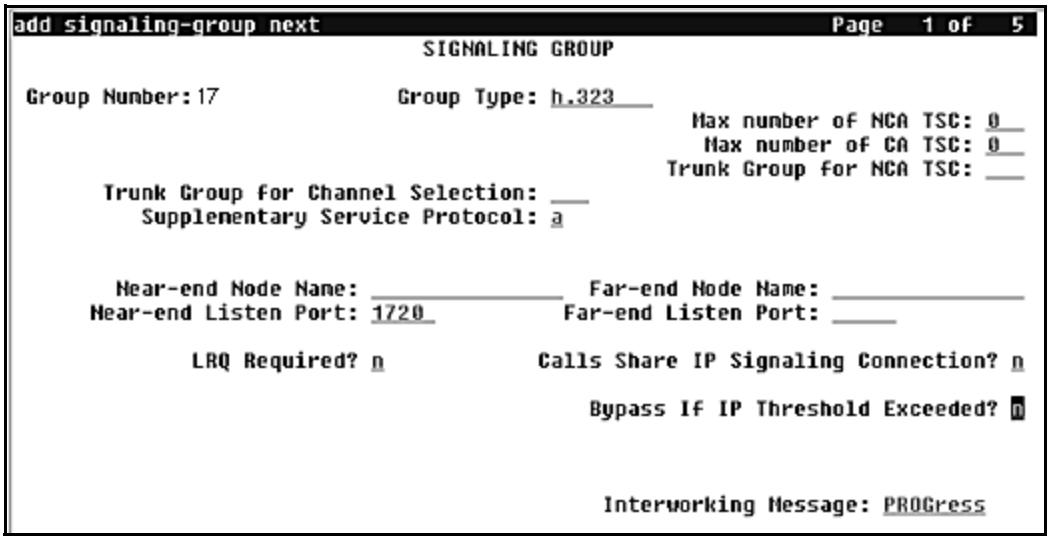


Figure 2-85. Signaling Group Form (page 1)

The following list identifies the fields on the Signaling Group form and their related values.

- *Group Number*

  This is a display-only field that provides the signaling group number used as a qualifier in the commands listed in the previous table.

- *Group Type*

  Enter the value as **h.323**.

- *Max Number of NCA TSC*

  N/A for the MCU. Leave this field set to **0**.

- *Max Number of CA TSC*

  Leave this field set to **0**.

- *Trunk Group for NCA TSC*

  This field is not used.

- *Trunk Group for Channel Selection*

  Enter the assigned trunk group number. Values include **1** through **99** and blank (default).

NOTE:
Leave blank until the trunk group is added then perform a change command and readminister the trunk group number in the *Trunk Group for Channel Selection* field.

- *Supplementary Service Protocol*

  Enter **a** if AT&T Non-Call Associated Temporary Signaling Connections (NCA-TSCs) are being sent over the interface. Value **b** is not used for the MCU.

- *Near-end Node Name*

  Specify the node name assigned to the C-LAN IP Interface on the MCU on the Node Names form.

- *Far-end Node Name*

  The field value can be blank if the signaling group is associated with an unspecified destination. If associated with a specific Gatekeeper, it specifies the node name assigned to the Gatekeeper Names on the Node Names form.

- *Near-end Listen Port*

  Enter an unused port number from **0** to **65535**. The default value of **1720** is recommended.

- *Far-end Listen Port*

  The same number as entered in the *Near-End Listen Port* field is recommended; this number must match the number entered in the *Near-end List Port* field on the signaling group form for the far-end. This field can be left blank if the signaling group is associated with an unspecified destination.

- *LRQ Required*

  Leave the default value of **n** if the far-end node is either a Gatekeeper or DEFINITY ECS. Set to y only if the far-end node requires a location request (to obtain a signaling address) in its signaling protocol.

- *Calls Share IP Signaling Connection*

  Leave the default value of **n**.

- *Bypass If IP Threshold Exceeded*

  If the far-end is a Gatekeeper (as administered by the far-end Node Name) then MCU software validates that this field is set to the default value of **n**. If the far-end mode is a DEFINITY IP Solutions trunk then set this field to **y** to automatically remove from service trunks assigned to this signaling group when IP transport performance falls below limits administered on the Maintenance-Related System Parameters form.

- *Interworking Message*

  Leave the default value of **PROGress**.

Creating a Trunk Group

When you add the trunk group for H.323 trunks, each H.323 trunk must be a member of an ISDN trunk group and must be associated with an H.323 signaling group (up to a maximum of 96 members can be added).

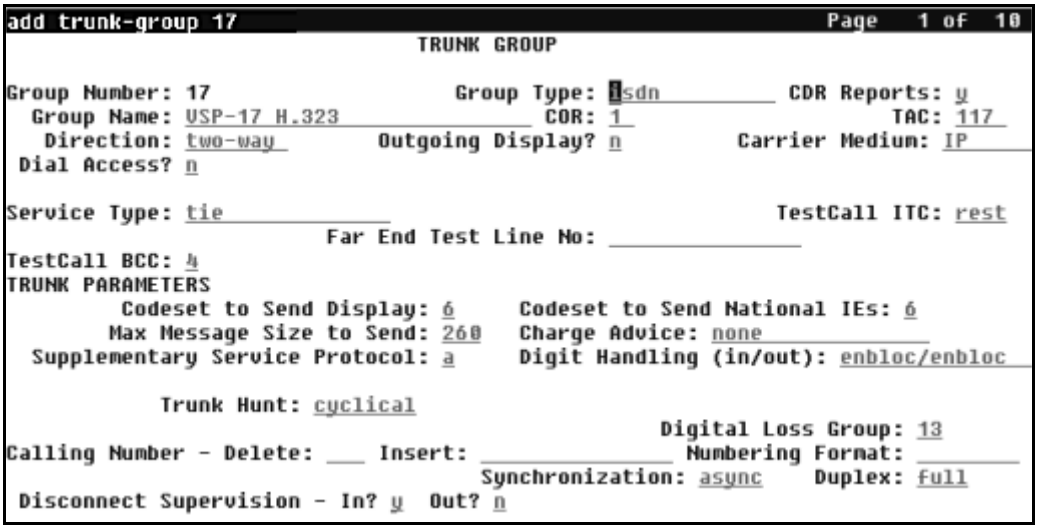


Figure 2-86. Trunk Group Form (page 1)

Page 1 of 10

- *Group Type*

  Enter the value **isdn**.

- *Carrier Medium*

  Enter **IP**.

- *Service Type*

  Enter **tie**.

- *TestCall ITC*

  Enter **unre**.

- *TestCall BCC*

  Enter **0**.

- *Codeset to Send Display*

  Enter **0**.

- *Outgoing Display*

  The default value of n may need to be changed if the far-end is a non-DEFINITY switch.

NOTE:
If using DCS, also complete the appropriate fields on pages 2 and 3 (not shown).

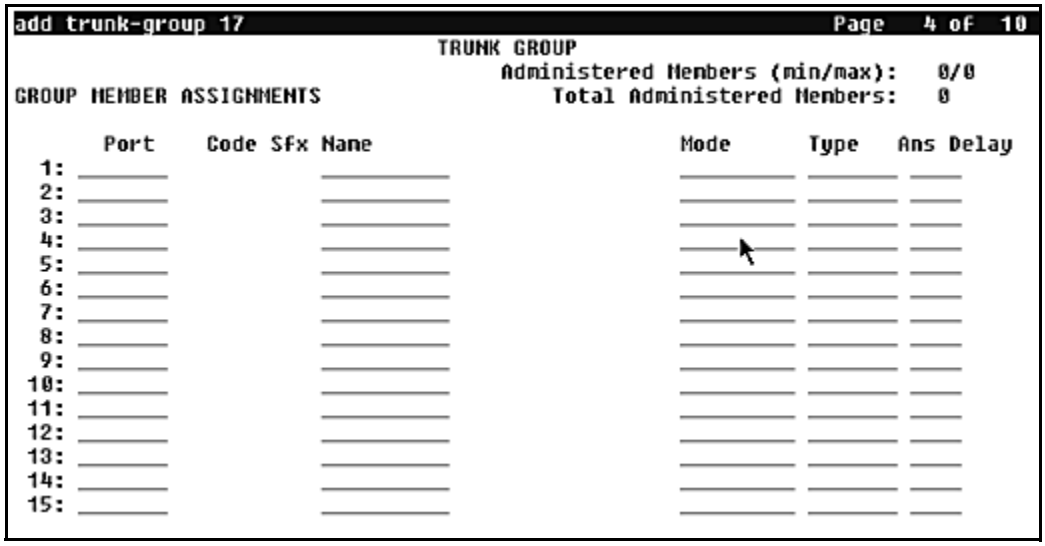


Figure 2-87. Trunk Group Form (page 4)

Page 4 of 10

- *Port*

  Enter **ip**.

NOTE:
When the form is submitted, this value automatically changes to a **T** number of the form **Txxxx**.

- *Name*

  Enter a 10-character descriptive name for the trunk that will help you identify the trunk (this name is not used by the system).

- *Sig Grp*

  Enter the number of the signaling group that you set up for H.323 trunks.

Administering the IP Interface

The IP interface for each C-LAN and Media Processor board in the MCU must be defined on the IP Interfaces form. There is one IP Interface form for the system.

1. Type **change ip-interfaces** and specify the required information for the TN2303 Media Processor.

NOTE:
Make sure the **Enabled** field is reset to **y**. The Interface must be enabled before it can be used.

```
change ip-interfaces                                    Page   1 of   2

                                  IP INTERFACES
Inter-region IP connectivity allowed?  y
 En-                                                                  Net
abled Type    Slot   Code Sfx Node Name        Subnet Mask     Gateway Address Rgn
  y   C-LAN   01C03  TN799  B  CLAN           255.255.255.0   135.17 .65 .1   1
  y   IP-MP   01C04  TN2302    IP-MD          255.255.255.0   135.17 .65 .1   1
  n   _____  _____              _____________  255.255.255.0   ___.___.___.___ 1
  n   _____  _____              _____________  255.255.255.0   ___.___.___.___ 1
  n   _____  _____              _____________  255.255.255.0   ___.___.___.___ 1
  n   _____  _____              _____________  255.255.255.0   ___.___.___.___ 1
  n   _____  _____              _____________  255.255.255.0   ___.___.___.___ 1
  n   _____  _____              _____________  255.255.255.0   ___.___.___.___ 1
  n   _____  _____              _____________  255.255.255.0   ___.___.___.___ 1
  n   _____  _____              _____________  255.255.255.0   ___.___.___.___ 1
  n   _____  _____              _____________  255.255.255.0   ___.___.___.___ 1
  n   _____  _____              _____________  255.255.255.0   ___.___.___.___ 1
  n   _____  _____              _____________  255.255.255.0   ___.___.___.___ 1
  n   _____  _____              _____________  255.255.255.0   ___.___.___.___ 1
  n   _____  _____              _____________  255.255.255.0   ___.___.___.___ 1
```

Figure 2-88. IP Interfaces (page 1)

The following list shows the IP Interface form fields and valid entries.

- *inter-region IP connectivity allowed*

  Default is **y**.

- *Enabled*

  Default value is **n**.

- *Type*

  Enter the circuit pack type.Valid entries are **C-LAN** and **IP-MD**.

- *Slot*

  Enter the slot location of the circuit pack.

- *Code*

  Display only field showing the circuit pack number.

- *Sfx*

  Display only field showing the circuit pack suffix designation.

- *Node Name*

  Enter the unique node name. for the IP Interface which was already administered on the Node Names form.

- *Subnet Mask*

  Enter the subnet mask associated with the IP address for this IP Interface. (The IP address is associated with the Node Name already entered on the Node Names form.)

- *Gateway Address*

  Enter the address of the network node which will serve as the default gateway for the IP Interface.

- *Net. Rgn*

  Keep the Network Region default setting value of **1**.

Administering Lip Synchronization

Lip Synchronization can be administered for CPP, SM, or H.263/H.261 Transcoding conferences. One of two modes, Preserved Lip Sync Mode or Audio Priority, may be enabled.

To administer Lip Synchronization, complete the fields in the forms identified in the following table. Appropriate page references to the forms are provided. Detailed instructions for completing the forms are provided after the table

Table 2-40. Required Forms and Fields for Lip Synchronization

Form	Field	Page Reference
Feature-Related System Parameters	■ *Default Custom Lip Sync <=128K* ■ *Default Custom Lip Sync 224/256K* ■ *Default Custom Lip Sync >=336K* **NOTE**: These fields are required only for customizing Lip Sync delay.	2-49 2-50 2-50
Conference Record	■ *Lip Sync,* or*:* ■ *Lip Sync <=128K* ■ *Lip Sync 224/256K* ■ *Lip Sync >=336K* ■ *Value* (only for customizing Lip Sync delay)	1-9 1-9 1-9 1-9 1-10

Feature-Related System Parameters Form

To customize the Lip Synchronization delay for conferences at a rate of 128k or lower, populate the *Default Custom Lip Sync <=128K* field with a value of **0** through **1000** in increments of 20. To customize the delay for conferences at a rate of 224/256k, populate the *Default Custom Lip Sync 224/256K* field with a value of **0** through **1000** in increments of 20. To customize the delay for conferences at a rate of 336k or higher, populate the *Default Custom Lip Sync >=336K* field with a value of **0** through **1000** in increments of 20.

Conference Record Form

Use this form to administer one of two options, as explained in the following sections.

Option for Transcoded or Non-SM CPP Conferences

To establish Lip Synchronization mode for either H.263/H.261 transcoded conferences or CPP conferences without SM, populate the *Lip Sync* field, as appropriate. One of two modes, Preserved Lip Sync Mode or Audio Priority, may be enabled.

To enable Preserved Lip Sync Mode, enter one of two values into the field. Value **auto** enables a preselected MCU delay of a length determined by the endpoint type and/or audio standard. Preselected audio delays are defined within and uplinked by the TN2237 circuit pack. Value **custom** enables a delay of **0** to **1000** msecs in 20 msec increments. Entering this value brings up an associated *Value* field, which allows you to enter the appropriate msec value. To enable Audio Priority, enter value **none** into the field.

Option for SM Conferences

To establish Lip Synchronization mode for SM conferences at any of three rate ranges, populate the *Lip Sync <=128K, Lip Sync 224/256K,* or *Lip Sync >=336K* fields, as appropriate. One of two modes, Preserved Lip Sync Mode or Audio Priority, may be enabled.

To enable Preserved Lip Sync Mode, enter one of two values into the field(s). Value **auto** enables a preselected MCU delay of a length determined by the endpoint type and/or audio standard. Preselected audio delays are defined within and uplinked by the TN2237 circuit pack. Value **custom** enables a delay of **0** to **1000** msecs in 20 msec increments. Entering this value brings up an associated *Value* field, which allows you to enter the appropriate msec value.

NOTE:
As a default, each *Value* field is automatically populated with the corresponding value administered in the Feature-Related System Parameters form. For details, refer to "Features-Related System Parameters Form" on page 2-49.

To enable Audio Priority, enter value **none** into the field.

Administering Speed Match Conferences

To administer Speed Match conferences, complete the fields in the forms identified in the following table. Appropriate page references to the forms are provided. Detailed instructions for completing the forms are provided after the table

Table 2-41. Required Forms and Fields for Speed Match

Form	Field	Page Reference
Customer-Options	■ *Speed Match (SM)*	2-32
	■ *Conferencing Suite*	2-30
Conference Record	■ (Refer to the following “Conference Record Form” section.)	1-3

To administer Speed Match conferences, populate the forms described in the following sections as directed.

Customer-Options Form

The system administrator must set the *Speed Match (SM)* and/or the *Conferencing Suite* field(s) to a value between **0** and **8** which, when combined with the values within the *Continuous Presence/Executive Conf* and *Executive Conference* fields, does not exceed a total of eight (corresponding to the maximum number of possible Video Processor circuit packs within the system).

The Video Processor circuit packs can accommodate a mixture of full screen-only Speed Match conferences (with or without H.263/H.261 transcoding), CPP Speed Match conferences, CPP-only, and Executive Conferencing conferences. The number of simultaneous conferences using some form of video processing is controlled by the number of each of the three right-to-use permissions as displayed on the Customer-Options form. In particular, the sum of the CPP-only, full screen SM, combination SM/CPP, H.263/H.261 transcoding, and Executive Conferencing right-to-use permissions may not exceed eight since one dedicated Video Processor circuit pack is required to support each of these conference types. CPP/EC permissions are valid only for non-SM, single transfer rate CPP (or CPP-only) conferences or Executive Conferencing conferences. SM permissions are valid only for full screen SM or H.263/H.261 transcoding conferences. However, Conferencing Suite permissions can be used to provide a CPP-only conference, a full screen-only SM conference, an SM conference that also provides CPP video to and from endpoints at various transfer rates, an H.263/H.261 transcoding conference, or an Executive Conferencing conference. Therefore, as long as all of the available Conferencing Suite right-to-use permissions have not been used, any such available permissions may be applied to administer a CPP-only, full screen-only SM, SM/CPP, H.263/H.261 transcoding, or Executive Conferencing conference. Therefore, for example, if the *SM* field contains **5**, the system supports a combined total of five full-screen conferences that are either speed-matched or transcoded. This means that the system can support, for example, three full-screen speed-matched conferences and two full-screen H.263/H.261 transcoded conferences (for a combined total of five conferences).

The right-to-use option for SM is preset by the Technical Assistance Center upon delivery to the customer. To disable the feature, the port capacity for SM and Conferencing Suite must be set to **0** on the Customer-Options form. To enable the feature, the port capacity must be set to a nonzero number corresponding to the “right-to-use” number for the feature desired by the customer.

A maximum of eight conferences administered via the *Conferencing Suite* field at transfer rate 448/512k is allowed. A maximum of six such conferences administered at transfer rate 672/768k is allowed.

NOTE:
These conference maximums assume a three-party BONDed configuration with two parties administered at the indicated “high” rate and one party administered at the 2B rate.

By default, all the endpoints within an SM conference operate at the primary transfer rate. The transfer rates of the endpoints (except Audio Add-On and UCC endpoints) that will operate at a rate other than the primary transfer rate must be administered.

Conference Record Form

The following list explains how to administer Speed Match via the Conference Record form. The *Speed Match* field appears on page 1 of the form; the *Rate field* appears on pages 2 through 8 of the form.

1. Enter into the *Speed Match* field value **y** to allocate speed matching resources for the conference.

   The field cannot be set to **y** unless the *Speed Match* or *Conferencing Suite* field in the Customer-Options form is set to a value in the range **1** through **8**. Sufficient speed matching resources must be available for the requested time period.

   Also, the field cannot be set to **y** unless various fields in the Conference Record form are populated correctly. The following list identifies these fields along with the appropriate values for Speed Match, and it provides any necessary commentary:

   - *Status* — **inactive** (The field cannot be set for active or in-use conferences.)
   - *Bandwidth* — **1x56k**, **1x64k**, **2x56k**, **2x64k**, **112k**, **128k**, **224k**, **256k**, **336k**, **384k**, **448k**, **512k**, **672k**, or **768k**
   - *Video Mode* — Values for H.261-associated video modes, including **H.261-down_only**, **H.261-w/upgrade**, **H.261-CIF-Floor**, **H.261-CIF-Now**, or **H.261-QCIF-Now**
   - *CIF Frame Rate* — **7.5 fps**, **10 fps**, **15 fps**, or **auto**
   - *QCIF Frame Rate* — **7.5 fps**, **10 fps**, **15 fps**, or **auto**
   - *MLP Rate* — If T.120 Data Conferencing is enabled, this field must contain one of the following values: **6.4k**, **8k**, **14.4k**, **16k**, **22.4k**, **24k**, **30.4k**, **32k**, or **38.4k**. SM conferences do not allow the following MLP rates: 40k and 46.4k. Also, variable rates (indicated by value “var_mlp”) are not allowed.

2. Ensure that the conditions in the following list are satisfied:

   - OneNumber Access is supported but only for Audio Add-On endpoints. Multimedia endpoints are not supported.

— UCC and Audio Add-On endpoints cannot be speed matched. Therefore, if the *Type* field on the form contains **UCC** or **AUD**, the corresponding *Rate* field must be blank.

— Ensure that the rate of the Dedicated Access (DA) endpoints is compatible with the administered endpoint rate. Also, ensure that the rate of the specified access endpoints for the dial-out numbers contained in the *Dial-Out #1* and *Dial-Out #2* fields is equal to or greater than the rate at which the endpoint is administered.

— Ensure that the *Type* field contains **BOND** or **BCAS** if the *Rate* field contains **112k**, **128k**, **224k**, **336k**, **448k**, or **672k**.

— If the *Rate* field contains **2x56k** or **2x64k,** populate the *Dial-Out #2* field as well as the *Dial-Out #1* field. If the *Rate* field does not contain either of these values, ensure that the *Dial-Out #2* field is blank.

3. Enter into the *Rate* field the rate at which the endpoint is joining the Speed Match conference. Values include **1x56k**, **1x64k**, **2x56k**, **2x64k**, **112k**, **128k**, **224k**, **256k**, **336k**, **384k**, **448k**, **512k**, **672k**, **768k**, and blank.

   The MCU allows a maximum of four rates at which an endpoint can join a Speed Match conference. Any rate entered into this field that exceeds this total is denied.

   NOTE:
   This field must be blank if *Speed Match* is set to **n**. The field must also be blank for Audio Add-On and UCC endpoints. The field may be blank for endpoints at the primary transfer rate as indicated in the *Bandwidth* field

Administering H.263/H.261 Transcoding

To administer H.263/H.261 Transcoding (H.320 Translator), complete the fields in the forms identified in the following table. Appropriate page references to the forms are provided. Detailed instructions for completing the forms are provided after the table

Table 2-42. Required Forms and Fields for H.263/H.261 Transcoding

Form	Field	Page Reference
Customer-Options	■ *Speed Match (SM)*	2-32
	■ *Conferencing Suite*	2-30
Conference Record	■ *Video Mode*	1-16
	■ *Continuous Presence*	1-6
	■ *Speed Match*	1-13
	■ *H.263/H.261 Transcoding*	1-18

To enable H.263/H.261 Transcoding, populate the forms discussed in the following sections as directed.

Customer-Options Form

The system administrator must set either the *Speed Match (SM)* or *Conferencing Suite* field in the form to a nonzero value.

NOTE:
The right-to-use (RTU) for SM applies to either full-screen Speed Match or full-screen H.263/H.261 transcoding. Similarly, the RTU for Conferencing Suite applies to any one of the following: full-screen SM, full screen H.263/H.261 transcoding, CPP, CPP with SM, or Executive Conferencing.

The following table summarizes the RTUs for several options (fields) on the Customer-Options form.

Table 2-43. RTUs for Several Options on the Customer Options Form

Option (Field)	Meaning
Continuous Presence/Executive Conf	--- Continuous Presence *Plus,* or --- Executive Conferencing
Speed Match (SM)	--- full-screen Speed Match, or --- full-screen H.263/H.261 Transcoding at Same Speed
Conferencing Suite	--- CPP, or --- full-screen Speed Match, or --- full-screen H.263/H.261 Transcoding at Same Speed, or --- CPP with Speed Match, or --- Executive Conferencing
Executive Conference	--- Executive Conferencing only

Conference Record Form

Complete the following steps:

1. Ensure that the *Video Mode* field in the form contains **H.263/1-down_only** or **H.263/1-w/upgrade**.
2. Ensure that both the *Continuous Presence* field and the *Speed Match* field in the form contain **n**.
3. Set the *H.263/H.261 Transcoding* field in the form to **y**. This field enables H.263/H.261 transcoding for endpoints operating at the same transfer rate. Value **y** indicates that H.263 and H.261 endpoints can coexist within the same conference.

Administering On-Screen Display

To administer On-Screen Display, complete the fields in the forms identified in the following table. Appropriate page references to the forms are provided. Detailed instructions for completing the forms are provided after the table

Table 2-44. Required Forms and Fields for On-Screen Display

Form	Field	Page Reference
Customer-Options	■ *Notification Package*	2-29
Conference Record	■ *Class*	1-5
	■ *Continuous Presence*	1-6
	■ *Speed Match*	1-13
	■ *Entry/Exit Alert*	1-15
	■ *Warning Alert*	1-15

To administer On-Screen Display (OSD), complete the forms discussed in the following sections as directed.

Customer-Options Form

The system administrator must set the *Notification Package* field to **y**.

Conference Record Form

Complete the following steps:

1. If you want to provide conference entry/exit notifications, populate the *Entry/Exit Alert* field, as appropriate. Enter **tone** (default) to provide an audible tone indicating that the conferee is joining or exiting the conference. Enter **text** to provide a text message indicating that the conferee is joining or exiting the conference. Enter **ANI** to display the Automatic Number Information (ANI) code of the endpoint for the associated conferee. Enter **text/tone** to provide both an audible tone and a text message indicating that the conferee is joining or exiting the conference. Enter **ANI/tone** to provide both an audible tone and the ANI code of the endpoint for the associated conferee.

   NOTE:
   Values **text**, **text/tone**, **ANI**, and **ANI/tone** cannot be administered unless the conference is a non-SM CPP conference. Therefore, the *Speed Match* field must contain **n** and the *Continuous Presence* field must contain **y**.

Value **text/tone** for entry/exit alert is not allowed if OneNumber Access is being used on the conference for either Audio Add-On or multimedia endpoints.

Enter **none** to provide no notification of a conferee joining or exiting the conference.

NOTE:
None of the values for the field can be changed dynamically during an active or in-use conference.

2. If you want to provide an end-of-conference warning notification, populate the *Warning Alert* field, as appropriate. This field appears if your MCU model has the Notification Package feature and if *Class* contains **reserved** or **file**. Enter **tone** (default) to provide the traditional 10-minute audible warning tone. Enter **text** to provide the text message for both the 10-minute and two-minute warnings. Enter **text/tone** to provide both an audible tone and a text message for both the 10-minute warning and the two-minute warning.

   NOTE:
   Values **text** and **text/tone** cannot be administered unless the conference is a non-SM CPP conference. Therefore, the *Speed Match* field must contain **n** and the *Continuous Presence* field must contain **y**.

   Enter **none** to provide no conference end notification.

   NOTE:
   None of the values for the field can be changed dynamically during an active or in-use conference.

   If the conference end time is extended dynamically during a conference in response to the 10-minute notification, and if the field contains a valid value other than **none**, a subsequent 10-minute notification followed by a two-minute notification are provided starting 10 minutes prior to the newly established conference end time.

Administering RS366 Dialing

To administer RS366 Dialing, complete the fields in the forms identified in the following table. Appropriate page references to the forms are provided. Detailed instructions for completing the forms are provided after the table

Table 2-45. Required Forms and Fields for RS366 Dialing

Form	Field	Page Reference
Customer-Options	■ *DI Direct Connect*	2-35
Conference Record	■ *Type*	1-20
Access Endpoint	■ *Interface Type*	2-183
	■ *Timing Mode*	2-185
	■ *RS366 Dialing*	2-186

To administer RS366 Dialing, populate the forms discussed in the following sections as directed.

Customer-Options Form

The system administrator must populate the *DI Direct Connect* field, as appropriate. This field reserves MCU resources for point-to-point calls made from V.35, RS449, and EIA-530 endpoints using RS366 Dialing. Values for this field equate to the number of DI circuit packs (ports) used for point-to-point calls, and they include the range **0** through **32**. The number of MCU resources depends on the 384k transfer rate.

Conference Record Form

Ensure that the *Type* field contains value **DA** or **P64**.

Access Endpoint Form

Complete the following steps:

1. Populate the *Interface Type* field, as appropriate. Values include **V.35**, **RS449**, and **EIA530**.
2. Enter value **DCE** into the *Timing Mode* field.
3. Use the *RS-366 Dialing* field to indicate whether access endpoints can receive dial strings.

Administering Far-End Camera Control

To enable this feature, first access the Customer-Options form and set the *Chair Control Suite* field to **y**. Then access the Conference Record form and enter **y** into the *Far End Camera Control* field. Also, ensure that both the *Continuous Presence* field and the *T.120 Data Mode* field are set to **n** and that the *Cascade Mode* field is blank. Finally, ensure that the *Basic/Enh* field contains **enhanced** or **h263_enh**.

NOTE:
Value **basic** can be administered for endpoints in FECC conferences. However, these endpoints do not have access to FECC.

Administering ISDN-BRI Trunk Interface

To administer ISDN-BRI Trunk Interface, complete the fields in the forms identified in the following table. Appropriate page references to the forms are provided. Detailed instructions for completing the forms are provided after the table

Table 2-46. Required Forms and Fields for ISDN-BRI Trunk Interface

Form	Field	Page Reference
Customer-Options	■ *Maximum Port Capacity* ■ *BONDed Use Same DS1*	2-32 2-29
Optional Features	■ *ISDN-BRI Trunks*	2-245
Feature Access Code	■ *ISDN Access Code*	2-147
System Capacities	■ *ISDN-PRI Ports*	2-245
BRI Trunk	(Refer to the following “BRI Trunk Form” section.)	2-245
Trunk Group	(Refer to the following “Trunk Group Form” section.)	2-250, 2-114

To administer ISDN-BRI Trunk Interface, populate the forms discussed in the following sections as directed.

Customer Options Form

Populate the appropriate *Maximum Port Capacity* fields. Also, set the *BONDed Use Same DS1* field to **n**.

Optional Features Form

Ensure that the *ISDN-BRI Trunks* field in the Optional Features form is set to **y**. If the field is disabled, the BRI Trunk form is not accessible.

Feature Access Code Form

Populate the *ISDN Access Code* field with a four-digit code number. The number can contain any digits 0 through 9 along with the # and * symbols in any position (for example, ***256**).

System Capacities Form

Populate the I*SDN-BRI Ports* field with a value indicating the appropriate number of ISDN-BRI ports.

BRI Trunk Form

The BRI Trunk form is used to support the TN2185 circuit pack to enable Trunk-Side BRI. The following table lists the commands that can be used with the BRI Trunk form.

Table 2-47. Trunk-Side BRI Administration Commands

Action	Object	Qualifier
add	bri-trunk-board	PPCSS
change	bri-trunk-board	PPCSS
display	bri-trunk-board	PPCSS
remove	bri-trunk-board	PPCSS

An example of Page 1 of the BRI Trunk form for Trunk-Side BRI appears as follows.

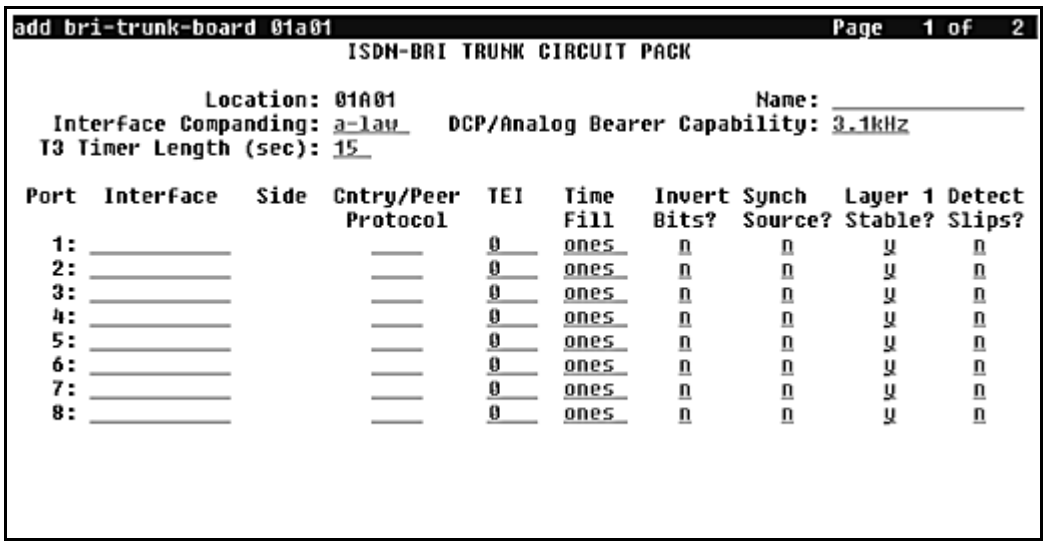


Figure 2-89. BRI Trunk Form (ISDN-BRI Trunk Interface) — Page 1

The following list identifies the fields on the BRI Trunk form and the possible values.

- *Location*

  Read-only field that shows the location of the TN2185 circuit pack in the form ***PPCSS***.

- *Name*

  15-character field that may be used to identify the circuit pack. Default is blank.

- *Interface Companding*

  Indicates the companding algorithm expected by the system at the far end. This parameter must be sent to the TN2185 circuit pack. Values include **a-law** (default) and **mu-law**. Blank is not a valid entry for this field.

  NOTE:
  You can change this field only if the circuit pack is busied out or if all ports are unadministered.

- *DCP/Analog Bearer Capability*

  Indicates how to encode the Bearer Capability IE for an outgoing call originated by a DCP or analog endpoint. Blank is not a valid entry for this field. Values include **3.1kHz** (default) and **speech**.

- *T3 Timer Length*

  Informs the TE side how long to wait for an inactive Layer 1 to become active. This parameter must be sent to the TN2185 circuit pack. Values include **1** through **127** seconds in increments of one second. The default is **15** seconds. Blank is not a valid entry for this field.

  NOTE:
  You can change this field only if the circuit pack is busied out or if all ports are unadministered.

Port parameters include the following:

NOTE:
The user is blocked from changing a port parameter unless the associated port is busied out or unadministered.

- *Interface*

  Tells the call processing software whether a particular port is connected to a user/network or a peer interface. For the TN2185 circuit pack, values include **user**, **network**, **peer-master**, **peer-slave**, and blank (default). Value **peer-slave** can be entered only if the QSIG Basic Call Setup optional feature has been enabled. Value **peer-master** can be entered only if *Cntry/Peer Protocol* is set to **QSIG**.

  NOTE:
  If the field contains a valid value when the form is submitted, the contents of all other fields for the associated port are validated and the port is enabled. If the field is blank when the form is submitted, all other fields for the port are reset to their default values, and the port is disabled. A port cannot be disabled if it is already administered as a member of a trunk group.

- *Side*

  Determines how glare conditions should be handled when *Interface* contains **peer-slave**. The field is not administrable when *Interface* contains **user**. Values include a and b (default). Blank is not a valid entry for this field.

- *Cntry/Peer Protocol*

  Tells the call processing software which ISDN protocol standard to apply. Values include **1** through **23**, **etsi**, and **QSIG**. The default is blank; however, the user cannot leave this field blank if *Interface* is set to a valid, non-blank value. Whenever *Interface* is set to **peer-slave**, *Cntry/Peer Protocol* must be set to **QSIG**. Whenever *Cntry/Peer Protocol* is set to **1**, *Protocol Version* is implicitly set to **b** even though the field is not administrable by the customer.

- *TEI*

  Layer 2 parameter. Values include **0** (default) and **auto**.

- *Time Fill*

  Identifies the bit pattern sent on the D-channel between valid LAPD packets. Values include **flags** and **ones** (default). Blank is not a valid entry for this field.

- *Invert Bits*

  Provides information needed by the TN2185 circuit pack. Enter **y**. Default is **n**.

- *Synch Source*

  Provides information needed by the TN2185 circuit pack. Enter **y**. Default is **n**.

- *Layer 1 Stable*

  Tells call processing and maintenance software whether to expect the network to drop Layer 1 when the BRI port is idle. Values include **yes** (default) and **no**. Blank is not a valid entry for this field.

- *Detect Slips*

  Tells maintenance software whether slips reported by the BRI port should be logged. Values include **no** (default) and **yes**. Blank is not a valid entry for this field.

Page 2 of the form provides port parameters and appears as follows.

```
add bri-trunk-board 01a01                                  Page   2 of   2
                        ISDN-BRI TRUNK CIRCUIT PACK

Port  Interwork  XID   Endpt      SPID       Endpt      SPID       Endpt    Max
      Message    Test?  Init?              ID                    ID      NCA TSC
  1:  PROGress   n      n                                                  0
  2:  PROGress   n      n                                                  0
  3:  PROGress   n      n                                                  0
  4:  PROGress   n      n                                                  0
  5:  PROGress   n      n                                                  0
  6:  PROGress   n      n                                                  0
  7:  PROGress   n      n                                                  0
  8:  PROGress   n      n                                                  0

  Port Directory    Directory          Port Directory    Directory
       Number       Number                  Number       Number
    1:                                  5:
    2:                                  6:
    3:                                  7:
    4:                                  8:
```

Figure 2-90. BRI Trunk Form, Page 2

NOTE:
The user is blocked from changing the values for *Endpt Init* and *SPID* unless the corresponding port is busied out or unadministered. All other fields on this page can be changed even if the corresponding port is active.

- *Interworking Message*

  This field appears only when **isdn-pri** is selected, and determines what message the switch sends when an incoming ISDN trunk call interworks (is routed over a non-ISDN trunk group). Possible values are **PROGress** (the typical setting) which asks the public network to cut through the B-channel and let the caller hear tones such as ringback or busy tone provided over the non-ISDN trunk and **ALERTing** which causes the public network in many countries to play ringback tone to the caller. Select this value only if the DS1 is connected to the public network, and it is determined that callers hear silence (rather than ringback or busy tone) when a call incoming over the DS1 interworks to a non-ISDN trunk.

- *XID Test*

  Indicates whether the far end supports the Layer 2 XID test. Values include **yes** and **no** (default). Blank is not a valid entry for this field.

- *Endpt Init*

  Indicates whether the far end supports endpoint initialization. Values include **yes** and **no** (default). Blank is not a valid entry for this field.

  NOTE:
  If this field is set to **no**, *SPID* and *Endpt ID* must be blank. If this field is set to **yes**, *SPID* must not be blank.

- *SPID*

  12-digit field containing the SPID expected by the far end. Values include any string containing one to 12 digits and blank (default). Leading zeros are significant and are not ignored.

  NOTE:
  If *Endpt Init* is set to **no**, this field must be blank. If *Endpt Init* is set to **yes**, this field must not be blank.

- *Endpt ID*

  2-digit field containing the endpoint identifier expected by the far end. Values include any 2-digit string from **00** through **62** and blank (default). Leading zeroes are significant and are not ignored.

  NOTE:
  If *Endpt Init* is set to **no**, this field must be blank

- *Max NCA TSC*

  2-digit field providing the maximum number of Non-Call-Associated Temporary Signaling Connections allowed on the associated BRI D-channel. Values range from **0** (default) to **63**. Blank is not a valid entry for this field.

- *Port*

  This is a display-only field. It shows the port number to which parameters administered on the row apply.

- *Directory Number*

  These 10-digit fields contain the directory numbers assigned to the interface which it views as being allocated to 2 separate endpoints. Valid entries are any string of 1 to 10 digits. These fields must be administered in pairs, that is, if you enter a value in one field, you must enter a value in the other.

Trunk Group Form

Populate the form fields identified in the following list as directed.

- *Group Type:* ***isdn***
- *Used for DCS:* ***y***

  NOTE:
  However**,** if *DCS Signaling* is set to **d-chan**, *DCS Signaling* should be reset to **bx.25**.

- *Wideband Support:* ***no***
- *Trunk Hunt: blank*
- *Outgoing Channel ID Encoding: if Used for DCS is enabled,* ***exclusive****; if Used for DCS is disabled,* ***preferred****.*

Administering Trunk-Side BRI

NOTE:
When connected to a 5ESS switch, translations are performed on the switch side and the BRI number from the 5ESS is added to the **change bri-trunk-board** form. You may need to obtain the numbers from the carrier to perform the required translations. The screens shown in this section are provided as an example only of trunk-side BRI administration when connected behind an 5ESS.

1. At the *command:* prompt, enter **change bri-trunk-board *PPCSS*,** where ***PPCSS*** is the location of the circuit pack. Specifically, ***PP*** is the two-digit port network number, ***C*** is the one-digit carrier identification, and ***SS*** is the two-digit slot number.
2. Verify that the screen displays the *BRI Trunk* form (refer to *BRI Trunk Form* for a list of fields and values).

```
change bri-trunk-board b16                                  Page   2 of   2
                          ISDN-BRI TRUNK CIRCUIT PACK

Port   Interwork  XID    Endpt       SPID        Endpt       SPID        Endpt   Max
       Message    Test?  Init?                   ID                      ID      NCA TSC
 1:    PROGress   n      y     732332643101      01      732332707301    01      0
 2:    PROGress   n      y     732332545001      01      732332707401    01      0
 3:    PROGress   n      y     732332563701      01      732332707501    01      0
 4:    PROGress   n      y     732332641901      01      732332707601    01      0
 5:    PROGress   n      y     732332532701      01      732332707701    01      0
 6:    PROGress   n      y     732332668501      01      732332707801    01      0
 7:    PROGress   n      y     732332684201      01      732332707901    01      0
 8:    PROGress   n      y     732332539501      01      732332708001    01      0

  Port Directory     Directory              Port Directory     Directory
       Number        Number                      Number        Number
    1: 3326431       3327073                5:   3325327       3327077
    2: 3325450       3327074                6:   3326685       3327078
    3: 3325637       3327075                7:   3326842       3327079
    4: 3326419       3327076                8:   3325395       3327080
```

Figure 2-91. Sample Trunk-Side BRI Trunk Form (ISDN-BRI Trunk Interface) — Page 2

3. Use TAB or RETURN to advance to the fields you want to change.
4. Submit the form.
5. To verify the form, enter **display bri-trunk-board *PPCSS***.
6. Enter **change trunk-group** to administer the ISDN-BRI trunk group.

```
change trunk-group 6                                          Page   1 of  10
                                TRUNK GROUP

Group Number: 6                      Group Type: isdn          CDR Reports: y
  Group Name: isdnbri-5ess                 COR: 1                      TAC: 106
   Direction: two-way        Outgoing Display? n          Carrier Medium: PRI/BRI
 Dial Access? y

Service Type: tie                                              TestCall ITC: rest
                          Far End Test Line No:
TestCall BCC: 4
TRUNK PARAMETERS
        Codeset to Send Display: 6      Codeset to Send National IEs: 6
      Max Message Size to Send: 260     Charge Advice: none
  Supplementary Service Protocol: a     Digit Handling (in/out): enbloc/enbloc

           Trunk Hunt: cyclical
                                                  Digital Loss Group: 13
Calling Number - Delete:    Insert:                Numbering Format:
                                        Synchronization: async    Duplex: full
 Disconnect Supervision - In? y  Out? n
```

Figure 2-92. Sample Trunk-Side BRI Trunk Group Form (ISDN-BRI Trunk Interface) — Page 2

7. Enter **change route pattern** to add the BRI trunk group (refer to *Route Pattern Form* for a list of fields and values).

```
change route-pattern 10                                       Page   1 of   1
                          Pattern Number: 10

   Grp.  FRL NPA Pfx     Toll No. Del Inserted                              IXC
   No.         Mrk       List Digits  Digits
1: 6     0          1                 #9                                    user
2:                                                                          user
3:                                                                          user
4:                                                                          user
5:                                                                          user
6:                                                                          user

    BCC VALUE  TSC CA-TSC    ITC BCIE Service/Feature BAND  No.  Numbering LAR
    0 1 2 3 4 W    Request                                  Dgts Format
                                                         Subaddress
1: y y y y y n  n            bothunr                        _    unk-unk   none
2: y y y y y n  n            rest                           _              none
3: y y y y y n  n            rest                           _              none
4: y y y y y n  n            rest                           _              none
5: y y y y y n  n            rest                           _              none
6: y y y y y n  n            rest                           _              none
```

Figure 2-93. Sample Trunk-Side BRI Route Pattern Form (ISDN-BRI Trunk Interface) — Page 1

Administering Full Tie-Trunk Capabilities Using BRI Trunks

Full tie-trunk capabilities using BRI trunks are available via the TN556 circuit pack and by administering the BRI Trunk form.

BRI Trunk Form

The BRI Trunk form is used to support the TN556 circuit pack. The following table lists the commands that can be used with the BRI Trunk form.

Table 2-48. Trunk-Side BRI Administration Commands

Action	Object	Qualifier
add	bri-trunk-board	PPCSS
change	bri-trunk-board	PPCSS
display	bri-trunk-board	PPCSS
remove	bri-trunk-board	PPCSS

An example of the BRI Trunk form for full tie-trunk capabilities appears as follows.

```
add bri-trunk-board 01a09                                  Page 1 of 2

                        ISDN-BRI TRUNK CIRCUIT PACK

              Location: 01A09                              Name: _______________
  Interface Companding: a-law_     DCP/Analog Bearer Capability: 3.1kHz


Port  Interface   Side  Cntry/Peer  TEI    Time    Invert
                        Protocol            Fill    Bits?
  1:  network____         12__     0___   flags     n
  2:  network____         etsi     0___   ones_     y
  3:  network____         2___     auto   flags     y
  4:  peer-master  b      QSIG     0___   flags     n
  5:  peer-master  a      QSIG     auto   ones_     n
  6:  ___________         ____     0___   ones_     n
  7:  ___________         ____     0___   ones_     n
  8:  ___________         ____     0___   ones_     n
  9:  ___________         ____     0___   ones_     n
 10:  ___________         ____     0___   ones_     n
 11:  ___________         ____     0___   ones_     n
 12:  ___________         ____     0___   ones_     n
```

Figure 2-94. BRI Trunk Form (Full Tie-Trunk Capabilities)

To administer full BRI tie-trunk capabilities on the form, follow these procedures:

1. At the *command:* prompt, enter **change bri-trunk-board *PPCSS*,** where ***PPCSS*** is the location of the circuit pack. Specifically, ***PP*** is the two-digit port network number, ***C*** is the one-digit carrier identification, and ***SS*** is the two-digit slot number.
2. Verify that the screen displays the *BRI Trunk* form (refer to the following list of fields and values).
3. Use TAB or RETURN to advance to the fields you want to change.
4. Submit the form.
5. To verify the form, enter **display bri-trunk-board *PPCSS***.

The following list identifies the fields on the BRI Trunk form and the possible values.

- *Location*

  Read-only field that shows the location of the TN556 circuit pack in the form ***PPCSS***.

- *Name*

  15-character field that may be used to identify the circuit pack. Default is blank.

- *Interface Companding*

  Indicates the companding algorithm expected by the system at the far end. This parameter must be sent to the TN556 circuit pack. Values include **a-law** (default) and **mu-law**. Blank is not a valid entry for this field.

  NOTE:
  You can change this field only if the circuit pack is busied out or if all ports are unadministered.

- *DCP/Analog Bearer Capability*

  Indicates how to encode the Bearer Capability IE for an outgoing call originated by a DCP or analog endpoint. Blank is not a valid entry for this field. Values include **3.1kHz** (default) and **speech**.

Port parameters include the following:

NOTE:
The user is blocked from changing a port parameter unless the associated port is busied out or unadministered.

- *Interface*

  Tells the call processing software whether a particular port is connected to a user/network or a peer interface. For the TN556 circuit pack, values include **network**, **peer-master**, and blank (default). Value **peer-master** can be entered only if the QSIG Basic Call Setup feature has been enabled.

  NOTE:
  If the field contains a valid value when the form is submitted, the contents of all other fields for the associated port are validated and the port is enabled. If the field is blank when the form is submitted, all other fields for the port are reset to their default values, and the port is disabled. A port cannot be disabled if it is already administered as a member of a trunk group.

- *Side*

  Determines how glare conditions should be handled. The field is not administrable when *Interface* is set to **network**. Values include **a** (default) and **b**. Blank is not a valid entry for this field.

- *Cntry/Peer Protocol*

  Tells the call processing software which ISDN protocol standard to apply. Values include **2** through **23**, **etsi**, and **QSIG**. The default is blank; however, the user cannot leave this field blank if *Interface* is set to a valid, non-blank value. Whenever *Interface* is set to **peer-master**, *Cntry/Peer Protocol* must be set to **QSIG**. Whenever *Cntry/Peer Protocol* is set to **10**, **12**, **13**, or **etsi**, *Protocol Version* is implicitly set to **b** even though the field is not administrable by the customer.

- *TEI*

  Layer 2 parameter. Values include **0** (default) and **auto**.

- *Time Fill*

  Identifies the bit pattern sent on the D-channel between valid LAPD packets. Values include **flags** and **ones** (default). Blank is not a valid value for this field.

- *Invert Bits*

  Provides information needed by the TN556 circuit pack. Enter **y**. Default is **n**.

Checking MCU Performance

3

Overview

The MCU provides a variety of reports upon request. These reports provide details about the performance and status of trunks and MCU ports.

The optional system printer, not the local printers connected to the MCU-MT or MCU-ST, automatically prints all reports when the command includes the schedule qualifier. The system printer is remotely connected to the MCU via a 7400B data module.

If you do not have a system printer, individual reports can be printed on local printers by adding the print qualifier to the command line.

Scheduling Reports

The schedule option appears as a qualifier for many MCU list, display and test commands. Whenever a command containing the schedule qualifier is executed, a J*ob Id* is generated and a Report Scheduler screen appears so you can change the *Print Interval*. A maximum of 50 *Job Ids* can be scheduled for printing on the system printer.

The *Print Interval* field specifies when each report is printed (**immediate**, **deferred**, or **scheduled**). The **immediate** option prints the report on-demand and is the default.

The **deferred** option schedules the report for a single printing at some day or time in the future. Once the report is printed, the *Job Id* is automatically deleted.

Both the **deferred** and **scheduled** options provide two additional fields for *Print TIme* and *Days of Week* to specify when the report is to be printed. The

scheduled option differs from the **deferred** option because the specified report continues to print at the scheduled time until it is removed from the Report Scheduler.

Table 3-1 lists the commands that relate to the Report Scheduler feature.

Table 3-1. Report Scheduler Administration Commands

Action	Object	Qualifier
list	report-scheduler	
change	report-scheduler xx*	
remove	report-scheduler xx	

* xx = the Job ID

When a scheduled report needs to be changed with the **change report-scheduler** command, the *Job Status* field indicates whether the report is scheduled to be printed (**print-next**), currently printing (**printing**), finished printing (**printed**), or not scheduled to print (**waiting**) during the current 15-minute interval. To print a scheduled report immediately, change the *Print Interval* field to **immediate**.

Recent Change History

The Recent Change History Report allows a history of the most recent administration and maintenance changes to be viewed or printed. This report may be used for diagnostic or informational purposes.

The MCU maintains a log in the software buffer of up to 250 of the most recent administration and maintenance commands. This log is called the transaction log. The commands must be data-affecting and are called data commands (see Table 3-2).

The Recent Change History Report shows the command, date and time, MCU port (such as, MCU-MT, INADS, or CDR) and the login used to enter the command. The transaction log can be displayed on screen or printed using the following command:

Table 3-2. Recent Change History Administration Commands

Action	Object	Qualifier
list	history	print

The following list shows the data commands available on the MCU:

Table 3-3. MCU Data Commands

Command	Command	Command
add	enable	reset
busyout	get	rp
change	list	save
clear	mark	set
disable	monitor	status
display	recycle	test
download	release	upload
duplicate	remove	wp

Trunk Group Measurements Report

Three reports provide traffic measurements for trunk groups and Call-By-Call (CBC) reports. The Trunk Group CBC Report displays the last-hour traffic data for any specified trunk group. The Trunk Group Summary Report tracks the activity of the trunk group. The Trunk Group Measurements Hourly Report captures hourly trunk group usage.

Table 3-4 shows the commands that relate to obtaining trunk group measurements.

Table 3-4. Trunk Group Measurements Administration Commands

Action	Object	Qualifier
change	meas-selection trunk-group	print or schedule
display	meas-selection trunk-group	print or schedule
list	measurements trunk-group hourly ##	print or schedule
list	measurements trunk-group summary	yesterday-peak, today-peak, last-hour, print, or schedule
list	measurements cbc-trunk-group <number>	last-hour, print, or schedule

Trunk Group Measurements Call-By-Call Report

The Trunk Group Measurements CBC Report monitors the trunk group and determines if the usage selected by the Usage Allocation Plan (UAP) is optimal.

Each UAP specifies the network services and features assigned to the trunk group. By implementing the UAP, the CBC trunk group can be optimized within certain limits without involving any of the Inter-Exchange Carrier/Local Exchange Carrier (IXC/LEC) network services personnel. Each plan specifies the minimum number of reserved channels and maximum number of channels each service or feature may use at a given time.

The UAP may be administered as **fixed** or **scheduled**. With the **fixed** method, a specified plan remains in effect continuously. With the **scheduled** method, two or three UAPs may be scheduled to vary during the week or time of day. Before this report can be analyzed, the intent of the UAP must be known.

The report appears as follows:

```
list measurements cbc-trunk-group 99 last-hour
Switch Name: Cust_Switch_Name
Switch Name:                                    Date: 2:15 pm WED DEC 13, 1995

                        CBC TRUNK GROUP MEASUREMENTS
                   Peak Hour For CBC Trunk Group 99 : 1300
Queue Size          : 40                              Usage Allocation Plan Used
Calls Queued        : 23                    Plan Number:  0  0   0   0   0   0
Queue Overflow      : 0                        Duration:  0  0   0   0   0   0
Queue Abandonments  : 4
Out of Service      : 0
                  Min  Max Meas Total Total Inc.  Ovf  Ovf  Ovf  %   %   %Out
Service/Feature   Chn  Chn Hour Usage Seize Seize  TG  S/F  Max TBM ATB  BLK
  outwats-bnd       5   12 1300   240   333   0     0   0   23   10   2    1
  sdn               4    8 1300    40    30  22     0   0    0   62   1    0
  other             0   20 1300    70    41  36     0   0    0    0   0    0
```

Figure 3-1. Trunk Group Measurements Call-By-Call Report

The following list identifies the data collected by the Trunk Group Measurements CBC Report:

- *Queue Size*

  This field is set to **0**; no queue is administered.

- *Calls Queued*

  This field is not used.

- *Queue Overflow*

  This field is not used.

- *Queue Abandonments*

  This field is not used.

- *Out of Service*

  The number of trunks in the trunk group that are out-of-service at the time the measurements are taken. An individual trunk may be taken out-of-service automatically by the MCU if too many errors occur or by maintenance personnel to run tests.

- *Usage Allocation Plan Used*

  N/A on the MCU.

- *Service/Feature*

  The name of up to 10 services or features and the special identifier “other” for which the associated measurements are being reported. The following services can be administered in a UAP: ACCUNET digital service, SDN and SDDN. The identifier “other” is used to report activity for any service or feature not specified in the current UAP. If no UAP is in effect, no report is made. If public network access is to an LEC or IXC other than Avaya, that carrier’s ISDN services or features are listed, provided they have been administered as a user-defined service or feature.

- *Min Chn*

  The minimum number of channels in the ISDN-PRI CBC trunk group allocated to the specified service or feature at the time the measurements were collected.

- *Max Chn*

  The maximum number of channels in the ISDN-PRI CBC trunk group allocated to the specified service or feature at the time the measurements were collected.

- *Total Usage*

  The sum of time, in hundred-call-seconds (CCS) for all channels that were used by the specified service or feature during the measurement interval (60 minutes).

- *Total Seize*

  The total number of incoming calls that requested the specified service or feature through the ISDN-PRI CBC trunk group.

- *Inc. Seize*

  The total number of incoming calls that requested the specified service or feature through the ISDN-PRI CBC trunk group.

- *Tan Seize*

  This field does not apply. It should remain at **0**.

- *Ovf TG*

  This field does not apply. It should remain at **0**.

- *Ovf S/F*

  This field is not used.

- *Ovf Max*

  This field is not used.

- *% TBM*

  This field is not used.

- *% ATB*

  The percentage of time (**0** to **100** percent) during the measurement interval when the specified service or feature could not get a channel because all trunks in the ISDN-PRI trunk group were busy on a call or busied-out by maintenance, the service was above its minimum and all available trunks were reserved, or the specified service or feature was at its maximum number of channels.

- *% BLK*

  This field does not apply.

Trunk Group Summary Report

The Trunk Group Summary Report appears as follows:

```
list measurements trunk-group summary last-hour
Switch Name: Cust_Switch_Name                    Date: 1:58 pm MON DEC 11, 1995
                          TRUNK GROUP SUMMARY REPORT
                      Peak Hour For All Trunk Groups: 1000
Grp Grp  Grp  Grp Meas Total Total Inc.  Grp  Que  Calls Que Que Out   %  %Out
No. Size Type Dir Hour Usage Seize Seize Ovfl Size Qued  Ovf Abd Serv ATB Blk
20  1    did  inc 1200 0     0     0     0    0    0     0   0   0    0   *
30  1    tie  two 1200 36    0     0     0    0    0     0   0   0    100 0
37  22   tand two 1200 598   179   0     0    0    0     0   0   0    0   0
38  23   isdn two 1200 171   654   0     0    0    0     0   0   0    0   0
39  22   isdn two 1200 270   762   762   0    0    0     0   0   0    0   0
40  5    co   two 1200 61    32    0     6    0    0     0   0   0    6   15
```

Figure 3-2. Trunk Group Summary Report

The following list identifies the data collected by the Trunk Group Summary Report:

- *Peak Hour for All Trunk Groups*

  Peak hour and busy hour are one in the same. The peak hour is the highest usage for each day regardless of the average across days.

- *Grp No.*

  A number that identifies each trunk group associated with the displayed data.

- *Grp Size*

  The number of administered trunks in a trunk group.

- *Grp Type*

  The type of trunk (**isdn-pri** or **tie**) in the trunk group.

- *Grp Dir*

  The direction (**incoming**) of the trunk group.

- *Meas Hour*

  The hour (using the 24-hour clock) in which the measurement was taken.

- *Total Usage*

  The total time the trunks are busy during the one-hour measurement period.

- *Total Seize*

  The number of times a trunk in the trunk group was seized. The call may or may not have been completed.

- *Inc. Seize*

  The total number of times a trunk in the trunk group was seized to receive an incoming call. The call may or may not have been completed.

- *Grp Ovfl*

  This field is not used.

- *Que Size*

  This field is not used.

- *Calls Qued*

  This field is not used.

- *Que Ovf*

  This field is not used.

- *Que Abd*

  This field is not used.

- *Out Serv*

  The total number of trunks in the trunk group that are out-of-service (listed as **maintenance busy**) at the time data was collected. An individual trunk may be taken out-of-service by the MCU when an excessive number of errors occurs or by maintenance personnel to run diagnostic tests. If the trunks were taken out-of-service by the MCU, it may be appropriate to notify maintenance personnel.

- *% ATB*

  The percentage of time that all trunks in the trunk group were simultaneously in use during the measurement interval. In use means all trunks were busy either processing calls or they were busied-out by maintenance. A high number in this field probably indicates calls are being blocked.

- *% Out Blk*

  This field is not used.

Trunk Group Hourly Report

NOTE:
To generate this report, the number of trunks you want measured hourly must be entered in the *Trunk Group Number* field of the Trunk Group Measurement Selection. If no selections are made, no measurements are taken.

The following list identifies the data collected by the Trunk Group Hourly Report:

- *Grp No.*

  A number that identifies each trunk group associated with the displayed data.

- *Grp Size*

  The number of administered trunks in a trunk group.

- *Grp Type*

  The type of trunk (**isdn-pri** or **tie**) in the trunk group.

- *Grp Dir*

  The direction (**incoming**) of the trunk group.

- *Que Size*

  This field is not used.

- *Total Usage*

  The total time the trunks are unavailable due to the trunks being busy, busied-out by maintenance, or any other reason.

- *Maint Usage*

  The total usage of trunks in this trunk group for maintenance busy or any other non-call situation where trunks are unavailable.

- *Total Seize*

  The total number of seizures on the trunk group.

- *Inc. Seize*

  The total number of times a trunk in the trunk group was seized to receive an incoming call. The call may or may not have been completed.

- *Tandem Seize*

  This field is not used.

- *Grp Ovfl*

  This field is not used.

- *Calls Qued*

  This field is not used.

- *Que Ovf*

  This field is not used.

- *Que Abd*

  This field is not used.

- *Out Serv*

  The total number of trunks in the trunk group that are out-of-service (listed as **maintenance busy**) at the time data was collected. An individual trunk may be taken out-of-service by the MCU when an excessive number of errors occurs or by maintenance personnel to run diagnostic tests. If the trunks were taken out-of-service by the MCU, it may be appropriate to notify maintenance personnel.

- *% ATB*

  The percentage of time that all trunks in the trunk group were simultaneously in use during the measurement interval. In use means all trunks were busy either processing calls or they were busied-out by maintenance. A high number in this field probably indicates calls are being blocked.

- *% Out Blk*

  This field is not used.

Trunk Outage Report

This report lists up to a maximum of five trunks in each trunk group that were out-of-service when sampled. The number of times the trunks were out-of-service when sampled is also given. The trunk outage data is kept for the current day, the previous day and the last hour.

Table 3-5 shows the command that relates to obtaining trunk outage measurements.

Table 3-5. Trunk Outage Measurements Administration Commands

Action	Object	Qualifier
list	measurements outage-trunk	yesterday, today, print, or schedule

Trunk Outage Measurements Report

The following list shows the data collected for the Trunk Outage Measurements Report:

- *Grp No.*

  A number that identifies each trunk group associated with the displayed data.

- *Grp Type*

  The type of trunk (**isdn-pri** or **tie**) associated with the accumulated data.

- *Grp Dir*

  Identifies the direction (**inc** for incoming only) of the trunk group.

- *Grp Size*

  The number of trunks in the trunk group.

- *Grp Mbr #*

  The number that identifies a specific trunk member in the group that is out-of-service.

- *#Sampled Outages*

  The number of times the group member is sampled as out-of-service over the period covered by the report (**yesterday**, **today**, or **last hour**). If there are no outages then no data is displayed. The sampling period is once per hour. If the report covers several hours but the column indicates a small number of outages, the trunk member may be providing intermittent service. Use the facility test calls feature to determine whether a specific trunk member is functioning. If you suspect the trunk is causing problems, use the ACA feature to monitor the particular trunk group. If the trunk is out-of-service, you may choose to refer the problem to maintenance personnel.

Trunk Group Traffic Report

The Trunk Group Status Report gives a current indication of the load on various trunk groups. For comparative analysis, the trunk members in the group that are active on calls are also displayed. Table 3-6 shows the command that relates to obtaining trunk status reports:

Table 3-6. Trunk Status Administration Commands

Action	Object	Qualifier
monitor	traffic trunk-groups	

Trunk Status Report

The following list shows the data collected for the Trunk Status Report:

- #

  Group number that identifies each trunk group.

- *S*

  Group size that shows the number of trunks administered for the trunk group.

- *A*

  Shows the number of trunk members in the group that are active on a call. Busied-out trunks are not active.

- *Q*

  This field is not used.

- *W*

  This field is not used.

DS1 (UDS1) Measurements

There are two performance measurements for DS1 (UDS1) links. The DS1 (UDS1) Link Performance Measurements Summary Report provides an indication of the quality of a DS1 (UDS1) link that connects to a DS1 (UDS1) interface circuit pack. The DS1 (UDS1) Link Performance Detailed Log Report lists errored events for the past 24 hours. The errored event records are listed for each 15-minute interval. Included are 96 records (for each 15-minute interval) dating from the current time back to 24 hours before the current interval, beginning with the oldest record.

Check these reports if you receive complaints from video endpoints about the stability of the far-end handshake, especially when the Status of Conference screen reports **Handshake** as the drop reason. (See Chapter 5 for troubleshooting details.)

Table 3-7. DS1 (UDS1) Measurements Administration Commands

Action	Object	Qualifier
clear	measurements-ds1 (uds 1)	
list	measurements ds1 (uds 1)	location, print, or schedule
list	measurements ds (uds)1-log	location, print, or schedule

DS1 (UDS1) Link Performance Measurements Summary

The following list shows the data collected on the DS1 (UDS1) Link Performance Measurements Summary form:

- *Counted Since*

  The date and time the counters were last cleared and restarted. The counters are set to 0 and start accumulating data when the MCU is administered or re initialized. The current system time appears in the field once the system clock is set. An error message appears if the system clock has not been set following a re initialization.

- *Number of Seconds Elapsed*

  The total number of 15-minute intervals (**0** to **96**) in the past 24 hours that have valid values. An invalid value is any 15-minute interval when the time was changed, a system re initialization occurred or the DS1 (UDS1) circuit pack was removed.

- *Worst 15-Min Interval*

  The date, ending time, and count for the 15-minute period that contained the maximum count in each error category. If there are no errors, the field displays a **0** with the oldest time.

- *Total of 24-Hour Count*

  The total count in each error category for the last 24 hours (**0** to **65535**).

- *Current 15-Min Interval Count*

  The count-so-far in each error category for the15-minute interval in progress when the report was requested. If no errors have occurred in any of the categories during the current 15-minute interval, the respective field will contain a **0**. If the system is busy performing call processing functions and cannot respond within eight seconds, the field will show **N/A**.

DS1 (UDS1) Link Performance Detailed Log Report

The following list shows the data collected on the DS1 (UDS1) Link Performance Detailed Log Report form:

- *Date*

  The date on which the event occurred (**yesterday** or **today**).

- *Time*

  The ending times for the 15-minute sampling intervals.

- *Errored Second*

  The number of errored seconds (maximum of **900**) for the specified interval. An errored second is any second in which one or more data transmission errors occurred. **N/A** indicates the count for that interval was not available because there was no data.

- *Bursty Err Sec*

  The number of bursty errored seconds (maximum of **900**) for the specified interval. A bursty errored second is any second in which two to 319 data transmission errors occurred. **N/A** indicates the count for that interval was not available. An error count of this severity causes a minor alarm. Depending on local arrangements, it may be appropriate to notify maintenance personnel if they have not already been alerted.

- *Severely Err Sec*

  The number of severely errored seconds for the specified interval (maximum of **900**). A severely errored second is any second in which 320 or more data transmission errors occurred. An error count of this severity results in a major alarm. Depending on local arrangements, it may be appropriate to notify maintenance personnel if they have not already been alerted.

- *Failed Second*

  The number of failed seconds states for the specified interval (maximum of 900). A failed second state exists any time that ten or more consecutive severely errored seconds have occurred. An error count of this severity results in a major alarm. **N/A** indicates the count for this interval was not available. Depending on local arrangements, it may be appropriate to notify maintenance personnel if they have not already been alerted.

- *Valid Interval*

  Specifies whether or not a valid count is provided by the DS1 (UDS1) interface circuit pack. A value of **y** indicates all counts are valid for the interval. An invalid interval is any 15-minute interval during which the system clock was changed, a system re initialization occurred, or the specified circuit pack was removed.

Hunt Group Measurements

There are three measurement reports for hunt groups. The Hunt Group Measurements Report monitors the hunt group. This report shows hunt group measurements for yesterday's peak hour, today's peak hour, and the last hour. A peak hour is the hour within a 24-hour period when there was the greatest usage for the specified day.

The Hunt Group Performance Report gives the slowest hourly average speed of answer for each hunt group. The Hunt Group Status Report provides an instantaneous indication of the load that is pending for various hunt groups. Table 3-9 lists the commands related to hunt group measurements.

Table 3-8. Hunt Group Measurements Administration Commands

Action	Object	Qualifier
list	measurements hunt-group	yesterday-peak, today-peak, last hour, print, or schedule
list	performance hunt group	yesterday, today, print, or schedule
monitor	traffic hunt-groups	

Hunt Group Measurements Report Form

The Hunt Group Measurements Report appears as follows:

```
list measurements hunt-group today-peak                          Page   1
Switch Name:                              Date: 5:32 pm  TUE MAY 9, 2000

                          HUNT GROUP MEASUREMENTS

Grp  Grp                    Grp  Meas Total Calls Que Calls Que  Time  Speed
No.  Name                   Siz/ Hour Usage Ans/  Siz Que.  Ovfl Avail Answer
                            Typ.            Aban.                    (sec)

1    60400                   0   1600 0     0     0   0     0    0     0
                             ddc             0
2    60401                   0   1600 0     0     0   0     0    0     0
                             ddc             0
3    60402                   0   1600 0     0     0   0     0    0     0
                             ddc             0
4    60403                   0   1600 0     0     0   0     0    0     0
                             ddc             0
6    60406                   0   1600 0     0     0   0     0    0     0
                             ddc             0
7    60407                   0   1600 0     0     0   0     0    0     0
                             ddc             0
```

Figure 3-3. Hunt Group Measurements Report

The following list shows the data collected on the Hunt Group Measurements Report form:

- *Grp No.*

  A number that identifies each hunt group.

- *Grp. Name*

  Name assigned, during administration, to the hunt group.

- *Grp Size*

  The number of extensions assigned to the hunt group.

- *Grp Type*

  The type of hunt group.

- *Meas Hour*

  The peak hours for the specified hunt group. Depending on the time of day the report is generated, today's peak hour data may vary.

- *Total Usage*

  The sum of all times that the members of a hunt group are busy on hunt group calls.

- *Calls Ans*

  The total number of all hunt group calls answered by the hunt group.

- *Calls Aban*

  The total number of calls which attempt to reach the hunt group but abandon the attempt before being answered.

- *Queue Size*

  This field is not used.

- *Calls Queued*

  This field does not apply.

- *Time Avail*

  The total time that the hunt group extensions are not in use but are available to receive hunt group calls during the measurement hour.

- *Speed of Answer*

  The average time interval (in seconds) from when the call first enters the hunt group until the call is answered by a hunt group member.

Hunt Group Performance Report

The following list shows the data collected on the Hunt Group Performance Report:

- *Grp No.*

  A number that identifies each hunt group.

- *Grp Size*

  The number of extensions assigned to the hunt group.

- *Grp Type*

  The type of hunt group.

- *Slowest Speed of Answer (sec)*

  A bar graph representation of the slowest hourly average speed of answer for the report interval (**yesterday** or **today**).

- *Speed Ans (sec)*

  The number of seconds corresponding to the slowest hourly average speed of answer (longest amount of time to answer) for the report interval (**yesterday** or **today**).

- *Meas Hour*

  The starting time (using the 24-hour clock) of the hour during which the data was recorded.

- *Daily Avg.*

  The number corresponding to the 24-hour daily average speed of answer for each hunt group.

Hunt Group Status Report

The Hunt Group Status report appears as follows:

```
monitor traffic hunt-groups

                        HUNT GROUP STATUS          9:18 am WED DEC 20, 1995

    #    S    A    Q    W    LCIQ        #    S    A    Q    W    LCIQ
    1    4    0    0    0    0

(#: Group; S: Grp Size; A: Active Members; Q: Q Length; W: Calls Waiting)
(LCIQ: Longest Call in Queue in seconds                                  )
```

Figure 3-4. Hunt Group Status Report

The following list shows the data collected for the Hunt Group Status Report:

- #

  Group number that identifies each hunt group.

- *S*

  Group size that shows the extensions assigned to the hunt group.

- *A*

  Shows the number of hunt group members that are active on a call.

- *Q*

  This field is not applicable.

- *W*

  This field is not applicable.

- *LCIQ*

  This field is not applicable.

Security Violations Reports

There are two security violation reports. The Security Violations Measurements Report measures the number of attempts at system entry through an invalid login. The Security Violations Status Report provides current status information on invalid system administration terminal login attempts and remote access violations.

Invalid login attempts and remote access violations are logged at the time they occurred. The login is entered and the port that was accessed during the failed login attempt is recorded. For remote access violations, the trunk group number is also reported. A total of 16 entries are maintained for invalid access. The data displayed by this report is refreshed every 30 seconds.

NOTE:
If login security violations occur, change the password for the login immediately.

Table 3-10 lists the commands that are used to obtain security violation reports.

Table 3-9. Security Violation Administration Commands

Action	Object	Qualifier
clear	security-violations	
list	measurements security-violations	print or schedule
monitor	security-violations	print

Security Violations Measurements Report

The following list shows the data collected on the Security Violations Measurements Report form:

- *Login ID*

  The login that was attempted.

- *Port Type*

  The port that was used for the login attempt.

- *Successful Logins*

  The total number of login attempts for each login that completed.

- *Invalid Passwords*

  The number of passwords that were entered for the login that were incorrect.

- *Counted Since*

  The time at which the counts were last cleared and started accumulating again or when the system was initialized.

Security Violations Status Report

The Security Violations Status report appears as follows:

```
monitor security-violations

                        SECURITY VIOLATIONS STATUS

                                              Date: 9:21 am WED DEC 20, 1995

     SYSTEM MANAGEMENT VIOLATIONS                REMOTE ACCESS VIOLATIONS

 Date  Time  Login  Port        Ext        Date  Time    TG No. Mbr   Ext
 05/04 15:22 testid SYS-PORT    71111      05/03 21:14     3     50   81111
 05/04 15:23 testit SYS-PORT    73456      05/04 22:10    21     43   83333
 05/04 15:25 testx  SYS-PORT    72198      05/04 22:13    21     43   83333
```

Figure 3-5. Security Violations Status Report

The following list shows the data collected on the Security Violations Status Report:

- *Date*

  The date of the invalid login attempt.

- *Time*

  The time of the invalid login attempt.

- *Login*

  The login ID used in the invalid login attempt. The failure may have been due to an invalid password but the login (valid or invalid) is also listed.

- *Port*

  The port on which the invalid login attempt was made. **SYSAM-LCL** is for the MCU-MT; **SYSAM-RMT** is for the **MCU-ST**; and **SYS-PORT** is for the dial-up remote maintenance port.

- *Ext*

  The extension assigned to the port.

- *Date*

  The date of the remote access attempt.

- *TIme*

  The time of the remote access attempt.

- *TG No.*

  The trunk group number associated with the trunk used in the invalid remote access attempt.

- *Mbr*

  The trunk group member number of the trunk used in the invalid remote access attempt.

- *Ext.*

  The remote access extension.

System Status Reports

There are two monitor system status reports. Monitor System View1 Report includes maintenance status and last hour's traffic data for hunt groups and trunk groups. The Monitor System View2 Report provides maintenance status and last hour's traffic for trunk groups only (no hunt group data). For both reports, data for maintenance status is updated every minute. Data for traffic status is collected on an hourly basis from existing measurements.

NOTE:
Consider requesting these reports as the last request during your current login. The screens are exited by pressing CANCEL, which also logs you off the system.

Table 3-11 lists the commands related to obtaining system status reports.

Table 3-10. System Status Reports Administration Commands

Action	Object	Qualifier
monitor	system view1	
monitor	system view2	

Monitor System View1 Report

The Monitor System View1 report appears as follows:

```
monitor system view1

                                                MAINTENANCE STATUS

                                              # of alarms for trunks: 0
                                              # of alarms for stations: 0
                                              # of alarms for other res: 2
                                              INADS has been informed? n


                                TRAFFIC STATUS
                              Measurement Hour: 8
         Trunk Group Measurement            Hunt groups Measurement
  (4 grps with highest %time ATB)     (4 grps with highest # of qued calls)
      Grp no:                                  Grp no:
     Grp dir:                                Calls qued:
  Calls qued:                                Calls aban:
   %Out blkg:
   %Time ATB:
                                                      9:26 WED DEC 20 1995
                - press CANCEL to quit -
```

Figure 3-6. Monitor System View1 Report

The following list shows the data collected for the Monitor System View1 Report:

- *Maintenance Status*

  Shows the number of alarms (including minor and major alarms) that may indicate problems on trunks, stations (maintenance alarm terminals) or other resources. If any alarm exists in the system or if remote maintenance (for example, INADS) has acknowledged an alarm, indications are shown on the report. Use the **display alarms** command to determine exactly what alarms currently exist. A **y** in the *INADS* field indicates the alarm has been acknowledged.

- *Traffic Status*

  Displays the call handling status for trunk groups and hunt groups. The report indicates the number of abandoned calls during the previously completed measurement interval for the identified group. For the trunk group measurements, only the four trunk groups numbers with the highest percentage of blocking are listed.

- *Grp Dir*

  Displays the trunk group direction (**incoming**).

- *%Time ATB*

  Shows the percentage of all trunks busy. For incoming trunk groups that report a high number in this field, enter the **list performance trunk-group** command to check the trunk group for problems.

Monitor System View2 Report

The following list shows the data collected for the Monitor System View2 Report:

- *Maintenance Status*

  Shows the number of alarms (including minor and major alarms) that may indicate problems on trunks, stations (maintenance alarm terminals) or other resources. If any alarm exists in the system or if remote maintenance (for example, INADS) has acknowledged an alarm, indications are shown on the report. Use the **display alarms** command to determine exactly what alarms currently exist. A **y** in the *INADS* field indicates the alarm has been acknowledged.

- *Traffic Status*

  Displays the call handling status for trunk groups only. The report indicates the number of abandoned calls during the previously completed measurement interval for the identified group. Only the four trunk groups numbers with the highest percentage of blocking are listed.

- *Grp Dir*

  Displays the trunk group direction (**incoming**).

- *%Time ATB*

  Shows the percentage of all trunks busy. For incoming trunk groups that report a high number in this field, enter the **list performance trunk-group** command to check the trunk group for problems (see “Performance Reports” for details).

Performance Reports

There are two performance reports. The Performance Summary Report summarizes the peak-hour trunk blocking, ARS traffic data, trunks out-of-service, and trunks not used. The report captures data from the previous day or the current day. The Trunk Group Performance Report gives a graphical and numerical display of the peak-hour blocking for each trunk group. This report captures data from the previous day or the current day.

Table 3-12 gives the commands related to obtaining performance reports.

Table 3-11. Performance Reports Administration Commands

Action	Object	Qualifier
list	performance summary	yesterday, today, print, or schedule
list	performance trunk-group	yesterday, today, print, or schedule

Performance Summary Report

The Performance Summary Report appears as follows:

```
list performance summary yesterday                                Page 1
Switch Name:  Customer_Switch_Name
SUMMARY PERFORMANCE REPORT                    Today: 4:38 pm  SAT DEC 16, 1995
PEAK HOUR TRUNK BLOCKING                           DAILY ARS CALLS CARRIED
Grp - %Out Blocking or % ATB - Grp        Grp -  % Calls Per Group Type -   %
No. 1 2 3 4 5 6 7 8 9 10 20 50 Blk
                                          Type 1 10 20 30 40 50 60 80 100 Calls
54  ////////////////////////   42
59  ////////////////////////   39
58  ////////////////////////   36
63  ////////////////////////   34
61  ////////////////////       10
      TRUNKS OUT OF SERVICE                      TRUNKS NOT SERVICE
Grp Trunks Out Of Service All Day         Grp Trunks With No Calls All Day
No. ----------------------------          No. ----------------------------
41    9 19                                55    1
73    7                                   60    9
211   1 2 3 4 5 6 7 8 9 10                223   19 20 21 22 23
      more out of service                       more out of service
```

Figure 3-7. Performance Summary Report

The following list shows the data collected for the Performance Summary Report:

- *Peak-Hour Trunk Blocking*

  Lists up to the maximum of five trunk groups that have the highest percentage of blocking in a measurement hour. For incoming trunk groups, the percentage of blocking is shown in the*% ATB* field. The number in this field represents the percentage of time all trunks in the trunk group were simultaneously in use during the measurement interval.

- *Daily ARS Calls Carried*

  This field is not used.

- *Trunks Out of Service*

  Lists four trunk groups with out-of-service trunks over the report interval. A list of the first 10 trunks that are out-of-service is also given. The message `more out of service` is displayed when more than four trunk groups are out of service or more than ten members of any trunk group are out of service. This measurement is a summary of the Outage Trunk Measurement Report.

- *Trunks Not Used*

  Lists the four trunk groups with trunks that have not been used over the report interval. A list of the first five trunks, in each of the identified groups, that have not been used are also listed. The message `more out of service` displays when more than four trunk group have not been used or whenever more than five members of any group have not been used. You should determine the exact reason why trunks are not being used. If there is only one trunk member identified for a trunk group and that member has zero calls, the trunk may be defective.

Trunk Group Performance Report

The Trunk Group Performance Report appears as follows:

```
list performance trunk-group yesterday
Switch Name:  Cust_Switch_Name
Trunk Group Performance                          Today: 4:28 pm  SAT DEC 16, 1995
              HIGHEST HOURLY TRUNK GROUP BLOCKING
Grp Grp       Grp Grp    --% Outgoing Blocking or % ATB-- %Out  %Time Meas  Total
No. Type      Dir Size   1 2 3 4 5 6 7 8 9 10 20 30 40 50 Blkg  ATB   Hour  Calls
1   isdn-pri  in  6      /////////////////                      9     1200  876
2   isdn-pri  in  5      ////////////////////////////           30    1400  94
3   tie       in  14     /////////////                         36    1300  312
5   tie       in  10     ////////////////////////              99    1300  542
12  tie       in  18     ////////////////////                  96    1400  614
23  tie       in  7      ///////////////////////               81    1400  359
41  tie       in  8      ////////////////////////              91    1300  411
221 tie       in  5      ////////////////////                  77    1300  109
```

Figure 3-8. Trunk Group Performance Report

The following list shows the data collected for the Trunk Group Performance Report:

- *Group No.*

  A number that identifies the trunk group associated with the displayed data.

- *Grp Type*

  The type of trunk (**isdn-pri** or **tie**) associated with the accumulated data.

- *Grp Dir*

  The direction (**incoming**) of the trunk group.

- *Grp Size*

  The number of trunks in the trunk group.

- *% Outgoing Blocking or % ATB*

  A graphical representation equivalent to the numerical value of all trunks busy. For incoming trunks, peak hour is the largest *% ATB*. Since outgoing blocking is meaningless for incoming trunks, it is displayed as ***** in that column.

- *%Out Blkg*

  This field is not used.

- *%Time ATB*

  The percentage of time that all trunks in the trunk group were simultaneously in use during the measurement interval. In use means the trunks were busy processing calls or are busied-out by maintenance.

- *Meas Hour*

  The starting time (using the 24-hour clock) of the hour during which the data was recorded.

- *Total Calls*

  Because the value collected is not relevant for incoming trunks, it is displayed as * in that column.

Occupancy Reports

These four reports track the percentage of time the MCU is busy performing call processing tasks, maintenance tasks, administration tasks, and the operating system support for each of these tasks. The percentage of time when the MCU is not used is referred to as Idle Occupancy (*Idle Occ*). These reports determine usage, available capacity and help to diagnose certain customer-reported problems.

Table 3-13 lists the commands that relate to occupancy measurements.

Table 3-12. Occupancy Reports Administration Commands

Action	Object	Qualifier
clear	measurements occupancy	
list	measurements occupancy	summary, print, or schedule
list	measurements occupancy	last-hour, print, or schedule
list	measurements occupancy	busiest-intervals, print, or schedule
list	measurements communications-links	print or schedule

Occupancy Summary Report

The Occupancy Summary Report appears as follows:

```
list measurements occupancy summary                              Page 1

                                                  Date: 3:12 pm MON DEC 6, 1999
                          OCCUPANCY SUMMARY MEASUREMENTS
                           Peak Hour For Occupancy: 1000
Meas     Stat    CP     Sm     Idle    Total    Total              Inc      Out
Hour     Occ     Occ    Occ    Occ     Calls    Atmpt              Atmpt    Atmpt
1400     4       13     22      61     28463    43908                0        0
1300     5       14     23      58     35626    51094                0        0
1200     5       14     23      58     35632    51120                0        0
1100     5       14     23      58     35645    51130                0        0
1000     5       16     24      55     24342    31756                0        0

            press CANCEL to quit  --  Press NEXT PAGE to continue
```

Figure 3-9. Occupancy Summary Report

The following list shows the data collected for the Occupancy Summary Report:

- *Meas Hour*

  The starting time (using the 24-hour clock) of the hour during which the data was recorded. Data is listed beginning with the most recent.

- *Meas Min*

  The start 3-minute interval for which the measurement is taken. It takes the form **hh:mm**.

- *Date of Occur*

  The date and time that coincides with a line of busiest-interval data. It takes the form of **MM/dd/hh:mm** where **MM** is the month, **dd** is the day, **hh** is the hour, and **mm** is the minute.

- *Stat Occ*

  The amount of time taken by high-priority background processes to support call processing, maintenance, and administration functions.

- *CF Occ*

  The amount of time taken by call processing level processes, such as ISDN and CDR. It is not desirable for the MCU to operate at 100 percent processor occupancy. Rather, the *CP Occ* and *Stat Occ* fields should combine to no more than 70 percent. This allows the system to perform conferencing and administration functions at optimum levels.

- *Sm Occ*

  The amount of time taken by lower-priority activities, such as maintenance and administration command processing and error logging.

- *Idle OCC*

  The amount of time that the processor is unused. This value should not fall below 15 percent for a sustained period.

- *Total Calls*

  This field is not used and is marked with an *.

- *Total Atmpt*

  The number of incoming trunk seizure attempts made during the measurement interval.

- *Out Atmpt*

  This field is not used.

Occupancy Last-Hour Measurements Report

The data collected for the Occupancy Last-Hour Measurements Report is the same as the Occupancy Summary Report except that the measurements are taken for the last hour. This report helps to identify potential load related problems that may have occurred during the last hour. Be sure to check the hardware error log for an excessive amount of maintenance activity when investigating a problem.

The Occupancy Last-Hour Measurements Report appears as follows:

```
list measurements occupancy last-hour                          Page 1

                                              Date: 3:13 pm MON DEC 6, 1999
                        OCCUPANCY LAST-HOUR MEASUREMENTS
Meas    Stat   CP    Sm    Idle   Total   Total            Inc     Out
Min     Occ    Occ   Occ   Occ    Calls   Atmpt            Atmpt   Atmpt
15:11    2      5    26    67      646    1421              0       0
15:08    4      5    22    69      641    1412              0       0
15:05    5      6    25    64      639    1410              0       0
15:02    4      6    24    66      645    1420              0       0
14:59    3      4    22    71      639    1411              0       0
14:56    3      5    24    68      639    1412              0       0
14:53    6      6    24    64      645    1418              0       0
14:50    4      5    27    64      641    1418              0       0
14:47    4      6    19    71      648    1429              0       0
14:44    2      5    26    67      639    1405              0       0
14:41    4     14    19    63     1624    2399              0       0
14:38    6     15    28    51     1786    2556              0       0
            press CANCEL to quit  --  Press NEXT PAGE to continue
```

Figure 3-10. Occupancy Last-Hour Measurements Report

Occupancy Busiest-Interval Measurements Report

The data collected for the Occupancy Busiest-Interval Measurements Report is the same as the Occupancy Summary Report except that the measurements are a collection of the 20 busiest 3-minute intervals (instead of one-hour intervals) within the past two months. This report is useful to maintenance personnel who need to investigate habitual performance problems or problems that were not reported when they occurred. Be sure to check the hardware error log for an excessive amount of maintenance activity when investigating a problem.

An Occupancy Busiest-Interval Measurements Report for 3-minute interval measurements appears as follows:

```
list measurements occupancy busiest-intervals                    Page 1
                                                 Date: 3:13 pm MON DEC 6, 1999
                OCCUPANCY BUSIEST 3-MINUTE INTERVALS MEASUREMENTS

Date of       Stat  CP   Sm   Idle  Total  Total          Inc   Out
Occur         Occ   Occ  Occ  Occ   Calls  Atmpt          Atmpt Atmpt
11/11/10:20   16     9   26   49     686   1225            0     0
11/11/11:14    8    16   27   49    1788   2558            0     0
11/11/12:38    7    15   21   57    1786   2554            0     0
11/11/13:41    6    16   26   52    1786   2553            0     0
11/11/14:11    7    15   25   53    1780   2557            0     0
             press CANCEL to quit  --  Press NEXT PAGE to continue
```

Figure 3-11. Occupancy Busiest-Interval Measurements Report

Occupancy Communications Link Measurements Report

The Occupancy Communications Link Measurements Report appears as follows:

```
list measurements communications-links                          Page 1

                                                  Date: 1:55 pm TUE DEC 12, 1995

                          COMMUNICATION LINK MEASUREMENTS

Meas      Link      Link      Link      Link      Link      Link      Link      Link
Hour      9         10        11        12        13        14        15        16
1200      10471     576       24        4         0         40        2         0
1100      13764     612       24        14        0         313       4         0
1000      12217     550       24        4         0         36        9         0
900       12365     601       26        4         0         32        2         0
800       12630     559       28        4         0         36        4         0
700       12714     412       24        4         0         36        4         0
600       12531     299       24        4         0         40        4         0
500       12407     352       24        4         0         42        2         0
400       12173     311       34        4         0         32        2         0
300       12121     301       24        4         0         36        4         0
200       12561     412       24        4         0         36        4         0
100       12501     478       24        4         0         36        2         0

            press CANCEL to quit  --  Press NEXT PAGE to continue
```

Figure 3-12. Occupancy Communications Link Measurements Report

The following list shows the data collected for the Occupancy Communications Link Measurements Report:

- *Meas Hour*

  The starting time (using the 24-hour clock) of the hour during which the data was recorded. Data is listed beginning with the most recently completed hour.

- *Link #*

  The links are identified by numbers **9** through **16**. The numbers in each column represent the number of messages traversing the link. Once a link is established and traffic begins flowing over it, the messages are counted automatically; no command is required.

Tone Receiver Measurements Report

The Tone Receiver Measurements Report provides traffic data on the TN744C, TN420C, or TN748D Tone Detector circuit pack. Reports can be requested for yesterday's peak hour, today's peak hour, or the last hour. You may want to request this report as conferees report they are unable to join a conference when other conferences are also active.

Table 3-14 shows the command related to obtaining the tone receiver measurements.

Table 3-13. Tone Receiver Measurements Administration Command

Action	Object	Qualifier
list	measurements tone-receiver	last-hour, today-peak, yesterday-peak, print, or schedule

The Tone Receiver Measurements Report appears as follows:

```
list measurements tone-receiver last-hour

Switch Name:  Cust_Switch_Name                    Date: 4:16 pm TUE DEC 19, 1995

                          TONE RECEIVER MEASUREMENTS

                Total   Total   Peak   Total    Peak     Total    Peak
     Hour  Type Avail    Req     Req    Queued   Queued   Denied   Denied
     1400  DTMF   40      23      13      0        0        0        0
     1500  GPTD    6      94       7                        1        1

                    PN      PN        Peak      Total      Peak
      PN     Type   Req     Alloc     Alloc     Off-PN     Off-PN
      1      DTMF    8       8         200         0          5
      1      GPTD   12      12         3          0          0

           Press CANCEL to quit   -   press NEXT PAGE to continue
```

Figure 3-13. Tone Receiver Measurements Report

The following list shows the data collected for the Tone Receiver Measurements Report:

- *Hour*

  The starting time (using 24-hour clock) of the hour during which the greatest number of requests for tone receivers were made.

- *Type*

  The type of tone receiver being measured. Each TN748 circuit pack provides four DTMF ports (for touchtone reception) and two GPTD ports (for call progress tone reception).

- *Total Avail*

  The system wide total number of DTMF and GPTD receivers that are available and not busied-out for maintenance.

- *Total Req.*

  The system wide total number of requests by the tone receivers during the listed hour. The total number of requests is calculated by incrementing a counter for each request.

- *Peak Req*

  The system wide peak number of simultaneous requests for tone receivers that occurred at any one time for the listed hour. The peak (or maximum) number is calculated by incrementing a counter for each request and decreasing the counter when the request fails or a tone receiver is released. Denied requests fail and are given the reorder tone.

- *Total Queued*

  The system wide total number of tone receivers that were queued during the listed hour. There is no queuing for GPTD receivers.

- *Peak Queued*

  The system wide maximum number of DTMF receivers that were queued at any one time during the listed hour. The system has a maximum queue size of four. GPTD receivers cannot be queued.

- *Total Denied*

  The system wide total number of requests for tone receivers that were denied because none were available.

- *Peak Denied*

  The system wide peak number of requests for tone receivers that were denied because no receivers were available during the listed hour.

- *PN*

  The port network where the circuit pack is located.

- *Type*

  The type of tone receiver being measured (**DTMF** or **GPTD**).

- *PN Req*

  The port number requests.

- *PN Alloc*

  The total number of tone receivers located in the port network that were allocated for use during the listed hour.

- *Peak Alloc*

  The peak number of tone receivers located in listed port network that were used simultaneously during the listed hour.

- *Total Off-PN*

  This field is not used.

- *Peak Off-PN*

This field is not used.

Conference Control Features

4

Overview

This chapter discusses three key MCU conference control features, including the following:

- Universal Conference Control *Star*
- Conference control commands from the MCU-MT
- OpCenter

Using Universal Conference Control *Star*

Universal Conference Control (UCC) *Star* allows the user to control conferences in a manner similar to Chair Control conference mode. UCC *Star* enables the use of a regular touchtone telephone as the controlling terminal. This section discusses setting and using UCC *Star*.

Setting Up the Universal Conference Control *Star* Controller

The following list indicates the requirements for a terminal to be used as a Universal Conference Control (UCC) *Star* controller at a customer location.

- Terminal must be able to access the MCU via PRI trunks or non-ISDN DS1 trunks.
- Terminal must be a terminal capable of transmitting Dual-Tone Multifrequency (DTMF) touchtones to the MCU.

- If the terminal has a speakerphone, it is recommended that you “mute” audio feeding into the terminal. This is done to prevent audio frequencies that may be interpreted as touchtones from being transmitted to the MCU. If no mute capability is available and you are using a speakerphone, it is recommended that you turn off the speakerphone and place the handset next to the phone. Since the handset is less sensitive than the speakerphone, this reduces the chance of stray tones reaching the MCU.

Connecting the UCC *Star* Controller

Once the conference is scheduled with the reservations agent, the convener is provided with a confirmation report from CRCS (if available). This report includes instructions on how to access UCC *Star* features via touchtone dialing. The convener is responsible for ensuring that the controlling location receives the UCC *Star* dialing instructions along with its dial-in number. Included with the instructions are the endpoint numbers of each location reserved in the conference. These numbers are necessary to use the endpoint-specific options in UCC *Star*, such as selecting an endpoint for the broadcaster or dropping an endpoint. If CRCS is not available for the conference, the convener must manually write down the feature access codes and endpoint numbers and then provide this information to the controlling location.

The UCC *Star* party is identified on the conference form, and it is given a dial-in number that has been reserved for the UCC *Star* controller. This number is the dial-in number that the controlling endpoint subscriber will dial to reach the MCU. Once the controlling party successfully completes optional passwording procedures and a TN744 touch-tone detector is connected to the port, a feedback tone is provided to the party to indicate that the MCU is ready to accept UCC *Star* commands.

Failure to enter a correct password or to connect a tone detector causes the MCU to drop the party. Accordingly, the Status Conference form indicates the drop reason as either a password failure or a failure to connect a tone detector resource.

The joined controlling party does not receive media (that is, audio, video, or data), and it does not transmit media to the multimedia conference. Its audio is not summed into the audio portion of the conference, and it does not receive conferenced audio. Because the MCU never considers the UCC *Star* controller a valid video source, it does not attempt to make the controller a video broadcaster in the VAS switching algorithm. Accordingly, an entry tone is not provided to endpoints already connected to the conference when the controller is joined.

UCC *Star* Command Interface

The controller accesses UCC services by entering the telephone keyboard commands as shown in the next table. These feature access codes and endpoint numbers of each location are provided to the controlling location prior to the conference.

Accessing and Implementing Universal Conference Control Services

The controller (UCC terminal) can be used to access UCC services by entering the appropriate feature access code for the service. The following table identifies the available UCC services, indicates the means to access each service, and describes each service:

Table 4-1. UCC Services Access

Desired Service	Required Keypad Entry	Description
Unlock Video	****8**	Releases any fixed broadcaster and returns the conference to Voice Activated Switching (VAS) mode.
Select a site to be a video broadcaster	*** *N***	Locks in the specified site ***N*** as the broadcaster (broadcasting site). The broadcaster sees the site that is currently speaking, or, if no other sites are speaking, the site that spoke most recently.
Browse sites (after selecting a broadcaster)	****2**	Shows the video from one specific site to the broadcasting site. All other sites, including the site whose video is being shown to the broadcaster, continue to view the broadcaster. Pressing "#" allows the broadcaster to view each of the other sites in the prescribed order.
Conduct Rollcall of all sites	****7**	Shows the video from a specific site to all the sites. Pressing "#" shows the video from each of the other sites, in the prescribed order, to all the sites in the conference.
Scan to the Next Site (when in Rollcall or Browse option)	**#**	Pressing "#" displays the next site in Rollcall and Browse modes. The sites are scanned in order of their site numbers on the Conference Record form.
Change image from full-screen to quad-screen	****4#**	Partitions the full-screen image into four areas (quadrants). This allows up to four different sites to be viewed at one time.
Assign site to quadrant 1 (top left), 2 (top right), 3 (bottom left), or 4 (bottom right)	****4*QN***	Enables the user to choose what is seen in each quadrant (***Q***). The video from a single site can be locked into a quadrant. Also, a quadrant can display video according to VAS. To set a quadrant according to VAS, use ***0*** as the site number (***N***).
Change image from quad-screen to full-screen	****1**	Returns the quad-screen image back to full-screen. The layout of the quad-screen is remembered.

Table 4-1. UCC Services Access — *Continued*

Desired Service	Required Keypad Entry	Description
Transition to upper-panoramic three-image layout	****46**	Displays a three-image CPP screen layout where the top half of the screen displays one image while the bottom half of the screen is segmented into two screen displays.
Transition to lower-panoramic three-image layout	****47**	Displays a three-image CPP screen layout where the bottom half of the screen displays one image while the top half of the screen is segmented into two screen displays.
Transition to dual-panoramic screen layout	****48**	Displays a two-image CPP screen layout where the top half of the screen displays one image and the bottom half of the screen displays one image.
Transition to Executive Conferencing Mode	****49**	Displays a dual-panoramic screen layout for the three broadcaster endpoints and an upper-panoramic screen layout for the other conference participants.
Mute site	****61 *N***	Mutes the incoming audio of site ***N***. Other sites do not hear anyone at the muted site, but the muted site continues to hear audio from other unmuted sites. **NOTE**: This command overrides the “mute” button of the video equipment at Site *N*.
Unmute site	****62 *N***	Unmutes the incoming audio of site ***N.*** This site can be heard by all of the other sites. **NOTE**: This command does not override the “mute” button of the video equipment at Site *N*.
Solo Audio	****63 *N***	Mutes the audio of all the sites except site ***N.*** Therefore, only the “solo audio” site can be heard by all of the other sites.
Unmute all sites	****6#**	Unmutes all of the sites. All the sites can speak and be heard.
Adjust Audio Volume for Audio Add-On Party	**64**	(This is the command code used within the commands for the specific services provided.)
— Decrease	****64 *N* 7**	Decreases the volume of endpoint ***N*** by 3 db.
— Reset	****64 *N* 8**	Resets the volume of endpoint ***N*** to the default (6 db loss).
— Increase	****64 *N* 9**	Increases the volume of endpoint ***N*** by 3 db.

Table 4-1. UCC Services Access — *Continued*

Desired Service	Required Keypad Entry	Description
Mute site bidirectionally	****65 *N***	Mutes the incoming and outgoing audio of site ***N***. Other sites do not hear anyone at the muted site, and the muted site does not hear audio from any other sites.
Unmute site bidirectionally	****66 *N***	Unmutes the incoming and outgoing audio of site ***N.*** This site can be heard by all of the other sites, and it can hear all of the other sites.
Manipulate Most Recently Joined Endpoint	**99**	(This is the command code used within the commands for the specific services provided.)
— Broadcast	***99**	Broadcasts the most recently joined endpoint.
— Mute	****6199**	Mutes the most recently joined endpoint.
— Unmute	****6299**	Unmutes the most recently joined endpoint.
— Solo Audio	****6399**	Performs Solo Audio on the most recently joined endpoint.
— Set in Quad	****4Q99**	Sets the most recently joined endpoint into a quadrant.
— Drop	****399**	Drops the most recently joined endpoint.
Drop site	****3*N***	Drops a single site ***N*** from the conference.
End conference	****91**	Drops all sites in the conference, including the UCC port, and terminates the entire conference.

NOTE:
Refer to Appendix B for a complete description of the UCC services.

To select, for example, endpoint 2 to be a video broadcaster, enter either "*** 2**" or "*** 02**." To drop endpoint 12, enter "****3 12**."

NOTE:
Whenever you are using the keypad to access UCC services, be sure to strike the appropriate keys in a deliberate manner (that is, firmly and not too quickly). Otherwise, you may not get the desired result.

The "#" key or double-digit dialing (for example, ***02**, ***03**, etc.) can be used

to override the interdigit timer. This causes the MCU to process the command immediately; as a result, you do not have to wait for the timer to expire.

Feedback Tones

For each command you enter, a feedback tone is provided to the UCC controller. The tone indicates to the controller that the MCU has collected and (if possible) acted upon a command. It also indicates that the MCU is ready to accept another command.

The UCC controller hears one of two tones. A “positive” feedback tone is played whenever either of the following is true:

- Controller successfully joins the conference.
- Request (command entered) is valid and the MCU is able to honor the request.

The “positive” feedback tone consists of one short tone.

A “negative” feedback tone is played whenever either of the following is true:

- Request is invalid.
- Request is well-formed, but the MCU is unable to honor it.

The “negative” feedback tone consists of five short tones in rapid succession.

Command Collection and Interpretation

The MCU responds to the digits entered by the UCC controller according to a number of different circumstances, as described in the following sections.

Valid Requests

The MCU recognizes any string of digits illustrated in the previous table as a complete request. For the command to be valid, it must satisfy the conditions for the particular command as described in the “Feature Description” chapter. The following list identifies, interprets, and comments on some valid requests:

- ****8**

  Unlock video (valid only if the current broadcaster is not broadcasting due to an MCV request).

- ****91**

  Drop all endpoints (always valid and honored).

  NOTE:
  This command cancels a previous command to select the broadcaster and also cancels Rollcall and Browse.

- ***8**

  Broadcast endpoint 8 (valid only if endpoint 8 is joined to the conference and is a valid video source).

  NOTE:
  This command overrides a previous command to select the broadcaster, and it cancels Rollcall and Browse.

- ****34**

  Drop endpoint 4 (valid only if endpoint 4 [which could be the controller] is joined to the conference).

- ****2**

  Begin Browse (valid only if the broadcaster is fixed and if the conference is currently viewing full screen).

For each of the previous cases, the MCU provides positive feedback tone and honors the request.

Invalid Requests

If the MCU detects a set of digits that does not adhere to the access code rules in the previous table, the MCU plays a negative feedback tone, disregards the request, and waits for another command. If the request is recognized as completed according to the previous table, but the MCU cannot honor the request because it does not satisfy the conditions required for the request, negative feedback tone is provided. The following list identifies, interprets, and comments on some invalid requests:

- ****5**

  (Invalid digit following “**.”)

- **1 or 3**

  (Invalid first digits. All commands must be preceded by either “*” or “**”.)

- ****8**

  Unlock video (invalid if the current broadcaster is broadcasting due to an MCV request).

- ***2**

  Broadcast endpoint 2 (invalid if endpoint 2 is not reserved in the conference, has not been joined to the conference, or is not video source capable).

- ***26**

  Broadcast endpoint 26 (invalid because the endpoint number is not in the range 1 through 25).

- ****311**

  Drop endpoint 11 (invalid if endpoint 11 is not reserved in the conference or is not joined to the conference).

Interdigit Timer Expiration

If, while making a request, you wait too long after entering a digit, the MCU processes the digits already entered, attempts to honor the request, plays a feedback tone, and waits for another command.

The interdigit timing varies according to your current dialing stage. Specifically, a 5-second timer is set immediately after the MCU detects an initial “*”. Also, a 5-second timer is set once the MCU recognizes that you intend to make a “drop endpoint” or “mute endpoint” request (This timer is set before you enter any digits for the endpoint number). Finally, a 2-second timer is set after you enter the first digit of an endpoint number for the “select broadcaster” or “drop endpoint” request.

Timing is disabled immediately after you hear a feedback tone. This gives you an indefinite amount of time before you enter the next request.

The following list provides some interdigit timer scenarios and consequences.

- ****** <2-seconds>

  A timeout occurs and the MCU processes the request because the user waited too long to enter a digit after the user entering “**”. The MCU plays a negative feedback tone and disregards the request.

- ****3** <5-seconds>

  The user failed to enter, within five seconds, an endpoint number after “3.” The user may have intended to drop an endpoint and then decided against doing so. Alternatively, the user may have had the same intention but could not locate in time the endpoint number of the location to be dropped. Since this is an incomplete command, the MCU plays a negative feedback tone and disregards the request.

- ***1** <2-seconds>

  Broadcast endpoint 1. The MCU cannot immediately process the digits prior to the 2-second timeout due to an ambiguity in the request. For example, if the MCU receives “*1” to broadcast an endpoint, it is not immediately known whether the user intends to broadcast endpoint “1” or to broadcast an endpoint with a number between “10” and “19” inclusive. Therefore, the MCU gives the user two seconds after “1” is dialed to enter a second digit for the endpoint number. This example shows that the user probably intended to enter endpoint number “1.” The MCU provides a positive feedback tone if it is able to broadcast the location with endpoint number “1”.

- ****32** <2-seconds>

Drop endpoint 2. This timeout causes the MCU to drop the location with endpoint 2. The MCU must wait for the 2-second timer to expire before it can act on this request because it is not immediately known whether the user intends to drop endpoint “2” or an endpoint with a number between “20” and “25” inclusive. This example shows that the user probably intended to enter “2” for the endpoint number. The MCU provides a positive feedback tone if it is able to drop the location with this endpoint number.

Overriding the Interdigit Timer

The “#” key or double-digit dialing (for example, ***02**, ***03**, etc.) can be used to override the interdigit timer. This causes the MCU to process the command immediately and, as a result, you do not have to wait for the timer to expire.

The “#” key allows you to resolve ambiguity in the endpoint number. For example, “*1#” causes the MCU to broadcast endpoint 1 immediately without waiting for the timer to expire.

Entering equivalent 2-digit endpoints numbers also resolves ambiguous cases. For example, instead of entering “*2” to broadcast endpoint 2, you could enter “*02” to broadcast endpoint 2 immediately (and without waiting for the timer to expire).

Handling Dialing Mistakes

Once the MCU intercepts a command that it recognizes as “valid,” the MCU immediately honors the command (if possible) and provides feedback tone. However, if you enter a partial or incomplete request (for example, “*”, “**”, or “**3”), the expiration of the interdigit timer essentially causes the request to be “canceled.” For example, if you intend to enter a “drop endpoint” command but fail to enter the endpoint number after “**3” within five seconds, the MCU disregards the request and provides a negative feedback tone.

Dropping the UCC Controller

Whenever the UCC party is disconnected from a conference, it is assumed that the conference's primary method of control is no longer in effect. Therefore, to avoid leaving the conference “stuck” in a mode with a fixed full-screen broadcaster (via a Browse, Rollcall, or Select Broadcaster request, for example), any video locks caused by these commands are automatically canceled when the UCC party is disconnected. All active Mute features (such as Solo Audio and Mute Endpoint) are also canceled.

Disconnecting the UCC party has no affect on an MCV broadcaster. If an endpoint is broadcast due to an MCV request, that endpoint remains broadcasting until it sends a cancel-MCV request.

The remaining parties do not hear an exit tone after the controller is dropped from the conference.

If Continuous Presence *Plus* is enabled, quadrant video locks are not cancelled after the UCC drops.

NOTE:
Refer to the “Universal Conference Control” section in Appendix B for complete details on the interactions between UCC and Continuous Presence *Plus*.

Using UCC Options

The following sections discuss selected UCC options and present several command line examples for each option. For a complete description of these and all the other UCC options, refer to Appendix B.

Browse

Browse is an option of UCC that allows the fixed broadcaster (that is, the presenter or “selected broadcaster” via UCC) to scan endpoints in the conference without specifying an endpoint number for each scanned endpoint. Refer to Appendix B for a complete description of Browse.

Command Set. The following commands pertain to Browse.

- ****2**

  Starts Browse. This command is valid in presentation mode with a fixed broadcaster in effect (that is, if ***N** [explained later in this list] was previously entered and executed successfully) and also if the conference is currently viewing full-screen video. If the command is successful, the MCU immediately locks return video on an endpoint and provides a positive tone after entering Browse mode.

- **#**

  Selects the next return video in Browse. The current broadcaster is skipped in the browse unless it is the only party in the conference. A positive tone is provided to indicate a switch to a new return video.

- ***N**

  Selects a new UCC broadcaster and cancels Browse.

- ****8**

  Clears all controlled video locks and, if viewing full-screen video, cancels Browse.

- ****91**

  Ends the conference and cancels Browse.

- ****2**

  Starts Browse.

- ****7**

Starts Rollcall. (This is denied in presentation mode and allowed in VAS mode).

Using Rollcall

Like Browse, Rollcall is an option of UCC that allows the UCC broadcaster to scan endpoints in the conference without specifying an endpoint number for each scanned endpoint. Unlike Browse, Rollcall allows all the endpoints in the conference to see the change in video caused by the scan. This feature allows the broadcaster to be seen by all the endpoints in the conference including the broadcaster itself (the broadcaster receives looped video). Refer to Appendix B for a complete description of Rollcall.

Command Set. The following commands pertain to Rollcall.

- ****7**

  Starts Rollcall. Once this command is entered, the MCU immediately locks the broadcast video and provides the broadcaster with looped video. A positive tone is given if this is successful.

- **#**

  Selects the next endpoint in the roll call. A positive tone is provided to indicate a switch in broadcast video.

- ***N**

  Selects a new UCC broadcaster and automatically cancels Rollcall.

- ****8**

  Clears all controlled video locks and, if viewing full-screen video, cancels Rollcall.

- ****91**

  Ends the conference and cancels Rollcall.

- ****7**

  Starts Rollcall.

- ****2**

  Starts Browse. (This allowed in Presentation mode and denied in VAS mode.)

UCC Options Permissions Summary

The following table provides a summary of permissions for the UCC options.

Table 4-2. Summary of Permissions for UCC Options

UCC Option	VAS conferences?	Presentation Conferences?	Viewing Full Screen	Viewing Quad Screen?
Select Broadcaster	yes	no	yes	yes, but causes an automatic transition to full screen
Browse Endpoints	yes	yes	yes	no when in VAS mode, yes when in presentation mode
Rollcall of all Endpoints	yes	no	yes	yes, but causes an automatic transition to full screen
Unlock Video	yes	yes	yes	yes
Mute Controls	yes	yes	yes	yes
Force Image to Quad Screen*	yes	yes	yes	N/A, has no effect
Set Quadrant	yes	yes	yes, saved, but does not cause transition to quad screen	yes
Force Image to Full Screen	yes	yes	N/A, has no effect	yes
Drop Endpoint	yes	yes	yes	yes
End Conference	yes	yes	yes	yes
Adjust Audio Volume for Audio Add-On Party	yes	yes	yes	yes
Manipulate Most Recently Joined Endpoint	yes	yes	yes	yes
Executive Conferencing	yes	no	yes	N/A

* Allowed only in conferences with Continuous Presence *Plus*

Using Conference Control Commands

Conference control commands can be issued from the MCU-MT to control MCU conferences. A number of these commands are based on the Universal Conference Control (UCC) feature and are consistent with the operation of this feature. On the other hand, some of the commands are intended for troubleshooting purposes. Once a command is issued and successfully completes, the message “Command successfully completed” is displayed. If the command does not complete successfully, the appropriate error message is displayed.

Operations and Commands

This section indicates the possible operations available via the MCU-MT conference control commands, the command for each operation, and a description for each command.

Unlocking Video

Syntax:

control conference *CONFERENCE_ID* unlock video *SUB-PICTURE*

Description:

For full-screen video, this command switches back to the voice-activated broadcaster, and it terminates the Rollcall, Browse, and Select Broadcaster options of UCC. If the conference previously went from quad-screen or panoramic video to full-screen video due to Rollcall or Select Broadcaster, this command does not return the conference to quad-screen or panoramic video.

For quad-screen or panoramic video, this command switches back to the administered quad-screen or panoramic view. If ***SUB-PICTURE*** is not specified, all four quadrants or the three images are returned to the administration view. If ***SUB-PICTURE*** is specified, only the specified quadrant is returned to the administration view. Whenever ***SUB-PICTURE*** command is not seen until the conference switches to quad-screen or panoramic video.

For the command to be successful, the following must be true:

- ***CONFERENCE_ID*** must be all digits and in the range from ***1*** through ***200***.
- ***SUB-PICTURE*** must be all digits and in the range from ***1*** through ***4***.
- Specified conference must be in use, and it must be able to support Continuous Presence *Plus*.
- Command must be consistent with the conference mode.
- Current broadcaster must *not* be MCV.

Selecting a Full-Screen Broadcaster

Syntax:

control conference *CONFERENCE_ID* broadcaster *ENDPOINT_ID*

Description:

This command selects a full-screen broadcaster.

For a Continuous Presence *Plus* conference in quad-screen or panoramic video, the command switches the conference to full-screen video. The command locks an endpoint as a video broadcaster (The “unlock-video” or “quad-screen” (transition to quad) command releases this lock). This command is not allowed in Presentation mode conferences.

For full-screen conferences, the command auto-cancels Rollcall or Browse, and it overwrites the current MCV broadcaster. Once the video is unlocked, the endpoint with the MCV becomes the broadcaster once again.

For the command to be successful, the following must be true:

- ***CONFERENCE_ID*** must be all digits and in the range from ***1*** through ***200***.
- ***ENDPOINT_ID*** must be all digits and in the range from ***1*** through ***25***.
- Specified conference must be in use.
- Command must be consistent with the conference mode.
- Specified endpoint must be joined to the conference, and it must be a valid video source.

Selecting a Broadcaster or Viewed Endpoint for a Quadrant

Syntax:

control conference *CONFERENCE_ID* set-sub-pict *SUB-PICTURE* *ENDPOINT_ID*

Description:

This command selects (locks) the broadcaster for the specified quadrant (**1, 2, 3**, or **4**). If the command is issued when the conference is viewing full screen, command information is stored and becomes effective once the conference switches to quad-screen or panoramic video (via the “quad-screen” command). If ***ENDPOINT_ID*** is ***0,*** the specified quadrant is locked as a Voice-Activated Switching (VAS) quadrant even if the quadrant was previously administered as a fixed quadrant. The quadrant can be returned to the administered view via the “unlock-video” command.

For conferences in Presentation mode, the command selects the endpoint videos to be viewed by the presenter.

For the command to be successful, the following must be true:

- ***CONFERENCE_ID*** must be all digits and in the range from ***1*** through ***200***.
- ***ENDPOINT_ID*** must be all digits and in the range from ***0*** through ***25,*** where ***0*** is VAS.
- ***SUB-PICTURE*** must be all digits and in the range from ***1*** through ***4***.
- Specified conference must be in use, and it must be able to support Continuous Presence *Plus*.
- Command must be consistent with the conference mode.
- Specified endpoint must be joined to the conference, and it must be a valid video source, but it must not be the Presenter.

Swapping Quadrants

Syntax:

control conference *CONFERENCE_ID* swap-sub-pict *SUB-PICTURE* *SUB-PICTURE*

Description:

This command exchanges the characteristics of the two specified quadrants.

For the command to be successful, the following must be true:

- ***CONFERENCE_ID*** must be all digits and in the range from ***1*** through ***200***.
- ***SUB-PICTURE*** must be all digits and in the range from ***1*** through ***4***.
- Specified quadrants must be different.

- Specified conference must be in use, and it must be able to support Continuous Presence *Plus*.
- Command must be consistent with the conference mode.

Beginning Browse

Syntax:

control conference *CONFERENCE_ID* browse-begin

Description:

This command starts the Browse option of UCC. However, the full-screen broadcaster must be selected first. The next endpoint serving as the return video source is selected via the “next-endpoint” command. The “unlock-video” command returns the conference back to VAS mode.

The command switches a quad-screen or panoramic conference to full-screen video. The “unlock-video” command terminates Browse, but it does not automatically return the conference to quad-screen or panoramic video.

For the command to be successful, the following must be true:

- ***CONFERENCE_ID*** must be all digits and in the range from ***1*** through ***200***.
- ***ENDPOINT_ID*** must be all digits and in the range from ***1*** through ***25***.
- Specified conference must be in use, and it must not be in Rollcall mode.
- Command must be consistent with the conference mode.
- Fixed broadcaster must be established.
- Current broadcaster must not be MCV.

Beginning Rollcall

Syntax:

control conference *CONFERENCE_ID* rollcall-begin

Description:

This command starts the Rollcall option of UCC, and it releases the currently fixed broadcaster. The next endpoint serving as the video source is selected via the “next-endpoint” command. The “unlock-video” command returns the conference back to VAS mode.

The command switches a quad-screen or panoramic conference to full-screen video. The “unlock-video” command terminates Rollcall, but it does not automatically return the conference to quad-screen or panoramic video. Rollcall is not allowed in Presentation mode conferences.

For the command to be successful, the following must be true:

- ***CONFERENCE_ID*** must be all digits and in the range from ***1*** through ***200***.
- Specified conference must be in use.
- Command must be consistent with the conference mode.

Selecting the Next Endpoint

Syntax:

control conference *CONFERENCE_ID* next-endpoint

Description:

This command selects the next endpoint as a video source for the Browse and Rollcall features of UCC.

For the command to be successful, the following must be true:

- ***CONFERENCE_ID*** must be all digits and in the range from ***1*** through ***200***.
- Specified conference must be in use.
- Command must be consistent with the conference mode.
- Rollcall or Browse, as appropriate, must be activated.

Dropping an Endpoint

Syntax:

control conference *CONFERENCE_ID* drop-endpoint *ENDPOINT_ID*

Description:

This command disconnects the designated endpoint from the specified conference.

For the command to be successful, the following must be true:

- ***CONFERENCE_ID*** must be all digits and in the range from ***1*** through ***200***.
- ***ENDPOINT_ID*** must be all digits and in the range from ***1*** through ***25***.
- Specified conference must be in use.
- Command must be consistent with the conference mode.
- Specified endpoint must be joined to the conference.

Dropping All Endpoints

Syntax:

control conference *CONFERENCE_ID* drop-all

Description:

This command disconnects all endpoints from the specified conference.

For the command to be successful, the following must be true:

- ***CONFERENCE_ID*** must be all digits and in the range from ***1*** through ***200***.
- Specified conference must be in use.
- Command must be consistent with the conference mode.

Muting an Endpoint

Syntax:

control conference *CONFERENCE_ID* mute-endpoint *ENDPOINT_ID*

Description:

This command mutes the specified endpoint (that is, it excludes the endpoint's audio from the audio sum). For this process, the Status Conference form displays value **M** in the *Ts* field. Value **M** takes priority over value **m** (mute by an endpoint). This pertains to all connected endpoint types that have audio capabilities.

For the command to be successful, the following must be true:

- ***CONFERENCE_ID*** must be all digits and in the range from ***1*** through ***200***.
- ***ENDPOINT_ID*** must be all digits and in the range from ***1*** through ***25***.
- Specified conference must be in use.
- Command must be consistent with the conference mode.
- Specified endpoint must be joined to the conference, and it must have audio capabilities.

Muting an Endpoint Bidirectionally

Syntax:

control conference *CONFERENCE_ID* mute-hold *ENDPOINT_ID*

Description:

This command mutes the incoming and outgoing audio of the indicated endpoint. Other endpoint do not hear anyone at the muted endpoint, and the muted endpoint does not hear audio from any other endpoints. For this process, the Status Conference form displays value **M** in the *Ts* field. Value **M** takes priority

over value **m** (mute by an endpoint). This pertains to all connected endpoint types that have audio capabilities.

Be sure to note the following points:

- Command **control conference *CONFERENCE_ID* solo-audio *ENDPOINT_ID*** for a bidirectionally-muted endpoint overrides the mute in both directions (refer to "Enabling Solo Audio" on page 4-22).
- Bidirectionally-muted endpoint becomes unmuted whenever it is moved to another conference (refer to "Moving an Endpoint to Another Conference" on page 4-28).
- Commands **control conference *CONFERENCE_ID* unmute-endpoint *ENDPOINT_ID*** and **control conference *CONFERENCE_ID* unmute-all** do not mute a bidirectionally-muted endpoint (refer to "Unmuting an Endpoint" on page 4-20 and "Unmuting All Endpoints" on page 4-21).

For the command to be successful, the following must be true:

- ***CONFERENCE_ID*** must be all digits and in the range from ***1*** through ***200***.
- ***ENDPOINT_ID*** must be all digits and in the range from ***1*** through ***25***.
- Specified conference must be in use.
- Command must be consistent with the conference mode.
- Specified endpoint must be joined to the conference, and it must have audio capabilities.

Unmuting an Endpoint

Syntax:

control conference *CONFERENCE_ID* unmute-endpoint *ENDPOINT_ID*

Description:

This command unmutes the designated endpoint (that is, it includes the endpoint's audio into the audio sum if the endpoint hasn't muted itself via AIM).

For the command to be successful, the following must be true:

- ***CONFERENCE_ID*** must be all digits and in the range from ***1*** through ***200***.
- ***ENDPOINT_ID*** must be all digits and in the range from ***1*** through ***25***.
- Specified conference must be in use.
- Command must be consistent with the conference mode.
- Specified endpoint must be joined to the conference.

Unmuting an Endpoint Bidirectionally

Syntax:

control conference *CONFERENCE_ID* unmute-hold *ENDPOINT_ID*

control conference *CONFERENCE_ID* solo *ENDPOINT_ID*

control conference *CONF_ID* move *ENDPOINT_ID* to *CONF_ID*

Description:

Each of these commands unmutes the incoming and outgoing audio of the designated endpoint. This endpoint can be heard by all of the other endpoints, and it can hear all of the other endpoints.

For the command to be successful, the following must be true:

- ***CONFERENCE_ID*** must be all digits and in the range from ***1*** through ***200***.
- ***ENDPOINT_ID*** must be all digits and in the range from ***1*** through ***25***.
- Specified conference must be in use.
- Command must be consistent with the conference mode.
- Specified endpoint must be joined to the conference.

Unmuting All Endpoints

Syntax:

control conference *CONFERENCE_ID* unmute-all

Description:

This command unmutes in the specified conference all the endpoints that were muted via conference control (and do not control AIM).

For the command to be successful, the following must be true:

- ***CONFERENCE_ID*** must be all digits and in the range from ***1*** through ***200***.
- Specified conference must be in use.
- Command must be consistent with the conference mode.

Enabling Solo Audio

Syntax:

control conference *CONFERENCE_ID* solo-audio *ENDPOINT_ID*

Description:

This command mutes all but the specified endpoint in the conference. Endpoints joining the conference subsequently join muted.

For the command to be successful, the following must be true:

- ***CONFERENCE_ID*** must be all digits and in the range from ***1*** through ***200***.
- ***ENDPOINT_ID*** must be all digits and in the range from ***1*** through ***25***.
- Specified conference must be in use.
- Command must be consistent with the conference mode.
- Specified endpoint must be joined to the conference, and it must have audio capabilities.

Suppressing Video

Syntax:

control conference *CONFERENCE_ID* suppress-video *ENDPOINT_ID*

Description:

This command stops the conference from using the specified endpoint's video as a video source. Feature interactions are similar to VIS (video suppressed at the request of the endpoint).

For the command to be successful, the following must be true:

- ***CONFERENCE_ID*** must be all digits and in the range from ***1*** through ***200***.
- ***ENDPOINT_ID*** must be all digits and in the range from ***1*** through ***25***.
- Specified conference must be in use.
- Command must be consistent with the conference mode.
- Specified endpoint must be joined to the conference, and it cannot be an audio-only or UCC party.

Unsuppressing Video for an Endpoint

Syntax:

control conference *CONFERENCE_ID* unsuppress-video *ENDPOINT_ID*

Description:

This command unsuppresses the video of an endpoint that was suppressed via the “suppress-video” command. In other words, the command allows the conference to start using the endpoint’s video as a video source if the endpoint has not suppressed its own video via VIS and if the endpoint’s video is still valid.

For the command to be successful, the following must be true:

- ***CONFERENCE_ID*** must be all digits and in the range from ***1*** through ***200***.
- ***ENDPOINT_ID*** must be all digits and in the range from ***1*** through ***25***.
- Specified conference must be in use.
- Command must be consistent with the conference mode.
- Specified endpoint must be joined to the conference, and it cannot be an audio-only or UCC party.

Unsuppressing Video for all Endpoints

Syntax:

control conference *CONFERENCE_ID* unsuppress-all-video

Description:

This command unsuppresses the video for all the endpoints for which video was suppressed via the “suppress-video” command.

For the command to be successful, the following must be true:

- ***CONFERENCE_ID*** must be all digits and in the range from ***1*** through ***200***.
- Specified conference must be in use.

Redialing an Endpoint

Syntax:

control conference *CONFERENCE_ID* redial-endpoint *ENDPOINT_ID*

Description:

This command redials this dial-out endpoint. The effect is identical to the redial flag being set via the Conference Record form.

For the command to be successful, the following must be true:

- ***CONFERENCE_ID*** must be all digits and in the range from ***1*** through ***200***.
- ***ENDPOINT_ID*** must be all digits and in the range from ***1*** through ***25***.
- Specified conference must be active.
- Specified endpoint must be a dial-out endpoint.

Switching a CPP or Executive Conferencing Conference to Full-Screen Video

Syntax:

control conference *CONFERENCE_ID* full-screen

Description:

This command switches a CPP or Executive Conferencing conference to full-screen video.

For the command to be successful, the following must be true:

- ***CONFERENCE_ID*** must be all digits and in the range from ***1*** through ***200***.
- Specified conference must be in use, and it must be able to support Continuous Presence *Plus* or Executive Conferencing.

Switching a CPP Conference to Quad-Screen

Syntax:

control conference *CONFERENCE_ID* quad-screen

Description:

This command switches a CPP conference back to quad-screen video (if quad-screen resources are still available).

For the command to be successful, the following must be true:

- ***CONFERENCE_ID*** must be all digits and in the range from ***1*** through ***200***.
- Specified conference must be in use, and it must be able to support Continuous Presence *Plus*.

Switching a CPP Conference to Dual-Panoramic

Syntax:

control conference *CONFERENCE_ID* dual-panoramic

Description:

This command switches a CPP conference to dual-panoramic video (if dual-panoramic resources are still available).

For the command to be successful, the following must be true:

- ***CONFERENCE_ID*** must be all digits and in the range from ***1*** through ***200***.

- Specified conference must be in use, and it must be able to support Continuous Presence *Plus*.

Switching a CPP Conference to Lower-Panoramic

Syntax:

control conference *CONFERENCE_ID* lower-panoramic

Description:

This command switches a CPP conference to lower-panoramic video (if lower-panoramic resources are still available).

For the command to be successful, the following must be true:

- ***CONFERENCE_ID*** must be all digits and in the range from ***1*** through ***200***.
- Specified conference must be in use, and it must be able to support Continuous Presence *Plus*.

Switching a CPP Conference to Upper-Panoramic

Syntax:

control conference *CONFERENCE_ID* upper-panoramic

Description:

This command switches a CPP conference to upper-panoramic video (if upper-panoramic resources are still available).

For the command to be successful, the following must be true:

- ***CONFERENCE_ID*** must be all digits and in the range from ***1*** through ***200***.
- Specified conference must be in use, and it must be able to support Continuous Presence *Plus*.

Switching a Full-Screen Conference to Executive Conferencing

Syntax:

control conference *CONFERENCE_ID* executive

Description:

This command switches a full-screen conference to Executive Conferencing (if Executive Conferencing resources are still available).

For the command to be successful, the following must be true:

- ***CONFERENCE_ID*** must be all digits and in the range from ***1*** through ***200***.

- Specified conference must be in use, and it must be able to support Executive Conferencing.

Forcing CIF Video

Syntax:

control conference *CONFERENCE_ID* cif-floor

Description:

This command forces the video mode to CIF, and it takes effect when viewing full-screen video. The highest common MPI rate (auto) is implied.

For the command to be successful, the following must be true:

- ***CONFERENCE_ID*** must be all digits and in the range from ***1*** through ***200***.
- Specified conference must be in use, and it must be able to support H.261.

Forcing QCIF Video

Syntax:

control conference *CONFERENCE_ID* qcif-now

Description:

This command forces the video mode to QCIF, and it takes effect when viewing full-screen video. The highest common MPI rate (auto) is implied.

For the command to be successful, the following must be true:

- ***CONFERENCE_ID*** must be all digits and in the range from ***1*** through ***200***.
- Specified conference must be in use, and it must be able to support H.261.

Forcing an Audio Mode

Syntax:

control conference *CONFERENCE_ID* audio-mode *AUDIO_MODE*

Description:

This command forces the conference to the specified audio mode (***g.711***, ***g.722***, or ***g.728***). If the administered audio mode is not ***g.722***, any changes to ***g.722*** are disallowed unless an “auto” audio mode is administered and the transfer rate is greater than 2B. Audio changes are not allowed for data conferences.

Values for ***AUDIO_MODE*** depend on the administered transfer rate and audio mode of the conference when the conference becomes active (that is, after the first endpoint joins the conference).

The following tables show the allowable values for the R7.0 MCU.

Table 4-3. Values for the *AUDIO-MODE* Parameter of the Conference Control Audio-Mode Command

***Audio Mode* Field Value Administered in Conference Record Form**	**Transfer Rate**	**Values Allowed for *AUDIO-MODE* Parameter***	**Values Not Allowed for *AUDIO-MODE* Parameter***
G.722	any	***G.722, G.711***	***G.728***
G.728	any	***G.728, G.711***	***G.722***
G.711	any	***G.728, G.711***	***G.722***
auto-down_only or **auto-w/upgrade**	less than or equal to 2B	***G.728, G.711***	***G.722***
auto-down_only or **auto-w/upgrade**	greater than 2B	***G.722, G.711***	***G.728***

***** Values ***auto-down_only*** and ***auto-w/upgrade*** are not allowed for any conference.

Table 4-4. Values for the *AUDIO-MODE* Parameter of the Conference Control Audio-Mode Command

***Audio Mode* Field Value Administered in Conference Record Form**	**Transfer Rate**	**Values Allowed for *AUDIO-MODE* Parameter***	**Values Not Allowed for *AUDIO-MODE* Parameter***
G.722	any	***G.722, G.728, G.711***	***-----***
G.728	any	***G.728, G.711***	***G.722***
G.711	any	***G.728, G.711***	***G.722***
auto-down_only or **auto-w/upgrade**	less than or equal to 2B	***G.722, G.728, G.711***	***-----***
auto-down_only or **auto-w/upgrade**	greater than 2B	***G.722, G.728, G.711***	***-----***

***** Values ***auto-down_only*** and ***auto-w/upgrade*** are not allowed for any conference.

For the command to be successful, the following must be true:

- ***CONFERENCE_ID*** must be all digits and in the range from ***1*** through ***200***.

- Specified conference must be in use, and it must be able to support H.261.
- ***AUDIO_MODE*** must be ***g.711***, ***g.722***, or ***g.728.***
- Resources must be available for a conference administered in g.722 audio mode.
- Conference cannot be a data conference.

Moving an Endpoint to Another Conference

Syntax:

control conference *CNF_ ID -From* move *EPT_ID-From CNF_ID-To*

This command can do the following:

- Move a conferee to his or her destination conference (by entering **control conference *CNF_ID-From* move *EPT_ID-From***).
- Move a conferee to another conference with the option of specifying a specific endpoint index (by entering **control conference *CNF_ID-From* move *EPT_ID-From CNF_ID-To***.

For the command to be successful, the following must be true:

- Specified conferences must be in use.
- ***CNF_ID-From*** and ***CNF_ID-To*** must be all digits and in the range from ***1*** through ***200***.
- ***EPT_ID-From*** and ***EPT_ID-To*** must be all digits and in the range from ***1*** through ***25***.

Reporting Conference Record Translation Changes

Syntax:

control conference *CONFERENCE_ID* xln-clear-flag

NOTE:
This command is used exclusively with CRCS OpCenter.

Whenever a translation for a conference record is changed, the corresponding conference translation flag is set and reported in the Status All Conference form. This allows the standalone OpCenter to extract the translation change. Use this command to clear the translation change flag for the specified conference once the standalone OpCenter has the new translation.

For the command to be successful, the following must be true:

- ***CONFERENCE_ID*** must be all digits and in the range from ***1*** through ***200***.

OpCenter

OpCenter is a PC-based real-time graphical user interface (GUI) within the CRCS platform that enables conference management. OpCenter allows agents to find and correct typical multipoint conferencing problems quickly and also provide value-added services. For more information, refer to the appropriate CRCS documentation.

Diagnosing and Solving Problems

5

Overview

The reservations agent, system administrator, and the Multimedia Collaboration Center (MCC) are responsible for troubleshooting MCU conferences. As the primary contact for making MCU reservations, the reservations agent is the first person whom conferees and conference conveners will call when something goes wrong with their conference. This section describes how to resolve scheduling conflicts and diagnose minor problems. Such problems can include the following:

- User is unable to join or remain joined to a conference, or is not dropped from the conference.
- Conference has poor video quality as a result of its being downgraded due to automatic algorithms.
- User is not receiving full service (for example, the endpoint is administered as an audio-only endpoint and not with “mlp-var” or “ld-celp” [G.728]).
- Dial-out call (including that for a cascade link or for other types of multimedia users) is unable to be joined by the user’s endpoint equipment.
- Audio-only endpoint is unable to join or remain joined to the conference or is not dropped from the conference.
- Conferee is not seen by other users due to interworking problems.
- User is not able to participate in a Multipoint Communication Service (data) conference.

When conferees call to report a problem, you need to isolate the problem before you attempt to resolve it or escalate it. Since the MCU brings together a variety of video endpoints through the network (sometimes through another telephone system), it may take some investigating to figure out where the trouble lies. This

troubleshooting section details some of the most likely possibilities and best actions to take.

NOTE:
Many of the problems in this chapter relevant to Dial-Out and Cascading can be resolved only during an active conference and if Dynamic Resizing is allowed (customer option). Without dynamic resizing, modifications to the Conference form can be made only to the *Stop Time* and *Class* fields. Specifically, the *Class* field must be changed to “file” to stop the conference. Then, once the proper modifications are made, this field must be changed back to “reserved” or “dedicated.”

NOTE:
Dial-out problems can be retried by setting the *Redial?* flag in the Conference Record to **y**.

There are three commands available for troubleshooting an MCU conference, including:

- **status conference**
- **status conference endpoint**
- **monitor conference**

The following sections discuss and illustrate these commands. Thereafter, several sections discuss troubleshooting MCU feature-related problems.

Status of Conference Screen

The Status of Conference screen displays information about active, in-use and completed conferences that can be used to diagnose a problem. You can display data for a number of conferences. In such a case, active conferences are displayed first (in order of conference ID), followed by completed conferences (in order of completion). If you reserve a conference that has not yet begun using the same conference ID as a completed conference, the Status of Conference screen will show the completed conference until the reserved conference has begun. (There is no data or information for conferences that have not yet begun.) For a completed conference, the *Status* field in the screen shows **complete**.

The data for each conference is displayed in two parts. The first screen describes the status of the conference, and it indicates the modes and levels of the conference. The rest of the first screen and the second screen show information concerning endpoints (for example, which endpoints are in use and which endpoint(s) (if any) caused the conference operating mode to change). The rest of the screens display endpoint level data, including ports and drop reasons. Data for up to six endpoints per screen are displayed.

The command syntax for accessing the Status of Conference screen is **status conference *[all | conference-ID] [print | schedule]***. The default for the

conference ID is **all**, which indicates all the stored data. Value ***conference ID*** is the number of the conference. A conference ID uniquely identifies a current conference; however, a completed conference may have the same conference ID. Nonetheless, this ID causes the system to display a current conference with that ID. If there is no active or in-use conference, the most recently completed conference with that ID is displayed. Value **print** sends the screen to the printer attached to the MCU-ST. Value **schedule** sends the screen to the system printer at the specified time.

To view the screens for all conferences, enter **status conference** or **status conference *all***. You can add **print** to any of the preceding command lines (for example, **status conference *conference-ID* print)** to print a copy of the Status of Conference screen.

The first screen appears whenever you enter **status conference** and at least one valid conference is found. You can use the “Page” keys to browse through all the screens for a conference. The “Next Form” key enables you to move to the next conference (if any). To exit, press “Cancel.” Note that the data displayed is whatever the system had stored at the time the command was entered. To see the latest data, enter the command again. A repeat feature allows you to reissue the previously executed command. To do so, enter “R” followed by a return.

```
status conference 100                                          Page   1 of   7
                      STATUS OF CONFERENCE: 100 Status: in-use
 Conference Name: CRCS ID 1              Conference Mode: voice-activated
        Password:                                            Scn Int: 0
  Password Scope:                 Cascade Mode:           Audio Mode: G.711-m
           Class: dedicated         Data Mode: none         MLP Rate:
 Start Time/Date: 16:22 MAY 12  Admin Bandwidth: 1x56k   Lo/Hi Interworking? n
  Stop Time/Date: 00:00 000 00   Conf Bandwidth: 1x56k     Rate Adaptation? n
 Video Processor:                Format(in/out): CIF          SM Rate 1:
  VP Audio Delay:        FPS 16C:     4C:     C: 15  Q: 15             2:
Q1:     Q2:     Fill Ept:           Video Mode: H.261-w/upgrade       3:
Q3:     Q4:      Vid Mix:         H.261/H.263 Transcoding? n      Chair:
                             Dial In  -----Capability----- SM Rt Bd
   Type  Ext  Meet-Me Number  Type Use Ch Au Vid T120 CC Gx Rt Ad Md Ts Vs
1: P64  70100 70100           out  c  y  c  c 1         e           n   b
2: P64  70126                 in
3: P64  70127                 in   n  n  y  e           e
4: P64  70128                 in
5: UCC  70122 70122           in
6: P64  70115 70115           in
7:
8:
```

Figure 5-1. Sample Status of Conference Screen, Page 1

```
status conference                                              page 2 of 7

                STATUS OF CONFERENCE ____     Status: ______

                                        Dial In  ----Capability----   SM Rt Bd
    Type  Ext  Meet-Me Number           Type Use Ch Au Vid T120 CC Gx Rt Ad Md Ts Vs
 9: ___ _____ _________________          ___ _   _  _  _ _  _    _  _  _  _  _  _  __
10: ___ _____ _________________          ___ _   _  _  _ _  _    _  _  _  _  _  _  __
11: ___ _____ _________________          ___ _   _  _  _ _  _    _  _  _  _  _  _  __
12: ___ _____ _________________          ___ _   _  _  _ _  _    _  _  _  _  _  _  __
13: ___ _____ _________________          ___ _   _  _  _ _  _    _  _  _  _  _  _  __
14: ___ _____ _________________          ___ _   _  _  _ _  _    _  _  _  _  _  _  __
15: ___ _____ _________________          ___ _   _  _  _ _  _    _  _  _  _  _  _  __
16: ___ _____ _________________          ___ _   _  _  _ _  _    _  _  _  _  _  _  __
17: ___ _____ _________________          ___ _   _  _  _ _  _    _  _  _  _  _  _  __
18: ___ _____ _________________          ___ _   _  _  _ _  _    _  _  _  _  _  _  __
19: ___ _____ _________________          ___ _   _  _  _ _  _    _  _  _  _  _  _  __
20: ___ _____ _________________          ___ _   _  _  _ _  _    _  _  _  _  _  _  __
21: ___ _____ _________________          ___ _   _  _  _ _  _    _  _  _  _  _  _  __
22: ___ _____ _________________          ___ _   _  _  _ _  _    _  _  _  _  _  _  __
23: ___ _____ _________________          ___ _   _  _  _ _  _    _  _  _  _  _  _  __
24: ___ _____ _________________          ___ _   _  _  _ _  _    _  _  _  _  _  _  __
25: ___ _____ _________________          ___ _   _  _  _ _  _    _  _  _  _  _  _  __
```

Figure 5-2. Sample Status of Conference Screen, Page 2

```
status conference                                              page 3 of 7

                          STATUS OF CONFERENCE 2__

                    Sum Grp: Group1  Group2  Group3  Group4
                         L1: 1a0716  1a0714  _______ _______
                         L2: 1a0715  1a0713  _______ _______

          Join  Drop      Drop     AC  -------Ports---------  Sum
     Ext  Time  Time     Reason    Num Trunk  Video  Aud/ESM  Grp Software
1: 75000 12:01 _____ __________ ___ 1a1201 1a0801 1a0905    1  _________
         12:01 _____ __________ ___ 1a1202 1a0802 _______       _________
2: 75001 12:06 12:07 Handshake_ ___ _______ _______ _______    _  _________
         _____ _____ __________ ___ _______ _______ _______       _________
3: 75002 12:02 _____ __________ ___ 1a1203 _______ 1a0907    _  _________
         _____ _____ __________ ___ _______ _______ _______       _________
4: 75003 12:01 _____ __________ _12 1a1215 1a0805 1a0908    1  _________
         12:01 _____ __________ _13 1a1216 1a0806 _______       _________
5: _____ _____ _____ __________ ___ _______ _______ _______    _  _________
         _____ _____ __________ ___ _______ _______ _______       _________
6: 75004 12:02 _____ __________ _14 1a1205 1a0803 1a0906    1  _________
         12:03 _____ __________ _15 1a1206 1a0804 _______       _________
```

Figure 5-3. Sample Status of Conference Screen, Page 3

```
status conference                                                page 4 of 7

                              STATUS OF CONFERENCE 2__

                 Join  Drop      Drop       AC  -------Ports--------  Sum
      Ext        Time  Time      Reason     Num Trunk   Video Aud/ESM  Grp Software
 7:  75005 12:01 _____ __________ _16 1a1001 1a0807 1a1107    1  ________
           12:01 _____ __________ _17 1a1002 1a0808 ______       ________
 8:  75006 12:01 _____ __________ ___ 1a1005 1a0807 1a1108    1  ________
           12:01 _____ __________ ___ 1a1006 1a0808 ______       ________
 9:  75007 12:01 _____ __________ ___ 1a1007 1a0807 1a1105    1  ________
           12:01 _____ __________ ___ 1a1008 1a0808 ______       ________
10:  75008 12:01 _____ __________ _18 1a1202 1a0810 1a1109    2  ________
           12:01 _____ __________ _19 1a1203 1a0811 ______       ________
11:  _____ _____ _____ __________ ___ ______ ______ ______    _  ________
           _____ _____ __________ ___ ______ ______ ______       ________
12:  _____ _____ _____ __________ ___ ______ ______ ______    _  ________
           _____ _____ __________ ___ ______ ______ ______       ________
13:  _____ _____ _____ __________ ___ ______ ______ ______    _  ________
           _____ _____ __________ ___ ______ ______ ______       ________
14:  _____ _____ _____ __________ ___ ______ ______ ______    _  ________
           _____ _____ __________ ___ ______ ______ ______       ________
```

Figure 5-4. Sample Status of Conference Screen, Page 4

NOTE:
Pages 4 through 6 of the Status of Conference screen display the same information as Page 3 when there are more than six MCU-extensions assigned to a conference.

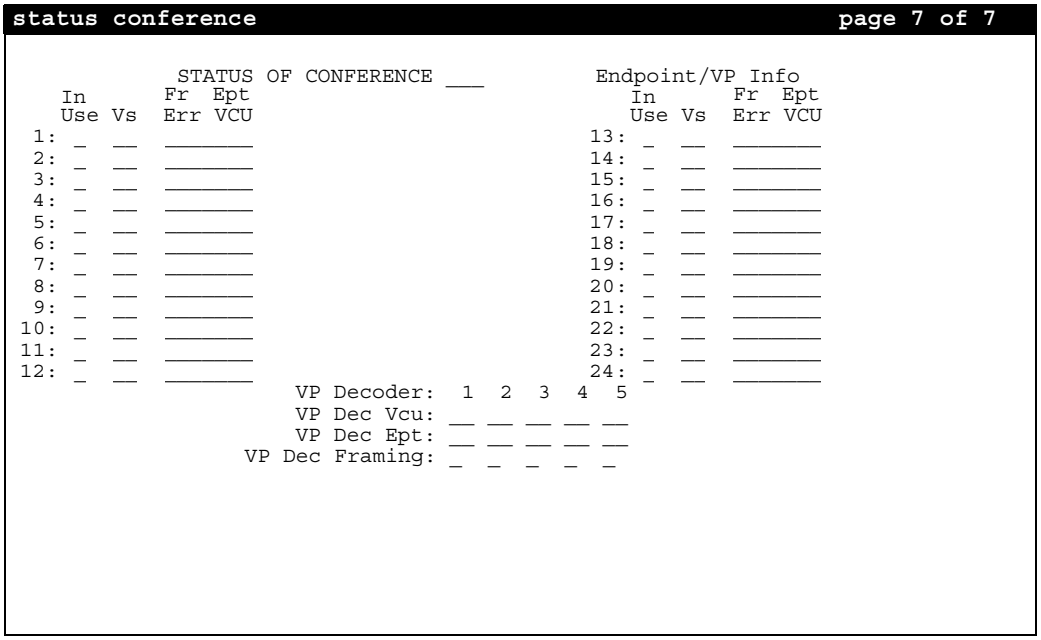


Figure 5-5. Sample Status of Conference Screen, Page 7

The following list describes the fields in the screen:

- *Conference ID*

  Display-only field that shows the number (**1** through **200**) that identifies this conference.

- *Conference Name*

  The purpose of the meeting for identification purposes. This is chosen by the convener.

- *Password Scope*

  If this field is blank, no password is required. **Audio** indicates that the per-conference password is in effect and is required only for an Audio Add-On endpoint. If the field is set to **all**, the per-conference password is in effect and is required for all endpoints.

  NOTE:
  The value “all” does not appear on the form if no H.320 endpoints in the conference support passwords.

- *Password*

  Identifies the per-conference password. Per-conference passwords are not required to gain entry into a conference unless the per-conference or per-user password is set. If the per-conference password is set, each endpoint entering the conference is checked against the *Password Scope* field to determine whether password validation is done (refer to *Password Scope*). The per-conference password is blank on the Status Conference form if *Password Scope* is blank or **per-user**. Per-user passwords are not displayed on the Status Conference forms.

- *Class*

  The choices are **reserved** or **dedicated**. A **reserved** conference is a conference that is scheduled to begin within 24 hours of the current time. A **dedicated** conference is a conference that is always available and can be joined at any time.

- *Start Time/Date*

  Indicates the starting time for the conference (in 24-hour notation) along with the month and calendar day.

- *Stop Time/Date*

  Indicates the ending time for the conference (in 24-hour notation) along with the month and calendar day. If *Status* (discussed later in this list) contains **complete**, the actual ending time is displayed. Otherwise, the field is blank.

- *Chair*

  Identifies current chair token holder. Value is an endpoint from **1** through **25** corresponding to the slot number associated with the endpoint.

- *Format (in/out)*

  Indicates the video format for single screen or multi-screen conferences. For SM conferences, indicates the video format for the primary rate of the conference. Values include **16CIF**, **4CIF**, **CIF**, **QCIF**, **QCIF-SQCIF**, **H.CTX**, **H.CTX+**, **SG4**, and **MRV**.

- *FPS 16C*

  Indicates the rate (frames per second) at which an H.263-only endpoint can receive 16CIF frames. Values include **' '**, **30**, **15**, **10**, **7.5**, **6**, **5**, **3**, **2**, and **1**.

NOTE:
There is no indication of either the maximum transmit frame rate or current frame rate that can be detected by the MCU. In practice, the frame rate changes as a function of the amount of motion in the input image.

The field is always blank for proprietary modes, H.261 modes, and conferences using a video processor (including CPP, SM, and same rate H.263/H.261 transcoding conferences). The field is also blank for the 4CIF, CIF, and QCIF video formats.

- *FPS 4C*

  Indicates the rate (frames per second) at which an H.263-only endpoint can receive 4CIF frames. Values include **' '**, **30**, **15**, **10**, **7.5**, **6**, **5**, **3**, **2**, and **1**.

  NOTE:
  There is no indication of either the maximum transmit frame rate or current frame rate that can be detected by the MCU. In practice, the frame rate changes as a function of the amount of motion in the input image.

  The field is always blank for proprietary modes, H.261 modes, and conferences using a video processor (including CPP, SM, and same rate H.263/H.261 transcoding conferences). The field is also blank for the 4CIF, CIF, and QCIF video formats.

- *FPS C*

  Indicates the rate (frames per second) at which an H.263-only endpoint can receive CIF frames. Values include **' '**, **30**, **15**, **10**, **7.5**, **6**, **5**, **3**, **2**, and **1**. Values **6**, **5**, **3**, **2**, and **1** apply only to H.263 video mode; values **' '**, **30**, **15**, **10**, and **7.5** apply to both H.263 video mode and H.261 video mode.

  NOTE:
  There is no indication of either the maximum transmit frame rate or current frame rate that can be detected by the MCU. In practice, the frame rate changes as a function of the amount of motion in the input image.

  For conferences using a video processor (including CPP, SM, and same rate H.263/H.261 transcoding conferences), the field indicates the highest common CIF frame rate of all the endpoints and the rate of the video mixer board (which may be lower than that of the rest of the participants).

  The field also contains the frame rate value for proprietary modes.

  The field is blank for QCIF full-screen conferences or QCIF CPP conferences using the TN2237 Video Processor circuit pack. For Presentation mode quad-screen conferences, the field indicates the highest common CIF frame rate of all the participants.

- *FPS Q*

  Indicates the rate (frames per second) at which an H.263-only endpoint can receive QCIF frames. Values include **' '**, **30**, **15**, **10**, **7.5**, **6**, **5**, **3**, **2**, and **1**. Values **6**, **5**, **3**, **2**, and **1** apply only to H.263 video mode; values **' '**, **30**, **15**, **10**, and **7.5** apply to both H.263 video mode and H.261 video mode.

For conferences using a video processor (including CPP, SM, and same rate H.263/H.261 transcoding conferences), the field indicates the highest common QCIF frame rate of all the endpoints and the rate of the video mixer board (which may be lower than that of the rest of the participants).

NOTE:
The QFPS frame rate cannot be greater than the CIF frame rate announced by the presenter.

The field is blank for proprietary modes.

NOTE:
For SM conferences, the previous five fields are blank if no endpoints dial in at the administered rate. Also, if one or more endpoints dial in at this rate, all endpoints administered at this rate display the same values. This is true even for endpoints that have not joined the conference.

- *Video Mode*

  The video mode of a non-cascaded conference can be changed during an active conference via administration or conference control. Conference control does not modify the administered video mode. The following are video mode values:

  — **H.261 with upgrade** — sets the conference to H.261 video mode unless an endpoint joins which only supports a lower video quality. In that case, the conference is downgraded. If the endpoint drops from the conference, the conference is automatically upgraded to H.261. This setting enables the highest quality video resolution when all participating endpoints support the upgrade. However, due to a lack of uniformity in design, some endpoints may not be able to follow the upgrade—a knowledgeable agent should use this setting to enable a higher quality video experience for conferences where all participating endpoints are known to support the capability upgrade.

  — **H.261 down only** — is a safe setting in that the video resolution and frame rate are based on the lowest common denominator, that is the resolution and rate supported by the least-capable endpoint. This setting allows endpoints with fewer capabilities to participate in the video portion of the conference. Therefore, if the conference begins with endpoints that all support H.261, the video resolution remains in H.261 until an endpoint joins which does not support it. The conference is then downgraded and will not be upgraded even if the endpoint drops out of the conference.

  — **H.261 CIF Floor** — sets the lowest video mode supported at H.261 Common Intermediate Format (CIF). All endpoints must support at least H.261 CIF or will be joined as audio only.

NOTE:
When an H.323 endpoint is joining the conference, the video mode must be set to one of fixed settings which includes any of the **Now** settings as supported by all the video endpoints.

- **H.261 QCIF Now** — immediately forces the conference into QCIF mode even if the participating sites have endpoints capable of CIF (this is primarily used as a diagnostic tool). This setting forces the conference to use the specific video resolution regardless of the capabilities of the participating endpoints. A frame rate corresponding to H.261 Minimum Picture Intervals 1 to 4 (30fps, 15fps, 10fps, 7.5fps) must also be specified or select auto for automatic selection of the highest frame rate supported by all the endpoints.
- **H.261 CIF Now** — immediately forces the conference into CIF mode regardless of the capabilities of endpoints that may be participating in the conference (this is primarily used as a diagnostic tool). Selecting this option forces a conference to use the specific video resolution regardless of the capabilities of the participating endpoints. A frame rate corresponding to H.261 Minimum Picture Intervals 1 to 4 (30fps, 15fps, 10fps, 7.5fps) must also be specified or select auto for automatic selection of the highest frame rate supported by all the endpoints.
- **H.263/1 with upgrade** — sets the conference to H.263 video mode unless an endpoint joins which only supports H.261. In that case, the conference is downgraded to H.261. If the H.261-only endpoint drops from the conference, the conference is automatically upgraded to H.263. This setting enables the highest quality video resolution when all participating endpoints support the upgrade. However, due to a lack of uniformity in design, some endpoints may not be able to follow the upgrade—a knowledgeable agent should use this setting to enable a higher quality video experience for conferences where all participating endpoints are known to support the capability upgrade.
- **H.263/1 down only** — is a safe setting in that the video resolution and frame rate are based on the lowest common denominator, that is the resolution and rate supported by the least-capable endpoint. This setting allows endpoints with fewer capabilities to participate in the video portion of the conference. Therefore, if the conference begins with endpoints that all support H.263, the video resolution remains in H.263 until an endpoint joins which only supports H.261. The conference is then downgraded to H.261 and will not be upgraded even if the only H.261 endpoint drops out of the conference.

- **H.263 CIF Now** — immediately forces the conference into H.263 CIF mode regardless of the capabilities of endpoints that may be participating in the conference. Selecting this option forces a conference to use the specific video resolution regardless of the capabilities of the participating endpoints.
- **H.263 QCIF Now** — immediately forces the conference into QCIF mode even if the participating sites have endpoints capable of CIF. This setting forces the conference to use the specific video resolution regardless of the capabilities of the participating endpoints.
- **H.263 4CIF Now** — immediately forces the conference into 4CIF mode. This setting forces the conference to use the specific video resolution regardless of the capabilities of the participating endpoints.
- **H.263 16CIF Now** — immediately forces the conference into 16CIF mode. This setting forces the conference to use the specific video resolution regardless of the capabilities of the participating endpoints. **H.CTX** — indicates the H.CTX proprietary video format.
- **H.CTX+** — indicates the H.CTX+ proprietary format.
- **MRV** — indicates that the video mode of the conference is MRV video mode. If the conference is using MRV video, the values for the CIF Minimum Picture Intervals reflect the current maximum frame rate at the MCU.
- **SG4** — indicates the SG4 proprietary video format.

■ *Q1* through *Q4*

Indicate the quadrants. Values include **1** through **25** (representing the endpoints that are part of the quad image), **F** (indicating that the displayed video is a default board “fill” image), or **FE** (indicating that the displayed video is that of the fill endpoint). (Refer to the explanation for the following *Fill Ept* field.)

Also, the *Q4* field displays **XX** for a CPP upper-panoramic, CPP lower-panoramic, or (if *Vid Mix* on page 1 of the form is set to **exec**) Executive Conferencing screen layout; the *Q3* and *Q4* fields display **XX** for a dual-panoramic screen layout; and the *Q1* through *Q4* fields display **XX** for a CPP full-screen video screen layout. In each case, value **XX** indicates that the relevant quadrant(s) are not being used currently.

- *Fill Ept*

  Indicates the fill endpoint. Values include **1** through **25**. Whenever the video of an endpoint that is fixed in a quadrant cannot be used as a valid video source (because the endpoint has not joined the conference, has disconnected from the conference, or has invalid video), a fill video is displayed in the designated quadrant. The fill can be another endpoint's video or the default board fill image. Value blank indicates a default fill.

  Fill video is also displayed in VAS quadrants whenever not enough endpoints have joined the conference.

- *Vid Mix*

  Indicates the picture layout for the conference. The following list identifies and discusses the values for this field.

  — blank — indicates a non-CPP full-screen conference. For this value, the *Q1* through *Q4* fields are also blank.

  — **exec** — indicates an Executive Conferencing conference in mixed image mode. For this value, the *Q1* through *Q3* fields are used to indicate the Executive Conferencing broadcast endpoints. Also, the *Q4* field displays **XX** to indicate that this quadrant is currently not being used.

  — **full** — indicates a CPP conference in full-screen mode. For this value, the *Q1* through *Q4* fields display **XX** to indicate that the four quadrants are currently not being used.

  — **dual** — indicates a dual-panoramic mixed-image conference. For this value, the *Q3* and *Q4* fields display **XX** to indicate that they are currently not being used.

  — **up-panor** — indicates a three-image conference where the top half of the screen displays one image while the bottom half of the screen is segmented into two screen displays. For this value, the *Q4* field displays **XX** to indicate that the fourth quadrant is currently not being used.

  — **lo-panor** — indicates a three-image conference where the bottom half of the screen displays one image while the top half of the screen is segmented into two screen displays. For this value, the *Q4* field displays **XX** to indicate that the fourth quadrant is currently not being used.

  — **quad** — indicates a quad-screen mixed-mode conference.

- *H.263/H.261 Transcoding*

  Indicates if H.263/H.261 transcoding is performed within the same rate. Values include **y** and **n**. Value **y** also indicates that TN2237 video processor resources are being used.

- *Video Processor*

  This field has two components. The first component is the board address for the TN2237 resource handling all four quadrants. Whenever there are problems with the video processor resources, a failure reason (the second component) is displayed along with the board address.

  The following list identifies and defines the keyword values associated with Continuous Presence *Plus* status:

  — blank — video processor resources were successfully allocated for the CPP, EC, SM, or same rate H.263/H.261 transcoding conference.

  — **mtcbusy** — available resources were maintenance busy at the start of the conference.

  — **went oos** — an active video processor resource went OOS during an active CPP, SM, or same rate H.263/H.261 transcoding conference. For the TN2237 resource, this indicates a failure of the Video Processor circuit pack.

  — **time slot** — Continuous Presence *Plus* time slot resources are not available at the start of the conference.

  — **not ready** — the TN2237 Video Processor circuit pack is not ready for connection.

- *VP Audio Delay*

  Indicates the current conference audio delay for multimedia endpoints associated with the primary rate of the conference. The field value is blank for full-screen (non-CPP) non-SM conferences and CPP non-SM conferences in full-screen mode.

  For CPP conferences in quad mode, the value of the delay depends on the value for the *Lip Sync Setting* field in the Conference Record form. The following table illustrates the appropriate variations:

Lip Sync Setting Value	Corresponding CPP Audio Delay Value
“none”	**0**
“auto”	Value uplinked by the TN2237 circuit pack
“custom”	Same as “custom” value (0 through 1000 ms)

- *Status*

  This display-only field reports the current status of a conference as it relates to the *Class* of the conference. A reserved conference can be **active, in-use**, or **complete**. **Active** means the conference is available to receive calls. **In-use** means the conference is in progress and one or more

conferees has joined in. **Complete** means a conference has ended (the *Stop Time* has been reached). A dedicated conference is always **active** (available to receive calls).

- *Conference Mode*

  Depending on the MCU model, this field offers up to 4 conference modes. Value **voice-activated** allows all conferees to have an active audio path so everybody hears what the other participants are saying. All video participants see the current speaker which means that the video source changes when another speaker begins talking. The current speaker sees return video of the last person who spoke. **Chair** allows the chairperson to determine which video-sending endpoint is broadcast to all the other conferees. **Presentation** mode allows one location to be viewed constantly by all conferees. If a conferee asks a question or makes a comment, the other conferees hear the speaker but continue to view the presenter. **Broadcast/scan** mode allows one location to be viewed and heard constantly by all conferees. The broadcaster receives video (not audio) from all conferees on a rotating basis.

NOTE:
If the value of the **Scn Int** is greater than 0, when the current broadcaster has been speaking for a pre-set period of time, the return video for the broadcaster is replaced with a scanning of all the conference's video participants; the other video participants continue to see the current speaker. For **Voice-activated**, **Chair**, and **Presentation** mode the default setting is 0, so no scanning occurs. For **Broadcast/scan**, the default setting is 15 seconds.

- *Control Ext.*

  This field is displayed only if the operating mode has a controlling endpoint.

- *Scn Int.*

  This is the amount of time (in seconds) that the broadcaster will view each conferee before the MCU switches to the next conferee.

- *Cascade Mode*

  If the conference includes a CAS link, this mode must be either **primary** or **secondary.** On the other hand, if a cascaded endpoint cannot be administered, the mode must be **blank.** Finally, if endpoints can be administered but the link is not enabled, the mode is **disabled.**

- *Audio Mode*

  This field identifies the current operating audio mode from among the following: **G.711** (PCM-A), **G.711** (PCM-mu), **G.728** (LD-CELP), or **G**.**722** (7kHz).

  The following list discusses the interactions between G.711, G.728, and G.722 along with the results generated by including into the *Audio Mode* field of the Conference Record the following values, coupled with the accompanying circumstance:

— ***auto-down_only*** or ***auto-w/upgrade*** *and the conference bandwidth is 112k or 128k* — the system starts out with the highest common audio, G.728 (LD-CELP). When a G.711 (PCM) endpoint joins such a conference, the conference audio mode is downgraded to G.711 (PCM). If the endpoint that caused the downgrade to G.711 disconnects, and if the conference is administered with ***auto-w/upgrade***, the conference is upgraded to G.728.

— ***auto-down_only*** or ***auto-w/upgrade*** *and the conference bandwidth is greater than 128k* —the system starts out with the highest common audio, G.722 (7kHz). When a G.711 (PCM) endpoint joins such a conference, the conference audio mode is retained, and the PCM endpoint interworks with the conference. The *Capability...Aud* field displays value **e** to indicate G.722/G.711 interworking.

— ***G.722*** *(7kHz), and a G.711 (PCM) endpoint joins such a conference* — the conference audio mode is not downgraded to G.711 (PCM). The Status Conference form indicates that such an endpoint does not support G.722 (7kHz) audio by displaying **e** in the *Capability...Aud* field. In this case, value **e** implies G.711/G.722 interworking.

— ***G.728*** *(LD-CELP), and a G.711 (PCM) endpoint joins such a conference* — the Status Conference form indicates that such an endpoint does not support G.728 (LD-CELP) by displaying **e** in the *Capability...Aud* field. In this case, value **e** implies G.728/G.711 interworking. This type of endpoint is an invalid video source. The MCU may or may not send video to it.

- *Data Mode*

  Indicates the data mode capability for this conference. Entries include **none** and **any-mlp.**

- *MLP Rate*

  Indicates the MLP Data Rate for the conference. Entries include **var-MLP, 6.4k, 8k, 14.4k, 16k, 22.4k, 24k, 30.4k, 32k, 38.4k, 40k, 46k,** and blank.

- *Admin Bandwidth*

  This field is used to specify the bandwidth selected for the conference. Values include **1x56k**, **1x64k**, **2x56k**, **2x64k**, **112k, 128k, 168k, 192k, 224k, 256k, 280k, 320k, 336k, 448k, 512k, 672k, 768k, 1008k, 1152k, 1288k, 1344k, 1472k, 1536k, 1680k,** and **1920k**.

- *Conf Bandwidth*

  Indicates the current operating channel conference bandwidth. This value can differ from the administered bandwidth due to Rate Adaptation.

- *Rate Adaptation*

  Indicates whether the conference supports rate adaption. Value is **y** or **n**.

- *Lo/Hi Interworking*

  Indicates whether the conference supports Low-/High-Speed Interworking. Value is **y** or **n**.

- *SM Rate 1 (2, 3)*

  Identifies the additional Speed Match rates for the conference. Values include blank, **1x56k**, **1x64k**, **2x56k**, **2x64k**, **112k**, **128k**, **224k**, **256k**, **336k**, **384k**, **448k**, **512k**, **672k**, and **768k**. Within the *Ept Rt* field, values **1**, **2**, and **3** are used to associate endpoints with the Speed Match rates 1, 2, and 3 identified in the *SM Rate 1 (2, 3)* field.

- *Type*

  Indicates the type of conferee. Possible entries include **P64** (audio/video), **H323** (H.323 multimedia), **AUD** (Audio Add-On), **CAS** (cascade link), **BOND** (BONDing), **DA** (Dedicated Access), **BCAS** (cascade BONDing), or **UCC** (Universal Conference Control).

  NOTE:
  BONDing calls use up to 12B-channels to form one H.261 channel.

  A maximum of one UCC terminal per MCU per conference is allowed.

  An addition field appears when H.323 endpoint is joining the conference **H323** under *Type*). That field is labeled *GK Registered?* with a value of **y/n** to specify the registration status of the H.323 Gatekeeper.

- *Dial Type*

  Indicates whether dial-in **(in)** or dial-out **(out)** is being used to join the endpoint to the conference.

- *Ext*

  Indicates the extension for the endpoint. This extension is selected at administration time. For dial-in calls, the extension is the Avaya MCU internal mapping for the external Meet-Me Number that the user dials. For dial-out calls, the extension is the MCU-extension used to originate the call.

- *Meet-Me Number*

  The MCU automatically displays the data entered on the MCU-extension form in the associated Meet-Me Number field. The Meet-Me Number is usually the network number the conferee dials to join a conference or the location of the conferee.

- *In Use*

  Indicates the status of endpoints and/or conferences. You can use this field to identify general connection or capability problems quickly. By checking other fields, you may identify specific capability or connection problems. This field is blank until the first call is made from or to the endpoint. The following list identifies other possible entries and their meaning:

- blank — the call was never attempted.
- **n** — the endpoint was connected but dropped or was dropped, or the endpoint attempted to connect but failed.
- **y** — the endpoint is in use and is fully connected on all media. For a data call, at least MLP level '2' connectivity was reached (and DLCI0 was established).
- **c** — the endpoint is in use and is fully connected (as it is for **y**). However, the endpoint has changed the conference audio or video capability, or it has changed the rate of the conference because of rate adaptation. This condition requires a closer analysis of the endpoint's capabilities and mode fields to determine the missing capability.
- **e** — the endpoint is in use but it has a capability problem. Specifically, it does not have one of the required capabilities (channel, video, or data) to be a full participant This condition requires a closer analysis of the endpoint's capabilities and mode fields to determine the missing capability.
- **f** — the endpoint is in use but is not connected to all media. This indicates that the endpoint has declared all the required capabilities (channel, video, audio, or data) but is not fully connected to all conference media at this time. It could also indicate that the endpoint is in the process of connecting or an invalid video source (in which case the *Vs* flag would be set to **i**).
- **t** — the endpoint has been moved to another conference. Refer to the appropriate Status of Conference Endpoint screen for details.

- *Capability*

  This field contains several subfields indicating the endpoint's current status and also its ability to receive video, audio, and data.

  - *Ch*

    Provides information on the quantity and quality of channels. The following list identifies other possible entries and their meaning:

    - **y** — the endpoint has the required number of channels.
    - **e** — the endpoint has not declared support for the correct number of channels and cannot participate fully in the conference.
    - **n** — the endpoint has declared the correct number of channels, but all the channels have not yet joined the conference due to a problem with either the network or an endpoint.

    This field is always blank for audio-only endpoints.

  - *Au*

Provides information on the required audio capability. The following list identifies possible entries and their meaning:

- **y** — the endpoint has the required audio capability. This field is always set to **y** once an audio-only endpoint joins the conference.

  c — Whenever the administered audio mode of a conference is set to **auto** the system starts out with the highest common audio. A G.711 or G.711/G.722-only endpoint that joins such a conference changes the conference video quality by changing its operating audio from CP716 to G.722. Any G.728 endpoints that join this conference do not change the conference audio.

  Whenever the conference bandwidth is less than or equal to 128k, the system starts out with G.728. A G.711 or G.711/G.722-only endpoint that joins such a conference changes the conference video quality by changing its operating audio from G.728 to G.711.

  Whenever the conference bandwidth is greater than 128k, the system starts out with G.722. A G.711-only endpoint that joins such a conference does not change the conference video quality because the conference audio in such a case remains at G.722 and the endpoint's G.711 audio interworks with G.722.

- **e** — either a G.711 (PCM) only endpoint was unable to support the administered audio mode of G.728 (LD-CELP) or G.722 (7kHz), or a G.728/G.711 endpoint could not support the administered audio mode of G.722 (7kHz). Such endpoints operate with G.711 (PCM) audio and interwork with the current operating audio mode.

This field is blank until the first call is made from or to the endpoint, or if the endpoint is a UCC endpoint.

— *Vid*

Two column field that provides information concerning video.

Values in the first column indicate if the associated endpoint has the required video capability and is receiving video. The following list identifies possible values and their meaning:

- **y** — the endpoint has the required video capability and should be receiving video if the *Ch, Au,* and *Dat* fields are each set to **y**.
- **c** — the endpoint downgraded the video quality of the conference. For example, H.263 could be downgraded to H.261. Also, within H.263 and H.261, the video format and the associated frame rates could be downgraded. For example, H.261 could be downgraded from CIF to QCIF.

H.261 video mode is set by default to CIF and, if a QCIF-only endpoint joins the conference, the entire conference is set to operate in QCIF with a downgrade in video clarity. In addition, the conference frame rate is initially set to the highest frame rate, which can subsequently be reduced by an endpoint. Whenever the conference video mode is not administered with an upgrade capability, and if the video parameters for a conference are “downgraded,” they are not “upgraded” until all endpoints disconnect from the conference.

- **e** — the endpoint has not declared any video capability in its cap-set.
- **n** — the endpoint is an audio-only endpoint and is not receiving video (due possibly to an audio or data problem).

The first column is always blank for Audio Add-On endpoints.

Values in the second column indicate the standard video type. Values include blank (for a proprietary video), **1** (for H.261 video), and 3 (for H.263 video).

— *T120*

Provides information on MLP data capability, the state of the data connection in the T.120 stack, and the state of the Control Link to the ESM (T.120 stack terminator). The following list identifies possible entries and their meaning:

- **a —** the endpoint has the MLP data capability, but the endpoint’s MLP channel was not joined to the data conference because the endpoint is administered as one that uses a non-compliant application.
- **e** — the endpoint does not have the MLP capability. This endpoint is joined to the conference as a secondary audio-only endpoint.
- **m** — the endpoint has the MLP data capability, but the MLP channel is not opened to the endpoint because the endpoint did not confirm the **MLP on** request from the MCU, or the endpoint is viewed as a “secondary” endpoint. (For example, an endpoint that supports CIF is joining a Continuous Presence *Plus* conference that does not support CIF.) As long as the MLP channel is not opened, this endpoint is joined to the conference as a secondary audio-only endpoint.
- **t** — the endpoint has confirmed the **MLP on** request, and the MLP channel is opened toward the endpoint. If the endpoint has no T.120 capability, or if it did not confirm the **T.120 on** message, the endpoint is joined to the conference as a audio/video endpoint.

- **0** — the endpoint has the MLP data capability and the MLP channel is opened to the endpoint, but the endpoint is not currently connected to the data conference due to a connection problem to the ESM.
- **1** — GCC initiated a Conference Invite Request to the endpoint, or GCC received Conference Join Request from the endpoint.
- **2** — the endpoint accepted a GCC Conference Invite Request. The endpoint has confirmed the Conference Invite/Join Request and, as such, is now connected to the Multipoint Communications System (MCS).
- **y** — the endpoint announced its entry into the conference. Accordingly, the endpoint's MLP channel has been successfully joined to a data conference. The endpoint can now send and receive data as a party in the multipoint conference.
- ***** — the control link to the ESM (MCS Provider) is down, and the real state of the connection to the MCS domain is not known.

A blank entry indicates either that the endpoint is a UCC or Audio Add-On endpoint or that the data mode for the conference is **none** (the latter case indicates either that the data does not apply or that the endpoint never joined the conference).

— *CC*

Indicates the state of the H.221 LSD channel and also the H.224 capabilities for each endpoint in the conference. The following list identifies possible values and their meaning:

- **t** — indicates an H.224-capable endpoint. The endpoint is an H.224 LSD token holder (current LSD broadcaster).
- **y** — indicates an H.224-capable endpoint that has sent an H.224-LSD-on mode command. However, it does not indicate whether or not this endpoint supports FECC.
- **d** — an H.221 LSD channel opened successfully, but an H.224-LSD-on command has not been received from the endpoint.
- **n** — LSD channel failed to open successfully in an FECC conference (that is, LSD-6400-on mode was never sent by the endpoint) even though the endpoint announced the LSD capability at 6.4k. This is also true for endpoints administered as "basic" on the Conference Record form. Therefore, the endpoint is joined to the conference as a secondary audio-only endpoint.

- **e** — Endpoint has not announced the 6.4k data capability in an FECC conference. Therefore, the endpoint is joined to the conference as a secondary audio-only endpoint.
- blank — FECC is not optioned for this conference; therefore, the data does not apply, the endpoint never joined the conference, or the endpoint is not a video-capable endpoint.

NOTE:
If FECC is administered for the conference, all the endpoints in the conference must open the 6.4k LSD channel for FECC to be fully functional. If an endpoint does not open the channel, it becomes an audio-only endpoint.

— *Gx*

Provides information on the Still-Frame Graphics capability of the endpoint. The following list identifies possible values and their meaning:

- **y** — the endpoint has this capability.
- **e** — the endpoint did not declare this capability. The conference retains the Still-Frame Graphics capability when a noncompliant endpoint joins the conference.

A blank entry indicates that the endpoint is either a UCC or Audio Add-On endpoint, or that the endpoint never joined the conference.

— *SM Rt*

Identifies endpoints with rates that are different from the primary conference rate. Values include **1**, **2**, and **3**. These values correspond to the respective rates entered into the *SM Rate 1 (2, 3)* fields.

— *Rt Ad*

Serves as a Rate Adaptation/interworking indicator. The following list identifies possible values and their meaning:

- **5** and **6** — pertain only to Low-/High-Speed Interworking. All other values pertain only to rate adaptation. The value **5** indicates that a low-speed (56k) endpoint joined a high-speed (128k or higher) conference. Such an endpoint is connected with audio-only capability and is not a valid video source and destination. The value **6** indicates that a low-speed (64k) endpoint joined a high-speed (128k or higher) conference. Such an endpoint is connected with audio-only capability and is not a valid video source and destination.
- **y** — the endpoint has joined the conference at the administered rate of 64k, but because another endpoint triggered rate adaptation to 56k, this endpoint has successfully rate-adapted down to 56k.

- **c** — the administered bandwidth of the conference is 64k and the endpoint joined the conference at 56k. The first 56k endpoint that joins a 64k rate adaptable conference triggers rate adaptation (refer to *Join Time* on page 5-25).
- **n —** assumes a 64k conference, and indicates that a rate adaptation to 56k was triggered by some other endpoint. This endpoint joined the conference at a 64k bandwidth but encountered problems in rate adapting down to 56k. This endpoint may have audio capability and may be receiving video, but it is not a valid video source. Other conferees may hear, but not see, the conferee.

A blank entry indicates that rate adaptation was never triggered by any endpoint, and that if the endpoint is in use and connected, it has joined the conference at the administered bandwidth.

— *Bd Md*

Indicates the BONDing mode for BONDing calls. The entry **1** indicates BONDing Mode 1, and the entry **t** indicates transparent mode. This field is blank for any call not associated with BONDing.

— *Ts*

Provides information on the talking state of the endpoint. The following list identifies possible entries and their meaning:

- **t** — at the time of the request, voice energy was detected from the endpoint.
- **m** — at the time of the request, the endpoint informed the MCU that it (the endpoint) was muted.

  NOTE:
  There is no way for the MCU to find out if an endpoint is muted if the endpoint does not inform the MCU about this condition after it joins the conference. In such a case, the endpoint does not display a mute indication.

- **M** — can indicate either of the following:
  - — At the time of the request, the endpoint's audio was muted by a UCC/CRCS CRCS Agent interface.
  - — Both the endpoint and the UCC/CRCS CRCS Agent have muted the endpoint audio.
- **S** — at the time of the request, the endpoint's audio was muted due to the solo audio state set by the UCC/CRCS agent interface.
- blank — at the time of the request, voice energy was not being detected from the endpoint.

— *Vs*

Provides information on the MCU video state of the endpoint. For quad-screen conferences, an asterisk (*) is prepended to the value in the field to indicate that an endpoint is currently part of the mixed image. A pound sign (#) may be prepended to the field value to indicate that an endpoint was fixed to be in the mixed image (via administration or UCC/CRS Agent), but a “fill” video is shown in its place. This occurs whenever the video of an endpoint that is fixed in a quadrant cannot be used as a video source because the endpoint is currently not joined to the conference, has suppressed its video, or has invalid video to be the video source. A maximum of four endpoints can have * or # prepended to the field value.

For a quad-screen conference in VAS mode, the mixed image is broadcast to all the endpoints. For quad-screen conferences in Presentation mode, the mixed image is the return video to the Presenter.

The following list identifies possible values and their meaning:

- **a —** applies only to quad-screen conferences. Value ***a** indicates that the endpoint is part of the current mixed image and is fixed in one of the quadrants via administration. This number is prepended to the value in the *Vs* field. Value **#a** indicates that the endpoint is fixed in a quadrant but is not currently connected. (The fill image is being displayed.)
- **b** — for full-screen conferences, at the time of the request, the endpoint’s video was being broadcast to other sites, and the conference was in VAS, Broadcast, or Presentation mode.

  For a quad-screen VAS conference, the value is prepended with *, and it indicates that the endpoint’s video is part of the mixed image due to VAS. For a quad-screen Presentation conference, the value without the asterisk identifies the presenter as the broadcaster.
- **B** — at the time of the request, the endpoint’s video was being broadcast to other sites due to the UCC Rollcall option. This option can be performed only in full-screen mode.
- **c** — at the time of the request, the endpoint’s video was broadcast to other sites, the conference was in chair mode, and the broadcaster was designated by the chair. Chair features can be performed only in full-screen mode.
- **i** — at the time of the request, the endpoint was not a valid video source.

  If this endpoint is in a Continuous Presence *Plus* conference with fixed quadrant participants and is fixed in a specific quadrant, **#** is prepended to the value.

- **r** — for full-screen conferences, at the time of the request, the endpoint's video was the return video to the broadcaster.

  For Continuous Presence *Plus* conferences in Presentation mode, ***r** represents a VAS quadrant that is part of the mixed range.

- **R —** at the time of the request, the endpoint's video was the return video due to the UCC Browse option. Browse can be performed only in full-screen mode.

- **s** — at the time of the request, the endpoint's video was suppressed at the request of the endpoint.

  For Continuous Presence *Plus* conferences with fixed quadrant participants, if the endpoint is fixed in a specific quadrant, **#** is prepended to the value.

- **S** — at the time of the request, the endpoint's video was suppressed by the UCC/CRCS CRCS Agent interface. For Continuous Presence *Plus* conferences with fixed quadrant participants, if the endpoint is fixed in a specific quadrant, **#** is prepended to the value.

  This value is also displayed whenever both the endpoint and the UCC/CRCS CRCS Agent suppress the endpoint video.

- **u** — for full-screen conferences, at the time of the request, the endpoint's video was being broadcast to other sites, the conference was in Voice Activated Switching (VAS) mode, and the endpoint was designated to be the broadcaster by the UCC/CRCS CRCS Agent interface.

  For quad-screen conferences, a UCC/CRCS Agent designated this endpoint as fixed in a quadrant. The value is prepended with ***** if the endpoint is currently part of the quad image, and **#** is prepended if the endpoint is not currently joined.

- **U** — pertains only to quad-screen conferences, and indicates that the UCC/CRCS Agent designated a quadrant as a VAS quadrant. A ***** is prepended to the value to indicate that this endpoint is part of the current quad image.

- **v** — at the time of the request, the endpoint's video was being broadcast to other sites and the conference was in VAS mode, but the endpoint requested to be a broadcaster via a "See-Me" request and was granted a Multipoint Command Visualize (MCV) token. The See-Me feature is performed only in full-screen mode.

A blank entry indicates that, at the time of the request, the endpoint's video was not broadcast, used as return video, or part of the mixed image, but is a valid video source for endpoints currently joined to the conference.

- *Sum Grp*

  Identifies the VC audio Level 1 (L1) and Level 2 (L2) summer group ports for each assigned group (**1** through **4**). Summer ports are assigned only for conferences with more than six participants. Whenever a conference is operating at 7kHz audio mode (that is, the administered audio mode is either 7kHz or auto with a bandwidth higher than 128k), the system allocates “primary” and “secondary” L1 and L2 summer ports. These ports are allocated as adjacent port slots on the same circuit pack. Status conference displays only the “primary” summer ports. The “secondary” summer ports are always one slot higher than the displayed “primary” summer ports.

The remaining fields can contain up to two entries (one for each channel):

- *Join Time*

  Indicates (in 24-hour notation) when the channel joined the conference.

- *Drop Time*

  Indicates (in 24-hour notation) when the channel dropped from the conference. If the first channel has a drop time, the endpoint is not in use. Also, if there is a drop time, but no join time, the call was dropped without being joined to the conference.

- *Drop Reason*

  Indicates why the channel dropped. Refer to "Conferee Dropped from Conference" on page 5-79.

- *Ports Trunk/LAN*

  Identifies the trunk port that the channel is using. For IP connected ports, it will display a virtual port id (**Tnnnn** where **T** indicates a H.323 trunk and nnnn is a unique ID number assigned by the administrator) associated with the IP network trunk.

- *Ports MMI/MP*

  Identifies the MMI resources used for the channel. This field is always blank for a UCC or Audio Add-On endpoint unless the endpoint is supporting an H.323 connection. For H.323 calls, the second channel (row) indicates the TN2303 Media Processor resource being used for audio or UCC stream for that port. It indicates the TN2303 Media Processor DSP resource performing audio transcoding functionality to convert packetized G.723, G.729, or G.711 audio into PCM audio to be put on the TDM bus.

- *Ports Audio*

  If the endpoint type is not “UCC,” indicates the VC audio encoder port Indicates the VD audio encoder port (which is always paired to a decoder port) for the first channel. Because only one audio encoder port is allocated per endpoint, it appears together with the ESM data port in the endpoint’s channel 1 port slot position of the *Port...Aud/ESM* column. Ports 1 through 4 comprise encoder ports, while ports 5 through 8 comprise decoder ports.

For endpoint type “UCC,” the channel 1 port slot position displays the allocated Call Classifier resource.

For a UCC endpoint, this indicates a call classified resource.

- *Ports ESM*

  Indicates the Expansion Service Module (MMI) data port. This port is assigned only for channel 1. Because only one ESM MMI port is allocated per endpoint, it appears together with the audio port in the endpoint’s channel 2 port slot position of the *Port...Aud/ESM* column. This field is always blank for a UCC or Audio Add-On endpoint.

  NOTE:
  A missing ESM port for data calls indicates an ESM port resource problem. This condition can exist from the beginning of the call if the port is not available during the call setup, or it can occur during the active session if something happens to the allocated port. ESM port resources are not reallocated during an active call.

- *Sum Grp*

  Indicates the assigned summer group number for the endpoint (the summer group port assignments are shown on the first screen).

  This field is always blank for a UCC endpoint.

- *Software*

  Provides additional troubleshooting information. Refer to "Software Field Description" on page 5-53.

- *AC Num*

  Indicates the Administered Connection Number (**1** through **128**). Administered Connection Numbers can be used to diagnose a problem more thoroughly by combining status conference information with the **status administered connection** command and data stored in the error and alarm logs. AC Numbers are only for dial-out calls; therefore, this field should be blank for dial-in calls.

The following fields on Page 7 are grouped with the *In Use*, *Vs*, and *Fr Err* fields, which also appear on page 1 of the form. For an explanation of these fields, refer to the appropriate bullet items earlier in this list.

- *Ept VCU*

  This is a circular hexadecimal counter which indicates the number of endpoint and video processor Video Command Fast Update (VCU) requests from endpoints. Values are **0** through **FF**. Each time the broadcaster changes this value, it is reset to **0**. Generally a **1** or **2** in this field is not a problem. Re-execute the command several times. If the broadcaster stays the same, but one or more *Ept VCU* fields continue to increment, the endpoints associated with the incrementing value may have a network or video unit problem. If all endpoints values are incrementing,

the problem location is the broadcaster. The video degradation caused by many Fast Updates will look like pulsing video at about one second intervals.

- *VP Dec Vcu*

  Video Processor Decoder VCU counter. This is a circular hex counter that is used to indicate the rate of the decoder's VCU requests. Values are **0** through **FF**.

- *VP Dec Ept*

  Endpoint that is currently associated with the video processor's decoder.

- *VP Dec Framing*

  Indicates whether or not the video processor's decoder has framing. Values include **y** and **n**.

Status of Conference Endpoint Screens

All data relevant to an endpoint is displayed in the Status of Conference Endpoint Screens. These screens display some conference level data and all endpoint-associated data. An example of page 1 of the screen set follows:

```
status conference 62 endpoint 1                                  Page   1 of   6
              STATUS OF CONFERENCE: 62   ENDPOINT: 1            Status: active
Ext: 60102  Type: AUD        Manufacturer/Country: 0000/0000   Product: 0000
   Terminal Name:                        Data Mode: none       MLP Rate:
 Admin Bandwidth: 2x56k              Conf Bandwidth: 2x56k      Rate Adaptation? n
  Admin Ept Rate: 2x56k               Endpoint Rate:         Lo/Hi Interworking? n
  Format(in/out):          FPS:           Meet-Me Number: 81360102
  Sum Grp:    L1:           L2:              Dial Out #1:
                                                    #2:
                                        Related Conf ID: 62   Related Ept ID: 1

                  ENDPOINT STATES/CAPABILITIES/MODES
               In  Enh  -----Capability----- Rt Bd
               Use BAS  Ch Au Vid T120 CC Gx Ad Md  Ts Vs
                    n

OneNumber Access? assigned                Channel Association Attempt: no

Calling #1:                    #5:                    # 9:
 Party  #2:                    #6:                    #10:
        #3:                    #7:                    #11:
        #4:                    #8:                    #12:
```

Figure 5-6. Sample Status of Conference Endpoint Screen (Page 1)

To view, on the MCU-ST, the Status of Conference Endpoint screen for an endpoint in a specific conference, log in and enter **status conference *conference-ID* endpoint *endpoint-ID***, where ***conference-ID*** is the number of the conference and ***endpoint-ID*** is the slot number in which the endpoint was administered in the Conference Record. To view the screens for all the endpoints

in a conference, enter **status conference *conference-ID* endpoint *all*** or **status conference *conference-ID* endpoint *endpoint-ID*.** You can add **print** to any of the preceding command lines (for example, **status conference *conference-ID* endpoint *endpoint-ID* print**) to print a copy of the Status of Conference screen. Similarly, you can add schedule to any of these command lines to send the screen to the system printer at the specified time.

The first screen appears whenever you enter **status conference *conference-ID* endpoint *endpoint-ID*** and the specified conference ID is valid. This screen shows the first administered endpoint in the conference (the first administered endpoint may be in a slot other than the first slot). You can use the “Next Form” key to move to the next endpoint (if any) in the conference. Accordingly, the next screen shows the next administered endpoint; any empty slots are skipped. The command exits once the last endpoint is displayed. Also, you can exit the command by pressing “Cancel.” Note that the data displayed is whatever system had stored at the time the command was entered. To see the latest data, enter the command again.

Basic States and Modes Screen—Page 1

The top of this screen (shown in the previous section) primarily reflects administration plans along with information relevant to format and summer groups. The middle of the screen contains information on endpoint level states, capabilities, and modes.

Most of the fields in the screen are the same as the fields in the Status of Conference screen (discussed earlier in this chapter). Therefore, the following list describes only those fields that are specific to the endpoint level command output.

- *Terminal Name*

  String of a maximum of 15 characters that represents the terminal name/identification parameters from the endpoint as defined in the ANSI version of the H.243 recommendation. Given that the MCU can poll and ascertain “naming/identification” parameters from endpoints, the contents of this field can be useful for site identification. For an Audio Add-On terminal, the term “audio-only” appears in this field.

- *Endpoint-ID*

  Identifies the slot number associated with the endpoint entered on the conference forms.

- *Sum Grp*

  Identifies the Summer Group number to which the endpoint belongs and also the VC audio Level 1 (L1) and Level 2 (L2) summer ports for this group.

  NOTE:
  These fields are populated only for conferences with more than five participants.

- *Product*

  Identifies the product identification number obtained from the endpoint.

- *Manufacturer*/*Country*

  Identifies the manufacturer identification number and the manufacturer's country code obtained from the endpoint.

- *Admin Endpoint Rate*

  Indicates the SM rate at which the associated endpoint is administered. The field is blank if the endpoint is administered at the primary conference rate. Other values include **2x56k**, **2x64k**, **112k**, **128k**, **224k**, **256k**, **336k**, and **384k**.

- *Endpoint Rate*

  Indicates the actual rate at which the associated endpoint joined the conference. This rate can be different from the one indicated in *Admin Bandwidth* or *Admin Ept Rate*. If the rate is different from the rate identified in *Admin Ept Rate*, the endpoint has joined the conference as a secondary audio-only endpoint.

- *Destination Conf ID*

  Provides the ID of the conference to which the specified endpoint is currently related. The conference may be the administered conference or the conference to which the endpoint has been moved. Values include **1** through **200**.

  NOTE:
  If *In Use* contains **t**, the *Related Conf ID* field identifies the conference to which the endpoint has been moved. If *In Use* contains a value *other than* ***t***, the *Related Conf ID* field identifies the conference where the endpoint has been administered. Therefore, if the value for the *Related Conf ID* field and the value for the *Related Ept* field are the same as the value for the *Status of Conference* field and the value of the *Endpoint* field, respectively, the endpoint is being used in the conference in which it was administered.

- *Destination Ept*

  Provides the ID of the endpoint in the related conference. Values include **1** through **25**.

- *Enh BAS*

  Indicates the status of the Basic/Enhanced Service Flag. Entry **y** indicates that the endpoint supports the enhanced BAS commands/caps. Entry **n** indicates that the endpoint supports only the basic BAS commands/caps.

- *OneNumber Access*

  Indicates if the extension for the associated endpoint is a duplicated MCU-extension. Value **assigned** indicates that the MCU-extension assigned to the endpoint is also assigned to one or more other endpoints within the same conference. Value **no** indicates that the endpoint uses a unique MCU-extension. It does not indicate a failed attempt.

- *Channel Association Attempt*

  Because OneNumber Access allows the same MCU-extension to be administered for multiple endpoints in the same conference, there is a possibility of an incorrect association between the first and subsequent channels associated with a calling party. Value **yes** indicates that the subsequent channel association has been attempted for the associated endpoint. Value **no** indicates that the association attempt has not been made.

- *Calling Party Number [1 through 12]*

  Identifies the calling party numbers (CPNs) received from the network. CPNs may not always be available. Whenever a Billing Number is available, it may replace a CPN. Another name for the Billing Number is Automatic Number Identification (ANI).

Endpoint Channel Information Screen—Page 2

This screen contains channel data for up to 12 channels, which are required for BONDing calls. The number of channels used depends on the conference bandwidth. Non-BONDing calls use channels 1 and 2 or just channel 1.

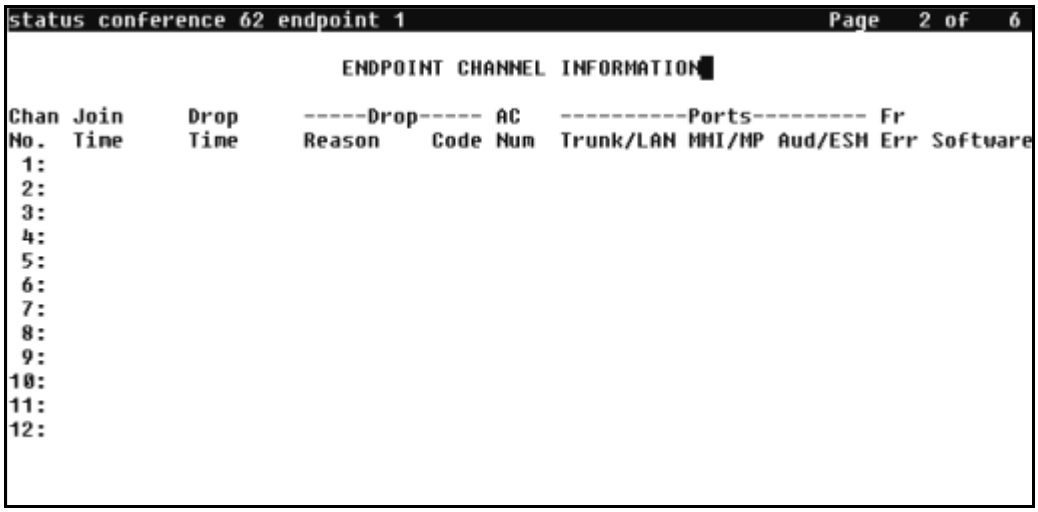


Figure 5-7. Status of Conference Endpoint—Page 2

Most of the fields in the screen are the same as the fields in the Status of Conference screen (discussed earlier in this chapter). Therefore, the following list describes only those fields that are specific to the endpoint level command output.

- *Drop Code*

  Code that complements the drop reason and allows the Technical Center personnel to identify a more specific cause of the problem.

  NOTE:
  Drop codes are discussed later in this chapter.

- *Ports BONDng*

  Indicates the BONDing port for the channel.

- *Fr Err*

  Indicates, in hexadecimal notation (**1** to **FF**), the count of framing errors. An entry other than blank indicates a possible endpoint problem.

Communication Modes, Frame Alignment, and Miscellaneous Information Screen—Page 3

Page 3 provides information on the following:

- Frame alignment word (FAW)
- Conference communication modes

- Endpoint incoming and outgoing command modes
- Miscellaneous endpoint states
- Conference broadcaster/return video

All Page 3 values are zero (**0**, **0x00**, **n**, or **neutral**) if call is not active or the endpoint is an Audio Add-On endpoint (endpoint Type is **BAUD** on Page 1 of the forms.) Some values are zero during initial handshaking.

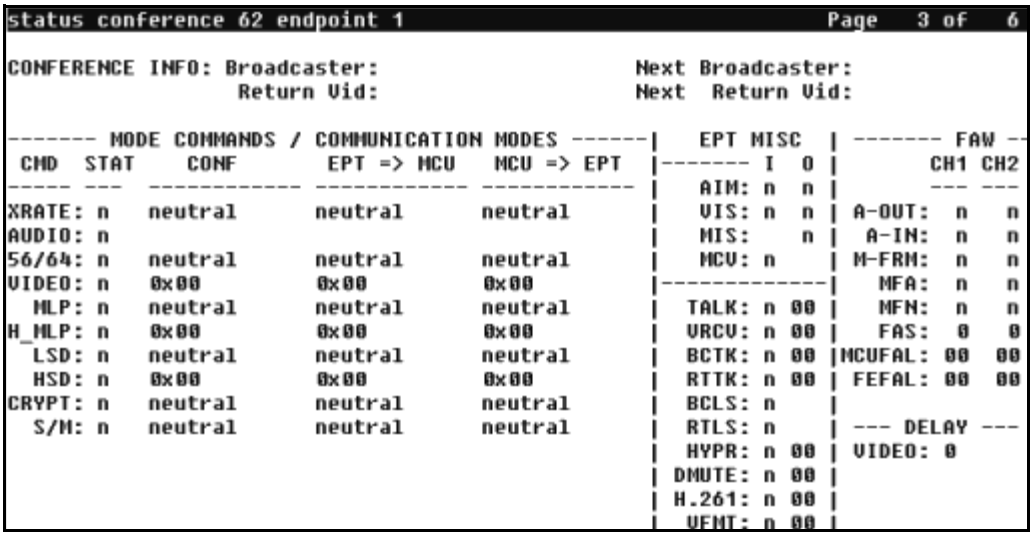


Figure 5-8. Status Conference Endpoint Screen—Page 3

Frame Alignment Word (FAW) Area

The FAW area provides the channel Frame Alignment Word information for the communication paths labeled CHL *1* and *2*. For 2B calls, both CHL *1* and *2* are used. For 1-channel calls (1x56k, 1x64k, 112k, 128k, 168k, 192k, 224k, 256k, 280k, 320k, 336k, 384k, 448k, 512k, 672k, 768k, 1008k, 1152k, 1288k, 1344k, 1472k, 1536k, 1680k, and 1920k), only CHL *1* is used. *A-OUT, A-IN, M-FRM, MFA* and *FN* are flags with values of **y** or **n**. The following list discusses these and other flags.

- *A-OUT*

  Indicates if the MCU has endpoint framing.

- *A-IN*

  Indicates if the endpoint has MCU framing.

- *M-FRM*

  Indicates if a multichannel frame alignment (alignment of both channels in 2B) was achieved.

- *MFA*

  Indicates if a multiframe alignment word (required in 2B call) was found.

- *MFN*

  Indicates if multiframe numbering (required in a 2B call) is present.

- *FAS*

  Frame Alignment Signal (FAS) channel number (1 or 2; should match column header).

- *MCUFAL*

  MCU Frame Alignment Loss (MCUFAL). This is a counter of the number of times the MCU indicates to the endpoint that it has lost endpoint FAW or multichannel synchronization (M-FRM). The MCU a-bit toggles when the MCU gains or loses endpoint multichannel synchronization (M-FRM). This counter (MCUFAL) starts with initial value of 0x00, it increments to 0xff and then wraps around to 0x01. The MCU FAL count is also shown in the *Fr Err* field of Page 1 output.

- *FEFAL*

  Far-End Frame Alignment Loss (FEFAL). This is a counter of the number of changes the MCU detects in the endpoint's a-bit (A-OUT). The endpoint a-bit toggles when an endpoint gains or loses MCU framing. This counter (FEFAL) starts with an initial value of 0x00. It increments to 0xff and then wraps around to 0x01.

Mode Commands and Communication Modes Area

The modes of a conference are the Selected Communication Modes. These modes are a collection of bandwidth allocations for the multiplex. The *MODES COMMANDS* include incoming and outgoing modes. “Incoming” pertains to what the MCU thinks the endpoint is doing based on the Bit-Rate Allocation Signal (BAS) codes the MCU receives from the endpoint or codec and the capabilities the MCU has declared. “Outgoing” pertains to what is going from the MCU toward the endpoint.

The *CMD* column contains labels for the various types of mode commands. The *STAT* column indicates if the conference and the incoming modes are compatible. A value of **y** indicates mode compatibility. A value of **n** indicates that modes are not compatible. A value of **n** in the *STAT* column for any command impacts video status.

NOTE:
The *56/64* field is an exception to the previous statements. Refer to the note in the *56/64* description on page 5-37.

The *CONF* column defines the communication modes of the conference. The *EPT => MCU* column defines the communication modes coming in from an endpoint. The *MCU => EPT* column defines the communication modes sent out to an endpoint based on the number of channels connected and the capabilities of the endpoint.

For Speed Match conferences, there can be a maximum of four conference communication modes; that is, one mode per conference. The values in the *STAT* column corresponding to the XRATE, AUDIO, and 56/64 communication modes in the *CMD* column indicate the status of information associated with the Speed Match rate for the associated endpoint. This rate can be the primary conference rate. The values in the *CONF* column for the XRATE, AUDIO, and 56/64 communication modes provide information associated with the endpoint's rate. This rate can be the primary conference rate or one of the additional Speed Match rates.

The following list identifies and discusses the Command/Communication modes:

- *XRATE*

  Transfer rate. The XRATE should be one of the supported rates as defined in the following table.

Table 5-1. XRATES and Corresponding Bandwidth(s)

XRATE	Bandwidth of the Call
1x64	1B (1x56k or 1x64k)
2x64	2B (2x56 or 2x64)
128	112k or 128k
196	168k or 196k
256	224k or 256k
320	280k or 320k
384	336k or 384k
512	448k or 512k
768	672k or 768k
1152	1008k or 1152k
1472	1288k or 1472k
1536	1344k or 1536k
1920	1680k or 1920k

XRATE may be **64** when the endpoint is just dialing in or if problems occur. This value implies that only one B-channel is being used.

With Speed Match enabled, this field indicates the transfer rate for the associated endpoint. This rate may differ from the primary rate administered for the conference.

- *AUDIO*

  Indicates the actual audio delay for the associated endpoint. (This information is retrieved from call processing.) Value 0 appears for full-screen conferences, Audio Add-On endpoints, UCC endpoints, and endpoints that are not joined to the conference. The displayed value is not retained once the endpoint drops from the conference.

  Audio rate (number of kilobits per second of bandwidth) of the conference and the endpoint must be the same, but the conference and the endpoint need not necessarily have the same mode (for example, G.711-A-48k/G.711-Mu-48k/G.722-48k and G.711-A-56k/G.711-Mu-56k/G.722-56k have the same rate but different modes.) When the audio rate of the conference and the endpoint are different, the endpoint's audio interworks, but the endpoint's video is invalid. The MCU may or may not send video to such an endpoint.

  The following table summarizes the expected endpoint audio mode with different configurations of transfer rate, facility bandwidth, and conference mode. The table also indicates whether or not all endpoints support the highest common audio mode (HC Audio) when the administered mode is **auto**. The highest common conference mode is dependent on the administered bandwidth. A dash (-) indicates that a value for the corresponding field does not apply.

Table 5-2. Summary of Expected Endpoint Audio Modes

Transfer Rate	Administered Audio Mode	Facility BW	Conference Audio Mode	All Support Conf Mode?	Expected Endpoint Mode for Video
<=128k	auto	___	G.728	yes	G.728
		64k	G.711-A-56k	no	G.711-A-56k G.711-Mu-56k
		56k	G.711-A-48k		G.711-A-48k G.711-Mu-48k
		64k	G.722-56k	no	G.722-56k G.711-A-56k G.711-Mu-56k
		56k	G.722-48k		G.722-48k G.711-A-48k G.711-Mu-48k
>128k		64k	G.722-56k	___	G.722-56k G.711-A-56k G.711-Mu-56k
		56k	G.722-48k		G.722-48k G.711-A-48k G.711-Mu-48k
		64k	G.722-56k	no	G.722-56k G.711-A-56k G.711-Mu-56k
		56k	G.722-48k		G.722-48k G.711-A-48k G.711-Mu-48k
___	G.728	___	G.728	___	G.728
	G.711		G.711-A-56k		G.711-A-56k G.711-Mu-56k
			G.711-A-48k		G.711-A-48k G.711-Mu-48k
	G.722		G.722-56k		G.722-56k G.711-A-56k G.711-Mu-56k
			G.722-48k		G.722-48k G.711-A-48k G.711-Mu-48k

NOTE:
Endpoint modes of G.729, G.723-5.3k or 6.3k will interwork with all administered audio modes for VoIP audio add-on endpoints.

Other possible mode values for this field include **neutral** (neutralized I-channel) plus **Au-off** and **Frm** (no audio signal), which never match the conference mode.

NOTE:
Conferences using Speed Mach allow audio interworking between different facility bandwidths.

- *56/64*

  This field contains **derestrict** when operating at per-channel speeds of 1x64k, 2x64k, 128k, 192k, 256k, 320k, 384k, 512k, 768k, 1152k, 1472k, 1536k, or 1920k; it contains **restrict** when operating at speeds of 1x56k, 2x56k, 112k, 168k, 224k, 280k, 336k, 448k, 672k, 1008k, 1288k, 1344k, and 1680k.

  NOTE:
  If the conference is configured for Nx56k operation, the endpoint may signal either via capabilities or modes that are operating at the proper rate. Accordingly, if the **derestrict** value appears and therefore does not match the conference communication mode of **restrict** (with a STAT 56/64 of **n**), but the capability indicates **restrict** (MISC capability has **restrict** displayed on Page 3), the MCU assumes that the 56/64 compatibility exists for the conference and endpoint.

- *VIDEO*

  The value **H.263** (Recommendation H.263) **H.261** (Recommendation H.261), **H.CTX** (proprietary), **H.CTX+** (proprietary), or **SG4** (proprietary) indicates that the video is on in the direction indicated. The value **video-off** indicates that the video is off.

- *MLP*

  Multilayer Protocol data mode. When *Data Mode* is administered as **any_mlp**, the *MLP* mode should be consistent with the administered MLP Rate**.** These values include **var-MLP**, **MLP-6.4k**, **MLP-8k**, **MLP-14.4k**, **MLP-16k**, **MLP-22.4k**, **MLP-24k**, **MLP-30.4k**, **MLP-32k**, **MLP-38.4k**, **MLP-40k**, and **MLP-46.k**. Other values will affect video status.

  The *MLP* mode should be **MLP-off** when *Data Mode* is administered as **none**. Again, other values in this mode will affect video status.

- *H_MLP*

  The High-Speed MLP mode. This mode should be **H-MLP-off**. Other values in this mode will affect video status.

- *LSD*

  Low-Speed Data mode. This mode should be **LSD-off**. Other values in this mode will affect video status.

- *HSD*

  High-Speed Data mode. This mode should be **HSD-off**. Other values in this mode will affect video status.

- *CRYPT*

  Encryption mode. This mode should be **encrypt-off**. Other values in this mode will affect video status.

- *S/M*

  Single-/Multi-channel interoperability mode. The value **6B-H0-comp** indicates that the sender is interoperating multiple channels and a single channel (for example, a 6B channel and an H0 channel). The value **Not-comp-6B-H0** indicates that the sender is not interoperating between 6B and H0. Usually, this value is **Not-comp-6B-H0**. Other values in this mode will affect video status.

Endpoint Miscellaneous Information (EPT MISC) Area

The EPT MISC area contains miscellaneous states and counters for an endpoint. The flags can have a value of **y** or **n**. The counters start with initial value of 0x00, increment to 0xff and then wrap around to 0x01. **AIM** and **VIS** are BAS commands that can be sent as input (I) to the MCU from an endpoint or as output (O) from the MCU to an endpoint.

- **AIM**

  Audio Indicate Muted. Value **y** on input (I) indicates that this endpoint has muted its audio. MCU will not VAS to an endpoint displaying a mute indication. Value **n** on input indicates that this endpoint has not muted (this is possible only if the endpoint audio mode is turned on.) Value **y** on output (O) indicates that all other endpoints in the conference have muted their audio (have sent **AIM** to the MCU). By sending **AIM** to the endpoint, the MCU in turn tells the endpoint that there is no audio output from the MCU. Value **n** on output indicates that there is an audio path open across the bridge.

- **VIS**

  Video Indicate Suppressed. Value **y** on input (I) indicates that this endpoint has suppressed its video (indicated video is muted). Value **y** on output (O) indicates that the MCU is not sending video to this endpoint because there is no video broadcaster (that is, the broadcaster has not joined, or the broadcaster's video is not valid).

- **MIS**

  Multipoint Indicate Secondary Status. This command is sent only as output (O) to an endpoint. Value **n** indicates that the endpoint is viewed as capable of being a valid source (although not necessarily at this moment).Value **n** is the correct state to be in for video. Value **y** indicates

that MIS was sent to an endpoint and that this endpoint is viewed as a secondary endpoint and is therefore included in the audio portion of the conference but not in the video portion. Video will not be sent.

- **MCV**

  Multipoint Command Visualize. This command is sent only as input (I) from an endpoint. Value **y** indicates that an endpoint has requested to become a broadcaster. (This is used during Still-Frame Graphics and to force presentation mode.)

- **TALK**

  Value **y** in the TALK flag indicates that the VC board is detecting voice energy from the endpoint. The TALK counter indicates the number of times a start/stop was detected.

- **VRCV**

  Value **y** in the VRCV flag indicates if the endpoint is receiving video (MCU is sending video to the endpoint). The VRCV counter indicates the number of times video was sent or not sent to this endpoint.

- **BCTK**

  Value **y** in the BCTK flag indicates that the endpoint is the video broadcast source. The BCTK counter indicates the number of times this endpoint was the video broadcast source.

- **RTTK**

  Value **y** in the RTTK flag indicates that the endpoint is the return video source. The RTTK counter indicates the number of times this endpoint was the return video source.

- **BCLS**

  Value **y** indicates that the endpoint is watching the video of the broadcast source.

- **RTLS**

  Value **y** indicates that the endpoint is watching the video of the return source.

- **HYPR**

  Value **y** in the HYPR flag indicates hyperactivity from an endpoint (the MCU isolated an endpoint from the MCU conference due to a “thrashing” behavior) and that this hyperactivity affects the endpoint’s status as a video source (for five seconds of the hyperactivity timer). The HYPR counter indicates the number of times this endpoint was hyperactive.

- **DMUTE**

  Value **y** in the DMUTE flag indicates that the decoder was muted by the VC circuit pack or by the software in the MCU. The VC circuit pack mutes the decoder when it loses MMI, endpoint framing is lost, it receives an invalid audio code word, or when the endpoint is hyperactive. The only time that

the MCU software mutes the decoder of an endpoint is when it mutes all endpoints, other than the broadcaster, in a conference with broadcast with auto scan mode enabled. The DMUTE counter indicates the number of times this endpoint's decoder was muted by the VC circuit pack.

- **VFMT**

  Applies only to quad-screen conferences. Value **y** indicates that the video format is violated: the Video Processor circuit pack detected CIF instead of QCIF in the quad-screen conference. The VFMT counter indicates the number of times CIF was detected.

- **H.261**

  Value **y** indicates video framing loss. The H.261 counter indicates the number of times the framing was lost.

Conference Information Area

This area contains the following fields and corresponding values

- *Broadcaster*

  Indicates the endpoint number that is the current broadcaster. The following list identifies the associated keywords along with their meaning:

  - **Broadcast**

    Broadcast mode broadcaster.

  - **Chair**

    Broadcaster was designated by the chair.

  - **See-Me**

    Broadcaster is a result of MCV request from an endpoint.

  - **Presenter**

    Presentation mode broadcaster.

  - **Rollcall**

    Broadcaster was designated by the UCC via the Rollcall feature.

  - **UCC**

    Broadcaster was designated by the UCC.

  - **VAS**

    Voice-Activated Switching broadcaster.

- *Next Broadcaster*

  Indicates the endpoint number that is selected to be the next broadcaster.

- *Return Vid*

  Indicates the endpoint number that is the current return video. The following list identifies the associated keywords along with their meaning:

— **blank**

Return video is the previous broadcaster forced to be return video because of VAS, action by the Chair, action by UCC, or endpoint MCV request. The broadcaster qualifier identifies which action forced this endpoint to become return video.

— **Autoscan**

Auto-scan return video. This is true only when the conference mode is broadcast with auto-scan.

— **Browse**

Return video was designated by the UCC via the Browse feature.

— **VAS**

Voice-Activated Switching return video.

- *Next Return Vid*

  Indicates the endpoint number that is selected to be the next return video.

Endpoint Capabilities Screen—Page 4

The capabilities of an endpoint indicate what audio modes, video rates, and transfer rates the endpoint supports (can receive) on the current connection. All Page 4 values are blank when the call is not active or when the endpoint is either an Audio Add-On endpoint (endpoint *Type* is **AUD** on Page 1 of the form) or a UCC endpoint (endpoint *Type* is **UCC** on Page 1 of the form). Some values are blank during initial handshaking.

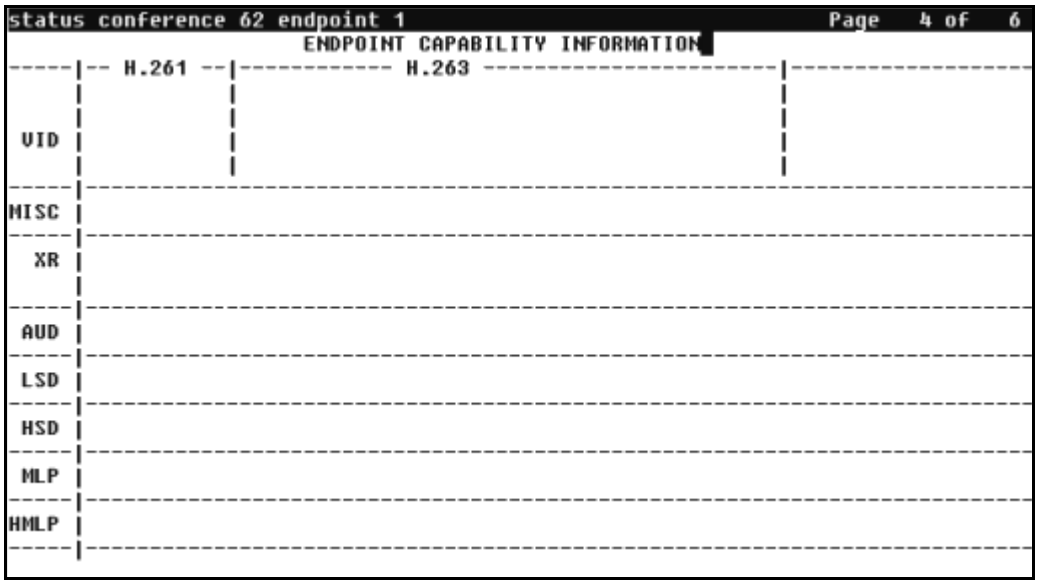


Figure 5-9. Status Conference Endpoint Screen—Page 4

Fields on this page are displayed only if an endpoint declares the specific capability. For example, if an endpoint does not declare the VID CTX capability, the *CTX* field is not displayed.

Video Capabilities

The *VID* (video) fields in the *CAPABILITY* information provide statements about the type of video and frame rate the endpoint supports.

NOTE:
The format capabilities fields are not displayed if endpoint has no video capability.

An endpoint can have both H.261 and H.263 capabilities. In general, for larger screens, higher resolutions such as CIF display a sharper resolution video, while lower resolutions such as QCIF are not as sharp (but may run at higher frame rates). With very small displays, the differences between the resolutions are less observable.

Associated with each format is a frame rate; this indicates the minimum picture interval or the maximum frame rate (in frames per second or fps) at which the endpoint can receive video. A faster frame rate provides better quality motion in video. H.263 frame rate values include 30fps, 15fps, 10fps, 7.5fps, 6fps, 5fps, 3fps, 2fps, and 1fps. H.261 frame rate values include 30fps, 15fps, 10fps, and

7.5fps Therefore, for example, *CIF*: **30fps** indicates that the endpoint can receive one frame each 30th of a second with full CIF format.

NOTE:
The endpoint does not indicate to the MCU the transmit frame rate the endpoint is capable of or currently encoding.

Associated with the H.263 format are the following options:

- **CMP** — reserved for future use
- **UMV** — Unrestricted Vector Mode
- **AMP** — capable of using Advanced Motion Prediction
- **AC** — capable of using Arithmetic Coding
- **PB** — capable of using PB Frames
- **HRD** — using HRD-B scaling factor for a higher resolution format. Contains associated HRD-B value.
- **BPP** — using BPPmaxKB scaling factor for a higher resolution format. Contains associated BPPmaxKB value.

If the endpoint does not support a specific format, all values associated with that format (frame rate and options) are blank.

The following list identifies and comments on other values for the *Vid* fields.

- **da_sfg**

  Indicates support for H.261 Still-Frame Graphics transfers.

- **imp**, **iso**, and **aviso**

  These values are reserved for future use and will not usually appear.

- **H.CTX, H.CTX+**, **SG4**, and **MRV**

  Proprietary video format capabilities. Value **MRV** includes the associated frame rate.

- **SG4_sfg**

  Indicates support for SG4 Still-Frame Graphics.

- **vic**

  Video Indicate Compose. This may be declared by a cascaded MCU.

  NOTE:
  This is currently not supported by the Avaya MCU.

- **vim**

  Video Indicate Mixing. This may be declared by an endpoint.

NOTE:
This is currently not supported by the Avaya MCU.

Transfer Rate Capabilities

The *XR* (transfer rate) fields of the CAPABILITY information are statements about the speeds at which the endpoint can operate over the current connection and how it can operate a H.320 multiplex.

For a 384k (H0) call, the endpoint sets its capabilities to indicate 384k support; therefore, *XR* **384** is displayed. On a 336k call, the endpoint must signal 384k support. If an endpoint does not indicate support for 384k on a 384k/336k call, the MCU provides Audio-Only Communications Mode (AOCM).

For a 2B conference, the MCU sets a 2x64k rate. It expects endpoints to do likewise. If this capability is present, *XR* **64x2** is displayed. (If this value is not displayed, there is no 2x64k capability.)

Endpoints may occasionally take 2x64 (or the current channel rate 384k, 768k, 1472k, 1536k) out of their capability set. This is part of a customary procedure called Mode 0 forcing. The MCU provides AOCM if the endpoint does not signal support that matches the configuration of the conference (that is, the MCU's capabilities for that conference).

Audio Capabilities

The *AUD* (audio) fields are statements of the audio protocols that the endpoint supports. The following list identifies and discusses the associated values.

- **711m** and **711a**

  Indicate PCM (G.711) support, Mu and A-law, respectively. At least one value is required of endpoints.

- **728**

  Indicates whether G.728 is supported (LD_CELP). This value depends on the type of the endpoint and how that endpoint is currently configured.

- **722_48**

  Indicates endpoint support for G.722 (7kHz) at both 48kbps and 56kbps. If this value is displayed, the endpoint supports G.722 audio at both rates.

- **722_64**

  Indicates endpoint support for G.722 at 64k in an unframed mode (not supported by the MCU).

- **723.1**

  Indicates that an H.323 endpoint supports G.723_5.3 or G.723_6.3 capability.

- **729** and **729A**

  Indicates that an H.323 endpoint supports G.729 or G.729A capability.

- **729B** and **729AB**

  Indicates that an H.323 endpoint supports G.729B or G.729AB capability.

- **au_iso**

  Reserved for future use (will not be displayed).

Miscellaneous Capabilities (MISC)

A **restrict** value is one way for an endpoint to indicate that it is operating at 56k per channel. Another way is the **56/64** command mode (refer to page 2) with the value **restrict**. An endpoint on a 56k conference must send one of the two indications (or both) that it is operating at 56k before it can become a video source in a 56k conference. If it signals either way that it is operating at 56k in a 64k (or 384k) conference, it is an audio-only source. However, the MCU continues to send Selected Communication Mode (SCM) toward it whenever possible.

A MISC capability of **derestrict** and a **56/64** command with **derestrict** (refer to page 2) together indicate that an endpoint is operating at 64k. If either the capability or the command has the value **restrict,** 56k operation is signaled.

Other values are identified and discussed in the following list.

- **dcomp**

  Data compliance indicator. This is reserved for future use and should not appear.

- **mbe**

  Indicates support for Multi-Byte Extension (MBE). MBE capability is used for the exchange of passwords, terminal names, and other special capabilities

- **cic**

  Chair Indicate Capability. Indicates chair control capability.

- **S/M**

  Indicates capability of Single-/Multi-Channel interoperability. This is reserved for future use and should not appear.

- **encrypt**

  Indicates encryption capability. This is reserved for future use and should not appear.

- **esccr**

  This is reserved for future use and should not appear.

- **tic**

  Terminal Indicate Capability. Indicates the Terminal Indicate Exchange (TIX) commands capability. This is reserved for future use and should not appear.

Low-Speed Data Capabilities

The *LSD* fields indicate the capabilities for Low-Speed Data conferencing and for H.224 over the LSD channel. Value **h224s** indicates that H.224 in the LSD channel can function simultaneously with T.120 protocols in the MLP channel.

High-Speed Data Capabilities

The *HLP* fields indicate the capabilities for High-Speed Data conferencing and for H.224 over the HSD channel.

Multilayer Protocol Data Capabilities

The *MLP* fields indicate the capabilities for MLP data conferencing, including support for the T.120 stack and H.224 capabilities over the MLP channel. The 4k, 62.4k, and 64k rates are not displayed.

High-Speed Multilayer Protocol Data Capabilities

The *HMLP* fields indicate the conference's capability for High-Speed MLP data conferencing.

Endpoint Call Status Information Screen—Page 5

This page summarizes call-related status. The page contains fields for per-channel join counts, join/drop times, drop reasons, drop codes, and auxiliary bonding drop codes. It also contains fields for drop codes and software from the previous call.

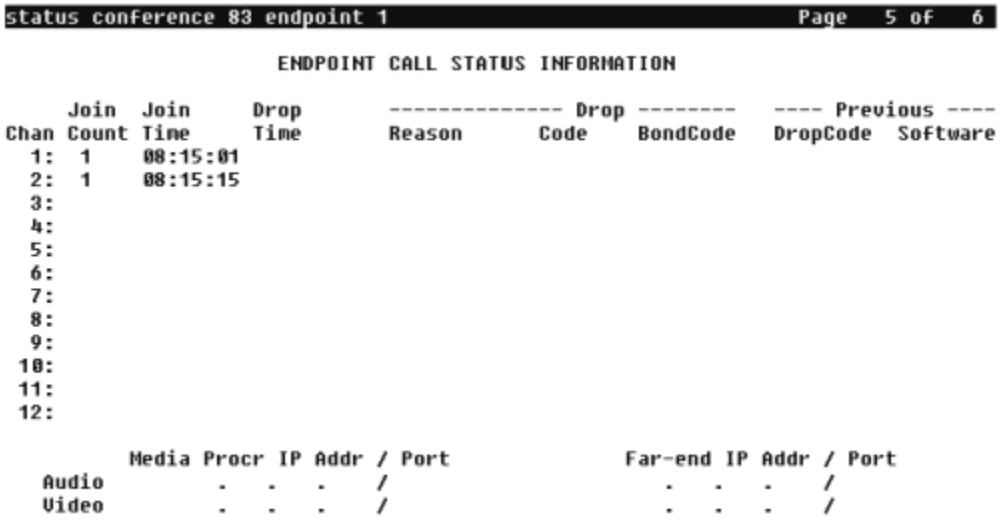


Figure 5-10. Status Conference Endpoint Screen—Page 5

This screen is always retained, and it groups together all call-related fields. All the fields in this section appear on Page 1 of the form except for the *Join Count* and *IP Addr* fields. The *Join Count* field displays a count of the number of times the endpoint joined the associated conference during a specific conference session. This counter starts with initial value of 0, increments to 64, and then wraps around back to 1. The *IP Addr* fields display audio and video media processor IP Address and port status for the near and far end.

The *Previous DropCode* and *Previous Software* fields reflect the values of the *Drop Code* and the *Software* fields (refer to Page 1 of the form) during a previous call or call attempt.

Administered Connections Information Screen—Page 6

This screen contains information on the administered connections for the associated endpoint. The screen can be viewed only while the conference is active. The screen appears as follows:

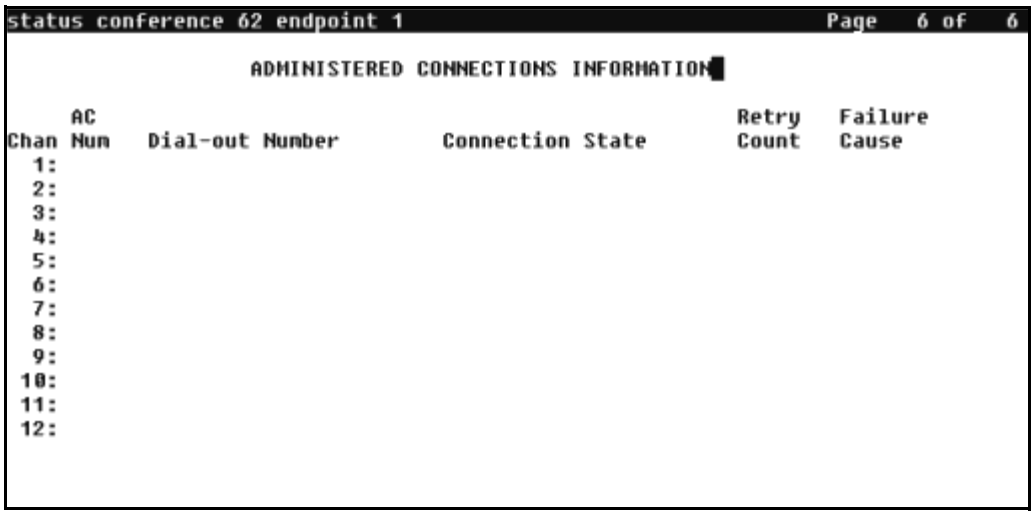


Figure 5-11. Status Conference Endpoint Screen—Page 6

The following list identifies and discusses fields for the screen.

- *Dial-out Number*

  Contains actual numbers that are dialed out by the administered connections for each channel in the call.

  NOTE:
  Dial Out #1 and *#2* on Page 1 of the form display only the administered numbers. This is particularly useful with BONDing dial-out calls.

- *Connection State*

  Indicates the current call state of the AC. The following are connection states associated with dial-out ACs:

  — **enabled**

  Transient in nature, indicates that an AC is about to enter the “attempting to connect” state.

  — **disabled**

  Indicates one of the following:

  - AC has reached an administered retry threshold and all retries have been stopped. This can be verified by checking the Hardware Error Log and checking whether an error type of 9 is logged against the AC.
  - AC was in a “connected” state and the far end has disconnected.

- Initial channel call has not yet been connected. No dial-out call attempt is made for the additional channel(s) until the initial channel has reached a “connected” state.

— **not scheduled**

Transient in nature, indicates that an AC is about to enter the “attempting to connect” state.

— **waiting to retry**

Indicates that the AC is inactive (sleeping) waiting for the retry timer to expire. Once the timer expires, the AC will launch a dial-out call and enter the “attempting to connect” state. ACs in this state also indicate that the dial-out call has failed at least once.

— **attempting to connect**

Indicates that the AC is active on a call, but the call has yet to be connected.

— **connected**

Indicates that the call associated with the AC has been answered and joined cut-thru to the conference.

- Retry Count

  Indicates how many retries have been attempted for this AC during this join attempt. This field is not cleared when the AC is connected. However, it is cleared when a new join attempt is made via a Redial feature. Note that this is different from “Join Count,” which counts the number of times the channel joined the conference during this conference session.

- *Failure Cause*

  Shows an ISDN or CPTR cause value (values lower than 0x7f) recorded when the last dial-out call was dropped. Values above 0x7f are generated internally. The following table lists all possible failure cause values displayed by this field and its associated description. The *Failure Cause* value is logged in the Hardware Error Log and can be displayed via the **display errors** command. (*Err Type* is normally displayed in decimal.)

Table 5-3. Values for Status AC Failure Cause Field

Failure Cause Hex (decimal)	Description
0x00 (0t0)	N/A
0x01 (0t1)	Incorrect destination address
0x02 (0t2)	Reason unknown
0x06 (0t6)	Reason unknown
0x10 (0t16)	Normal call clearing

Table 5-3. Values for Status AC Failure Cause Field — *Continued*

Failure Cause Hex (decimal)	Description
0x11 (0t17)	Endpoint not available
0x12 (0t18)	ISDN timer expired
0x15 (0t21)	Reason unknown
0x12 (0t22)	Destination address changed
0x1C (0t28)	Bad destination or access denied
0x1D (0t29)	Access denied
0x1F (0t31)	Reason unknown
0x22 (0t34)	Trunks unavailable
0x26 (0t38)	Temporary or facility failure
0x29 (0t41)	Temporary or facility failure
0x2A (0t42)	Resources unavailable
0x2C (0t44)	Resources unavailable
0x32 (0t50)	Access denied
0x34 (0t52)	Access denied
0x36 (0t54)	Access denied
0x3A (0t58)	Resources unavailable
0x41 (0t65)	Required capability not implemented
0x42 (0t66)	Required capability not implemented
0x45 (0t69)	Required capability not implemented
0x51 (0t81)	ISDN protocol error
0x52 (0t82)	Required capability not implemented
0x58 (0t88)	Incorrect destination number
0x60 (0t96)	ISDN protocol error
0x61 (0t97)	ISDN protocol error
0x62 (0t98)	ISDN protocol error
0x64 (0t100)	ISDN protocol error
0x66 (0t102)	ISDN timer expired
0x7f (0t127)	Reason unknown
0xC2 (0t194)	Ring no answer

Table 5-3. Values for Status AC Failure Cause Field — *Continued*

Failure Cause Hex (decimal)	Description
0xC8 (0t200)	High and dry: no feedback detected
0xC9 (0t201)	Cascade link administered incorrectly
0xCA (0t202)	CPTR not available to detect failure

Debugging Hints

The additional information provided on the “Endpoint Capability Information” page (page 4) of the form is useful when attempting to understand why an endpoint may not be receiving video information or why the MCU may not be using an endpoint's video information, as well as other media troubles.

NOTE:
This section is not applicable to audio-only endpoints.

Follow these steps:

1. Verify the framing status or the frame alignment word (*FAW*). These fields detail the status of low level communication with the endpoint. If the *A-OUT* indication is **y**, the MCU has the endpoint's framing in that channel. If the call is dual channel, both channels should have *A-OUT* set to **y**. If a channel is not connected or does not have framing (both cases show **n**), the MCU will not use media from that endpoint in the conference.

   The *MCUFAL* count indicates how many times the MCU has lost the endpoint's framing (also refer to the *Fr Err* column on Page 1 of the form). Similarly, the *FEFAL* count indicates how many times the endpoint has lost MCU framing. If either of these counts is increasing over time (multiple commands are necessary to access the form over time), the endpoint is most likely not showing video from the MCU very well (due to freezing, tiling, etc.). Both counts are indications of the stability of the connection(s). Incrementing counters show problems are occurring in the network between the MCU and the endpoint. A few “hits" during call establishment are normal.

2. If the MCU has the endpoint's framing in all channels, check the information under the “MODE COMMANDS / COMMUNICATION MODES” section. In the *STAT* column, all media (*CMD*s) except **56/64** should be **y**. If any value other than **56/64** is **n**, that endpoint's video will be affected. If any **CMD** is **n**, the MCU will not use that media in the conference. The *Audio* field is an exception to this.

The indicator shows if the endpoint is matching exactly what the MCU wants (this is indicated in the *CONF* column). The endpoint may not be matching what the MCU wants and still participate in the audio portion of the conference. Since the information in the form is structured to show why an endpoint's bandwidth allocations for each media are invalid, it is necessary to indicate when the audio is at the wrong rate rather than when the MCU cannot decode the audio information.

3. Check the *EPT MISC* data.

   AIM indicates that the endpoint has muted the audio path to the MCU. The MCU will not VAS to an endpoint that has sent AIM even if it receives speech energy from the endpoint. The MCU transmits AIM if all other endpoints in the conference have sent the MCU AIM.

   TALK shows when speech energy is being received from an endpoint. The counter can help indicate a “stuck” speaker or provide supporting information about silent sites in the conference.

   VIS shows if an endpoint has suppressed the video stream. It is similar to muting the audio stream. The MCU will not VAS to an endpoint that has sent the MCU VIS. Endpoints usually send this code to the MCU when they have no video input. (For example, if the camera is off, selected video source is not providing video information to the endpoint.) The MCU transmits VIS if it has no input video to transmit.

   The *EPT MISC* field with **MIS** shows the user when the MCU has determined that the endpoint capability information shows that the endpoint can never meet the “Selected Communications Mode.” Value **y** in this field indicates an endpoint from which the MCU will not use video or to which it will not send video. This indicator occurs when the selection is for a fixed audio mode (usually G.728) and when the endpoint does not support G.728.

   An endpoint that has the **MCV** indicator set to **y** is requesting that it be made the broadcaster. In a VAS or Chair conference, MCV forces the MCU to broadcast the site requesting MCV. If an endpoint does not send “cancel-MCV,” the MCU will not be able to voice-activate switch the video. Therefore, users may complain about “locked” video. Endpoints use this BAS code when transferring still-frame graphics, and if the MCU does not receive the cancel-MCV indicator, it will get “stuck.” Corrections include sending the graphic again or disconnecting and then reconnecting the offending endpoint.

   BCLS and **RTLS** indicate that the endpoint is “listening” to the video sent by the current broadcaster or return video source. It is unusual for both flags to be set to **y**; however, it is not an error.

   BCTK and **RTTK** indicate that the endpoint is “talking” on the broadcast or return video channels. The counters are useful for checking if the MCU ever switched to a site and to note the “frequently accessed” sites. Zeros for both counters indicate the MCU never switched to the endpoint as a video source.

HYPR indicates if the MCU thinks the endpoint is hyperactive. Hyperactive endpoints send too many changes in a small window of time. This behavior can cause problems for all endpoints connected to the MCU. Therefore, the hyperactive endpoint is isolated for five seconds and then allowed to "return" to the conference. While the endpoint is isolated, it is not allowed to be a video source. Some types of hyperactivity associated with audio mode changes can cause the endpoint to be audio muted by the MCU. The counter is useful to note problems that are momentarily transient in nature.

MUTE indicates if the TN788 audio decoder has muted the audio input. This will happen if the input protocol is unknown, the MCU has lost endpoint framing, or if the endpoint is hyperactive. The counter is useful to note problems that are momentarily transient in nature.

CONFERENCE INFO indicates the endpoint numbers (from the conference form) of the current video broadcaster and video return source. *Next Broadcaster* and *Next Return Vid* indicate the endpoints that will replace the broadcaster return video sources within a few seconds. If the fields are the same, a video switch is not pending.

Software Field Description

The software field appears on Pages 3 through 6 of the **status conference** command output and on Page 2 of the **status conference endpoint** command output. The software reason code is a 32-bit word that is divided into five parts. The code is illustrated in the following table.

Table 5-4. Software Reason Code for Conference and Endpoint Status

Part	Mask								Position	Comment
1	X	-	-	-	-	-	-	-	Upper Nyble Byte 4	Low Nyble of drop reason
2	-	X	-	-	-	-	-	-	Lower Nyble Byte 4	Unused
3	-	-	X	X	-	-	-	-	Byte 3	Frame Alignment
4	-	-	-	-	X	X	-	-	Byte 2	MCU FAL count
5	-	-	-	-	-	-	X	X	Byte 1	Port Type, FEFAL count or supplementary BONDing drop codes

The following list contains statements concerning the code.

- The high-order nyble of the high-order byte (left-most nyble of Byte 4) contains the unique information that isolates specific causes within a drop reason class.

For the Status Conference form, the internal representation of the drop reason is split into two fields. Internally, the drop reason is stored as the unsigned character 0xFF. (Refer to the *Drop Code* field on Page 1 of the **status conference endpoint** command output.) The high-order nyble (high four bits) 0xF0 is displayed as the ASCII drop reason. (However, in most cases, Dial-Out and BONDing are exceptions to this.) The low-order nyble (low 4 bits) 0x0F is displayed as the highest order nyble in the Software Reason field (0xF0000000). The aforementioned drop codes are described in the following table.

- Lower nyble of Byte 4 is not used.
- Byte 3 details Frame Alignment Signal (FAS) information described in the “Frame Alignment Signal Information (FAS)” section later in this chapter. (Refer also to the FAW section on Page 2 of the **status conference endpoint** command output described earlier in this chapter.)
- Byte 2 is the MCU gain/loss H.221 framing count. This count is also shown in the *Fr Err* field of Page 1 output.
- The last byte (right-most byte or Byte 1) details the port type if the drop reason is **Bandwidth.** (Refer to "Port Type—Byte 1" on page 5-60.)

  If the drop reason is **BondHshake**, the last byte contains supplementary bonding drop codes. (Refer to "Supplementary BONDing Drop Codes" on page 5-60.) If the drop reason is anything else (including blank due to an active call), the low-order byte contains the far-end frame alignment loss count (FEFAL). This is a count of number of times an endpoint loses MCU framing. Framing loss is most likely due to network problems, such as noise, slips, etc. The FEFAL count also appears in the FAW section on Page 2 of the **status conference endpoint** command output described earlier in this chapter.

Table 5-5. Drop Codes Associated with the Software Field

Drop Reason	Software Reason	Drop Code	Comment
Far-end	0	00	Far-end disconnected (default)
Handshake	1	11	Frame Alignment Signal (FAS was not found
	2	12	Unsuccessful capability exchange
	3	13	No end of capability commands detected
	4	14	Proper Bit-rate Allocation Signal (BAS) channel was not found
	5	15	Initialization timer expired (while waiting for more than four events)
	6	16	BAS channel number does not match the FAS channel number
	8	18	BAS code received indicating initial BAS channel was lost
	9	19	FAS has been lost for more than 40 seconds
System	1	21	Reset System 2 occurred
	2	22	Internal maintenance has detected an invalid conference
Password	1	31	Password received was incorrect
	2	32	Password was not received within the required time interval
	3	33	Endpoint does not support passwords
Resource	0	40	System has insufficient TTRs to complete the call
	1	41	Resource (port) on the MMI circuit pack has failed
	2	42	Decoder or encoder port has failed on the VC circuit pack
	3	43	System has insufficient VC summers to complete the call
	4	44	System has tone generator problem
	5	45	System has insufficient MMI circuit pack resources to complete the call

Table 5-5. Drop Codes Associated with the Software Field — *Continued*

Drop Reason	Software Reason	Drop Code	Comment
	6	46	System has insufficient VC circuit pack ports to complete the call
	7	47	System has an internal exhaustion of timer buffers
	8	48	System has an internal exhaustion of queue buffers
	9	49	System has detected a DS1-to-MMI cable problem on an active connection
	A	4A	No TN744 ports are in service for UCC digit collection, or the TN744 port failed on an active UCC call
	B	4B	TN744 port failed while on an active UCC call.
	C	4C	System does not have sufficient time slot resources.
Bandwidth	5	55	Attempted to join a 64k conference at the wrong bandwidth
	6	56	Attempted to join a 56k conference at the wrong bandwidth
	7	57	Attempted to join a Wideband conference at the wrong bandwidth
	8	58	Bandwidth doesn't match previous channels
Conf End	0	60	Scheduled conference end occurred
Chair	1	71	Chair Controller used **drop endpoint** command
	2	72	Chair Controller used **drop conference** command
2-pri	1	81	Both sides of the cascade are administered as primary
2-sec	2	82	Both sides of the cascade are administered as secondary
Non-MCU	3	83	Far-end is not an MCU
Disconnect Notification	1	91	System detected a drop without notification from the endpoint.

Table 5-5. Drop Codes Associated with the Software Field — *Continued*

Drop Reason	Software Reason	Drop Code	Comment
	2	92	Endpoint notified the MCU before dropping. This should be considered a normal drop from the far end.
Unknown	0	A0	Internal software error
Agent	0	B0	CRCS or agent dropped the call
	1	B1	Endpoint was moved to another conference.
No-answer	1	C1	Call was answered and immediately dropped.
	2	C2	Dial-out call was dropped after the call rang
Busy	3	C3	Dial-out call was dropped; the far end was busy
No-trunks	4	C4	Dial-out call dropped on reorder (the network facilities are unavailable, or the endpoint is busy
Intercept	6	C6	Dial-out call dropped on intercept (an invalid number was dialed, or the far end was busy)
Far-end	7	C7	Dial-out call was dropped; the far end disconnected
No-ring	8	C8	Dial-out call dropped; the far end was left high and dry (no tones were received)
	9	C9	Dial-out call dropped; indicates cascading administration problem
	A	CA	Dial-out call dropped; the Call Classifier circuit pack is unavailable
Internal	B	CB	Dial-out call routing or trunk resource problem exists
PreAnsDrop	C	CC	Dial-out call dropped (by the network or the far end) before it was answered
Bondhshake	0	D0	BONDing handshake was lost
	1	D1	Information message had unacceptable parameters
	2	D2	Delay equalization timer expired

Table 5-5. Drop Codes Associated with the Software Field — *Continued*

Drop Reason	Software Reason	Drop Code	Comment
	3	D3	Additional channel setup timer expired while awaiting success for all channels
	4	D4	CID timer; Master channel negotiations failed
	5	D5	A-bit timer; multiframe alignment was not achieved
	6	D6	Incorrect BONDing framing was found (the additional channel is not proper)
	7	D7	Setup sequence error; the event was received out of sequence
Ucc	1	E1	UCC dropped the endpoint
	2	E2	UCC ended the conference
GKRejCall		0x1	Gatekeeper sent ARJ
NoRespARQ		0x2	No response to our ARQ
GKUnregReq		0x3	Gatekeeper sent URQ
OLCR-sent		0x4	MCU rejected ept's OLC
OLCR-rcvd		0x5	Ept rejected MCU's OLC
AudioCaps		0x7	Audio caps insufficient
AsymAudio		0x8	asymmetric audio mode
OLCA-rject		0x9	OLCA from ept rejected
OLCbrate		0xa	MCU reject ept's OLC for bitrate
OLCmpi		0xb	MCU reject ept's OLC for mpi

For example, the value 0x60000000 and the drop reason **Resource** indicate that the system did not have enough VC resources to handle the call. The value 0x909c1513 and the drop reason of **Handshake** indicate the following: the MCU lost the endpoint's framing a total of 0x15 (21) times, the endpoint lost framing 0x13 (19) times while the endpoint was connected, and the MCU dropped the connection because it could not recover framing within a 40 second window. The value 0x5016008f and the drop reason **Bandwidth** indicate that a 56k trunk attempted to join a 64k conference.

Frame Alignment Signal Information (FAS)—Bytes 1 through 3

Frame Alignment information is divided into three parts. When the drop reason is not Bandwidth or BondHshake, Byte 1 gives far-end frame alignment loss. Byte 2 provides information on how many times framing was found and subsequently lost by the MCU. Byte 3 gives information on the FAS in a bitwise fashion as follows:

```
x--- ----

        1=>multiframe numbering present
        0=>multiframe numbering not present
-xxx ----
        xxx=>fas channel number
---- x---
        0=>mfa word not found
        1=>mfa word found
---- -x--       ( incoming A-bit )
        0=>endpoint found MCU framing
        1=>endpoint lost MCU framing
---- --x-       ( outgoing A-bit )
        0=>MCU found endpoint framing
        1=>MCU lost endpoint framing
---- ---x
        0=>Multichannel alignment achieved(2x56/64 calls only)
        1=>Multichannel alignment not achieved(2x56/64 calls only)
```

Figure 5-12. Frame Alignment Signal (FAS) Representation for Byte 3

The following table lists and describes the common FAS values.

Table 5-6. Common Frame Alignment Signal Values

Value	Description
0x98	Everything on the initial channel is okay.
0xa8	Everything on the first additional channel is okay.
0x9c	Far end lost H.221 framing
0x13	MCU lost H.221 framing
0x17	Far end and MCU lost H.221 framing
0x16	Never found FAS

Port Type—Byte 1

Whenever the drop reason code for the channel is **Bandwidth**, Byte 1 of the *Software* field contains information on the trunk port type. The port type will vary depending on the trunk type or, for ISDN trunks, the bearer capability associated with the call connected to the MCU. All voice port types can be valid for audio-only calls. Port types with values less than 0x8f are invalid for H.320 endpoints or cascade links. Port types less then 0x92 and greater than or equal to 0x8f are valid for Nx56 conferences. Port types greater than or equal to 0x92 are valid for Nx64 conferences.

Table 5-7. MCU Port Types and Associated Values

Type	Value	Description
voice	0x86	DS1 Tie Toll—DIU-T
	0x88	Voice DS1 trunk—DIU-DTT
	0x8a	Voice DS1 trunk—Diu-DTT with low tie/co loss
	0x8c	Voice Tie—DIU/AIU-TTS
56k	0x8f	ISDN-PRI restricted trunk—56k
	0x90	
	0x91	Robbed-bit 56k
64k	0x92	ISDN unrestricted trunk—64k
	0x93	Wideband > 64k per channel

Supplementary BONDing Drop Codes

Whenever the drop reason code for the channel is **BondHshake**, Byte 1 of the *Software* field contains the supplementary BONDing drop codes. These drop codes are associated with specific checks. The following codes are a result of checks made on the first Information Channel (IC) message received for a master

channel when MCU is calling side (dial-out). (For dial-out, the MCU initializes the parameters desired for the call. The first IC received from the answering side must have parameters that match.)

Table 5-8. Supplementary BONDing Drop Codes for Dial-Out Initial Information Channel

Value	Description
0x01	Operating mode is not Mode 1.
0x02	Rate multiplier is not correct for the number of channels.
0x03	Bearer channel rate is not correct.
0x04	Revision level is not 0.
0x05	Channel ID is not 0.
0x06	Group ID is 0.
0x07	Transfer flag is not all binary 1s for the first IC.
0x08	Remote indicator cannot indicate call is delay equalized.
0x09	Remote loopback request indicates loopback.
0x0a	Sending endpoint is in loopback.

The following codes are a result of checks made on the first Information Channel (IC) message received for a master channel when MCU is answering side

(dial-in). (In dial-in, the MCU receives the far end view of the call parameters. If they are not acceptable, the MCU tries to change them.)

Table 5-9. Supplementary BONDing Drop Codes for Dial-In Initial Information Channel

Value	Description
0x11	56k not allowed into an Nx64 conference
0x12	Bearer channel rate was 56k, but port type of call was 64k unrestricted
0x13	64k not allowed into an Nx56 conference
0x14	Bearer channel rate was 64k, but port type of call was not 64k unrestricted
0x15	Channel ID is not = 0
0x16	Group ID is not = 0
0x17	Transfer flag is not all binary 1s for the first IC
0x18	Remote indicator cannot indicate call is delay equalized
0x19	Remote loopback request indicates loopback
0x1a	Sending endpoint is in loopback

The following codes are a result of checks made on the first IC message received for an additional channel:

Table 5-10. Supplementary BONDing Drop Codes for Additional Information Channel

Value	Description
0x21	Operating mode is not MODE 1
0x22	Channel IDis not unique among other channels
0x23	Group ID does not match the master channel
0x24	Remote loopback request indicates loopback
0x25	Sending endpoint is in loopback
0x26	Revision level is not 0
0x27	Rate multiplier does not match the master channel
0x28	Bearer channel rate does not match the master channel

The following codes are a result of checks made against received framing indications:

Table 5-11. Supplementary BONDing Drop Codes for Received Framing Indications

Value	Description
0x31	Additional channel has IC alignment without multiframe alignment
0x32	Transparent endpoint has multiframe alignment on an additional channel

The following codes are a result of checks made against subsequent IC messages:

Table 5-12. Supplementary BONDing Drop Codes for Subsequent Information Channel Messages

Value	Description
0x41	Initial channel negotiations are completed, but the correct number of phone numbers were not exchanged
0x42	Transfer flag value changed when the channel ID was not 0
0x43	Transfer flag value and not the prior value is +1 while the channel ID is 0
0x44	Call is neither dial-out nor dial-in with digits = 1s
0x45	Operating mode is not Mode 1
0x46	Bearer channel rate cannot change.
0x47	Group ID cannot change
0x48	Rate multiplier cannot change
0x49	Remote loopback request cannot change
0x4a	Remote loopback indication cannot change

The following checks relate to timers:

Table 5-13. Supplementary Timer-Related BONDing Drop Codes

Value	Description
0x51	Initial channel negotiation procedures are not completed by a timeout

Monitor Conference Screen

The Monitor Conference screen allows you to monitor the status of a specified *active* conference. You can access this screen by issuing the command **monitor conference *conference-ID***, where ***conference-ID*** is a number identifying the conference. Issuing this command causes the system to display continually the status data of the conference with the indicated ID. Data on the screen is updated with new status every 30 seconds. If you enter the command and the conference is scheduled or has completed, the command terminates with the following message: “Conference status must be active or in-use.”

The “Update” key provides an on-demand status update. You can terminate the command by pressing the “Cancel” key. Whenever the command is canceled, the system returns to the command input mode.

The Monitor Conference screen appears as follows:

```
monitor conference 12                                          Page   1 of   1
                        MONITOR CONFERENCE: 12                Status: active
Conference Name:                                 Conf Bandwidth: 384k
Start Time/Date: 19:45 MAY 13           Chair:     Audio Mode:
 Stop Time/Date: 00:00 000 00 Video Processor:                        Fill Ept:
 Format(in/out):                    Video Mode: H.261-w/upgrade    Q1:     Q2:
FPS 16C:     4C:     C:     Q:                  Vid Mix: quad      Q3:     Q4:
          In  Drop              Fr                    In  Drop              Fr
    Ext   Use Code  T120 Ts Vs  Err          Ext   Use Code  T120 Ts Vs  Err
 1: 68200                                  13:
 2: 68303                                  14:
 3: 68231                                  15:
 4:                                        16:
 5:                                        17:
 6:                                        18:
 7:                                        19:
 8:                                        20:
 9:                                        21:
10:                                        22:
11:                                        23:
12:                                        24:
                                           25:
```

Figure 5-13. Sample Monitor Conference Screen

Fields in the top part of the screen contain conference-level information. The rest of the form displays endpoint-level fields, which can change after the endpoint joins the conference. All the fields in the screen are also contained in the “Status Conference” or “Status of Conference Endpoint” screens. Therefore, for a description of the fields, refer to the appropriate sections earlier in this chapter.

NOTE:
Drop codes that appear on the Monitor Conference screen are discussed in the “Software Field Description” section in this chapter.

Using the Screens for Troubleshooting

This section shows the status conference forms that help to troubleshoot conference problems. Information about the conference is displayed, including conference mode, start and stop times, conference bandwidth, features, video mode, and number, type and status of endpoints.

```
status conference 100                                          Page   1 of   7
                        STATUS OF CONFERENCE: 100 Status: in-use
 Conference Name: CRCS ID 1               Conference Mode: voice-activated
        Password:                                              Scn Int: 0
  Password Scope:                    Cascade Mode:           Audio Mode: G.711-m
           Class: dedicated             Data Mode: none         MLP Rate:
 Start Time/Date: 16:22 MAY 12  Admin Bandwidth: 1x56k   Lo/Hi Interworking? n
  Stop Time/Date: 00:00 000 00   Conf Bandwidth: 1x56k      Rate Adaptation? n
 Video Processor:                Format(in/out): CIF           SM Rate 1:
  VP Audio Delay:        FPS 16C:     4C:     C: 15  Q: 15              2:
Q1:     Q2:     Fill Ept:            Video Mode: H.261-w/upgrade       3:
Q3:     Q4:      Vid Mix:          H.261/H.263 Transcoding? n      Chair:
                              Dial In  -----Capability-----  SM Rt Bd
   Type  Ext  Meet-Me Number  Type Use Ch Au Vid T120 CC Gx Rt Ad Md Ts Vs
1: P64  70100 70100            out  c  y  c  c 1         e           n   b
2: P64  70126                  in
3: P64  70127                  in   n  n  y  e           e
4: P64  70128                  in
5: UCC  70122 70122            in
6: P64  70115 70115            in
7:
8:
```

Figure 5-14. Sample Status Screen Used for Troubleshooting (1 of 7)

```
status conference 100                                          Page   2 of   7
                          STATUS OF CONFERENCE: 100

                                  Dial In  -----Capability----- SM Rt Bd
   Type  Ext  Meet-Me Number  Type Use Ch Au Vid T120 CC Gx Rt Ad Md Ts Vs
 9:
10:
11:
12:
13:
14:
15:
16:
17:
18:
19:
20:
21:
22:
23:
24:
25:
```

Figure 5-15. Sample Status Screen Used for Troubleshooting (2 of 7)

```
status conference 100                                          Page   3 of   7
                          STATUS OF CONFERENCE: 100

                  Sum Grp: Group1  Group2  Group3  Group4
                       L1:
                       L2:

          Join  Drop      Drop     AC   ----------Ports---------- Sum
     Ext  Time  Time     Reason    Num  Trunk/LAN MMI/MP Aud/Esn Grp  Software
 1: 70100 16:22                    1    01B1202  01B1013 01A0307  1   00980000

 2: 70126

 3: 70127 16:22 00:23 Far-end           01B1204  01B1016 01A1506  1   00910101

 4: 70128

 5: 70122

 6: 70115
```

Figure 5-16. Sample Status Screen Used for Troubleshooting (3 of 7)

```
status conference 100                                        Page   4 of   7
                          STATUS OF CONFERENCE: 100

        Join  Drop     Drop    AC    ----------Ports--------- Sum
    Ext Time  Time    Reason   Num  Trunk/LAN MMI/MP Aud/Esn Grp  Software
 7:
 8:
 9:
10:
11:
12:
13:
14:
```

Figure 5-17. Sample Status Screen Used for Troubleshooting (4 of 7)

```
status conference 100                                        Page   5 of   7
                          STATUS OF CONFERENCE: 100

        Join  Drop     Drop    AC    ----------Ports--------- Sum
    Ext Time  Time    Reason   Num  Trunk/LAN MMI/MP Aud/Esn Grp  Software
15:
16:
17:
18:
19:
20:
21:
22:
```

Figure 5-18. Sample Status Screen Used for Troubleshooting (5 of 7)

```
status conference 100                                          Page   6 of   7
                              STATUS OF CONFERENCE: 100

          Join  Drop      Drop     AC    ----------Ports--------- Sun
     Ext  Time  Time     Reason    Num   Trunk/LAN MMI/MP Aud/Esm Grp  Software
 23:
 24:
 25:
```

Figure 5-19. Sample Status Screen Used for Troubleshooting (6 of 7)

```
status conference 100                                          Page   7 of   7
             STATUS OF CONFERENCE: 100   Endpoint/VP Info
Ept In      Fr   Ept                    Ept In      Fr   Ept
Id  Use Vs  Err  VCU                    Id  Use Vs  Err  VCU
 1:  c   b       01                     13:
 2:                                     14:
 3:  n      01                          15:
 4:                                     16:
 5:                                     17:
 6:                                     18:
 7:                                     19:
 8:                                     20:
 9:                                     21:
10:                                     22:
11:                                     23:
12:                                     24:
                                        25:

               VP Decoder: 1  2  3  4  5
               VP Dec Vcu:
               VP Dec Ept:
            VP Dec Framing:
```

Figure 5-20. Sample Status Screen Used for Troubleshooting (7 of 7)

Troubleshooting Feature-Related Problems

This section discusses how to troubleshoot feature-related problems in MCU conferences.

NOTE:
Endpoints are often easier to troubleshoot by moving them from their original conference to another conference. The **control conference CNF_ID-From move EPT_ID-From CNF_ID-To** command can be used to move an endpoint to another conference for this purpose. The command can also be used to move the endpoint back to its original conference. Refer to "Moving an Endpoint to Another Conference" on page 4-28 for details.

To track the movement of endpoints between conferences, be sure to check the *Related Conf ID* and *Related Ept* fields on Page 1 of the Status of Conference Endpoint screen, which is discussed earlier in this chapter.

Dial-In Conferee Cannot Join a Conference

If a dial-in conferee has tried unsuccessfully to join a conference (conferee may see a visual indication or hear a busy signal, or reorder tone), take the following actions:

1. Ask the conferee which conference was being joined (ask for the day, start time, convener's name, and purpose of the conference).
2. Log in as **agent** on the MCU-ST.
3. Find the Conference Appointment Form for the conference and note the *Conference ID*. You can also enter **list conference** for a listing of the day's conferences. Locate the *Conference ID* number for the conference in question.
4. Enter **display conference *ID*** where ID is the *Conference ID* number found in Step 3. The Conference Record screen is displayed (see the next figure).

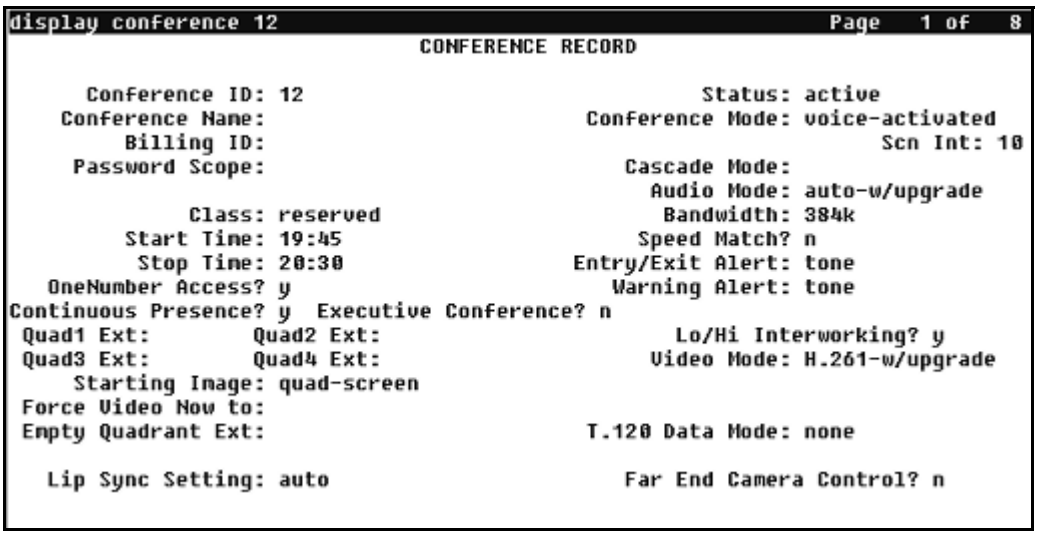


Figure 5-21. Conference Record Screen (Page 1 of 8)

5. Check the following fields on the Conference Record screen:
   - On the first page of the record, check the *Start Time* and *Stop Time* to be sure the conferee has the correct time of the conference. If the conferee is dialing in even one minute early, the call will be rejected. Note also if there is a time zone difference between the scheduled conference time and the location of the endpoint.
   - On the second through eighth page of the record, check the *Name* field to see if the conferee has dialed the right Meet-Me number. Make sure the Meet-Me number is assigned to the conference in question.
   - If there is a **2** in the *No. of Channels* field, ask the conferee if the *same* Meet-Me number was dialed *twice.* A 2-channel 56k/64k conference requires dialing the same Meet-Me number twice to connect both channels.
6. Enter **display time** to see if there was a time change (for example, daylight savings time) or a power outage that caused the MCU system clock to be incorrect. If the MCU system clock is wrong, notify your telecommunications manager.
7. Enter **status conference *conference-ID*** where ***conference-ID*** is the *Conference-ID* number found in Step 3. The Status of Conference screen is displayed (refer to Figure 5-1 on page 5-3).
8. *Check the Stop Time/Date field on the Status of Conference screen.* A **blank** means the conference has started and is still in progress.

If there is a time recorded in the *Stop Time/Date* field, the conference is over. Make sure the conference did not end early and that the conferee is calling from the same time zone.

A conference reserved for an earlier time (that is, reached its *Stop Time*) will show **complete** in the *Status* field. If this is the case, make sure the conferee is not calling from a different time zone. However, check the screen to make sure you are displaying data about the right conference.

NOTE:
A Status of Conference screen is not available for a conference that has not started. However, a Status of Conference screen will appear for any previous conference with a status of “complete” that used the same *Conference ID*. Be sure you are viewing the right conference. Conferences currently in progress have a status of “active” or “in-use.”

9. *Check the In Use* field.

   A **y** or **c** indicates the MCU-extension is being used by a conferee. The convener may have distributed the same number to two conferees. Give the conferee another MCU-extension assigned to the conference that has a blank in the *In Use* column.

   If there is a blank in the *In Use* column next to the dial type the conferee is using, the call never made it to the MCU. This indicates a problem with the endpoint or the network. Escalate the problem (refer to "When All Else Fails" on page 5-87).

   If there is an **n** in the *In Use* column, the endpoint call arrived at the MCU but was dropped. Refer to "Conferee Dropped from Conference" on page 5-79 for the drop reason.

10. If **Resource** appears in the *Drop Reason* field, refer to "Conferee Dropped from Conference" on page 5-79 for an explanation of the drop reason.

Dial-Out Conferee Cannot Join a Conference

If a dial-out conferee has tried unsuccessfully to join a conference, take the following actions:

1. Ask the conferee which conference was being joined (ask for the day, start time, convener’s name, and purpose of the conference). Also, ask the conferee for the dial-out number or location identification information (for example, Location Name, Room Number, etc.). The dial-out numbers are needed to associate the endpoint with the administered data on the Status Conference forms.
2. Log in as **agent** on the MCU-ST.

3. Find the Conference Appointment Form for the conference and note the *Conference ID*. You can also enter **list conference** for a listing of the day's conferences. Locate the *Conference ID* number for the conference in question.
4. Enter **display conference *conference-ID,*** where ***conference-ID*** is the *Conference ID* number found in Step 3. The Conference Record screen is displayed (refer to the next figure).

```
display conference 12                                    Page   1 of   8
                              CONFERENCE RECORD

     Conference ID: 12                                Status: active
   Conference Name:                          Conference Mode: voice-activated
        Billing ID:                                                Scn Int: 10
    Password Scope:                             Cascade Mode:
                                                  Audio Mode: auto-w/upgrade
             Class: reserved                       Bandwidth: 384k
        Start Time: 19:45                        Speed Match? n
         Stop Time: 20:30                    Entry/Exit Alert: tone
  OneNumber Access? y                          Warning Alert: tone
Continuous Presence? y  Executive Conference? n
 Quad1 Ext:        Quad2 Ext:                        Lo/Hi Interworking? y
 Quad3 Ext:        Quad4 Ext:                       Video Mode: H.261-w/upgrade
    Starting Image: quad-screen
 Force Video Now to:
 Empty Quadrant Ext:                        T.120 Data Mode: none

  Lip Sync Setting: auto                        Far End Camera Control? n
```

Figure 5-22. Conference Record Screen (Page 1 of 8)

5. Check the following fields on the Conference Record screen:
   - On the first page of the record, check the *Start Time* and *Stop Time* to be sure the conferee has the correct time of the conference. Note also if there is a time zone difference between the scheduled conference time and the location of the endpoint.
   - Check the administered dial-out numbers against the information obtained in Step 1 to verify that the correct dial-out numbers were administered.
   - If there is a **2** in the *No. of Channels* field, ensure that both dial-out numbers are specified correctly.
6. Enter **display time** to see if there was a time change (for example, daylight savings time) or a power outage that caused the MCU system clock to be incorrect. If the MCU system clock is wrong, notify your telecommunications manager.

7. Enter **status conference *conference-ID*** where ***conference-ID*** is the *Conference ID* number found in Step 3. The Status of Conference screen is displayed (refer to Figure 5-1 on page 5-3).
8. *Check the Stop Time/Date field on the Status of Conference screen.* A **blank** means that the conference has started and is still in progress.

   If there is a time recorded in the *Stop Time/Date* field, the conference is over. Make sure the conference did not end early and that the conferee is in the same time zone.

   A conference reserved for an earlier time (that is, reached its *Stop Time*) will show **complete** in the *Status* field. If this is the case, make sure the conferee is not in a different time zone. However, check the screen to make sure you are displaying data about the right conference.

   NOTE:
   A Status of Conference screen is not available for a conference that has not started. However, a Status of Conference screen will appear for any previous conference with a status of “complete” that used the same *Conference ID*. Be sure you are viewing the right conference. Conferences currently in progress have a status of “active” or “in-use.”

9. *Check In Use* field.

   A **y** or **c** indicates the MCU-extension is being used and that the call is in the process of being connected. This may be true because the call failed to establish the first time and the MCU is attempting to reestablish the call. Check the join/drop times for both the channel and associated drop reasons.

   A **blank** indicates that the call never made it out of the MCU. This could indicate a problem with the dial-out number. If the administered dial-out numbers are correct, escalate the problem (refer to "When All Else Fails" on page 5-87).

   An **n** indicates that the outgoing call was made on behalf of this MCU-extension but was dropped.

   The following drop reasons on the endpoint channels indicate a dial-out failure:

   - Busy

     The destination endpoint is busy. This drop reason is detected by Avaya MCU CPTR resources or via an ISDN cause value (for example, H0). Ensure that the destination endpoint is idle.

   - Internal

     The MCU cannot allocate the trunk resources necessary to route the dial-out call for the specified dial-out numbers. This can indicate a problem with the routing pattern or the trunk-associated translation (for example, the Task Access Code (TAC) specified in the dial-out

number or routing pattern points to a trunk group without members). This can also indicate a lack of trunk resources (for example, all trunk members are maintenance-busy, or all in-service members are busy on a call).

- No-ring

  The network has not returned ringing for more than 30 seconds. Verify the destination number.

- No-trunks

  The Avaya MCU has detected there are no available trunks in the network to place the call. This drop reason is detected by Avaya MCU CPTR resources. Escalate the problem.

- No-answer

  The destination's endpoint range and did not answer after more than 60 seconds. Check the equipment for this endpoint.

- Intercept

  The MCU has either detected an intercept tone from the network or received an intercept ISDN cause value. This could indicate a wrong destination number or a busy far end.

- Reorder

  The MCU has detected that there are no available trunks in the network to place the call. This drop reason is detected by the Avaya MCU CPTR resources.

- Wrong-num

  The MCU has detected that the wrong destination number was dialed. This drop reason is detected either by Avaya MCU CPTR resources, which detect the intercept tone from the network, or by an ISDN cause value.

If the drop reason itself does not identify the problem, refer to "When All Else Fails" on page 5-87.

Cascaded Call Deficient

It is possible that some conferees will join a cascaded conference but other conferees expected to join the conference will fail to do so. Whenever this happens, you should investigate the state of the cascaded link.

Whenever two MCUs are cascaded (joined) in a conference, one of the MCUs is set up to perform a dial-out and the other MCU is set up to receive the call. Usually, problems relevant to MCU call setup are the same as for other video endpoints. Therefore, you can use the same troubleshooting procedures to resolve these problems. However, in addition, the MCU provides three drop reasons (explained later) to identify problems relevant to cascading. The MCU

performing the dial-out does not retry the call(s) for these drop reasons. Accordingly, you must modify the cascade mode or change the dial-out numbers on the Status Conference Record for one or both MCUs.

If the call is a dial-in call, refer to the steps in "Dial-In Conferee Cannot Join a Conference" on page 5-69. For a dial-out call, refer to the steps in "Dial-Out Conferee Cannot Join a Conference" on page 5-71. In either case, you should investigate both the dial-in and dial-out MCUs.

If, in Step 9 of the procedure in either section, there is an **n** in the *In Use* column of the Status Conference forms for the CAS endpoint, the call was established on behalf of this MCU extension but was dropped.

Drop reasons specific to cascading include the following:

- 2-pri

  The cascading mode for both MCUs is specified as “primary” on the Status Conference forms. However, the cascading mode for one of the MCUs must be “secondary.” Change the cascading mode on Page 1 of the associated Status Conference record.

  If there is no preference that a specific MCU be the primary MCU, make the change on the dial-out MCU. This will allow the dial-out MCU to retry cascaded calls.

  If there is a preference that a dial-in MCU be the secondary MCU, you must change the administration of both MCUs. Specifically, you must change the dial-in MCU cascade mode designation to “secondary” and temporarily disable the dial-out MCU cascade mode designation. You must then submit the Status Conference Record form. Finally, you must change the mode from “disabled” to “primary.” This will cause the dial-out MCU to retry cascaded calls.

- 2-sec

  The cascading mode for both MCUs is specified as “secondary” on the Status Conference forms. However, the cascading mode for one of the MCUs must be “primary.” Change the cascading mode on Page 1 of the associated Status Conference record.

  If there is no preference that a specific MCU be the primary MCU, make the change on the dial-out MCU. This will allow the dial-out MCU to retry cascaded calls.

  If there is a preference that a dial-in MCU be the primary MCU, you must change the administration of both MCUs. Specifically, you must change the dial-in MCU cascade mode designation to “primary” and temporarily disable the dial-out MCU cascade mode designation. You must then submit

the Status Conference Record form. Finally, you must change the mode from “disabled” to “secondary.” This will cause the dial-out MCU to retry cascaded calls.

- Not-MCU

  The destination on the dial-out MCU was not an MCU. Verify that the MCU-extension administered on both MCUs for the cascaded link is of type CAS or BCAS and that the dial-out number(s) on the dial-out MCU is (are) the correct number(s) to dial to reach the CAS MCU-extension on the dial-in MCU.

  The endpoint that called the CAS extension on the dial-in MCU was not an MCU. This could indicate that one of the H.320 conferees dialed the Meet-Me Number associated with the CAS MCU-extension. Verify that the dial-out MCU has the correct dial-out number(s) administered for the CAS MCU-extension.

  NOTE:
  For non-cascaded conference drop reasons, refer to "Conferee Dropped from Conference" on page 5-79.

Conferee Cannot Get Video

If a conferee has joined a conference but does not receive video, do the following:

1. Ask the conferee which conference was joined (ask for the start time, convener’s name and purpose of the conference).
2. Log in as **agent** on the MCU-ST.
3. Find the Conference Appointment Form for the conference and note the *Conference ID*. You can also enter **list conference** for a listing of the day’s conferences. Locate the *Conference ID* number for the conference in question.
4. Enter **display conference *conference-ID***, where ***conference-ID*** is the *Conference ID* number from Step 3. The Conference Record screen is displayed.
5. C*heck the Status field* on the Conference Record screen to see if the conference is **in-use**, **active** or **complete**. If the conference is in-progress, the status should be **active** or **in-use**. However, check the screen to make sure you are displaying data about the right conference.
6. Check the *No. of Channels* field. If there is a **2** in the field, ask the conferee if the *same* Meet-Me number was dialed *twice*. A 2B-channel 56k/64k conference requires dialing the same Meet-Me number twice to connect both channels.
7. Enter **status conference *conference-ID*** where ***conference-ID*** is the *Conference ID* number from Step 3. The Status of Conference screen is displayed (refer to Figure 5-1 on page 5-3).

NOTE:
A Status of Conference screen is not available for a conference that has not started. A conference that has a class of “reserved” but has not begun displays **inactive** in the *Status* field of the Conference Record.

8. Check the *Has Capability...Ch field.*

   A **y** in this field means the endpoint has the required number of channels.

   An **e** in this field means the video endpoint has not declared support for the correct number of channels and cannot join the conference as a full video participant.

   An **n** means the video endpoint has declared the correct number of channels but all channels have not yet joined the conference. Ensure that the dial-in conferee dialed the *same* Meet-Me number *twice* (for a 2B 56k/64k conference) or just once (for any multirate or BONDed conference), or that the dial-out conferee’s conference record has the endpoint numbers specified the appropriate number of times (twice or once). If so, this may be a network or video endpoint problem; escalate the problem (refer to "When All Else Fails" on page 5-87).

9. Check the *Data Mode* field. If this field contains **any-mlp**, check the *Capability...Mlp* field.

   An **e** in this field indicates that the endpoint does not support MLP data and can join the conference only as a secondary audio-only endpoint (this may indicate an endpoint problem).

   An **m** in this field indicates that the endpoint has declared the MLP data capability, but the MLP channel has not been opened to or from the endpoint. This may occur when the endpoint does not support the G.728 (LD-CELP) capability (that is, when the *Capability...Aud* field contains **e**). If this is true, MLP is not opened to the endpoint, and the endpoint can join the conference only as a secondary audio-only endpoint. Otherwise, for a dial-out call, try rejoining the conferee to the conference via a redial. For a dial-in call, ask the conferee to drop and then dial in to the conference again. If the data call is again unsuccessful, escalate the problem (refer to "When All Else Fails" on page 5-87).

10. Check the administered *Audio Mode* field on the Conference Record by issuing the **display conference** command. If the field contains **G.728**, check the *Capabilities...Aud* field. The value **e** in this field indicates an endpoint capability problem because the endpoint does not have G.728 (LD-CELP) audio capability. Such an endpoint can join the conference only as a secondary audio-only endpoint.

11. Check the *Interworking* field. If the field contains **y**, check the *Rate Adpt* field. If this field contains **5** or **6**, all of these values together indicate that the endpoint is a low-speed (56k or 64k) endpoint interworking to a higher (112k or higher) bandwidth conference. A low-speed endpoint can join a higher bandwidth conference only as a secondary audio-only endpoint.

Conferee Cannot Get T.120 Data

If a conferee has joined a conference and is expected to receive T.120 data but does not receive it, do the following:

1. Ask the conferee which conference was joined (ask for the start time, convener's name and purpose of the conference).
2. Log in as **agent** on the MCU-ST.
3. Find the Conference Appointment Form for the conference and note the *Conference ID*. You can also enter **list conference** for a listing of the day's conferences. Locate the *Conference ID* number for the conference in question.
4. Enter **display conference *conference-ID***, where ***conference-ID*** is the *Conference ID* number from Step 3. The Conference Record screen is displayed.
5. C*heck the Status field* on the Conference Record screen to see if the conference is **in-use**, **active** or **complete**. If the conference is in-progress, the status should be **active** or **in-use**. However, check the screen to make sure you are displaying data about the right conference.
6. Check the *Data Mode* field on the Conference Record. If the field does not contain **any-mlp**, the conference is not a data conference.
7. Enter **status conference *conference-ID*** where ***conference-ID*** is the *Conference ID* number from Step 3. The Status of Conference screen is displayed (refer to Figure 5-1 on page 5-3).

   NOTE:
   A Status of Conference screen is not available for a conference that has not started. A conference that has a class of "reserved" but has not begun displays **inactive** in the *Status* field of the Conference Record.

8. *Check the Capability...Ch1 field.* A **y** in this field means the endpoint has the required number of channels.

   An **e** in this field means the data endpoint has not declared support for the correct number of channels and cannot join the conference as a full data participant.

   An **n** means the data endpoint has declared the correct number of channels but all channels have not yet joined the conference. Ensure that the dial-in conferee dialed the *same* Meet-Me number *twice* (for a 2B 56k/64k conference) or just once (for any multirate or BONDed conference), or that the dial-out conferee's conference record has the endpoint numbers specified the appropriate number of times (twice or once). If so, this may be a network or data endpoint problem; escalate the problem (refer to "When All Else Fails" on page 5-87).

9. Check the *Capability...Mlp* field. The following list indicates and explains each of the possible values for this field.
   - **y** — the data connection is fully established.
   - **e** — the endpoint has not declared the MLP data capability (this may be an endpoint problem.
   - **m** — the MLP channel was not opened to or from the endpoint (this may be an endpoint problem). Check the *Capability...Aud* field. If the field contains **e**, this is an endpoint capability problem. Check the *Aud/ESM* field on pages 3 through 6 of the Status Conference forms or on the Status Conference Endpoint form for the ESM resource port assignment. The ESM port is displayed in the second channel of the *Aud/ESM column*. If the ESM port is missing, escalate the problem (refer to "When All Else Fails" on page 5-87). Otherwise, for a dial-out call, try rejoining the conferee to the conference via a redial. For a dial-in call, ask the conferee to drop and then dial in to the conference again. If the data call is again unsuccessful, escalate the problem (refer to "When All Else Fails" on page 5-87).
   - **a** — the endpoint is specified on the Conference Record as an endpoint that runs non-compliant applications. This means that the full connection to MCS will not be established.
   - **t** — the endpoint has the MLP data capability and the MLP channel is opened, but the endpoint has no T.120 capabilities, or it did not confirm the **T.120 on** message. Since the MLP channel is open toward the endpoint, this endpoint is joined to the conference as an audio/video endpoint.
   - ***** — the link to the ESM is down. Since connection to MCS cannot be established, escalate the problem (refer to "When All Else Fails" on page 5-87).
   - **0** — the connection to the ESM cannot be established. Therefore, escalate the problem (refer to "When All Else Fails" on page 5-87).
   - **1** or **2** — there are problems with the connectivity to the T.120 stack. Tell the conferee to close all windows relevant to data and to then reopen them. If this fails to clear the problem, escalate the problem (refer to "When All Else Fails" on page 5-87).

Conferee Dropped from Conference

The MCU records the reason why a video endpoint dropped from a conference on Pages 2 and 3 of the Status of Conference screen.

1. Ask the conferee which conference was joined (ask for the start time, convener's name and/or purpose of the conference).
2. Log in as **agent** on the MCU-ST.

3. Find the Conference Appointment Form and note the *Conference ID* number. You can also enter **list conference** for a listing of the day's conferences. Locate the *Conference ID* number for the conference in question.
4. Enter **status conference *conference-ID*** where ***conference-ID*** is the *Conference ID* number located in Step 3. The Status of Conference screen is displayed.
5. Confirm you are viewing the right conference. Then, on Page 1 of the Status of Conference screen note the MCU-extension of the conferee on the *Ext/Meet-Me Number* line. Check the MCU-Extension and Number to Dial Form to match the MCU-extension on the Status of Conference screen with the number the conferee dialed to join the conference.
6. If there is an **n** in the *In Use* column for the MCU-extension, the video endpoint call arrived at or was initiated by the MCU but was dropped. Make sure the conference *Stop Time* has not been reached.
7. Go to Pages 2 and 3 of the Status of Conference screen to find the drop reason.
8. Press PAGE to display the next page of the Status of Conference screen.
9. For the MCU-extension of the conferee, find the *Drop Reason* column. If there are more than six conferees, check Page 3 for the remaining MCU-extensions. The possible values are as follows:
   - 2-pri

     Refer to "Cascaded Call Deficient" on page 5-74.
   - 2-sec

     Refer to "Cascaded Call Deficient" on page 5-74.
   - Agent

     The reservations agent caused the call to drop (for example, the agent changed a connected dial-out destination number).
   - Bandwidth

     Indicates a bandwidth mismatch between a call and a conference the call attempted to join. For example, a 56k call attempted to join a 64k conference that does not allow rate adaptation.
   - BondHshake

     One of the following is true:
     - — Information channel parameter is not supported or is invalid.
     - — Parameter negotiation terminated out of sequence.
     - — Timer expired because one of the secondary channels did not establish.
     - — BONDing framing was not detected for one of the other channels.

- Busy

  Refer to "Dial-Out Conferee Cannot Join a Conference" on page 5-71.

- Chair

  The Chair dropped the endpoint by using either the Chair Command Disconnect (CCD) or Chair Command Kill (CCK) signal.

- Conf End

  The conference ended because either the stop time for a reserved conference was reached or an active conference was converted to a file.

- Far-End

  Clearing was received from the DS1 circuit pack. The disconnect came from either the network or the endpoint.

- Handshake

  Framing was either never found (that is, the endpoint could not complete initialization, or there were problems finding FAS and MFA and getting a correctly coded cap-set) or was lost for more than 40 seconds and the endpoint was disconnected.

- Internal

  Refer to "Dial-Out Conferee Cannot Join a Conference" on page 5-71.

- No-answer

  Refer to "Dial-Out Conferee Cannot Join a Conference" on page 5-71.

- No-Ring

  Refer to "Dial-Out Conferee Cannot Join a Conference" on page 5-71.

- No-Trunks

  Refer to "Dial-Out Conferee Cannot Join a Conference" on page 5-71.

- Not-MCU

  Refer to "Cascaded Call Deficient" on page 5-74.

- Password

  The user entered the wrong password, or the Audio Add-On user did not enter the password within 60 seconds (the waiting period). The Audio Add-On user gets one attempt to enter a correct password and inter-digit timing for each digit (about 10 seconds between each digit).

- PreAnsDrop

  The call disconnected before being answered by an endpoint due to either the network, an endpoint, or a terminal adaptor. This drop reason is different from “No-answer,” which indicates that a 60 second timeout occurred while alerting. For “PreAnsDrop,” the call drops before the 60 second timer expires. Some busy endpoints connected through terminal adaptors display this behavior.

- Reorder

  Refer to "Dial-Out Conferee Cannot Join a Conference" on page 5-71.

- Resource

  One of the following reasons is relevant:

  — The VSP-MCU could not provide resources (VC or MMI) when the call arrived, or it lost the resources during the call. This happened because the resources were either out of service, busied out by the craft, or were being used by system maintenance.

  — The DS1/MMI cable was disconnected.

  If there was a resource problem when the call arrived, the call would get a reorder (fast busy), and it would not be dropped by the VSP-MCU.

- System

  An Avaya MCU restart (Level 2) dropped all calls.

- UCC

  The UCC controller intentionally dropped the endpoint.

- Unknown

  The system could not determine the cause for the disconnect (for example, a software glitch).

- Intercept

  Refer to "Dial-Out Conferee Cannot Join a Conference" on page 5-71.

- Wrong-num

  Refer to "Dial-Out Conferee Cannot Join a Conference" on page 5-71.

10. If you are unable to resolve the problem, refer to "When All Else Fails" on page 5-87.

Video Quality Decreased

The MCU attempts to provide the best video quality for a conference. It is possible that as conferees join a conference, the first few video endpoints may support high video quality (G.728) and so those locations initially receive the best video available. However, as other endpoints join that do not support G.728, the MCU adjusts the audio mode in use so all the video endpoints can participate in the conference.

As a result, the original conferees may notice a degradation of the video quality. Even if the non-G.728 video endpoints disconnect from the conference, the conference remains at the lower-quality video.

If you receive a report from the conference convener or conferees about reduced video quality, perform the following steps:

1. Ask the conferee which conference was joined (ask for the start time, convener's name and/or purpose of the conference).
2. Log in as **agent** to the MCU-ST.
3. Find the *Conference ID* number on the Conference Appointment Form or enter **list conference** and note the Conference ID**.**
4. Enter **status conference *conference-ID,*** where ***conference-ID*** is the *Conference ID* located in Step 3. The Status of Conference screen is displayed.
5. On Page 1 of the Status of Conference screen, check the *Vid* column. If there is a **c**, the conference video quality was changed when a video endpoint that did not support the higher-quality video joined. When this occurs, the entire conference is adjusted to accommodate the endpoint.
6. Check the *Aud* column. If there is a **c** in the field, the audio quality was changed when a video endpoint that did not support the audio capabilities of the other endpoints joined. When this occurs, the entire conference is adjusted to accommodate the endpoint.
7. Check the *Rate Adaptation* field. If the field contains entry **y**, check the *Admin Bandwidth* and *Conf Bandwidth* fields. If *Admin Bandwidth* contains **64k** and *Conf Bandwidth* contains **56k**, the rate of the 64k conference has changed to 56k because a 56k endpoint joined the conference.

Conferee Cannot be Seen by Other Participants

A conferee may not be seen by other conference participants even if these participants have full video privileges (that is, even if the participants are *not* audio-only participants). To identify this problem, you must first obtain conference and conferee (Meet-Me number and MCU-extension) information. For a dial-in conferee, perform Steps 1 through 7 of the "Dial-In Conferee Cannot Join a

Conference” section earlier in this chapter. For a dial-out conferee, perform Steps 1 through 7 of the “Dial-Out Conferee Cannot Join a Conference” section earlier in this chapter. Then enter the **status conference** command and do the following:

1. Check the administered endpoint type associated with the problem call. If the type is **BOND**, verify that the connected endpoint supports BONDing. If the endpoint supports only 2B capability, the endpoint will always be set up in audio-only (transparent) mode. In such a case, the *Bond Mode* field contains entry **t**, indicating transparent mode.
2. If the type is **H.320**, check the *Capability Ch* field. If this field has entry **y**, check the *Admin Bandwidth* and *Conf Bandwidth* fields. If the *Admin Bandwidth* field has entry **64k** and the *Conf Bandwidth* field has entry **56k**, check the *Rate Adpt* field for the problem endpoint. Entry **n** in the field indicates that the conference rate adapted from 64k down to 56k but the endpoint had problems adapting. Such an endpoint may still receive video and participate in the audio portion of the conference, but it cannot be a valid video source. Attempt to set up the call again. Ask the dial-out user to drop the call and dial in again. If these actions fail to correct the problem, check if the dial-in user can originate a 56k 2B call instead of a 64k 2B call to join the conference. For a dial-out user, change the endpoint to a dial-in endpoint (that is, remove the destination numbers for this endpoint on the Conference Record form); then change the endpoint back to a dial-out endpoint.
3. Entry **n** in the *Capability Ch* field indicates that the endpoint declared it can support 2B channels but one of the channels did not connect due to either a network or endpoint problem. Before escalating the problem, attempt to set up the call again. Ask the dial-out user to drop the call and dial in. Ensure that the dial-in user dialed the correct Meet-Me numbers for both channels. For a dial-out user, change the endpoint to a dial-in endpoint, then change it back to a dial-out endpoint to initiate the call. Ensure that the correct Meet-Me numbers for both channels are specified on the Conference Record form.
4. Entry **e** in the *Mlp* field indicates that the endpoint does not have MLP capability. Therefore, the endpoint joined to the conference as an audio-only endpoint.
5. Entry **e** in the *Aud* field indicates that the endpoint does not support G.728 (LD-CELP) audio mode. Therefore, the endpoint is joined to the conference as an audio-only endpoint.

Conferee Lost Audio or Video

For a dial-in call, ask the conferee to drop from the conference and attempt to rejoin. For a dial-out call, attempt to redial by entering **y** into the *Redial?* flag in the Conference Record. If the solution for either problem fails, refer to "When All Else Fails" on page 5-87 to escalate the problem.

All Conferees Were Dropped

If all conferees are dropped from a conference that was in progress, use the following procedure:

NOTE:
Conferees are dropped vis-a-vis the MCU that services them. Therefore, in a cascaded conference, it is possible that some conferees will be dropped while others will not be dropped.

1. Ask the conferee which conference was joined (ask for the start time, convener's name, and/or purpose of the conference).
2. Log in as **agent** on the MCU-ST.
3. Find the *Conference ID* number on the Conference Appointment Form or enter **list conference** and note the *Conference ID***.**

   NOTE:
   If you are trying to locate a reserved conference, you can enter **list conference class reserved** for a listing of reserved conferences only. Likewise, if you are trying to locate a dedicated conference, you can enter **list conference class dedicated**.

4. Enter **display conference *conference-ID*** where ***conference-ID*** is the *Conference ID* number located in Step 3. The Conference Record screen is displayed.
5. Check the *Stop Time* field on the Conference Record screen to make sure the conference has not ended.
6. Check the *Status* field. If the *Status* is **complete**, the *Stop Time* of the conference has been reached and all conferees were dropped.
7. If the *Status* is **inactive**, check the *Class* field. If **file** appears in the *Class* field, the conference was canceled when it was changed from **reserved** or **dedicated** to **file**.
8. If you cannot diagnose the problem, refer to "When All Else Fails" on page 5-87 to escalate the problem.

H.320 Party Dials Audio Add-On Number

If a H.320 party tries to enter a conference by dialing a number intended for an audio-only endpoint, the caller hears a fluttering sound and is then dropped. The drop reason "Far-End" appears on the Status Conference report. If a H.320 party calls the reservations agent to complain about not being able to enter the conference, the agent can diagnose the problem by issuing the **status conference** command and then checking which multimedia parties have not yet joined the conference. The agent can then give the correct number to the multimedia party.

Audio Add-On Party Dials H.320 Number

If an Audio Add-On party tries to enter a conference by dialing a number intended for a H.320 endpoint, the call is dropped. The drop reason “Handshake” appears on the Status Conference report. If an Audio Add-On party calls the reservations agent to complain about not being able to enter the conference, the agent can diagnose the problem by issuing the **status conference** command and then determining the correct number for the Audio Add-On party. The agent can then give the correct number to the Audio Add-On party.

Calls Involving BONDing Deficient

A conference with BONDing numbers or participants may encounter problems. The following sections discuss these problems and how you should deal with them.

NOTE:
For problems vis-a-vis cascade BONDing, refer to "Cascaded Call Deficient" on page 5-74.

NOTE:
Refer to the Status Conference Endpoint screen for debugging purposes.

H0 Participant Dials a BONDing Number

If an H0 participant tries to enter a conference by dialing a number intended for a BONDing endpoint, the call is dropped. The drop reason *Bandwidth* appears on the Status Conference report. For this scenario, use the **status conference** command and provide the correct H.320 Meet-Me number to the H0 endpoint.

2B Participant Dials a BONDing Number

If a 2B participant tries to enter a conference by dialing a number intended for a BONDing endpoint, the call is cut through to the conference and joined only as a H.320 audio-only endpoint via BONDing transparent mode. For this scenario, use the **status conference** command. Entry **t** appears in the *Bond Mode* field. This indicates that BONDing transparent mode has been invoked.

BONDing Participant Dials an H0 Number

If a BONDing participant tries to enter an H0 conference by dialing a number intended for a H.320 H0 endpoint, the call is dropped. The drop reason *Bandwidth* appears on the Status Conference report. For this scenario, use the **status conference** command. If the BONDed participant can communicate at a 384k bandwidth, provide the correct H.320 Meet-Me number to join the BONDed conference.

BONDing Participant Dials a 2B Number

If a BONDing participant tries to enter a conference by dialing a number intended for a 2B endpoint, the call is dropped. The message “Handshake” appears in the report. For this scenario, use the **status conference** command and provide an appropriate H.320 Meet-Me number to the participant to join the BONDed conference.

BONDing Participant Dials a Multirate Number

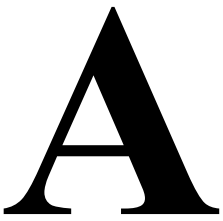
If a BONDing participant tries to enter a conference by dialing a number intended for a H.320 multirate endpoint, the call is dropped. The drop reason *Bandwidth* appears on the Status Conference report. If the BONDed participant can communicate at a reserved bandwidth, provide a correct H.320 Meet-Me number to join the BONDed conference.

When All Else Fails

If you have performed the preceding procedures and you do not have the solution to the problem (or the recommended action is to escalate the problem), the Multimedia Collaboration Center (MCC) or International Technical Assistance Center (ITAC) engineers are available to assist you. To contact the Technical Center or ITAC, follow these procedures:

1. Make sure you have both the Conference Appointment Form and the Port and Extension Usage Chart available.
2. Log in as **agent** to the MCU-ST.
3. Enter **status conference *conference-ID*** to display the Status of Conference screen.
4. Call either the Multimedia Collaboration Center (MCC) at **800 242-2121** or the international center at **303 804-3777** and follow the prompts for video conferencing.

Conference Command Summary



Overview

This appendix provides a summary of the following:

- Conference scheduling and troubleshooting commands.
- Conference control commands

Conference Scheduling and Troubleshooting Commands

The tables in this section include the relevant commands and actions available from the MCU Scheduling Terminal (MCU-ST).

Table A-1. Conference Scheduling and Troubleshooting Commands

Command	Description
list mcu-extension	Lists all the MCU-extensions that have been administered.
add mcu-extension xxxxx	Adds an MCU-extension. Used by telecommunications managers who should choose MCU-extensions that are consistent with the MCU's dial plan and trunks.
display mcu-extension xxxxx	Displays an MCU-extension.
change mcu-extension xxxxx	Changes the characteristics of an MCU-extension.
remove mcu-extension xxxxx	Deletes an MCU-extension.
add conference x	Adds a dedicated, reserved, or file conference.
change conference x	Changes the characteristics of a conference.
display conference x	Displays the conference record.
remove conference x	Removes a conference (file or reserved/completed only).
list conference	Lists the conferences administered on the MCU.
display available-ports 2B	Displays the number of ports available for 2B-channel 56k or 64k conferences over the next 24 hours.
display available-ports xxx	Displays the number of ports available for various ISDN multirate or BONDing conferences over the next 24 hours (for example, *display available-ports 384k, display available-ports B280/320,* etc.).
display available-ports T.120	Displays the number of data ports available for MCU conferences over the next 24 hours.
status conference x	Displays details about a conference that is active, in-use, or completed.

Table A-1. Conference Scheduling and Troubleshooting Commands — *Continued*

Command	Description
status conference x endpoint y	Displays details about a specific endpoint in a conference.
status to-conference x	Generates a conference termination warning tone and indicates to the endpoints how much time is left in the conference.
monitor conference x	Displays the status of a specified active conference in 30-second intervals. You can also display status on demand by pressing the “update” button.

Table A-2. Conference Class

Class	Description
dedicated	Conference is available continuously until it is changed to file.
reserved	Conference is scheduled to be available for a specified time period within the next 24 hours.
file	Conference is ignored by the MCU. Use this for recurring conferences and for recordkeeping.

Table A-3. Conference Status

Status	Description
active	Conference is available to receive calls.
inactive	Conference is not available to receive calls.
in-use	One or more conferees has joined the conference.
complete	A reserved conference has passed its stop time.

Table A-4. Conference Record Procedures

Action	On the Conference Record Screen
Stopping a dedicated or reserved conference	Change the *Class* to **file**. This stops the conference immediately.
Extending a reserved conference	Change the *Stop Time*.
Removing a dedicated or reserved conference	Change the *Class* to **file** and then remove it.

Conference Control Commands

Conference control commands can be issued from the MCU-MT to control MCU conferences. These commands are intended for troubleshooting purposes, and they are discussed in Chapter 4.

Feature Descriptions

B

Overview

This appendix describes the primary Avaya MultiPoint Conferencing Unit (MCU) features and the availability of each feature.

The features in this section are arranged in alphabetical order, regardless of the functional area to which they apply. The information for each feature is presented under six headings: Description, Considerations, Interactions, Administration, and Hardware and Software Requirements.

- Description

  Defines the feature, tells what it does for the user or how it serves the system, and briefly describes how it is used.

- Considerations

  Discusses the applications and benefits of the feature, followed by the feature parameters and any other factors to be considered when the feature is used.

- Interactions

  Lists and briefly discusses other features that may significantly affect the feature being described. Interacting features are those that:

  — Depend on each other — one of the features must be provided if another particular feature is being used.

  — Cannot coexist — one of the features cannot be provided if the other feature is provided.

  — Affect each other — the normal operation of one feature modifies, or is modified by, the normal operation of the other feature.

— Enhance each other — the features, in combination, provide improved service to the user.

- Administration

  States whether or not administration is required, how the feature is administered, who administers the feature, and lists items requiring administration.

- Hardware and Software Requirements

  Lists any additional hardware and/or software requirements needed for the feature.

NOTE:
Many of the Avaya MCU features and options are closely tied to administration and reports generation. This chapter is intended to provide an overview of the Avaya MCU features and options. For information concerning administration and reports, refer to Chapters 2 and 3.

Feature Summary

The following table provides a brief summary of the system features.

Table B-1. System Feature Summary

Feature	Category/Function
Audio Add-On (universal H.323 Integrated Audio Conferencing with Dynamic Echo Cancellation)	Multimedia Conferencing
Audio Modes	Multimedia Conferencing
Automatic Alternate Routing	Routing
Automatic Circuit Assurance	Identifying trunk problems (currently not used on the MCU)
Automatic Route Selection	Routing
Bandwidth On Demand Interoperability Group (BONDing)	Routing
Basic/Enhanced Service Flag	Multimedia Conferencing
BRI/DCP Direct Connect Interface	BRI or DCP connection directly to the MCU
Call Detail Recording	Detailed call information
Call-by-Call (CBC) Service Selection	Trunk service selection on a call-by-call basis (ISDN service)
Cascading	Multimedia Conferencing
Class of Restriction (COR)	Assigning restrictions to facilities
Conference Redial Flag	Automatic retry on conference dial failure
Conference Reservation and Control System (CRCS)	Multimedia Conferencing
Continuous Presence *Plus*	Enables a multipoint video conference to compose a picture consisting of the video from a maximum of 16 sites participating in the conference
DS1 Trunk Service	DS1 trunk interface
Dedicated Access	Allows non-signalling T1/E1 as well as EIA-530, RS449, and V.35 endpoints to join a conference
Dial-Out	Automatically calls all conference participants

Table B-1. System Feature Summary — *Continued*

Feature	Category/Function
Dial Plan	Enables trunk, station, and video port administration
Dynamic Resizing	Multimedia Conferencing
Executive Conferencing	Enables a conference to compose a picture of two or three “other” sites for each conference participant with no “self-view” (that is, no site ever sees itself).
Facility Test Calls (with Security Measures)	Provides for test calls from the maintenance alarm terminal
Facility and Non-Facility Associated Signaling	ISDN-PRI signaling
Far-End Camera Control (FECC)	Allows a site that requests far-end camera control to control the camera of the far-end site it is currently viewing
H.263/H.261 Transcoding	Video mode interworking capabilities
H.323 Audio	VoIP support for audio-add on
High-/Low-Speed Interworking	Allows lower speed endpoints to join higher speed conferences as audio-only endpoints
Integrated Services Digital Network (ISDN) — Primary Rate Interface (PRI)	Used for connecting the Avaya MCU to an ISDN-PRI trunk
ISDN-BRI Trunk Interface	Supports ISDN-BRI connections to the public network
Lip Synchronization	Conference audio delay option
Multirate Bandwidths	Larger bandwidths with ISDN interface
Networking/Call Handling	Connection of network calls to the appropriate video port
Notification Package	Includes the following: ■ Terminal names feature ■ Conference tones ■ Video-switching mode notification (tones and text) ■ Play tone command

Table B-1. System Feature Summary — *Continued*

Feature	Category/Function
On-Screen Display	Text and ANI code capabilities
OneNumber Access	Common external extension for multiple MCU endpoints
Passwords	Provides additional conference security with per-conference passwords.
Rate Adaptation	Adapts for mixed 56k/64k conferences
Recent Change History	History report generation
Report Scheduler and System Printer	Reports scheduling
RS366 Dialing	Dial string processing for endpoints connected to the MCU via data interfaces
Security Violation Notification	Notification of unauthorized attempt at system management access
Selected Communications Mode (SCM) Upgrades	Configures conferences as endpoints join or leave the conference
Service Flags	Provides for identification of interoperability concerns
Speed Match	Interworking of low-speed and high-speed endpoints
Still-Frame (H.261 Annex D)	Still-image transfer in the video channel
System Measurements	Traffic and efficiency report generation
System Status Report	Report generation
T.120 Data Conferencing	Multipoint data conferencing
Terminal Names	Provides endpoint identification during a conference
Uniform Dial Plan (UDP)	Shared dial plan among a group of Avaya MCUs or PBXs

Table B-1. System Feature Summary — *Continued*

Feature	Category/Function
Universal Conference Control (UCC)	Limited chair control for non-standard endpoints.
Video Conference Control Functions	Multimedia Conferencing
Video Modes	Video compression and transcoding

Audio Add-On (Integrated Audio Conferencing with Dynamic Echo Cancellation)

Description

Audio Add-On (Integrated Audio Conferencing with Dynamic Echo Cancellation and H.323 support) enables a reservations agent to add up to 25 audio-only endpoints to a conference. These universal audio-only ports provide the benefits for conference participants to call in from an H.323 VoIP audio terminal over a LAN or from a POTS phone over the PSTN. A common pool of MCU Extensions for audio add-on participants support both PSTN and H.323 voice calls.

Considerations

The maximum number of Audio Add-On ports per MCU is 32. The maximum number of Audio Add-On ports per conference is 25. When there is a mixture of PSTN and VoIP audio-add ons, both VoIP and PSTN can use One Number.

Interactions

Dynamic Resizing allows Audio Add-On only as an available audio port.

Administration

Audio Add-On is administered per system by the system administrator. For the Audio Add-On capability, the number of Audio Add-On ports must be administered. Audio Add-On ports are administered in increments of four.

Hardware and Software Requirements

The TN788B Voice Conditioner circuit pack is required.

Audio Modes

Description

For each conference, a preferred audio mode must be selected. A conference can be set up to require each endpoint to call the Avaya MCU (known as *dial-in* or *meet-me* setup), for the Avaya MCU to call each endpoint (known as *dial-out* setup) in turn, or for a combination of dial in and dial out. As each endpoint connects with the Avaya MCU for the conference, it automatically provides a capabilities list. The possible audio modes are:

- G.722
- G.728 (LD-CELP) with data sharing
- G.729, G.729B
- G.723_63 (5.6 kbps and 64 kbps)
- G.711M, G.711A (PCM)

NOTE:
The Avaya MCU is administered on a per-conference basis for one of the preferred audio modes (G.711, G.722 or G.728) or for auto selection. In most cases, conferences are set for automatic selection of audio mode.

These audio modes are also supported for IP-connected H.323 endpoints even if the audio mode for the conference is set to another non-IP audio mode:

- G.723
- G.729

Considerations

In auto selection, the Avaya MCU refers to the capabilities list of each endpoint in a highest common denominator (HCD) algorithm to determine the audio mode to use. First, the Avaya MCU attempts to use the audio mode requiring the smallest bandwidth G.722 or G.728 (LD-CELP) if the conference is also administered for data sharing) to provide greater video quality. If a connecting endpoint is not capable of G.722 or G.728 (LD-CELP) mode, G.711 pulse-code modulation (PCM) is selected and data sharing is disabled.

NOTE:
G.728 is the preferred mode in all 2-channel conferences. G.722 is the audio mode that allows the best video quality and is preferred in all other conference bandwidths.

If the endpoint capabilities list does not contain an audio mode common to the endpoints already connected and it is a single-channel endpoint attempting to

connect to a 2-channel conference, the connecting endpoint is allowed an audio-only PCM connection to the conference. Except in the case of High-Speed/Low-Speed Interworking, any other mismatch (such as, a 112k endpoint attempting to connect to a 384K (H0) conference) the endpoint is not allowed to join.

In conferences involving endpoints at higher rates than 64k, endpoints that cannot join with the administered bandwidth are connected as audio-only PCM endpoints.

Interactions

The following features interact with the audio mode selection:

- High-Speed/Low-Speed Interworking.

  This feature allows mismatched bandwidths to join conferences as audio-only endpoints.

- T.120 Data Conferencing

  Refer to "T.120 Data Conferencing" on page B-150 for details.

Administration

Audio modes are administered via the Customer Options form and the Conference Record form. For general information, refer to the “Audio Mode” bullet item on page 1-12.

Hardware and Software Requirements

Consult your Avaya service representative.

Automatic Alternate Routing

Description

Automatic Alternate Routing (AAR) provides alternative routing choices for private on-network calls. With AAR, the system automatically selects the most desirable (normally the least expensive) route over various trunking facilities for private network calls. AAR also provides digit modification to allow on-network calls to route through the public network when an on-network route is not available, and to convert incoming digits to MCU extensions in the Avaya MCU.

The private network of PBXs that utilizes the AAR feature is called an Electronic Tandem Network (ETN). An ETN is a hierarchical network of privately owned trunk and switching facilities that can provide a cost-effective alternative to toll calling between locations. An ETN consists of tandem switches, the inter-tandem tie trunks that interconnect them, the access or bypass tie trunks from a tandem switch to a main switch, and the capability to control call routing over these facilities.

Within an ETN, each switching facility is identified by a unique private network office code. Private network office codes may be one to eight digits in length. Throughout the rest of this description, the private network office code will simply be referred to as the “office code.”

ETN addresses for Uniform Dial Plan (UDP) destinations are limited to a seven-digit format. This means that the location code part for UDP is a three-digit code of the form RNX and the extension number is a four-digit number in the XXXX format (along with limitations that the UDP number cannot start with a 0). Note that five-digit UDP extensions are supported. For other destinations, ETN addresses are not limited to the seven-digit RNX format.

The principal use of AAR is to provide routing of private network calls. Private network calls originate and terminate at a customer location without accessing the public network. The normal scenario is as follows: the dial-out feature is used to dial the AAR access code followed by an on-network number. AAR then selects the route for the call and performs any necessary digit manipulation. AAR selects the most desirable route for the call. If the first choice route is not available, another route is chosen automatically. AAR provides up to six routes for each office code.

Feature operation is completely transparent to the user. The AAR access code is normally the digit 8. Normally, the called number is a private network number.

Private network (on-network) numbers are handled by the AAR feature. An on-network number can be changed into a public network direct-distance dialing number, a CDOS number, or an IDDD number by administering the “ars” call-type for such numbers.

The private network location codes may match public network central office codes. Therefore, the only way to determine the intended network for seven-digit calls is by the AAR or ARS access codes administered in the dial-out number(s) or by specific administration of the “ars” call-type on the AAR Analysis form.

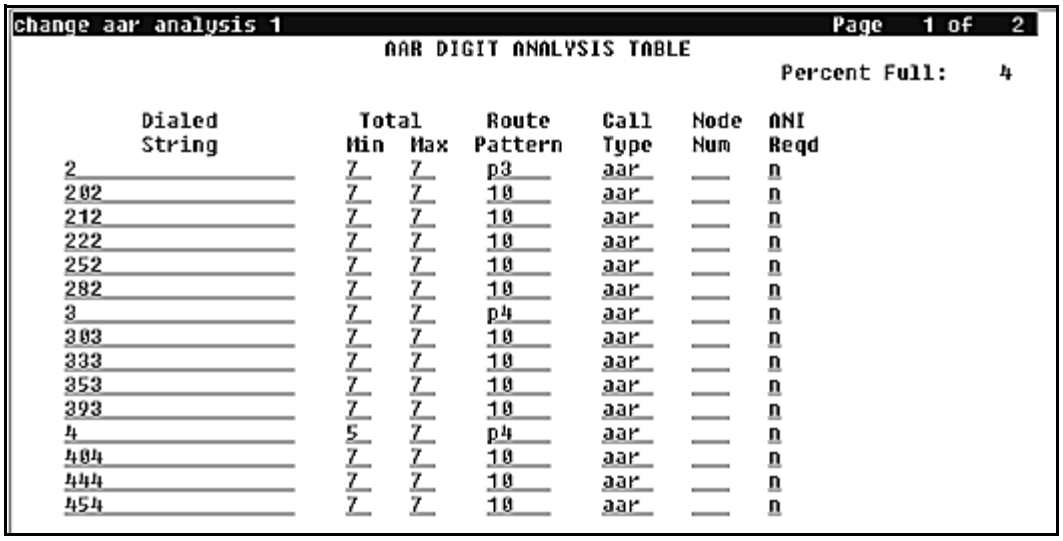
AAR and Subnet Trunking provide a convenient means to place IDDD calls to a frequently called foreign city. Such calls route as far as possible over the private network before exiting the network. The office code is, of course, reserved to represent a particular country and city. At the final on-network switch, the office code is deleted. The international prefix code (011 in the US, 00 in most of Europe, and so on), the country code, and the city code are inserted. The inserted digits plus the last four digits of the originally dialed number constitute the IDDD number.

Similar to the IDDD case, certain domestic calls may reach a point on the network where they can route no further because tie trunks to the next switch are busy or none are provided. In this case, the office code can be deleted and the appropriate public network code inserted. Calls of this type route off-network via a central office. The central office may be connected to either an ETN tandem or main switch. Toll charges, if any, are from the final ETN switch to the destination.

Each office code can point to any one of several Routing Patterns, numbered 1 through a maximum limit of 254 for your system. More than one office code can point to the same pattern. A blank pattern provides intercept treatment and pattern 254 is the default for all office codes. Routing Patterns are shared with ARS. Access to a route within the pattern is controlled by Facilities Restriction Level (FRL) assignments. FRLs are fully described elsewhere in this chapter. For outgoing ISDN calls, route selection is dependent on Bearer Capability Class (BCC), FRL, and type of facility.

Digit Conversion

Once the AAR access code and the called number are dialed, the dialed number is compared to entries in the Matching Pattern fields of the AAR Digit Conversion Table screen. An example of this is shown in the following figure. If all or part of the dialed number matches one of the Matching Patterns on the screen, the dialed number is replaced by a new number from the Replacement String field on the screen. This new number is then used to route the call, the call becomes an ARS call, and is routed using the ARS Analysis Table. This function may be used to route specific dialed number strings to a different number, intercept, and so on. The Digit Conversion Table is only used once per call.



```
change aar analysis 1                                    Page   1 of   2
                          AAR DIGIT ANALYSIS TABLE
                                                          Percent Full:   4

      Dialed          Total      Route    Call    Node   ANI
      String          Min  Max   Pattern  Type    Num    Reqd
2                     7    7     p3       aar            n
202                   7    7     10       aar            n
212                   7    7     10       aar            n
222                   7    7     10       aar            n
252                   7    7     10       aar            n
282                   7    7     10       aar            n
3                     7    7     p4       aar            n
303                   7    7     10       aar            n
333                   7    7     10       aar            n
353                   7    7     10       aar            n
393                   7    7     10       aar            n
4                     5    7     p4       aar            n
404                   7    7     10       aar            n
444                   7    7     10       aar            n
454                   7    7     10       aar            n
```

Figure B-1. AAR Digit Conversion Table

The purpose of AAR digit conversion is simply to convert private network numbers to public network numbers. This allows the system to change specific dialed digits to a public network number and route some calls via ARS. Also, unauthorized private network calls can be routed to receive intercept treatment.

AAR Analysis

After an AAR call passes through AAR Digit Conversion, AAR Analysis is performed.

The system uses AAR Analysis to compare the dialed number with entries in an AAR Analysis Table. When the system finds a dialed string entry in the table that matches the dialed number, the AAR Analysis Table maps the dialed number to a specific Routing Pattern (discussed later) and Call Type. The selected Routing Pattern and Call Type are then used to route the call. If the Call Type field on the AAR Analysis Table for a digit string is “ars,” call processing crosses over to ARS and the call is processed as an ARS call. The AAR Analysis Table screen form also shows the minimum and maximum number of digits required for digit analysis of each dialed number. An example of the AAR Analysis Table screen form is shown in following screen.

Dialed string entries may contain the letter “x” or “X,” which is used as a “wildcard” character. This wildcard character matches any of the digits 0 through 9. For example, a dialed string entry of “3x” applies to all calls beginning with 30 through 39. This “wildcard” makes it possible for traditional three-digit RNXs to be represented in several ways in the AAR Analysis Table. For example, RNXs 200 through 299 can be assigned to the AAR Analysis Table in either of the following ways:

Dialed String	Minimum Number of Digits	Maximum Number of Digits
2	7	7
	or	
20	7	7
21	7	7
22	7	7
...	...	...
29	7	7
	or	
2xx	7	7
	or	
20x	7	7
21x	7	7
22x	7	7
...	...	...
29x	7	7

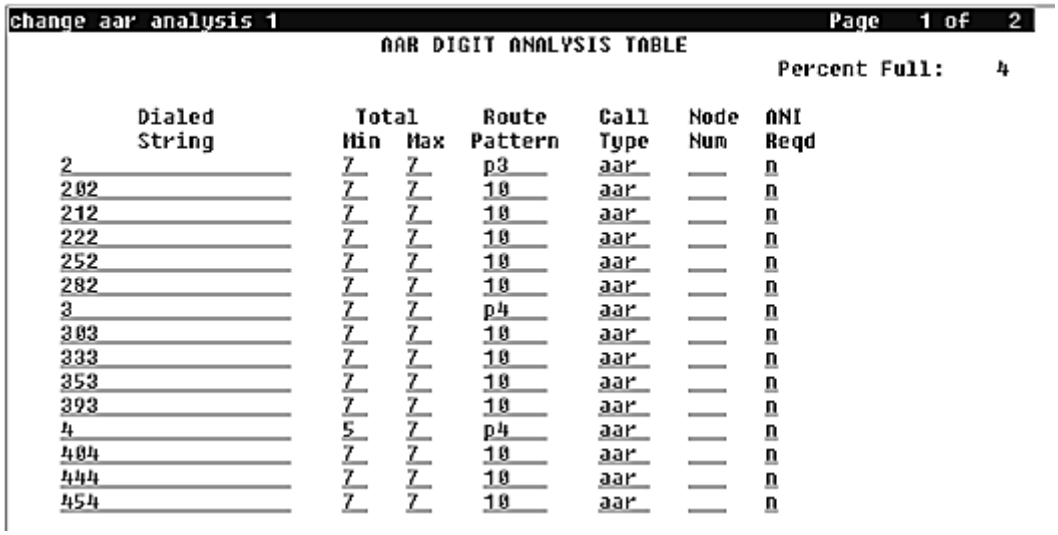
It is possible that some numbers may overlap other numbers. For example, the AAR Analysis Table may have dialed string entries of “645” and “6452.” In this case, for example, the number 645-2045 will be routed according to the 6452 entry (the longest dialed string).

When the UDP is used, the three-digit RNX dial string representation must be used on the AAR Analysis Table to match the administration in the UDP table.

Possible Call Types in the AAR Analysis Table are as follows:

- **aar** — Regular AAR call
- **ars** — Crossover to ARS call

The following figure shows the AAR Digit Analysis Table.



```
change aar analysis 1                                    Page   1 of   2
                          AAR DIGIT ANALYSIS TABLE
                                                        Percent Full:   4

      Dialed          Total      Route    Call    Node   ANI
      String          Min  Max   Pattern  Type    Num    Reqd
2                     7    7     p3       aar     ___    n
202                   7    7     10       aar     ___    n
212                   7    7     10       aar     ___    n
222                   7    7     10       aar     ___    n
252                   7    7     10       aar     ___    n
282                   7    7     10       aar     ___    n
3                     7    7     p4       aar     ___    n
303                   7    7     10       aar     ___    n
333                   7    7     10       aar     ___    n
353                   7    7     10       aar     ___    n
393                   7    7     10       aar     ___    n
4                     5    7     p4       aar     ___    n
404                   7    7     10       aar     ___    n
444                   7    7     10       aar     ___    n
454                   7    7     10       aar     ___    n
```

Figure B-2. AAR Digit Analysis Table

Some special dialing patterns are automatically mapped to a specific Routing Pattern and Call Type. These special dialing patterns, shown in the following table, are preassigned and require no administration. However, they can be changed by the system administrator.

Table B-2. AAR Analysis Default Translations

Dialed String	Number of Digits		Route Pattern	Call Type
	Minimum	Maximum		
0	1	23	—	ars
1	4	23	—	ars
2	7	7	254	aar
3	7	7	254	aar
4	7	7	254	aar
5	7	7	254	aar
6	7	7	254	aar
7	7	7	254	aar
8	7	7	254	aar
9	7	7	254	aar
X11	3	3	—	ars

Normally, the **Route Pattern** field on the Analysis Table screen contains a routing pattern number (1 through 254). However, this field may instead contain a Remote Home Numbering Plan Area (RHNPA) table number (r1 through r32). When an AAR Analysis table points to an RHNPA table, the next three dialed digits are compared with codes in the selected RHNPA table. Each code on the table is then mapped to a specific routing pattern number (1 through 254).

Routing Patterns

The digit translations performed on an AAR call by the AAR Analysis and RHNPA tables cause a specific Routing Pattern to be selected for the call. The Routing Patterns are numbered 1 through 254. More than one combination of dialed digits can point to the same pattern. A blank entry instead of a Routing Pattern number provides intercept treatment. However, with AAR, digit translation should always point to a Routing Pattern. If calls to some numbers are to be denied, this should be handled by FRL assignment, not by intercept on the codes. FRLs are discussed elsewhere in this chapter.

The Routing Pattern applicable for a given call contains a list of up to six trunk groups that can be used for the call. Trunk group access is controlled by FRLs. The digit manipulation necessary to route the call is controlled by the Subnet Trunking feature. Otherwise, the digit string to be outpulsed is as dialed by the user or as converted by AAR Digit Conversion.

Considerations

AAR provides efficient use of private network facilities.

ARS and AAR Analysis tables together can have up to 2,000 entries.

If a customer changes AAR routing assignments, it is the customer's responsibility to notify the RSC network designer and the SCO technician of the changes to receive their continued support.

Digit deletion/insertion can be used to route calls to the MCU.

Internal memory resources used for AAR Digit Analysis are shared by ARS, AAR, Digit Conversion, and Toll Analysis features. A Percent Full field on the ARS and AAR Digit Analysis screens indicates how many of these resources have been used.

Interactions

The following features interact with the AAR Feature.

- ARS

  ARS and AAR can access the same trunk groups and share the same Routing Patterns and RHNPAs. Also, AAR calls can be administered to cross over to ARS via digit analysis and digit conversion.

- CDR

  An AAR call using a trunk group marked for CDR is indicated by the dialed access code and by a Condition Code. The dialed number is recorded as the called number.

  Subnet Trunking does not affect CDR. The dialed digits are recorded, not the outpulsed digits.

  The originating FRL associated with the call is recorded. However, if 15-digit CDR account codes are used, the FRL value is overwritten.

  If CDR generation is administered for a trunk group assigned to a Routing Pattern, data will be collected for all calls routed through the trunk group. If an CDR account code is to be dialed with an AAR call, it must be dialed before the AAR access code is dialed.

- UDP

  When a UDP number is dialed (four or five digits), the routing software initially converts the dialed number to a seven-digit format. The location code in the UDP table equates to a three-digit RNX plus four digits. In a four-digit UDP, the number created is the RNX plus the four extension digits originally dialed. In a five-digit UDP, the number created is the RNX plus the last four extension digits dialed.

UDP destinations are limited to a seven-digit format. This means that the location code part for UDP is a three-digit code of the form RNX and the extension number is a four-digit number in the XXXX format (along with limitations that the UDP number cannot start with a zero).

When the UDP is used, the three-digit RNX dial string representation must be used on the AAR Analysis Table to match the administration in the UDP table.

Administration

AAR is initially assigned on a per-system basis by an Avaya service technician. After the feature is activated, the following items are administered by either the system administrator or the service technician:

- AAR Access Code (one to three digits)
- AAR Analysis Table
- AAR digit conversion table Up to 32 RHNPA Tables
- Up to 254 Routing Patterns
- FRLs — Assigned via Class of Restriction to each originating facility, authorization codes, and barrier codes
- Trunk Groups to be used with AAR

Hardware and Software Requirements

AAR may require additional tie trunks. These additions are, however, cost effective when compared to the other alternatives for call routing.

Automatic Circuit Assurance

Description

Automatic Circuit Assurance (ACA) assists users in identifying possible trunk malfunctions. The system maintains a record of the performance of individual trunks relative to short and long holding time calls. The system automatically initiates a referral call to a maintenance alarm terminal when a possible failure is detected.

This feature is currently not used on the MCU.

Automatic Route Selection

Description

The Automatic Route Selection (ARS) feature routes calls over the public network based on the preferred (normally the least expensive) route available at the time the call is placed.

ARS provides a choice of up to six routes for any given public network call. The following types of trunk groups can be accessed by ARS:

- **Tie trunks** — Used to provide access to an ETN or public network. In some cases, it is preferable to allow a private network to handle the routing of calls destined for the public network.
- **ISDN-PRI** — Used for calls over an ISDN and provides users access to a variety of switched nodal services such as the ACCUNET. digital service and allows access to other inter-exchange carriers or private networks.

A variety of numbers can be called using ARS, including seven-digit numbers, 10-digit numbers, International Direct Distance Dialing (IDDD) numbers, service codes, Customer-Dialed Operator-Serviced (CDOS) numbers (for example, in the United States, 0+ or 01+), and Inter-Exchange Carrier (IXC) numbers.

ARS Dialing

The dial-out feature uses ARS for outgoing calls. ARS is initiated if the ARS access code (normally the digit 9) is included in the first digit of the dial-out number(s) administered by the reservations agent.

Special Dialing Patterns

The system recognizes certain dialing patterns on outgoing calls and routes these calls accordingly. The descriptions of these dialing patterns reflect the system defaults as used in the United States. Other countries may require different administration of these values in the dial-out numbers. The following dialing patterns are recognized:

- **DDD Calls With Prefix Digit 1 Required**

  The dial-out number may or may not be required to contain a 1 before a seven- or 10-digit dial out string, depending on the system's dial plan administration. There are two cases where the digit 1 must be included:

  — Some metropolitan areas are so densely populated that there simply are not enough traditional central office codes. Therefore, it is possible that some NPA codes, also called "area codes" may also serve as CO codes. In this case, the digit 1 must be included if a 10-digit call is intended. The first digit tells the system whether to route the call as a seven-digit call within the home NPA (1 not

included) or as a 10-digit call to another NPA (1 included). In this case, the dial plan should be administered so that the 1 is included for 10-digit calls.

— Digit 1 may also be required in areas near an NPA boundary. In these areas, certain calls to the adjacent NPA may be local calls rather than toll calls. However, central office codes may be duplicated in the home and adjacent NPAs. Also a CO code in the home NPA may be a toll call. Therefore, if the digit 1 is not required on certain adjacent NPA local calls, then it must be included on the home NPA seven-digit toll calls so the system can differentiate between the intended destinations.

- **DDD Calls with Prefix Digit 1 Not Required**

  The first digit following the ARS access code may or may not be a 1. In systems where the 1 prefix is used, but not required (as administered on the Dial Plan form), using the 1 prefix before a 10-digit call is optional and the prefix is ignored.

- **IDDD Calls**

  IDDD numbers consist of a Country Code and a National Number. The National Number is simply the number used when calling within the country. The Country Code can be from one to three digits in length. In the NANP the National Number is 10 digits in length. The Country Code and National Number together cannot exceed 12 digits. In the NANP, international numbers are recognized by special prefix codes:

  — **011** — Indicates that dial out is making a station paid direct international call. The Country Code and National Number follow the 011 prefix.

- **Calls Dialed with Inter-Exchange Carrier (IXC) Access**

  The first digits following the ARS access code are an IXC Access Code. The access code may be followed by a DDD or an IDDD number. If included in the dial-out number(s), it selects the carrier or facilities used for routing the call.

Digit Conversion

Once dial out uses the ARS access code and the called number, the dialed number is compared to entries in the Matching Pattern fields of the ARS Digit Conversion Table screen. An example of this screen is shown in the following figure. If all or part of the dialed number matches one of the Matching Patterns on the form, the matching part of the dialed number is replaced by a new number from the **Replace** field on the form. This new number routes the call via AAR over a private network. If no corresponding entry is found in the AAR Digit Analysis table, the ARS Digit Analysis table is searched for a match with the new modified number and routed accordingly. If the call fails and a match is not found, an intercept tone is sounded.

```
change ars digit-conversion 0                              Page  1 of  2

                          ARS DIGIT CONVERSION TABLE
                                                        Percent Full: 2

Matching Pattern     Min   Max   Del    Replacement String     Net  Conv ANI Req

_________________    __    __    __     _________________      _    ____ ___ n_
_________________    __    __    __     _________________      _    ____ ___ n_
_________________    __    __    __     _________________      _    ____ ___ n_
_________________    __    __    __     _________________      _    ____ ___ n_
_________________    __    __    __     _________________      _    ____ ___ n_
_________________    __    __    __     _________________      _    ____ ___ n_
_________________    __    __    __     _________________      _    ____ ___ n_
_________________    __    __    __     _________________      _    ____ ___ n_
_________________    __    __    __     _________________      _    ____ ___ n_
_________________    __    __    __     _________________      _    ____ ___ n_
_________________    __    __    __     _________________      _    ____ ___ n_
_________________    __    __    __     _________________      _    ____ ___ n_
_________________    __    __    __     _________________      _    ____ ___ n_
_________________    __    __    __     _________________      _    ____ ___ n_
_________________    __    __    __     _________________      _    ____ ___ n_
_________________    __    __    __     _________________      _    ____ ___ n_
```

Figure B-3. ARS Digit Conversion Table

Digit analysis implies both route and conversion. The algorithm for deciding how to analyze a call is as follows:

- number of digits
- most digits matched
- explicit digits over wildcards (from left to right)
- conversion nodes over route nodes

The primary purpose of ARS digit conversion is to convert public network numbers (to be routed with ARS) to private network numbers (to be routed with AAR).

NOTE:
You can convert back to another AAR number or an extension, where the extension most likely is a UDP.

This can save toll charges and allow the reservations agent to route calls on the customer's private network facilities. Also, unauthorized public network calls can be blocked and routed to a receive intercept treatment via digit conversion.

The following table shows several ARS Digit Conversion examples. The following conditions are assumed for the examples: ARS Access Code = 9, AAR Access Code = 8, Home RNX (Private Network Office Code) = 222, Prefix 1 is required on all long-distance DDD calls, Dashes "-" shown in the table are for readability only.

Table B-3. ARS Digit Conversion Examples

Operation	Actual Digits Dialed	Matching Pattern	Replace-ment String	Modified Address	Notes
DDD call to ETN	9-1-303-538-1345	1-303-538	362	362-1345	The call will be routed via AAR on the route selected for RNX 362.
Unauthorized call to intercept treatment after 976 are ignored by ARS. The call receives intercept treatment.	9-1-212-976-1616	1-XXX-976	#	(blank)	The "#" signifies the end of dialing. Any digits dialed after 976 are ignored by ARS. The call receives intercept treatment.

NOTE:
The dial-out number digits are matched to the Matching Pattern that most closely matches them. For example, if the dial-out number is 957-1234 and matching patterns 957-1 and 957-123 are in the table, the match is on pattern 957-123. The call will be routed as dialed.

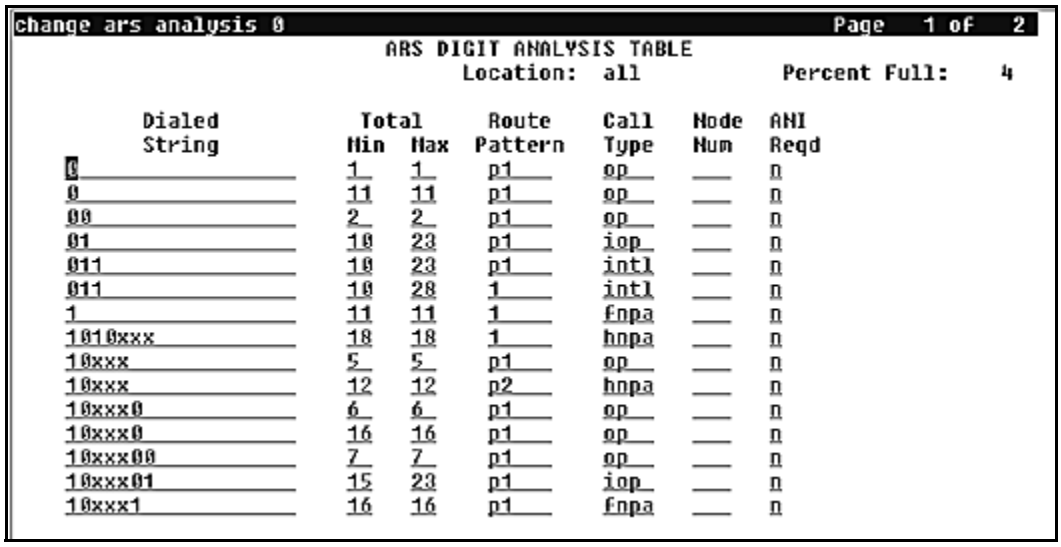
ARS Digit Analysis

ARS calls that pass through ARS Digit Conversion and Toll Analysis are analyzed based on the dial-out PGN.

The system uses ARS Digit Analysis to compare the dialed number with entries in an ARS Digit Analysis Table. When the system finds a Dialed String entry in the table that matches the dialed number, the ARS Digit Analysis Table maps the dialed number to a specific Routing Pattern, discussed later in this chapter, and Call Type. The selected Routing Pattern will then be used to route the call. The ARS Digit Analysis Table screen also shows the minimum and maximum number of trailing digits required for digit analysis of each dialed number. An example of the ARS Digit Analysis Table follows.

Possible Call Types in the ARS Digit Analysis Table are as follows:

- **fnpa** — 10-digit call within North America
- **hnpa** — 7-digit call within North America
- **int** — International call (in the United States, the international prefix is 011)
- **natl** — National numbers within a country (used outside North America)



```
change ars analysis 0                                        Page   1 of   2
                          ARS DIGIT ANALYSIS TABLE
                                  Location:  all          Percent Full:    4

      Dialed          Total      Route    Call    Node   ANI
      String          Min  Max   Pattern  Type    Num    Reqd
0                     1    1     p1       op             n
0                     11   11    p1       op             n
00                    2    2     p1       op             n
01                    10   23    p1       iop            n
011                   10   23    p1       intl           n
011                   10   28    1        intl           n
1                     11   11    1        fnpa           n
1010xxx               18   18    1        hnpa           n
10xxx                 5    5     p1       op             n
10xxx                 12   12    p2       hnpa           n
10xxx0                6    6     p1       op             n
10xxx0                16   16    p1       op             n
10xxx00               7    7     p1       op             n
10xxx01               15   23    p1       iop            n
10xxx1                16   16    p1       fnpa           n
```

Figure B-4. ARS Digit Analysis Table

Some special dialing patterns are automatically mapped to a specific Routing Pattern and Call Type. These special dialing patterns, shown in the following table, are preassigned and require no administration. They can, however, be

changed by the system administrator and probably will be changed for PBXs used outside North America.

Table B-4. ARS Digit Analysis Default Translations

Dialed String	Trailing Digits		Pattern	Route Type
	Minimum	Maximum		
011	10	23		int
1	11	11		fnpa
10XXX011	15	23		int
2	7	7	1	hnpa
3	7	7	1	hnpa
4	7	7	1	hnpa
5	7	7	1	hnpa
6	7	7	1	hnpa
7	7	7	1	hnpa
8	7	7	1	hnpa
9	7	7	1	hnpa

Legend:
fnpa — foreign number plan area (10-digit call)
hnpa — home number plan area (7-digit call)
int — international
X — any digit (0-9)

Normally, the Route Pat (routing pattern) field on the ARS Digit Analysis Table screen contains a routing pattern number of 1 through 254. However, this field may instead contain a Remote Home Numbering Plan Area (RHNPA) table number (r1 through r32). An RHNPA is simply a concentrator for up to 1,000 calls. Calls are routed to these tables by ARS/AAR Digit Analysis when an ARS Digit Analysis table points to an RHNPA table. The next three dialed digits (the code) are compared with the codes in the selected RHNPA table. Each code on the table is then mapped to a specific routing pattern number (one through 254).

The RHNPA tables allow up to 1000 codes to be handled by one entry in the Digit Analysis table.

In summary, Digit Analysis is merely a method of selecting a routing pattern. The routing pattern may be selected in two ways:

- It may be selected directly from the Digit Analysis table.

- The Digit Analysis table may first have to select an RHNPA table that will, in turn, select the routing pattern.

Routing Patterns

The digit translations performed on an ARS call by the Digit Analysis and RHNPA tables cause a specific Routing Pattern to be selected for the call. The Routing Patterns are numbered 1 through 254. More than one combination of dialed digits can point to the same pattern. A blank entry instead of a Routing Pattern number provides intercept treatment. However, with ARS, digit translation should always point to a Routing Pattern. This way, calls to unassigned office codes will be intercepted by the central office, not by the system. By allowing the unassigned codes to be intercepted by the central office, the system administrator does not have to keep track of which office codes are in service. If calls to some codes are to be denied, this should be handled by FRL assignment, not by intercept on the codes. FRLs are discussed elsewhere in this chapter.

The Routing Pattern applicable for a given call contains a list of up to six trunk groups that can be used for the call. Trunk group access is controlled by FRLs. If access to the public network is through a main switch (an Access trunk group is selected for the call), then the call will route through the main switch to one of the public network offices serving the main switch. The digit manipulation necessary to route the call is controlled by the Subnet Trunking feature. Otherwise, the digit string to be outpulsed is controlled by ARS. ARS digit manipulation is called code conversion. Code conversion is used to determine whether or not to outpulse the digit 1 on toll calls and whether to insert, keep, or delete the NPA on toll calls.

The following paragraphs describe how the switch decides what digits to outpulse in specific situations.

Digit 1 Outpulsing

The digit 1 may or may not be required at the public network office to which the call will be routing. If 1 is dialed on 7-digit calls at a stand-alone system (non-ETN), the 1 is outpulsed by the system. In the other cases, the 1 outpulsing requirements are indicated in the system. Since any given call may have a choice of up to six routes, some of which may require a 1 and some of which may not, this indication is associated with each route. Five choices are available and are identified in translations by a Prefix Mark. Digit 1 outpulsing only applies to calls administered as “fnpa” or “hnpa” in the ARS Digit Analysis table. The values and meanings of the Prefix Marks are as follows:

- Prefix Mark 0 — Suppress a dialed Prefix digit 1 for 10-digit FNPA calls, but leave a Prefix digit 1 for the following types of calls:
  - — 10-digit calls that are not administered as FNPA or HNPA types in the ARS Routing Table.
  - — 7-digit HNPA calls
- Prefix Mark 1 — Send a 1 on 10-digit calls, but not on 7-digit calls.

- Prefix Mark 2 — Send a 1 on all toll calls (for example, all 10-digit calls and 7-digit toll calls).
- Prefix Mark 3 — Send a 1 on all toll calls and keep or insert the NPA to ensure that all toll calls are 10-digit calls. Note that a dialed Prefix digit 1 for a 7-digit call makes it a toll call and, hence, NPA is also inserted in this case.
- Prefix Mark 4 — Always suppress a Prefix digit 1.

NOTE:
This capability is required, for example, when routing ISDN-PRI calls to an Avaya 4ESS. If the prefix digit 1 were not suppressed, then the 4ESS would reach calls.

Which of the five possible treatments of the 1 prefix digit should be administered on a given route is based on the characteristics of the distant office. Prefix Mark 0 prevents the system from sending a 1 prefix digit for 10-digit FNPA calls. However, the system leaves a user-dialed prefix digit 1 for 7-digit HNPA calls and 10-digit calls that are not administered as FNPA or HNPA types in the ARS Routing Table.

Prefix Mark 1 causes the system to send a 1 prefix on all 10-digit FNPA calls.

With Prefix Marks 2 and 3, the decision is based on whether the call is a toll call. Toll Lists are provided in the system to furnish this information. A Toll List simply indicates if the office code associated with the call constitutes a toll call from the interconnecting office (not from the local system). Up to 32 Toll Lists are provided. The applicable list number, if any, for the call is given in the Routing Pattern.

Prefix Marks are only applicable on 7- or 10-digit DDD public network calls. Requirements for outpulsing a 1 are specified via Prefix Marks and go into effect when the call accesses is outpulsed. Digit 1 outpulsing only applies to calls administered as “fnpa” or “hnpa” in the ARS Digit Analysis table.

NPA Deletion and Insertion

Each public network route in the ARS Routing Pattern contains an indication of the NPA of the distant end of the trunk group. If this NPA is the same as the NPA associated with the call, the NPA is deleted prior to outpulsing unless the Prefix Mark is 3 and the call is a toll call in the associated Toll List.

NPA deletion and insertion only applies to calls administered as “fnpa” or “hnpa” in the ARS Digit Analysis table.

The NPA is inserted on 7-digit calls if the distant NPA is different from the home NPA or if the Prefix Mark is 3 and the call is a toll call in the associated Toll List.

The preceding paragraphs describe NPA deletion or insertion when the call is an ARS 7- or 10-digit DDD call. An ARS call accessing a tandem trunk is another example of NPA insertion. If the call is a 7-digit ARS call, the system inserts the home NPA before sending the call to the tandem trunk. Therefore, all ARS calls accessing a tandem trunk are 10-digit calls. Whether or not the digit 1 is sent on a tandem call is determined by the prefix rules. This enables the system to distinguish between ARS calls and the 7-digit on-network calls.

IDDD and Service Code Dialing

ARS can provide individual Routing Patterns for each type of call. An ARS call can be processed via the RHNPA table. This is particularly useful on international calls, since the RHNPA table can be used on the country code. Thus, call routing can be determined according to the called country, rather than handling all international calls alike.

Considerations

ARS provides the most-preferred usage of public network facilities available at a system.

Up to 254 Routing Patterns, shared with AAR, can be provided.

Up to 32 Toll Lists can be provided.

Up to 32 RHNPA tables, shared with AAR, can be provided.

ARS and AAR Digit Analysis tables together with the Toll Analysis table can have up to 2,000 entries.

Internal memory resources used for ARS Digit Analysis are shared by ARS, AAR, Digit Conversion, and Toll Analysis features. A Percent Full field on the ARS and AAR Digit Analysis screens indicate how many of these resources have been used.

If a customer changes ARS routing assignments, it is the customer's responsibility to notify the Regional Support Center (RSC) network designer and the System Control Office (SCO) technician of the changes to receive their continued support.

Interactions

The following features interact with the ARS feature.

- AAR

  ARS and AAR can access the same trunk groups and share the same Routing Patterns, toll lists, and RHNPA tables. ARS calls may be converted to AAR calls.

- GRS

  Generalized Route Selection (GRS) works with ARS to provide call routing over the appropriate trunking facilities. Routing is determined by the type of call being made. With GRS, calls may be routed differently than they would with just ARS.

- CDR

  An ARS call using a trunk group marked for CDR is indicated by the dialed access code and by a Condition Code. The dialed number is recorded as the called number. Subnet Trunking does not affect CDR.

  If CDR generation is administered for a trunk group assigned to a Routing Pattern, data will be collected for all calls routed through the trunk group.

Administration

ARS is initially assigned on a per-system basis by an Avaya service technician. After the feature is activated, the following items are administered by the system administrator:

- ARS Access Code 1 (one to three digits)
- ARS Digit Analysis Table
- Up to 254 ARS Routing Patterns
- Trunk Groups to be used with ARS
- Whether or not the system returns dial tone after the ARSFAC is dialed on trunk calls

Hardware and Software Requirements

ARS may be used on a stand-alone system or may be an integral part of a private network. No additional hardware is required for a stand-alone system. A private network may require additional tie trunks and TN744 Tone Detector circuit packs. These additions are, however, cost effective when compared to the alternatives for call routing.

BONDing

Bandwidth on demand interoperability group (BONDing) is a standardized form of inverse multiplexing that is an alternative for gaining higher bandwidths between 112k and 768k without the use of ISDN-PRI multirate or H0 channels.

Description

As an alternative to the special hardware and software required for ISDN-PRI for higher bandwidths, an ANSI BONDing inverse multiplexing standard has been established. There are three BONDing modes outlined in the BONDing standard:

- Mode 1

  Provides user data rates in multiples of the bearer rate (56k/64k). This is the BONDing mode currently supported by the Avaya MCU.

- Transparent mode

  The default mode used when BONDing framing is not detected by a specific timeout period.

- Mode 3

  Includes an in-band monitoring function. Uses 7 B-channels instead of 6 B-channels for 384k. The Avaya MCU does not currently support this mode.

Considerations

To ensure proper operation of the BONDing link, the first call must be successfully connected before the Avaya MCU connects the remaining aggregated calls.

H0 calls can be placed to a 384k BONDed conference; however, the endpoints placing the calls must be translated within the conference as Px64 type endpoints.

One-channel calls placed to a BONDed MCU conference enabled with Interworking are added as audio-only calls.

Within a fixed BONDed environment only, all channels in a BONDed call are required to terminate on the same TN787K circuit pack; this may affect the system port capacity. This is not true within a flexible (non-fixed) environment, which is typical. The type of environment in effect depends on the BONDed rate in effect and the number of BONDing ports used.

Interactions

The following features interact with the BONDing feature.

- Low-/High-Speed Interworking

  BONDed ports cannot coexist with interworking ports in the same conference.

- Audio Add-On

  A maximum of 25 Audio Add-On endpoints are allowed for each BONDed conference.

- Cascading

  The inter-Avaya MCU link must be specified on the Conference Record as a specific BONDed bandwidth cascade. If transparent mode is invoked in the cascade link, the Avaya MCUs connected by the link do not share video, and the participants on one Avaya MCU are added to the conference as audio-only endpoints. If a bandwidth between 112k and 336k is specified for the link, the cascade must join the conference at a BONDed mode1 bandwidth of the same bandwidth or as a BONDed transparent mode link. If 384k is specified for the link, the cascade must join the conference at an H0 bandwidth, a BONDed mode 1 384k bandwidth, or as a BONDed transparent mode link.

- Dial-Out

  The Dial-Out feature dials one channel first and then all remaining channels simultaneously when an endpoint is designated as a BONDed endpoint. The calls can all be the same number or all different numbers. Different numbers are supplied from the endpoint equipment through the BONDing protocol.

- Dynamic Resizing

  To join an active H0 conference, a BONDed endpoint may only join if it is running at the same transfer rate.

Administration

The following administration is required for BONDing.

- Conference Record form

  Identify extensions that correspond to BONDing conferees.

- Availability of Ports form

  Use the BONDing option to identify the available BONDing ports.

- Optional Features form

  Enter the number for maximum BONDing port capacity.

Hardware and Software Requirements

Release 2.0 or later of the Avaya MCU is required for BONDing. The TN787K, vintage 5 or greater Multimedia Interface circuit pack is required for BONDed calls.

Basic/Enhanced Service Flag

Description

There are two user-selectable flags you can use for identifying an Avaya MCU to endpoint interface.

- Basic/enhanced service
- Application compliance

The basic/enhanced service flag is set to identify endpoints that can use the full set of conferencing messages. Some endpoints do not operate properly when other endpoints (or the MCU) attempt to use the full set of messages. If an endpoint cannot operate with the full message set, set the basic/enhanced service flag to basic.

The application compliance flag identifies whether endpoints in a conference can operate properly with T.120 Data Conferencing applications.

Considerations

None.

Interactions

Refer to the individual feature sections for details.

Administration

Translations must be performed to use this feature.

Hardware and Software Requirements

Only release 3.0 or later versions of the Avaya MCU can provide the service and compliance flags.

BRI/DCP Direct Connect Interface

Description

This feature allows the user to connect Basic Rate Interface (BRI) or Digital Communications Protocol (DCP) endpoints directly to the MCU without involving a public or private network, PBX, or MUX. A maximum of 36 Direct Connect endpoints can be administered.

NOTE:
In addition to BRI/DCP, several data interfaces allow endpoints to connect to the Avaya MCU. For details, refer to "Data Interfaces for Access Endpoints" on page B-79.

Considerations

BRI Direct Connect endpoints support data only. Voice capabilities are not provided via the BRI interface.

The endpoints directly connected to the MCU via BRI or DCP can participate in point-to-point conferences as well as multipoint conferences through the MCU.

The feature reduces the system port capacity. Therefore, for example, a 16-port BONDed system, which is a maxed-out system, cannot support BRI/DCP Direct Connect endpoints. Also, CRCS supports the feature but deducts resources from its calculated port capacities.

Interactions

All H.320 and T.120 features supported on the Avaya MCU are supported by this feature. However, refer to the last paragraph in the previous section for some important notes.

Administration

DCP Direct Connect endpoints are administered in increments of four with a maximum capacity of four and a default value of zero. BRI Direct Connect endpoints are administered in increments of 12 with a maximum capacity of 36 and a default value of 0. *A maximum of a combination of 36 of these two endpoint types can be active at one time*.

The following list indicates the fields in the Customer-Options form that you must populate along with the possible values up to a combined maximum total of 36.

- *Max. BRI Direct Connect Port Capacity:* **0**, **12**, **24**, or **36**
- *Max. DCP Direct Connect Port Capacity:* **0** or **4**

Also, the *Type* field in the Processor Interface Data Module form must be populated. To provide ISDN-BRI connectivity via this field, enter value **7500**. Otherwise, enter value **procr-intf**.

NOTE:
The feature can be administered as blocked or non-blocked. For assistance, contact your Avaya representative.

Hardware and Software Requirements

This feature is supported between an MCU running R3.0 (or greater) software and H.320 endpoints.

The TN556 ISDN Line circuit pack and the TN794 NetPacket circuit pack are required in every system that contains BRI Direct Connect endpoints. A maximum of three TN556 ISDN Line circuit packs are supported. Also, a maximum of two TN754 Digital Line circuit packs are supported; the second circuit pack is added to allow for DCP Direct Connect capability.

Endpoints that are directly connected to the MCU via BRI terminate on the TN556 circuit pack. Endpoints that are directly connected to the MCU via DCP terminate on the TN754 circuit pack. The High-Speed Link (HSL) is the data module used to connect endpoints to the MCU directly via DCP. For 112k and 128k connections, two HSLs connect to the MCU per endpoint.

Call Detail Recording

NOTE:
Call Detail Recording (CDR) is also referred to as Station Message Detail Recording (SMDR).

Description

The CDR feature records detailed call information on all incoming and outgoing calls on specified trunk groups and sends this information to a CDR output device. The CDR output device provides a detailed printout that can be used by the telecommunications manager or system administrator to compute call costs, allocate charges, analyze calling patterns, detect unauthorized calls, and keep track of unnecessary calls.

For two-channel conferences, two records with identical Conference Billing ID fields are stored. For multirate conferences, a single record is stored on a per-call basis. For BONDed conferences, a record for each B-channel with identical Conference Billing ID fields is stored.

Call detail information is provided on trunk groups that are administered for CDR. CDR provides detailed call information for the following types of calls:

- Outgoing Calls — calls originated by Administered Connection/MCU extension, going out on a trunk group.
- Incoming Calls — calls incoming on a trunk group and terminating at an MCU extension.
- Ineffective Call Attempt — (a) unavailable incoming or outgoing trunks due to trunk usage allocation for ISDN Call-By-Call Service Selection trunks and (b) incoming calls rejected by the MCU due to network specific feature (NSF) mismatch.

You have the option of turning off CDR generation for specific trunk group(s).

NOTE:
Some call accounting systems do not support all the call information offered by CDR. Consult your account executive for details.

Resource Limitation on CDR Records

If new calls come in when the CDR link is down and the buffer is full (the MCU has a 180 record maximum), the earliest records are overwritten.

Set Time and Date

The system clock must be set for daylight savings time (if appropriate) when the time changes. Changing the time and date ensures that CDR records have the correct time and date for the records being kept. The time and date can be changed using the MCU management terminal (MCU-MT).

NOTE:
If the time is changed while calls are in progress, the actual call durations for these calls are not reflected in the CDR record. A “9999” gets output in the CDR duration field. We recommend that you not make date and time changes when there are active calls.

CDR Data Formats

This part covers two types of formats sent to the CDR output device: date record and call detail formats.

Date Record Format

The date record format is shown in the following table.

Table B-5. Date Record Format to Printer and Expanded Version

ASCII Character Position	Data Field Description
01-02	Month*/Day* or Day*/Month*
03	Space
04-05	Day*/Month* or Month*/Day*
06	Carriage Return
07	Line Feed
08-10	null

* Leading zero added if needed. Also, depending on the CDR format, the month and day as they appear in the Feature-Related System Parameters form may be reversed.

Call Detail Record Format

The call detail record format provides detailed information concerning a call. The first table that follows summarizes the DS1 robbed bit CDR direct output from the system to the printer. The second table summarizes the 24-word ISDN expanded CDR record format. Call detail records are generated during processing of the call and are sent to the CDR output device in ASCII format when the call is disconnected.

Even though the MCU outputs the record in ASCII character representation, the terminology “word” is used here to mean the ASCII characters.

Table B-6. DS1 RB CDR Direct Output Format

ASCII Character Position	Data Field Description
01	Time Hour (tens)
02	Time Hour (units)
03	Time Minute (tens)
04	Time Minute (units)
05	Space
06	Duration Hour
07	Duration Minute (tens)
08	Duration Minute (units)
09	Duration Minute (tenths)
10	Space
11	Condition Code
12	Space
13-15	Access Code Dialed*
16	Space
17-19	Access Code Used*
20	Space
21-35	Dialed Number*
36	Space
37-41	Calling Number*
42	Space
43-57	Conference Billing Identification information*
58	Space
59-65	Authorization Code
66-69	Space
70	FRL
71	Space
72	IXC
73	Space
74-76	Incoming Circuit† (hundreds, tens, units)
77	Space

Table B-6. DS1 RB CDR Direct Output Format — *Continued*

ASCII Character Position	Data Field Description
78-80	Outgoing Circuit† (hundreds, tens, units)
81	Space
82	Feature Flag
83	Carriage Return
84	Line Feed

* Data is right-justified and padded with blanks.

† Data is right-justified and padded with 0s.

Table B-7. 24-Word ISDN Expanded CDR Record Format

ASCII Position	Data Field Description
01	Time Hours (tens)
02	Time Hours (units)
03	Time Minutes (tens)
04	Time Minutes (units)
05	Space
06	Duration Hours (units)
07	Duration Minutes (tens)
08	Duration Minutes (units)
09	Duration Minutes (tenths)
10	Space
11	Condition Code
12	Space
13-16	Access Code Dialed*
17	Space
18-21	Access Code Used*
22	Space
23-37	Dialed Number* (The MCU extension in the MCU)
38	Space
39-48	Calling Number* (TAC of the trunk group for DS1 robbed bit signaling; CPN/BN, if available, for ISDN)
49	Space
50-64	Conference Billing Identification information*
65	Space
66-72	Authorization Code*
73-76	Space
77	FRL
78	Space
79-81	Incoming Circuit ID* (hundreds, tens, units)
82	Space
83-85	Outgoing Circuit ID* (hundreds, tens, units)
86	Space

Table B-7. 24-Word ISDN Expanded CDR Record Format — *Continued*

ASCII Position	Data Field Description
87	Feature Flag
88	Space
91	Space
92-95	Incoming Trunk Group Access Code*
96-99	Space
100-102	INS*
103-107	Space
108	BCC
109-120	Space
121-122	Bandwidth
123-130	Space
131	Carriage Return
132	Line Feed
133-135	Null

* Data is right-justified and padded with blanks

Call Detail Record Fields

The following list describes the CDR data collected for each call and the number of digits in each field. All information is right-justified in the respective field, unless otherwise indicated.

- Access Code Dialed (four digits on 24-word formats)

  NOTE:
  This field is used only for outgoing calls.

  This field can be the ARS access code, AAR access code, or the access code of a specific trunk group.

- Access Code Used (four digits on 24-word formats)

  NOTE:
  This field is used only for outgoing calls.

  This field contains the access code of the actual trunk group that the call was routed over (often the trunk group used is different from the trunk group access code dialed). This field always shows the access code of the used trunk group, even if it is the same as the dialed access code.

- Billing Identification (up to 15 digits)

  NOTE:
  This field contains Account Code.

  This is a numeric field, and contains a number that uniquely identifies a conference. Information in this field is right justified. The billing ID is optional and is administered on the conference form. It allows the system administrator to associate conferences with projects or account numbers.

  If the MCU cannot allocate resources for a conference, but the trunk call is answered, a CDR report for that call is generated. However, the billing identification field is left blank.

- Authorization Code (seven digits)

  This field contains the four- to seven-digit authorization code used to make the call. This applies to outgoing calls only.

- Bearer Capability Class (BCC) (one digit)

  This field contains the BCC for ISDN calls, identifying the type of an ISDN call. It distinguishes between different types of data. Either of the following digits may appear in this field.

  — 1 = Mode 1 (112k synchronous data)

  — 4 = Mode 0 (128k data clear)

  — w = Multirate bandwidth (112k, 128k, 168k, 192k, 224k, 256k, 280k, 320k, 336k, 384k, 448k, 512k, 672k, 768k, 1008k, 1152k, 1288k, 1344k, 1472k, 1536k, 1680k, or 1920k)

- Bandwidth (two digits)(24-word Record only)

  Used to capture the bandwidth of the multirate bandwidth calls. Bandwidth is expressed as the number of DS0s or 128k channels comprising a call, and is stored in the two-digit bandwidth field (1 or 6).

- Calling Number (up to five, and 10 digits in 24-word format)

  — For *outgoing calls*, this field contains the MCU extension.

— For *incoming calls*, this field contains the TAC of the trunk group used for the call (in the standard 18-word formats). In the 24-word format, the calling number field is 10 digits and contains the CPN/BN information, if provided, on incoming ISDN calls. If the CPN information is not output, the field is blank.

- Carriage Return (one character)

  The ASCII carriage return character followed by a line feed is used to terminate CDR records.

- Condition Code (one character)

  The codes in this field reflect special events relating to the call. Table 4-8 describes the condition code mapping.

Table B-8. Condition Code Mapping

Condition Codes	Description
4	Identifies an extremely long call (10 hours or more) or an extremely high message count for TSC (9999 messages or more). On a call exceeding 10 hours, a call record with this condition code and a duration entry of 9 hours, 59 minutes, and 1 to 9 tenths of a minute is produced after the first period. A similar call record with this condition code is produced after each succeeding 10-hour period. When the call does terminate, a final call record with a different condition code identifying the call type is produced.
7	Identifies calls served by the AAR or ARS Selection feature.
9	Identifies an incoming call.
A	Identifies an outgoing call.
E	Identifies an ineffective call attempt due to trunks not being available. This also identifies an ISDN Call-By-Call Service Selection call that is unsuccessful because of an administered trunk usage allocation plan.
F	Identifies an ineffective call attempt because of either (a) insufficient calling privileges of the originator (assigned per FRL), (b) ISDN calls rejected by the switch due to an NSF mismatch, or (c) an authorization mismatch which prevents the completion of a data call.

NOTE:
When more than one condition applies to a call, the overriding code is shown in the following table.

When two condition codes apply on the same call, one will override the other. The following table matrix defines the overrides. To illustrate how to use this matrix, assume that condition codes 4 and 9 apply to the same call. The matrix contains four horizontal rows (4, 9, E, and F) and four vertical columns (4, 9, E, and F). To find the condition code that overrides, look at the point of intersection between row 4 and column 9. In this case, condition code 4 overrides. This can also be found by looking at the point where row 9 and column 4 intersect.

Table B-9. Condition Code Override Matrix

	Condition Code			
	4	**9**	**E**	**F**
4	NA	4	NA	NA
9	4	NA	E	F
E	NA	E	NA	NA
F	NA	F	NA	NA

- Dialed Number (up to 15 digits)

  For incoming calls, this field contains the MCU extension that corresponds to the dial-out number. If more than 15 digits are dialed, the least significant digits are truncated.

  NOTE:
  Dial out allows 22 digits in the dialed number field. The same truncation rules apply so that, as an example, for the dial-out number 90114567890123456, the dialed number field of the CDR record would show 901145678901234.

  The # sign (“E”) may be printed in this field:

  — When the user dials a feature access code that starts with a #

  — When the user dials # at the end of digit dialing (for example, for WATS and IDDD calls)

  — When the inter-digit timeout occurs before the answer supervision timeout, even if the user has not dialed the # sign.

- Duration (four digits)

  All calls are timed. The timing is recorded in hours (0 through 9), minutes (00 through 59), and to the nearest tenth of a minute (0 through 9).

- FRL (one digit)

  FRLs, numbered zero through seven, are associated with the AAR and ARS features and define calling privileges. The information contained in this field is as follows:

— If the call is an outgoing call, this field contains the FRL of the originator.

— If the call is an incoming call, this field contains the FRL assigned to the incoming trunk group.

— If the call is an incoming tandem tie trunk call, this field contains either the FRL assigned to the tandem tie trunk or the Traveling Class Mark (TCM) sent with the tandem tie trunk call, depending on which was used to complete the call. On ISDN calls, this field always contains the TCM, if it was received.

— The CDR System Parameters can be administered to have ‘‘Disconnect Information in Place of FRL.’’ For trunk CDR, the following call disconnect data is printed in this field in place of the FRL data:

Data	Meaning (for calls)
0	Don’t know who dropped first
1	We dropped first
2	The CO dropped first
3	Maintenance got the trunk

- Feature Flag (one digit)

  The digit in this field indicates whether or not the switch has received answer supervision from the network and whether the call was a voice or data call.

  — A **4** in this field indicates a voice call with network answer supervision.

  — A **0** in this field indicates a voice call without network answer supervision.

  — A **5** in this field indicates a data call with network answer supervision.

  — A **1** in this field indicates a data call without network answer supervision.

  Answer Supervision is indicated for non-interworked ISDN calls.

  The answer supervision flag is interpreted as follows:

  — For ISDN trunks, if the answer supervision field contains a **5**, the call interworked with non-ISDN trunks and the duration was calculated but does not have the degree of accuracy of a strictly ISDN call. Thus, this field shows whether the call was interworked or went through a strictly ISDN network.

- Incoming TAC (four digits) (24-Word Records Only)

  This field contains the access code of the incoming trunk group.

- ISDN Network Services (INS) (three digits)

  This field specifies the INS requested for a call. This field applies only to ISDN calls. Each Network Specific Facility is translated into an INS according to the following table.

Table B-10. Network Specific Facility to INS Mapping

Network Specific Facility	INS Value
Network Operator	324
Presubscribed Common Carrier Operator	325
Software Defined Data Network (SDDN)	352
INWATS	355
Maximum Banded WATS	356
Long Distance Service	358
ACCUNET Digital Service	357
International 800	359
Multiquest	367

- IXC Code (three or four digits with an ISDN format)

  — Non-ISDN Formats

  IXC codes, numbered 1 through 15 (1 through F hexadecimal), are associated with the AAR and ARS features and depict the carrier used on the call. This information is sent to the CDR output device in ASCII code as a hexadecimal representation (for example, ASCII "F" equals "15").

  An IXC access number is used to access a specific common carrier for a call. In the US, this number is of the form 10XXX, 950 — 1XXX, or NXX — XXXX, where N is any digit 2 through 9 and X is any digit 0 through 9. The IXC access numbers applicable at a given location are associated with an IXC code on the IXC form. When ARS is used, and a routing pattern inserts one of the administered IXC codes, the associated IXC code is recorded. If no IXC access number is used, a 0 is recorded. In this case, either an IXC carrier is not used on the call or the carrier is selected at the CO. A one-character index (1 through 15 and through F hexadecimal) corresponding to the administered IXC code's index in the first page

of the IXC form is generated when that matching IXC code is used on an ARS call. If none of the administered IXC codes is used, a zero is recorded.

IXC codes on the first page of the IXC form can be any one of the following:

- Any number matching the second page of the IXC form
- A 7-digit number of the form 950-XXXX, where "X" is any digit 0 through 9
- Any 8 to 11-digit number

— ISDN Formats

With an ISDN record format, this field is a three-digit field that identifies the actual IXC used on an ISDN call. This information is determined from the routing pattern administration. On AAR and ARS calls, the three-digit IXC value is administered in the routing pattern for all ISDN calls. If a user dials an IXC code with a 10 XXX format as administered on the IXC Codes form, the CDR device will put only the last three digits in the CDR record. If a user dials a seven-digit IXC code, this field will contain a zero.

- Incoming Circuit Identification (three digits)

  This field contains the member number of a trunk within a trunk group used for an incoming call.

- Line Feed (one character)

  The ASCII line feed character followed by a carriage return is used to terminate CDR records.

- Null (one character)

  The NULL is used to terminate and divide CDR Records (usually in triplets) when needed by the receiving adjunct.

- Outgoing Circuit Identification (three digits)

  For outgoing calls, this field contains the member number of the trunk within a trunk group used. This field is blank for incoming calls.

- Space (one to forty characters)

  The ASCII blank character is used to separate other CDR fields or to blank fill unused record locations.

CDR Output Devices

A standard 232C interface is provided by the system's processor circuit pack. This allows for direct connection of the CDR output device to the system. If this port is not used, additional interface equipment is required as described in the Hardware and Software Requirements part of this feature description.

If the CDR link is down for more than a minute, some data may be lost. However, the most recent 180 records are stored by the MCU if the link goes down. When the link comes back up, these records are output on a ‘‘first-in, first-out’’ basis.

If the CDR buffer is full, the MCU overwrites the earliest CDR records.

The time stamp on calls recorded by CDR is normally applied at the end of the call.

The following paragraphs give a brief description of the printer as CDR output device.

Printer

An 80- or 132-column (character) printer can be connected as an CDR output device. The printer prints CDR records in a two-line format. No data processing or reports are provided. The 18-word CDR records sent to the printer are 84 bytes or 672 bits long. The 24-word CDR records sent to the printer are 135 bytes or 1,080 bits long.

CDR can be used as a polling device or can be buffered to the following equipment:

- Host computer
- Tape drive
- ASCII printer

Considerations

The system can store up to 180 CDR records (when the link is down), which are sent to the output devices when the link comes back up.

CDR records of DS-1 calls are generated only if the answer supervision timeout is exceeded or if the call is answered at the far end. Therefore, more accurate CDR records for DS-1 facilities can be obtained by setting the answer supervision timeout field on the DS-1 tie trunk form to the highest possible value (250 seconds).

Endpoints that are moved to another conference do not change the CDR data. This data appears as if the endpoints were never moved.

Interactions

For two-channel conferences, two records with identical Conference Billing ID fields are stored. For 1x56k, 1x64k, 112k, 128k, 168k, 192k, 224k, 256k, 280k, 320k, 336k, 384k, 448k, 512k, 672k, 768k, 1008k, 1152k, 1288k, 1344k, 1472k, 1536k, 1680k, and 1920k multirate conferences, a single record is stored on a

per-call basis. For BONDed 336K or BONDed 384K (H0) calls, six records with identical conference billing ID fields are stored. The following interaction discussions assume CDR is activated.

- AAR and ARS

  CDR records the following information for ARS:

  - Fact that an ARS call was made
  - Calling extension number
  - FRL of the calling extension
  - Called number
  - Type of trunk group used for the ARS call
  - Time of call completion
  - Call duration (how long the parties talked)
  - IXC code, if any

  If CDR is suppressed for the trunk group actually used on an ARS call, an CDR record is not generated; otherwise, Condition Code 7 applies. The ARS access code is recorded in the Access Code Dialed field and the trunk access code for the trunk group actually used is recorded in the Access Code Used field.

  If an AAR call is placed to a busy trunk group and CDR is suppressed for that trunk group, the user hears reorder tone and the CDR output shows an ineffective call attempt.

- Call-By-Call Service Selection

  When a successful call is made on a Call-By-Call Service Selection trunk, the network specific facility used on the call is translated into an INS number and recorded in the INS field of the CDR record. If a Call-By-Call Service Selection call is unsuccessful because of an administered trunk usage allocation plan, the INS number is recorded in the INS field of the report with a condition code of ‘‘E.’’

- Intercept Treatment

  If an outgoing or tandem call is routed to Intercept Treatment, the number dialed by the calling party is recorded as the dialed number, and Condition Code F is recorded.

- ISDN

  When specific answer supervision is received from the network, an indication is sent to the CDR device to this effect. If an ISDN call has been interworked, the CDR record will not record the call as having answer supervision.

- Private Network Access

  Private Network Access calls will be recorded if CDR is administered for this trunk group. Private Network calls will be recorded if either an incoming and/or outgoing tie trunk is assigned CDR.

  UDP

  If one user calls another user via a Uniform Dial Plan extension number, and the trunk group used has CDR assigned, CDR records the following information:

  — Condition Code — 7

  — Access Code Dialed — blank

  — Access Code Used — trunk access code of trunk used

  — Dialed Digits — Uniform Dial Plan extension

Administration

CDR is administered via the CDR System Parameters form. For details, refer to "Administering the Call Detail Recording (CDR) Link" on page 2-45.

The following sections summarize what can be administered on the form.

System Parameters

- Whether standard or ISDN formats are used.
- The speed at which the CDR device connected to the direct RS-232C interface on the processor circuit pack will operate (300, 1200, 2400, 4800, or 9600 baud rate).
- Whether the reason for disconnect is recorded instead of the FRL.
- CDR can be suppressed for Ineffective Call Attempts. Ineffective call attempts include calls to incoming or outgoing trunks that are unavailable due to trunk usage allocation for ISDN Call-By-Call Service Selection trunks and incoming calls rejected by the switch due to NSF mismatch.
- Primary output layout: expanded or printer.
- Primary output destination: EIA or the assigned extension.
- ISDN layout?: A yes or no field.
- Data Format: either day/month or month/day format.

Date and Time

The date and time should always be updated for events such as a leap year, daylight savings time, or a system restart after a power failure. If a time of day is not administered, CDR records will not be generated.

Data Modules and Modems

The CDR output devices can be connected to a processor data module (PDM), Trunk Data Module, or a modem. The following items must be administered:

- A netcon channel must be assigned using a Data Module form and entering data-channel or netcon channel for the type. This channel provides a path for CDR data from the Switch Processing Element to the time-division bus.
- If the CDR output device is connected to an PDM, administer a PDM form.
- If the CDR output device is connected to a Trunk Data Module, administer a Trunk Data Module form.

If the EIA port on the Processor Interface circuit pack is used by the output device, the CDR output device extension should be administered as “eia.”

Hardware and Software Requirements

Hardware requirements depend on the type of output device used for CDR. The CDR output device can be connected directly to the processor circuit pack which provides a standard RS-232C interface. If the output device is connected via a 7400B data module (as is the case for a remote CDR printer), the 7400B must be administered so that 7400B result codes do not interfere with CDR data output.

Call-By-Call Service Selection

Description

Call-By-Call Service Selection allows a single ISDN-PRI trunk group to carry calls to more than one service or facility.

NOTE:
The Call-by-Call Service is only applicable for Country Protocol option 1 (US).

Without Call-By-Call Service Selection, each trunk group must be dedicated to a specific service or facility. Call-By-Call Service Selection eliminates this requirement by allowing a variety of services to use a single trunk group. These services are specified on a call-by-call basis. Trunking efficiency is immediately obtained with Call-By-Call Service Selection by distributing traffic over the total number of available trunks.

Services Used with Call-By-Call Service Selection

The services used on Call-By-Call Service Selection calls are assigned after an ISDN-PRI trunk group is assigned a service type of Call-By-Call Service Selection. A Call-By-Call Service Selection trunk group can be administered to carry calls to many services. The services relevant to the MCU are as follows:

- ACCUNET Digital Service — Digital network services for various high-volume, high-speed data transmission requirements.
- SDDN — An offering that provides a virtual private network using the public-switched network. SDDN can carry voice and data between customer locations as well as off-net locations.
- Other user-defined services — New service types can be assigned as they are developed and defined.

A Call-By-Call service selection example is shown in the following figure.

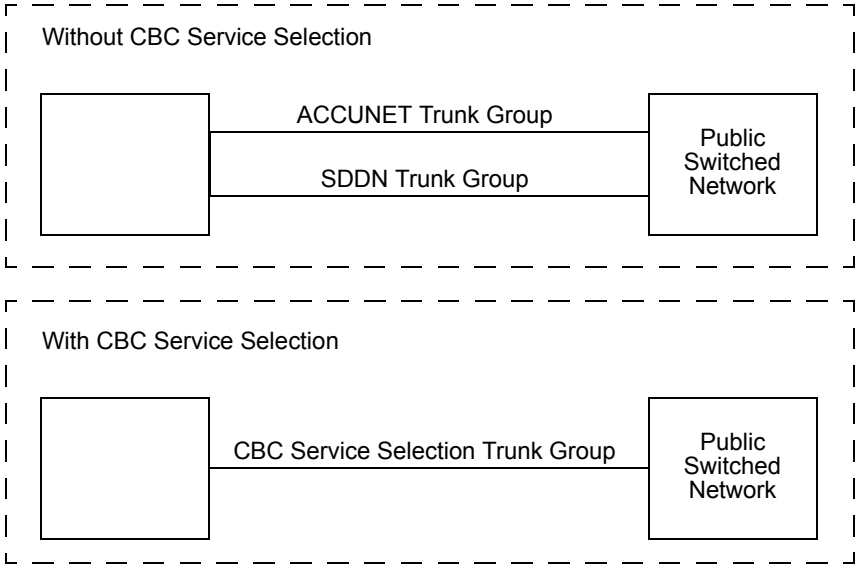


Figure B-5. Call-By-Call Service Selection Example

ISDN-PRI Messages and Information Elements used for Call-By-Call Service Selection

Although the technical details of ISDN-PRI messages and information elements are not critical to implementing the ISDN-PRI application, the following details may aid in the understanding of some readers and are, therefore, included in this description.

Call-By-Call Service Selection allows the system to specify one of the preceding service types on a call-by-call basis. This is done via a SETUP message that indicates the intent of the originating system to initiate a call using the specified service or facility. The SETUP message contains units called information elements that specify call-related information. The information elements used with Call-By-Call Service Selection are as follows:

- Network Specific Facility — indicates which facilities or services are to be used to complete the call.

  The system also checks all incoming ISDN-PRI calls for the presence of a Network Specific Facility information element. If this information element is present, the system makes sure that the requested service is compatible with the administration of the trunk. If the requested service is not compatible with administration, the switch rejects the call.

Considerations

Call-By-Call Service Selection provides the following benefits:

- Cost Reduction — since many services share the same trunks, the total number of trunks can be reduced.
- Improved Service — Call-By-Call Service Selection trunks can reduce the probability of features and services being blocked.
- Simplified Networking — network engineering is simplified because analysis of trunking needs can be done based on total traffic instead of on a per-service basis.
- The ability to respond to changes in a more timely fashion. The network does not have to be consulted because of the flexibility provided by the usage allocation plans.
- Measurement of Call-By-Call Service Selection calls.

Interactions

The following features interact with the Call-By-Call Service Selection feature.

- AAR

  Call-By-Call Service Selection uses the same routing tables and routing preferences that are used by AAR.

- ARS

  Call-By-Call Service Selection uses the same routing tables and routing preferences that are used by ARS.

- GRS

  Call-By-Call Service Selection uses the same routing tables and routing preferences that are used by GRS.

- CDR

  On successful incoming Call-By-Call Service Selection calls, the Network Specific Facility specified by the call's Network Specific Facility Information Element is recorded by CDR. CDR refers to this information as the INS (ISDN Network Service).

  When a Call-By-Call Service Selection call is rejected because of a trunk group usage allocation plan, CDR records the cause as an ineffective call attempt.

Administration

Call-By-Call Service Selection is administered by the system administrator on a per trunk group basis. The following items require administration:

- ISDN-PRI Trunk Group — must be administered with a Service Type of Call-By-Call Service Selection. The trunk group administration also includes the following:
  - — Incoming Call Handling Treatment
  - — Whether or not UAPs are required
  - — UAPs
  - — UAP Assignment Schedule
  - — Group Member Assignments
- ARS or AAR Routing Patterns — Routing Patterns can be administered to include a Network Specific Facility and/or IXC.
- Network Specific Facilities Encoding — new Network Specific Facilities can be added as needed by the system technician.

Hardware and Software Requirements

A TN767D DS1 circuit pack is required for assignment of a signaling link and up to 23 ISDN-PRI Trunk Group members. A TN2207 circuit pack is required for E1 interfaces for assignment of a signaling link and up to 31 trunk group members.

The DS1 provides 24 ports, and the E1 provides 32 ports. However, you can assign only 31 of the E1 ports, including ports 1 through 31. No assignment of port 0 is allowed within the E1 interface. Port 16 of the E1 interface is devoted to the signaling link. A TN768 Tone-Clock circuit pack is required to provide synchronization for the DS1 circuit pack.

Cascading

Description

Cascading provides the means to connect two MCUs via a switched H.320 or BONDing link to form a *cascaded* conference. For all practical purposes, each MCU treats the cascade connection as if it were simply another endpoint in the conference. All the features and services available for non-cascaded conferences are available in cascaded conferences as well. Cascading provides some particular benefits:

- Through Cascading, network charges can be greatly reduced for a conference between geographically distant endpoints. Without Cascading, all endpoints must call into one MCU that may be distant from some of the endpoints. This can mean many endpoints, each paying a network toll for each connection to the MCU. With Cascading, the endpoints can connect on an MCU that is geographically close to them and then request a single line for a cascade call to another MCU being used by other participants. This can be particularly useful for cross-continent conferences.
- Cascading allows larger conference sizes since the cascaded MCUs pool resources for as many as 48 multimedia endpoints (and no more than 25 per MCU) and as many as 48 audio-only endpoints (and no more than 25 per MCU) for a maximum of 25 endpoints per MCU per conference.

In addition, Star Cascading allows a maximum of 25 cascaded endpoints per MCU, as opposed to one such endpoint per MCU in some previous releases.

Considerations

In a cascaded conference, one MCU is referred to as primary and the other secondary. Any given MCU can be primary in one cascaded conference yet secondary in another simultaneous cascaded conference.

Additionally, each MCU in a cascaded conference honors its own stop time. The first MCU to reach its individual stop time is dropped from the conference despite the stop time of the second MCU.

The times for the cascaded MCUs must be within one minute of each other.

Interactions

The cascade feature interacts with the following features.

- CDR

  Each MCU in the cascade outputs its own CDR records for calls in the conference.

- Dial-Out

  One MCU in the cascade uses the Dial-Out feature to call the second MCU to provide the cascading connection.

Administration

It is recommended that the following fields in the Conference Record form be the same for both MCUs in a prearranged conference.

- *Conference Number*
- *Conference Name*
- *Billing ID*
- *Entry/Exit Tones*

Ideally, these fields should be (but need not be) identical for dynamically joined cascades. However, for two independent conferences to be dynamically joined, the following fields must be identical for each.

- *Password*

  All MCUs in the cascade must have the same password or no password.

- *Number of Channels and Bandwidth*

  The effective rate of the conference (1x56k, 1x64k, 2x56k, 2x64k, 112k, 128k, 168k, 192k, 224k, 256k, 280k, 320k, 336k, 384k, 448k, 512k, 672k, 768k, 1008k, 1152k, 1288k, 1344k, 1472k, 1536k, 1680k, or 1920k)

- *Conference Mode*

  The selected conference control mode must be the same for all MCUs involved.

To ensure that the dial-in MCU is ready to receive the connection that is initiated by the dial-out MCU, the dial-in MCU should be administered such that the conference is active before the dial-out MCU.

Star Cascading

This feature merely requires the administration of additional cascaded endpoints via the Conference Record form. A maximum of 25 cascaded endpoints per MCU is allowed. All other administration is identical to conventional Cascading.

Hardware and Software Requirements

Consult your Avaya service representative.

Class of Restriction

Description

Class of Restriction (COR) defines up to 64 different classes of call origination and termination privileges. Systems may have only a single COR, one with no restrictions, or many CORs up to 64 as necessary to effect the desired restrictions.

A COR is assigned to each of the following:

- Maintenance alarm terminals
- Data module
- Trunk group

Use of CORs can be categorized as follows:

- Calling party restrictions (that is, the extension for the maintenance alarm terminal)
- Called party restrictions
- Facility Access Trunk Test
- Fully Restricted Service
- Restriction Override
- Restricted Call List
- Unrestricted Call List
- Miscellaneous restriction groups
- Selective denial of public network calling through a CCSA or EPSCS network
- An ARS or AAR FRL for control of call routing

Features assignable as calling party restrictions are as follows:

- Origination Restriction
- Outward Restriction
- All-Toll Restriction
- TAC-Toll Restriction

Features assignable as called party restrictions are as follows:

- Inward Restriction

- Manual Terminating Line Restriction
- Termination Restriction
- Public Restricted

Use of CORs

CORs can be used to assign a variety of restrictions to a variety of facilities. The types of restrictions that can be assigned are discussed in the following paragraphs. The Unrestricted Call List field is displayed in the Class of Restriction form only if the calling party restriction is administered as TAC-Toll or All-Toll.

Calling Party and Called Party Restrictions

Calling party restrictions prevent specified users from placing certain calls or accessing certain features. Features assignable as calling party restrictions are Code Restriction, Origination Restriction, Outward Restriction, and Toll Restriction. These individual features are fully described elsewhere in this chapter. A brief description is given here:

- Outward Restriction — prevents callers at specified voice terminals from accessing the Public Network Access feature. Calls can be placed to other voice terminal users and to tie trunks.
- Origination Restriction — prevents callers at specified voice terminals from originating calls. Voice terminal users can, however, receive calls.
- TAC-Toll Restriction — prevents callers at specified voice terminals from making trunk access calls to certain toll areas as defined on the system's administered Toll Analysis form, unless the number is on an Unrestricted Call List associated with the caller's COR. This restriction applies to calls made using trunk access codes of CO or FX trunk groups.
- All-Toll Restriction — identical to the TAC-Toll Restriction described above, except this restriction also applies to ARS calls.

Called party restrictions prevent specified users from receiving certain calls. Features assignable as called party restrictions are Inward Restriction, Manual Terminating Line Restriction, Termination Restriction, and Public Restriction. These individual features are fully described elsewhere in this chapter. A brief description is given here:

- Inward Restriction — restricts users at specified voice terminals from receiving public network, access endpoint-originated, and access endpoint-extended calls.
- Manual Terminating Line Restriction — restricts users at specified voice terminals from receiving calls other than those from an access endpoint.
- Termination Restriction — restricts users of specified terminals from receiving any calls.
- Public Restriction — restricts users of specified voice terminals from receiving direct public network calls.

The field labeled `Calling Party Restriction` and the field labeled `Called Party Restriction` are both administered as none. However, the field `Calling Party Restriction` could be administered as any of the other previously described calling party restrictions. Likewise, the field for `Called Party Restriction` could be administered as any of the other previously described called party restrictions. Including ‘‘none’’ as a choice of restrictions, as many as 20 combinations of calling and called party restrictions are possible. However, it is unlikely that all 20 combinations are needed in any one situation. Therefore, only the required ones should be established.

Calling and called party restrictions are the basis for all CORs. In cases where no restrictions are needed, a single COR could be assigned with calling and called party restrictions of ‘‘none.’’ This same COR could be used for unrestricted trunk groups, terminating extension groups, UCD groups, DDC groups, and data modules.

The following are typical examples of calling and called party restrictions that may be assigned to a COR:

- Long-distance calling is limited by All-Toll Restriction, but there are no restrictions on incoming calls.
  - — Calling party restriction=All-Toll
  - — Called party restriction=None

The called party restriction is checked only at the called terminal, module, attendant console, zone, or group.

Each COR is established as needed and is arbitrarily identified by a number.

Facility Access Trunk Test

This field on the COR form is used to grant a user permission to make Facility Test Calls to access trunks. A y in this field allows users with this COR to make these calls. An n in this field causes users with this COR to receive intercept treatment when they attempt to make these calls.

Fully Restricted Service

Denies the specified voice terminal access to public network trunks for either incoming or outgoing completion. Note that Restriction Override should be set to No.

Restricted Call List

A Restricted Call List is assigned to the system by the system administrator. This call list is made up of specific digit strings that cannot be dialed from facilities that are restricted by the call list. The `Restricted Call List` field on the COR form is used to determine which facilities are restricted by this call list. If a COR has this field administered as y, facilities with that COR cannot be used to dial a number that matches one of the digit strings in the Restricted Call List.

Unrestricted Call List

Ten Unrestricted Call Lists are assigned to the system by the system administrator. Each `Unrestricted Call List` is made up of specific digit strings that can be dialed from facilities associated with the call list. The Unrestricted Call List fields on the COR form are used to determine which facilities have access to each of the 10 call lists. If a COR has any of these 10 fields administered with an Unrestricted Call List number, facilities with that COR can call any numbers contained in the assigned list(s) (unless the number is included in the Restricted Call List, which overrides the Unrestricted Call List).

Selective Denial of Public Network Calling Through a CCSA or EPSCS Network (APLT)

Public network calling via the private CCSA or EPSCS network (commonly referred to as off-network calling) is optional on a per-private network basis. If off-network calling is not provided, then the APLT field can be ignored. If off-network calling is provided, then permission or denial to access the off-network capability is set via the APLT field. Users assigned a COR that has APLT set to **n** (no) can use off-network calling. Users assigned a COR that has APLT set to **y** (yes) cannot. If there is a need for both yes and no choices in a system, separate CORs must be assigned to reflect this.

The field labeled APLT is preset as y. This means that a facility with this COR is not allowed to access CCSA or EPSCS off-network capabilities for public network calling. An n in this field would indicate that the facility can access CCSA or EPSCS off-network capabilities.

ARS/AAR FRL for Control of Call Routing

If the system does not use AAR or ARS to determine the most preferred routing of calls, then the FRL field can be ignored. If AAR or ARS is used, then an FRL is used to either allow or deny access to certain routes. The FRL for the outgoing (trunk) side of the call is provided in the AAR or ARS Routing Pattern. Although each outgoing trunk group has a COR and each COR has an FRL, this FRL is not used unless the trunk group is the originator of the call. Call routing is determined by a comparison of the FRLs in the AAR or ARS Routing Pattern and the FRL in the COR of the call originator.

The **FRL** field is preset to **7**. However, this field can have a value of 0 through 7. An originating FRL of 0 has the least calling privileges, whereas an originating FRL of 7 has the most calling privileges. Each route in each of the AAR or ARS Routing Patterns also has an FRL. These route FRLs can also have a value of 0 through 7. A route FRL of 0 is the least restrictive, whereas a route FRL of 7 is the most restrictive. An FRL of 0 is checked before the other routes in a given ARS routing pattern. To access a route, the originating FRL must be greater than or equal to the route FRL. Determination of appropriate FRL values must be made with respect to the outgoing routes from a specific system and the desired levels of calling privileges. This is part of AAR or ARS customization. The FRL of the call

originator is contained in the COR assigned. The **FRL** field in a COR assigned to an outgoing trunk group is never checked and should be ignored.

Assuming AAR and/or ARS has been customized for a system, the system administrator must establish unique CORs for each of the up to eight levels of ARS calling privileges that is used in the system. However, these CORs must maintain the desired restrictions dictated by the other fields on the screen form. The simplest case is a COR specifying no restriction. Ordinarily, this COR can be assigned to all unrestricted users. However, if some subset(s) of these users requires different FRLs, separate CORs must be established for each different FRL required.

For a detailed description of AAR, ARS, and FRLs, refer to the individual feature descriptions given elsewhere in this chapter.

COR Example

CORs could be used to prevent certain uses of the maintenance alarm terminal for anything other than its intended use.

Considerations

COR provides the means to consolidate assignment and administration of the various restriction features available with the system.

All items associated with a COR are distinct and separate. A unique COR must exist for each needed combination of FRLs, CCSA/EPSCS off-network restrictions, calling party restrictions, called party restrictions, and miscellaneous restrictions. Up to 64 CORs can be established, as required, to provide the needed combinations.

Interactions

The following features interact with the Class of Restriction feature.

- AAR or ARS

  Originating FRLs are assigned via a COR. Termination and Miscellaneous Restrictions do not apply to ARS or AAR calls.

Administration

COR is administered by the system administrator. For each COR that is assigned, the following items must be administered:

- Access to Malicious Call Trace
- COR Number
- FRL

- Permission to access EPSCS or CCSA off-net facilities
- Calling Party Restriction
- Called Party Restriction
- Permission to call other CORs
- Forced Entry of account codes for CDR (yes or no)
- Partitioned Group Number
- Priority Queuing (yes or no)
- Service Observing (yes or no)
- Time of Day Plan Number
- Direct Agent Calling
- Facility Access Trunk Test
- Fully Restricted Service
- Restricted Call List
- Unrestricted Call List

Assignment of Restrictions

A COR is assigned to each of the following:

Voice Terminals

All voice terminals must be assigned a COR. The same COR may be assigned to all voice terminals or a unique COR may be assigned to a particular voice terminal or group of voice terminals. This COR applies individually to each voice terminal and is independent of all other COR applications, such as Miscellaneous Restriction groups or UCD groups.

The main items of concern for individual voice terminals are calling party restrictions and called party restrictions (discussed previously under “Use of CORs”). If no restrictions are needed for a certain group of voice terminals, “none” can be specified for both calling party and called party restrictions. If it is desired to restrict a group of voice terminals from making outside calls, a COR specifying a calling party restriction of “outward” should be established.

Additionally, miscellaneous restrictions, restrictions to CCSA and EPSCS off-network calling capabilities, and FRLs also apply. A separate COR must be established for each unique set of restrictions.

Trunk Groups

Each trunk group is assigned a COR. Trunk groups are assigned CORs mainly for the use of miscellaneous restrictions. Calling party and called party restrictions should be “none.” Whether or not a CO or FX trunk group is restricted is specified

on the trunk group form used during implementation. CO and FX trunk groups default to being toll restricted for TAC calls. Toll Restriction for TAC calls can be disabled for certain CO or FX trunk groups on the trunk form.

Data Module

Each data module is assigned a COR.

Hardware and Software Requirements

No additional hardware or software is required.

Conference Redial Flag

Description

This feature allows a user to ask the reservations agent to redial the call. This can occur for any of the following reasons:

- The user failed password validation three times and wants to try again.
- The user missed the password entry window.
- The user disconnected from the conference and wants to rejoin.

There may be other legitimate reasons as well. With the redial flag set, a failed call receives the same redial treatment as any other dial-out call.

Considerations

For an endpoint that has one connection established successfully, the redial applies only to the second connection.

Interactions

None.

Administration

Administer the *(Re)dial* field in the Conference Record form, as appropriate. Values include **y**, **n** and blank. Enter **y** to enable redial capabilities. Enter **n** to indicate that the MCU will not dial out at the start of the conference.

The field value can be changed if Dynamic Resizing is optioned. The field should be blank whenever the conference is not active or not in use, or if *Class* is set to **file**.

Hardware and Software Requirements

Consult your Avaya service representative.

Conference Reservation and Control System

Description

The CRCS feature is an optional software package used on a personal computer or personal computer network to view and add MCU information. With this feature, one or more reservations agents can perform conference reservation and system administration functions.

Considerations

There are single-user and multiuser versions available for the CRCS software. The multiuser version allows a company such as a service provider to subdivide (or *partition*) logically the MCUs to which it is attached so that several reservations agents and administrators can work within their partition as if on a separate MCU.

Conference reservation functions are performed via the ResCenter module. This module provides a graphical user interface (GUI) for scheduling and managing conference rooms, point-to-point conferences, and multipoint conferences on the MCU. ResCenter is available in single-user and multiuser client/server models.

The *RESOLVE* option is available within single-user and multiuser ResCenter. This option provides Web-browsing capabilities, and it is intended to “steer” some of the conference reservation tasks away from the CRCS agents and toward the end-users.

Administration functions are performed via the OpCenter module. This module is a PC-based real-time GUI that enables conference management. OpCenter is available in two modes. “Basic” OpCenter is integrated with the ResCenter database. Standalone OpCenter, or “OpCenterSP,” is not integrated with ResCenter. OpCenter can support multiple simultaneous agents in a multipoint conference. Also, Multi-User OpCenterSP can support more than two MCUs.

OpCenter allows you to move active endpoints between conferences via the **move** command. The conference operator can use the **move** command to provide traditional “meet and greet” services, troubleshoot a customer site in isolation, or provide subconferencing services.

UCC *Web* provides an extension of UCC P&C-like capabilities to conference participants via a standard web browser interface. UCC *Web* provides

bi-directional communication between the web server (and therefore the end client's browser) and OpCenter.

Starting with R6.0, the "One-Release Back" CRCS option provides CRCS control of multiple MCUs running either of two software releases. For the R6.0 version of this feature, CRCS control is provided for the R5.0 and R6.0 MCUs.

To use the CRCS software, you must supply the personal computer or network system as described in the appropriate online CRCS documentation.

NOTE:
For more information on CRCS, refer to the MultiPoint System guide and also to the appropriate online CRCS documentation.

Interactions

CRCS supports all MCU conferencing features. Refer to the appropriate online CRCS documentation for details.

Administration

An MCU-ST is administered as an additional MCU-MT. CRCS-specific administration, including MCU partitioning, is described in the appropriate online CRCS documentation.

Hardware and Software Requirements

CRCS remote access via modem pooling requires the TN746B and TN754B circuit packs, the 7400A data module, and a modem. Refer to the appropriate online CRCS documentation for details.

Continuous Presence *Plus*

Description

This feature is a customer option that enables a multipoint video conference to compose a picture consisting of the video from multiple (up to 16) sites participating in the conference. Each Continuous Presence *Plus* conference shows a Continuous Presence *Plus*-mixed (CPP-mixed) video to all “eligible” sites from the beginning of the conference. The user can transition from one video layout to another (including quad-image, dual-panoramic, lower-panoramic, upper-panoramic, as well as full screen) via administration, conference control commands, UCC, and CRCS.

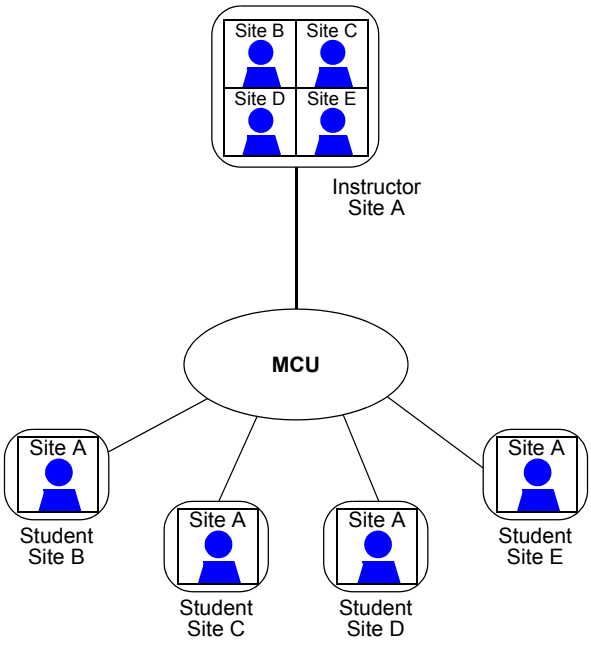


Figure B-6. Continuous Presence *Plus* Quad-Image Scenario

Considerations

Continuous Presence *Plus* supports multipoint video conferences at the following rates: 56/64k, 112/128k, 224/256k, 336/384k, 448/512k, and 672/768k. At the 448/512k and 672/768k rates, the maximum number of simultaneous CPP conferences that the system can support is reduced. (Refer to "Administration" on page B-77 for details.)

The “basic” CPP conference can support either two or three images (also known as “panoramic”) or four images (also known as “quad-images”). The user can select the type of image to be displayed. The panoramic composition continuously shows video from two or three endpoints. For upper-panoramic mode, the lower half of the screen is segmented into two quadrants, and each quadrant displays video from an endpoint. The upper half of the screen is not segmented, and it shows the video from still another endpoint. For lower-panoramic mode, the upper half of the screen is segmented into two quadrants, and each quadrant displays video from an endpoint. The lower half of the screen is not segmented, and it shows the video from still another endpoint. For dual-panoramic mode, neither the top half nor the bottom half of the screen is segmented and, therefore, video from a total of two endpoints is shown. The quad-image (4-image) configuration continuously shows video from four endpoints. The entire screen is segmented into four quadrants of identical dimensions, and each quadrant displays video from one endpoint.

The user can select the CPP picture composition on a per-conference basis. The default is set to quad-image. All the CPP quad-related features, such as fixing quadrants, UCC control, etc., are available in CPP panoramic.

The user can transition among the panoramic, quad-screen, and full-screen images. For transitioning between panoramic and quad-screen, the previous composition of the two quad images is retained whenever possible.

Even if the CPP-image is set to a panoramic mode, fixing the fourth quadrant via conference control or administration is still allowed; however, it is ignored in such a case. Fixing an endpoint to the fourth quadrant takes place only whenever quad-screen mode is in effect. Within panoramic CPP mode, whenever the endpoint fixed in the fourth quad speaks, this endpoint is fixed into one of the VAS quads. On transition to quad-screen mode, the endpoint fixed in the fourth quad appears in the fourth quad.

The MCU allows users to view seven, 10, 13, or 16 CPP participants simultaneously on the same screen. For this capability, several requirements must be in place, and the appropriate administration must be done. (Refer to "Administration" on page B-77 and "Hardware and Software Requirements" on page B-78 for details.)

NOTE:
As the number of CPP images increases, the number of CPP conferences supported decreases.

UCC can be used in conventional CPP fashion for each individual conference. There can still be up to 24 participants in any of the individual conferences. Also, any *one* or *four* of these participants can contribute to the composed image at any given time.

CPP non-SM conferences support the 30 fps frame rate.

The composition and arrangement of the sites to be included in the mixed video image can be controlled via administration and control interfaces provided by the MT and CRCS. Control over the image can be exercised before the conference begins as well as during an active conference.

Voice-Activated Switching determines the composition of the image for any quadrants that have not been fixed via the administration and control interfaces. Universal Conference Control (UCC) provides another means to control the image.

Effect of Adding and Dropping Endpoints

Parties joining or dropping from a Continuous Presence *Plus* conference do not cause the conference to transition from full screen to CPP-mixed video, or vice versa.

As new conferees join the conference, they enter one of the following: their designated fixed quadrant or half-screen, an MCU-selected Voice-Activated Switching (VAS) quadrant, or no quadrant at all.

When a site drops from a Continuous Presence *Plus* conference, and if the site is currently part of the Continuous Presence *Plus* image, the effect on the CPP-image depends on whether the dropping site is occupying a VAS quadrant or a fixed quadrant. (A fixed quadrant is established via conference administration, UCC, or CRCS.)

If the dropping site was occupying a VAS quadrant or half-screen, the MCU attempts to select another source to insert in place of the dropping site. If no such source is available, the MCU follows the “empty quadrant (half-screen)” behavior (described in the next section). If the dropping site was occupying a fixed quadrant (half-screen), no alternative site is automatically selected to occupy the quadrant (half screen).

Empty Quadrants/Half-Screens and “Fill” Patterns

The *Empty Quadrant Extension* field in the Conference Record form is used to provide a fill pattern in the CPP display whenever there are fewer than four parties (for a quad-screen conference) or three parties (for a panoramic conference) in the CPP conference. By default, the Avaya MCU provides a solid blue fill pattern. However, the user can designate a specific site in lieu of the fill pattern to display, for example, information pertinent to the user’s company (for example, the company logo).

Interfaces Affecting the CPP Image

The composition of the Continuous Presence *Plus* image can be changed via UCC, administration at the MT, administration at the CRCS ResCenter, or CRCS

OpCenter. For example, these interfaces can be used to toggle a conference between CPP image and single image. Commands in the BAS channel, such as MCV/Cancel-MCV and VCB/Cancel-VCB, can also toggle from one image to the other.

Whenever a Continuous Presence *Plus* conference is currently in CPP-mixed video mode, any change to the composition of the CPP image via any interface causes the image viewed by the user to change immediately.

NOTE:
There is no hierarchy of interface control. The last change to the CPP image from any interface becomes the current Continuous Presence *Plus* composition.

The control interfaces can change the stored composition of the CPP-image while the conference participants are viewing full-screen video. A change to the composition of the CPP image does not by itself force the conference to exit full-screen mode and return to CPP-mixed video mode. The change takes effect once the conference returns to CPP-mixed video mode.

NOTE:
The return to CPP-mixed video can always be forced, if desired, via the separate full-quad toggle provided at each control interface. For example, a user might send MCV, thereby forcing the conference to full screen in order to send a still frame. While the conference is in full screen, administration changes the extension for quadrants 1 through 4. This change is stored. Once the conference returns to CPP-mixed video (via Cancel-MCV, for example), the newly administered composition is shown.

Whenever a Continuous Presence *Plus* conference transitions from single image to CPP image, the current composition of the quadrants stored in the MCU is used. The composition of the CPP image can be changed any number of times by any control interface while the conference is in full-screen mode. The MCU simply updates its stored information regarding the content of each quadrant as each change is made from each interface. The MCU refers to this information to decide which sites to display when the conference toggles back to CPP-mixed video.

Whenever a Continuous Presence *Plus* conference transitions from CPP image to single-image for any reason other than MCV (see-me) or VCB (chair), the MCU reverts to VAS mode for the single image. In VAS mode, the broadcast video is selected via VAS. In Presentation mode, the return video seen by the presenter is selected via VAS. For MCV, the site sending MCV is shown, per usual. For VCB <M> <T>, the broadcaster identified by MCU number ‘M’ and terminal number ‘T’ is shown. If UCC chooses a single-image broadcaster, and if the conference is then transitioned to CPP-mixed video and later back to full-screen video, VAS is used to select the full-screen broadcaster (that is, the UCC-selected single image broadcaster is not “remembered”).

Whenever a Continuous Presence *Plus* conference is in single-image due to MCV (see-me), any of the control interfaces can break the MCV/VCB “locks” and return the conference to CPP-mixed video mode. If a control interface requests a return to CPP-image video, and if there are multiple MCV requests outstanding, the MCU returns the video to the stored CPP-image composition.

Whenever a Continuous Presence *Plus* conference is currently using a UCC single-image option (such as Select Broadcaster, Rollcall, or Browse), any of the other control interfaces can break the associated “locks” and return the conference to CPP-mixed video mode.

Changes to other conference parameters using MT/CRCS change/edit

Whenever the Conference Record form for an in-use conference is edited for reasons other than to make a change to the composition of the CPP image, the CPP image composed by the MCU is unaffected by the edit.

Video Switching Mode and Broadcaster Notification

The MCU cannot send broadcaster notification ns-command information to sites eligible to view a composed quad image. Such an action would be unwarranted because this feature announces the current video switching mode and broadcaster to all endpoints supporting the Multi-Byte Extension (MBE) capability. Also, the MCU sends a nonstandard command (ns-cmd) with information that enables the endpoint to determine the conference mode (for example, VAS, Presentation Mode, etc.) that is in effect. The current broadcaster is also included in the message.

Self-broadcast/Multipoint Command Visualize (MCV)

A terminal may send MCV to the MCU to force its video to be broadcast to other terminals in the conference. For example, MCV can be sent to lock the broadcaster prior to transmitting a still-frame graphic over the video channel. Whenever a Continuous Presence *Plus* VAS conference is in full-screen mode, MCV requests from a terminal are honored, just as in non-Continuous Presence *Plus* conferences. The MCV “locking” effect on the full-screen broadcast video is broken and, if appropriate, the BAS code “VCR” is sent to the previous MCV broadcaster whenever the following are true:

- Any unlocking action applicable to non-Continuous Presence *Plus* conferences occurs.
- Conference is transitioned back to CPP-mixed video operation via the MCU-MT, CRCS, or UCC interfaces (that is, if the conference is subsequently returned to full screen, the MCU need not “remember” and display the previously locked full-screen broadcaster selected via VCB).

The MCU automatically transitions a Continuous Presence *Plus* conference to full-screen MCV operation whenever MCV is received while the conference is in CPP-mixed video mode.

NOTE:
Some terminals may send MCV and then fail to send Cancel-MCV.

Since MCV causes an automatic shift to full screen, a conference could transition to full screen and remain in full screen. The control interfaces provide an override back to CP video that can be used in such a case.

If one endpoint sends MCV to the MCU and is the MCV single-image broadcaster, and if other endpoints also send MCV, the requests by these other endpoints are remembered. If the current MCV broadcaster sends Cancel-MCV or drops, the MCU selects one of the other MCV endpoints to display in single-image mode. Once the last site cancels MCV, the conference returns to the state in effect before the first site sent MCV. For example, if the conference was in CPP-image mode when MCV took effect, the conference returns to CPP-image mode. Unless the first MCV was in quad mode, if the conference was already in single-image VAS mode when MCV took effect, the conference returns to single-image VAS mode.

The **status conference** command indicates whether the broadcaster is self-designated via MCV. Therefore, the reason why a Continuous Presence *Plus* conference transitions to full-screen video is traceable.

Interactions

The following interactions are in effect.

Audio Add-On

Conferences using Continuous Presence *Plus* support as many Audio Add-On ports per conference as conferences that do not use Continuous Presence *Plus*. Audio Add-On port capacity is shared among Continuous Presence *Plus* and non-Continuous Presence *Plus* conferences. There is one system wide Audio Add-On port capacity. Therefore, Audio Add-On ports may be assigned freely to conferences that use Continuous Presence *Plus* and those that do not use this feature.

Speech detected from an Audio Add-On party (or an audio-only H.221 party) has no effect on the content of the quad image for single MCU conferences.

Audio Modes

Continuous Presence *Plus* conferences support the audio modes (including G.711, G.722, G.728) supported for non-Continuous Presence *Plus* conferences running at the same transfer rate.

BONDing

Endpoints in conferences with Continuous Presence *Plus* can use BONDing (Mode 1).

2 *64 and 4*64 BONDing and also 2*64 and 4*64 Multirate can be mixed in the same conference (Each endpoint receives video service.) Similarly, 6*64 BONDing and 6*64 Multirate/H0 can be mixed in the same conference with each endpoint receiving video service.

Cascading

CPP conferences, including Presentation CPP conferences, are supported on both primary and secondary MCUs.

Presentation mode is configured at the secondary MCUs to force the inter-MCU link to be the full-screen broadcaster at each secondary MCU. The return video at the secondary MCU(s) is therefore subject to VAS. This means that the primary MCU, which composes the CPP image, receives the video from the last or current speaking site connected to each secondary MCU.

The primary MCU does not include CIF capability in the capability set sent to the secondary MCU on the inter-MCU link. Therefore, the secondary MCU removes CIF capability from the capability set that it sends toward all its locally connected endpoints. The secondary MCU also removes CIF capability from the inter-MCU link back to the primary MCU. Under normal circumstances, the primary MCU stops transmitting CIF video toward an endpoint or inter-MCU link whose advertised capability set does not include CIF. However, in a cascaded Continuous Presence *Plus* conference, the primary MCU sends CIF video to the secondary MCU over the inter-MCU link even if CIF capability is not included. The result is that all compliant endpoints connected to all secondary MCUs:

- Transmit QCIF, and can be a source for the CPP image composed by the primary MCU
- Receive the CIF CPP image from the primary MCU whenever the primary MCU is using VAS mode and Continuous Presence *Plus*.
- Receive the CIF full-screen image from the primary MCU whenever the primary MCU uses presentation mode and Continuous Presence *Plus*. (This assumes that the presenter is CIF-capable.) In presentation mode, the presenter (that is, the controlling extension) can transmit CIF, and the

presenter's video is not subject to video processing by the MCU. This means that the presenter is viewed by all non-presenters at all MCUs in “full screen.”

NOTE:
Secondary MCUs are not required to be current release MCUs running Continuous Presence *Plus* hardware and software to participate in a Continuous Presence *Plus* conference. The video mixed and distributed by the primary MCU is broadcast to all capable endpoints by the secondary MCU.

In cascaded Continuous Presence *Plus* conferences, only one site connected to a given secondary MCU at a time can be included into the composed Continuous Presence *Plus* image. At any point in time, the primary MCU is receiving exactly one QCIF source from each secondary MCU. Usually, this source is the current (or last) speaker connected to the secondary MCU. At the primary MCU, the four new quadrant administration fields may be populated with the MCU extension of a cascaded link to a secondary MCU.

In cascaded Continuous Presence *Plus* conferences, whenever an Audio Add-On party begins speaking at a secondary MCU, the content of the quad image changes if all of the following are true:

- VAS quadrant exists at the primary MCU.
- No one at the secondary MCU was speaking previously (the inter-MCU link was previously viewed by the primary MCU as silent).
- Video received from the inter-MCU link is not currently part of the quad image.

Conference Modes

Interactions involving specific conference modes are provided in the following sections.

Broadcast with Auto-Scan Mode

This mode is not supported in Continuous Presence *Plus* conferences.

H.243 Chair Control

All the existing H.243 Chair Control operations are supported in Continuous Presence *Plus* conferences, as follows:

- Requesting (CCA) or relinquishing (CIT) the chair token can occur regardless of whether the conference is currently in full-screen or CPP-mixed video mode.

- Requests for the Floor (TIF) are forwarded to the Chair Terminal regardless of whether the conference is currently in full-screen or CPP-mixed video mode.
- The specific site can be dropped by the chair (CCD <MCU> <Terminal>) regardless of whether the conference is currently in full-screen or CPP-mixed video mode. If the site dropped by the chair is “on-air,” the effect on the conference video is the same as for the endpoint voluntarily dropping.
- The entire conference (CCK) can be dropped.

  NOTE:
  The chair's dropping the entire conference does not release the reserved ports or Continuous Presence *Plus* resources from a scheduling perspective.

- The chair terminal may send VCB <MCU> <Terminal> to the MCU to force the video from terminal number *T* connected to MCU number *M* to be the full-screen broadcast video source. Whenever a Continuous Presence *Plus* conference is in full-screen mode, the chair terminal's VCB requests are honored, just as in non-Continuous Presence *Plus* conferences. The VCB “locking” effect on the full-screen broadcast video is broken if the following are true:
  - — Any unlocking action applicable to non-Continuous Presence *Plus* conferences occurs.
  - — Conference is transitioned back to CPP-mixed video operation via the MCU-MT, CRCS, or UCC interfaces (that is, if the conference is subsequently returned to full screen, the MCU need not “remember” and display the previously locked full-screen broadcaster selected via VCB).

The MCU automatically transitions a Continuous Presence *Plus* conference to full-screen operation whenever VCB is received while the conference is in CPP-mixed video mode. The **status conference** command output shows why the conference has transitioned to full-screen.

Presentation Mode

In presentation mode conferences with Continuous Presence *Plus*, the viewing experience at the non-presenter sites is the same as it would be without Continuous Presence *Plus* (that is, the controlling extension remains the video broadcaster for the duration of the conference). All the non-presenter sites see the full-screen image of the presenter at the CIF frame rate. This means that the presenter can be managed via capability exchange to transmit CIF video (assuming it is capable); Therefore, there is neither a loss of video resolution nor a lowering of the frame rate introduced by using Continuous Presence *Plus*.

The viewing experience at the presenter site is subject to the same video mixing as for a VAS conference supporting Continuous Presence *Plus*. The composition

of the mixed image transmitted toward the presenter can be fixed via administration or UCC, or it can be left to voice-activated MCU control as in a VAS conference.

Similarly, UCC allows the presenter to transition to full-screen VAS switching of the return video.

Since the presenter must be CIF-capable, the presenter both transmits and receives CIF video as long as the presenter is viewing the Continuous Presence *Plus* image. Therefore, the endpoint interoperability concerns associated with QCIF/CIF asymmetry do not apply to the presenter as long as the presenter supports CIF video and continues to view the Continuous Presence *Plus* image. However, if the conference is toggled to full screen so that the presenter views the full-screen switched video from one other site, the presenter could be transmitting CIF while receiving QCIF.

NOTE:
If the conference is translated to upgrade capabilities on transition to full screen, it is possible that the presenter will again be able to send and receive CIF, depending on the capabilities of other endpoints in the conference.

Since the presenter is transmitting CIF video, the presenter site does not appear in the mixed quad image transmitted by the MCU to the presenter. The non-presenter sites are managed via capability exchange to transmit QCIF video and receive CIF video.

Endpoints that join the conference before the presenter receive the BAS code Video Indicate Suppress (VIS) from the MCU.

Voice-Activated Switching (VAS)

Whenever the conference mode is VAS, VAS can be used to determine the Continuous Presence *Plus* image seen by all sites. Whenever the conference mode is Presentation, VAS can be used to determine the Continuous Presence *Plus* image seen by the presenter.

The user may fix any or all of the quadrants via administration. The quadrants may or may not be subject to VAS. Whenever there is at least one VAS quadrant and normal human interaction, the following statements are true:

- If a site speaks, and if that site is already part of the mixed quad image, there is no change to the quad image. In other words, a site that is already on screen is not “rotated around the screen.”
- If a site speaks, and if that site is not part of the mixed quad image, the MCU replaces a nonspeaking site currently occupying a VAS quadrant with the new speaking site. However, given that the MCU will tend to have more than one quadrant from which to choose, the MCU can decide to do one of the following:

— Return the speaking party to the quadrant it had last previously occupied.

NOTE:
However, if two sites become engaged in a dialog, and if each site last occupied the same quadrant, the MCU allows both sites to appear on screen simultaneously rather than alternating them on screen in the same quadrant.

— Select for removal the site that has been quiet the longest

The methods in the previous list help minimize the likelihood that video switching via Continuous Presence *Plus* will be perceived to be disruptive or chaotic. Another factor to this end is the video holdover timer. This timer is applied to the entire quad image. As soon as any VAS-triggered change to the content of the quad image is made, the MCU sets the holdover timer. While the holdover timer is running, the MCU refrains from making any other VAS-triggered changes to the content of the quad image. Once the holdover timer expires, the queue of talkers is reexamined to determine if action is warranted.

Conference Reservation and Control System (CRCS)

CRCS supports conferences with Continuous Presence *Plus*. However, the following actions are required or suggested.

- CRCS scheduler must be updated to account for the greater resource consumption of Continuous Presence *Plus* conferences.
- CRCS must ensure that the number of conferences scheduled to use Continuous Presence *Plus* does not exceed the value administered on the System-Parameters Customer-Options screen. It is understood that CRCS is unaware of the status of the actual hardware resources supporting Continuous Presence *Plus*.
- CRCS user interface for reporting and resolving conflicts must be updated. The user interface for reporting resource exhaustion of Continuous Presence *Plus* conference capacity can follow the existing model (for example, using a red bar for a given time period along with the existing “detail” buttons to find out which resources are lacking).

The CRCS supports Dynamic Conference Resizing within conferences with Continuous Presence *Plus* via the real-time agent monitoring and control interfaces (such as OpCenter). Also, CRCS can use Dynamic Conference Resizing and OpCenter to allow a conference to toggle between full-screen switched video and Continuous Presence *Plus* mixed video. CRCS (along with the MCU) also prevents an ongoing conference without Continuous Presence *Plus* from being transitioned to a conference with Continuous Presence *Plus*.

CRCS supports the cascading of Continuous Presence *Plus* conferences to both MCUs controlled by CRCS as well as by external MCUs. (Refer to "Cascading" on

page B-52.) For such conferences, CRCS is designed to present one conference mode choice to the agent. Whenever the agent enters **VAS** for a cascaded conference with Continuous Presence *Plus*, CRCS downloads the secondary MCU(s) as presentation mode regardless of whether the overall conference mode is VAS or presentation. The primary MCU is downloaded with the conference mode selected by the agent

Dedicated Access

Parties in conferences with Continuous Presence *Plus* may be connected via dedicated, nonswitched access.

Dial-In

This feature functions the same way in conferences with Continuous Presence *Plus* as it does in conferences without Continuous Presence *Plus*.

Dial-Out

This feature functions the same way in conferences with Continuous Presence *Plus* as it does in conferences without Continuous Presence *Plus*.

Direct Connect

Endpoints in conferences with Continuous Presence *Plus* can be directly connected to the MCU.

Dynamic Conference Resizing/Reconfiguration

The following fields on the Conference Record form can be used during an active conference to enable this feature:

- Each of the four conference record form fields controlling the Continuous Presence *Plus* picture composition
- Field controlling whether an existing Continuous Presence *Plus* conference is currently using full-screen switched video or CPP-mixed video.
- Field controlling whether a conference will schedule and configure Continuous Presence *Plus* resources. (This field can be changed from **yes** to **no** but not from **no** to **yes**.)
- Fields controlling the video resolution (QCIF/CIF) and frame rate (i.e., the video caps)
- Field specifying the video source to be shown in “empty quadrants.”

H.CTX/H.CTX+

Conferences with Continuous Presence *Plus* and SG4 are blocked via administration from supporting CLI's H.CTX/H.CTX+ video. Continuous Presence *Plus* is supported for conferences using H.261 or H.263 video only.

Low-/High-Speed Interworking

This feature is supported in conferences with Continuous Presence *Plus*.

Mixed Dial-in and Dial-out

Conferences with Continuous Presence *Plus* allow any mixture of dial-in and dial-out parties.

MultiRate Video (MRV)

This feature is not supported by Continuous Presence *Plus.*

Passwords

The procedures for password collection and authentication are unchanged for Continuous Presence *Plus* conferences.

SG4

Conferences with Continuous Presence *Plus* are blocked via administration from supporting PictureTel's SG4 video. Continuous Presence *Plus* is supported for conferences using H.261 or H.263 video only.

Speed Match

Continuous Presence *Plus* can be disabled within a CPP Speed Match conference. If this happens, the conference changes to a full screen Speed Match conference. Also, if CPP Speed Match ports are administered in the System Parameters Customer Options form, and if there are no CPP Speed Match conferences active at a given time, the appropriate number of MCU resources are freed up to allow one or more additional CPP-only or full screen Speed Match conferences.

Still-Frame Graphics

A Continuous Presence *Plus* conference currently operating using full-screen switched video allows high resolution still-frame graphics (H.261 Annex D) to be transmitted in full-screen. CLI Token-Controlled Still Frame Graphics (TC-SFG) can also be transmitted.

T.120 Data Conferencing

This feature is supported within non-SM CPP conferences at all fixed MLP rates between 6.4k and 46.4k. The feature is supported within SM CPP conferences at all fixed MLP rates between 6.4k and 38.4k.

Video Modes

Conferences with Continuous Presence *Plus* and SG4 are blocked via administration from supporting CLI's H.CTX/H.CTX+ video. Continuous Presence *Plus* is supported for conferences using H.261 or H.263 video only.

MultiRate Video (MRV) is not supported by Continuous Presence *Plus.*

Conferences with Continuous Presence *Plus* are blocked via administration from supporting PictureTel's SG4 video. Continuous Presence *Plus* is supported for conferences using H.261 or H.263 video only.

Universal Conference Control (UCC)

The UCC controller can toggle a conference between CPP-mixed video operation and full-screen switched video. To accommodate scenarios where one site is the preferred (or required) viewed site (broadcaster), UCC can override VAS to ensure that this site remains the broadcaster despite speech detected from other sites.

If the UCC control port dials the access code for going full screen, all sites previously receiving the quad image begin to view the switched full-screen video from one other site.

The UCC commands for dropping a site or ending a conference operate within conferences currently viewing CPP-mixed video. Whenever a site that was previously part of the quad image is dropped via UCC, the effect on the conference video is the same as when an endpoint voluntarily drops.

Access to the commands for the Select Broadcaster, Browse, and Rollcall options of UCC are available in a Continuous Presence *Plus* Conference.

The UCC Set Sub-Pict option allows the UCC controller to place specific sites into specific quadrants. The sites to be included in the quad image are identified according to the number assigned via conference administration and appearing on the CRCS confirmation report.

Like conference administration, UCC denies attempts to make the controlling extension in a presentation mode Continuous Presence *Plus* conference one of the four sites specified for the quad image. (The controlling extension is transmitting CIF video.)

In Continuous Presence *Plus* mode, the UCC Unlock Video option returns the conference to its previous behavior (that is, the conference returns to its effective operation mode before UCC was used). The meaning of the option is context-sensitive; it depends on whether the conference is currently viewing full-screen video or CPP-mixed video. Therefore, for example, if the UCC controller uses the Set Sub-Pict option to designate the sites appearing in the quad image, the Unlock Video option returns the conference to the quad composition specified by conference administration.

If the UCC port drops from a conference after specifying the Continuous Presence *Plus* composition, the specified composition is remembered and not automatically cleared. Other control interfaces can subsequently change the composition.

Administration

Continuous Presence *Plus* is administered via the Customer-Options form and the Conference Record form. Refer to "Administering Continuous Presence Plus" on page 2-207 for details.

More than four images are obtained by using existing standard CPP conference administration techniques. Conferences can be combined via Cascading or by initiating a dial-out to the central conference. The central conference encodes the final composition of seven, 10, 13, or 16 images. The Presentation mode conference ensures that the encoded video image from the central conference is seen by all participants.

The following table lists the maximum number of simultaneous conferences for the higher CPP transfer rates based on 3-party BONDed configuration. For CPP/SM, the basis is two parties at a higher rate and one party at the 2B rate.

Table B-11. CPP Conference Maximums Based on Conference Types and Transfer Rates

Conference Type (Option)	Transfer Rate	Maximum Number of Conferences
CPP	448/512k	7
	672/768k	5
CPP/SM	448/512k	8
	672/768k	6

The following table lists the maximum number of simultaneous CPP conferences and the maximum number of parties per CPP conference for all possible CPP image configurations.

Table B-12. CPP Conference Maximums Based on CPP Image Configurations

Image Configuration	Maximum Number of Conferences	Maximum Number of Parties Per Conference
4-image	8	25
7-image	4	48
10-image	2	72
13-image	2	96
16-image	1	120

Finally, CRCS and UCC can be used to control the composition and arrangement of the quad images.

Hardware and Software Requirements

Continuous Presence *Plus* requires a TN2237C, vintage 16 or higher Video Processor circuit pack. This circuit pack provides a full decode/encode technique.

The TN2237C circuit pack decodes video at any supported frame rate up to 30 frames per second (fps). The circuit pack supports the 1B, 2B, 4B, 6B, 8B, and 12B transfer rates.

The MCU allows users to view four, seven, 10, 13, or 16 participants simultaneously on the same screen. This requires multiple CPP conferences, each requiring a separate right-to-use, a separate VPP circuit pack, and a separate UCC port. For example, a 16-image conference requires at least five CPP conferences, five rights-to-use, and 5 VPP circuit packs. A 7-image conference requires two CPP conferences, two rights-to-use, and two VPP circuit packs.

Data Interfaces for Access Endpoints

Description

Several data interfaces allow endpoints either connected directly to the MCU or behind an encryption device or proprietary inverse multiplexor to participate in multipoint conferences at a rate in the range 112k to 1920k. These interfaces include EIA-530, RS449, and V.35.

Considerations

The Dedicated Access (DA) feature of the Avaya MCU allows T1, EIA-530, RS449, and V.35 connectivity. A DA endpoint type is used whenever the destination is intended to be an access endpoint. EIA-530, RS449, and V.35 connectivity is supported by the TN2236 Data Interface (DI) circuit pack. T1 connectivity is supported by the TN767 DS1 or TN2207 UDS1 circuit pack.

The Avaya MCU supports a maximum of 32 DI ports at transfer rates up to and including 1920k. The following DI port/rate maximums are supported: 16 ports at 2B, 1680k, and 1920k; 20 ports at 1008k through 1536k; 32 ports at 128k through 768k.

DI endpoints can interwork with BONDed, multirate, and DS1 DA endpoints. However, there is no integrated BONDing for DI traffic. Encryption devices and inverse multiplexors (IMUXs) must use DA to connect to the MCU via the data interface. Also, Direct Connect endpoints can connect to the MCU via the data interface.

Audio Add-On and Universal Conference Control (UCC) endpoints cannot access an MCU conference via the data interface. Finally, a Call Detail Record (CDR) is not generated for DI access-endpoints.

The MCU waits one minute before originating a call for any type of DA endpoint. This is done to allow codecs and IMUXs to disconnect completely from a previous call before connecting to a new conference. Once the call is originated, the MCU looks for H.221 framing continuously until the conference ends. Once framing is found, the usual framing recovery strategy becomes active. If framing is found and then lost, the system searches for framing for 40 seconds; if framing is not found again, the system drops the call. The call is then reconnected after one minute, and it resumes searching for framing indefinitely. The one-minute waiting period applies to all methods of originating a call (including redialing an endpoint, Dynamic Conference Resizing, adding a new conference, etc.).

Interactions

DI endpoints interact with the following features or capabilities with specific changes or considerations as noted.

- BONDing

  Integrated BONDing is not supported for DI traffic.

- Cascading

  A data interface can be used as a static cascade link between two Avaya MCU conferences.

Administration

Several forms are used to administer the data interface. Refer to "Administering Access Endpoints" on page 2-180.

Also, Cascading is supported for all DA endpoint types. In the Conference Record form, the endpoint type should be administered as “CAS,” and the access endpoint extension to be used as the physical cascade link should be included.

Hardware and Software Requirements

The TN2236B, vintage 5 or higher Data Interface circuit pack is required. Two such circuit packs are required for MCU endpoints operating at the 2B (112k or 128k) transfer rate.

DS1 Trunk Service

Description

DS1 trunk service provides a digital interface for the following:

- Robbed-Bit DS1 Tie Trunks
- ISDN-PRI Trunks
- CAS DS1 Tie Trunks

Tie Trunks

Robbed-Bit DS1 tie trunks permit data calling between the MCU and another switch, can connect the system with other digital switches, and can be used to dynamically access data SDN services.

The TN767D DS1 circuit pack is used to support Robbed-Bit DS1 tie trunks in the Robbed-Bit Signaling mode.

DS1 transmission facilities in the US and Canadian DS1 format is a 1.544-M digital signal consisting of a 1.536-M signal multiplexed with an 8-k framing signal.

E1 transmission facilities format is a 2.048-M digital signal and requires the TN2207 universal DS1 circuit pack. E1 supports CAS signaling used in the United Kingdom.

Considerations

Each DS1 circuit pack can support up to 24 trunks: 24 trunks for transmission in the Robbed-Bit Signaling mode or 23 trunks for clear data transmission, and one trunk to transmit signaling for the other 23 trunks in the signaling mode or ISDN-PRI signaling mode.

The system can support a maximum of 26 DS1 circuit packs.

The TN2207 circuit pack is used for E1 trunks to provide 32 ports and includes an E1 interface cable.

Interactions

None.

Administration

DS1 trunks are assigned on a per-line basis by the system administrator. The following items require administration:

- DS1 Circuit Pack — assign the circuit pack to the system before administration of the associated trunks.
- Synchronization Plan — administer to provide synchronization between the switch's DS1 circuitry and the digital facilities to which the switch is connected.
- Trunk Groups — associate the trunks to groups, if desired.

Hardware and Software Requirements

One TN767D DS1 circuit pack is required for every 24 trunks using Robbed-Bit Signaling or for every 23 trunks using ISDN signaling.

A TN768 circuit pack is required to provide synchronization for the DS1 trunks.

For E1 (32 port) trunks, use the TN2207 universal DS1 circuit pack.

No additional software is required.

Dedicated Access

Description

The Dedicated Access (DA) feature of the Avaya MCU allows T1, EIA-530, RS449, and V.35 connectivity of endpoints to the MCU.

Considerations

For T1 connections, each Dedicated Access endpoint is assigned a fixed number of DS0s (1 through 30) that are always identified with that endpoint. To connect in a conference, the endpoint uses one or more (depending on the conference bandwidth) of those assigned DS0s. Bandwidths of 1x56k, 1x64k, 2x56k, 2x64k, 112k, 128k, 168k, 192k, 224k, 256k, 280k, 320k, 336k, 384k, 448k, 512k, 672k, 768k, 1008k, 1152k, 1288k, 1344k, 1472k, 1536k, 1680k, and 1920k are supported for Dedicated Access.

Several data interfaces allow endpoints either connected directly to the MCU or behind an encryption device or proprietary inverse multiplexor to participate in multipoint conferences at a rate in the range 112k to 1920k. These interfaces include EIA-530, RS449, and V.35. For details regarding connectivity via data interfaces, refer to "Data Interfaces for Access Endpoints" on page B-79.

The MCU waits one minute before originating a call for any type of DA endpoint. This is done to allow codecs and IMUXs to disconnect completely from a previous call before connecting to a new conference. Once the call is originated, the MCU looks for H.221 framing continuously until the conference ends. Once framing is found, the usual framing recovery strategy becomes active. If framing is found and then lost, the system searches for framing for 40 seconds; if framing is not found again, the system drops the call. The call is then reconnected after one minute, and it resumes searching for framing indefinitely. The one-minute waiting period applies to all methods of originating a call (including redialing an endpoint, Dynamic Conference Resizing, adding a new conference, etc.).

Interactions

For T1 connections, Audio Add-On, cascade links, and BONDed facilities must be accessed via switched facilities but can participate in a conference if they are at the same bandwidth as the Dedicated Access endpoints.

For information on interactions involving connectivity via data interfaces, refer to "Data Interfaces for Access Endpoints" on page B-79.

Administration

Dedicated Access administration involves several forms and varies according to the type of connectivity required. Refer to "Administering DS1 or UDS1 Circuit Packs" on page 2-61 for information on administering T1/E1 facilities. Refer to "Administering Access Endpoints" on page 2-180 for information on administering non-signalled T1/E1, EIA-530, RS449, and V.35 facilities.

Hardware and Software Requirements

EIA-530, RS449, or V.35 connectivity requires the TN2236B, vintage 5 or higher Data Interface (DI) circuit pack. T1 connectivity requires the TN767 DS1 or TN2207 UDS1 circuit pack.

Dial-Out

Description

The Dial-Out feature allows the MCU to place outgoing calls automatically to conference participants using an Administered Connection. This is in addition to the basic MCU capability that allows conferees to call the MCU to join a conference.

A conference convener can use the dial-out feature in order to convene a conference automatically. At the conference start time, the MCU automatically dials all conference participants simultaneously.

Considerations

To establish the dial-out links, the MCU automatically translates a dial-out administered connection for each conferee number. This administered connection remains in place until the conference is completed. When the conference is completed, the MCU automatically untranslates the administered connection and makes it available for reuse.

If one of the conference participant numbers is a cascade link (that is, another MCU), the dialing MCU attempts to connect to the second MCU first and then calls all the other endpoints simultaneously. If the dial-out call fails, the MCU uses the failure cause code to determine its next action depending on whether the link is a cascade or a non-cascade link and the type of failure. The number of retries pertaining to post connection (answer) failures is administered on the System-Parameters Features form.

Cascade Link Retry Strategy

The retry strategy that Dial-Out uses for a cascade link is as follows.

- If the failure is the first failure reported, retry immediately.
- If the failure occurred after a connection was established, retry the administered number of times, then raise a warning alarm on the administered connection and stop retries.
- For all other causes:

  If the alarm threshold has been reached, raise a warning alarm on the administered connection.

  Retry the connection in approximately one minute.

Since a cascade link can represent many conferees, the retry attempts for a cascade link are only halted after the administered number of post-connection retries are attempted. If the link is for a dedicated conference, the assumption is made that the link must always remain up. Therefore, retries are attempted no matter what the failure cause unless there is an administration mismatch between the two cascaded MCUs or the administered number of post-connection retries is reached.

Non-Cascade Link Retry Strategy

The retry strategy that dial out uses for a non-cascade link is as follows:

- If the failure is a far-end disconnect, stop trying to connect.
- If this is the first failure, retry immediately.
- If the failure occurred after a connection was established, retry the administered number of times, then raise a warning alarm on the administered connection and stop retries.
- For all other causes:

  Log an error in the hardware error log.

  If the alarm threshold has been reached, raise a warning alarm on the administered connection.

  Retry the connection in approximately one minute.

Interactions

The following features interact with the Dial-Out feature.

- Audio Add-On endpoints can be dialed out.

  Operator-Assisted Dial-Out allows you to enable or disable automatic dialout for both video and Audio Add-On endpoints on a per-endpoint basis. Enabled endpoints are dialed out automatically. Disabled endpoints are dialed out by an operator via the MCU-MT or an OpCenter or ResCenter user interface.

- AAR/ARS

  Dial out can use the AAR/ARS feature to route outgoing calls over the proper trunk facilities by including the AAR/ARS feature access codes in the destination number(s) of a conferee.

- BONDing

  Dial out can originate BONDed calls.

- Call-by-Call Service Selection

  Dial out can use the call-by-call service selection feature to route outgoing calls over specific ISDN-PRI networks.

- Cascading

  Cascading uses the dial-out feature to establish the inter-MCU link.

- CDR

  If the dial-out feature uses a trunk group with the CDR feature on, the origination extension (MCU extension), destination number, and conference billing ID are reported.

- Class of Restriction

  The system administrator can prevent stations connected to the MCU from making outgoing calls by administering the stations with an Outward Restriction COR.

- DS1 Trunk Service

  Robbed-bit trunks can be used as a network facility in routing dial-out calls.

- ISDN-PRI

  ISDN-PRI trunks can be used as a network facility in routing dial-out calls. In addition, the MCU extension is sent as the calling identifier if enabled on the trunk group form.

- Passwording

  Audio Add-On endpoints do not require a password to answer Dial-Out calls.

- System Measurements

  All trunks used for dial-out calls are measured as with any other trunk use.

- System Status Report

The status AC command is supported for dial-out administered connections.

Administration

Administration for this feature is required for outgoing trunk groups and AAR/ARS routing patterns. Dial-out numbers must be administered for each conference where they are to be used. If the conference is a single-channel high-speed conference, a single dial-out number is administered. If the conference is a 112k/128k conference, two dial-out numbers are administered. In either case, if ARS or AAR are to be utilized in the calls, the access codes for those features should be the first digit(s) of the dial-out number(s).

The maximum number of post-answer retries must be administered in the “Dial-out Post Answer Failure Retry Attempts” field of the System-Parameters Features form.

Audio Add-On Endpoint Dial-Out

You can administer Audio Add-On endpoint Dial-Out via the MCU-MT or CRCS. From the MCU-MT, this is done via endpoint administration; from CRCS, this is done via the site options page. Administration is done by using an administered connection.

Operator-Assisted Dial-Out

Populate the *(Re)dial* field in the Conference Record form, as appropriate, to enable or disable Operator-Assisted Dial-Out. For example, leave the field blank if you want to assign automatic Dial-Out capabilities to the associated endpoint. Also, if you set the *(Re)dial* field to **y** during an active conference, and if the previous field value was **n**, the call is dialed out to the endpoint for the first time; otherwise, the Dial-Out call to the endpoint is redialed.

Hardware and Software Requirements

Dial-Out requires MCU software release 1.1 or later. The feature also requires the TN744C Call Classifier circuit pack.

Dial Plan

Description

This feature enables the administration of the video port extensions used within the MCU to identify and route calls to video ports. It also enables the administration of extensions for entities such as the maintenance alarm terminal and an CDR printer port extension. In addition, feature access codes are defined by this feature.

Each video port is identified by a unique extension. As an example, this extension is used on the Conference Record Form and within the maintenance subsystem to identify the appropriate video port associated with a given call.

The dial plan, or first-digit table, established during administration for each system, provides information in conjunction with the AAR features on the MCU on what to do with digits received from the network or internal sources such as the maintenance alarm terminal. The following parameters define extensions and feature access codes (used internally by the MCU or the maintenance alarm terminal).

- Extension numbers

  Used to define video port extensions, maintenance alarm terminal extensions, and other extensions when applicable.

- Feature access codes

  A minimum of one digit is required but a maximum of three digits can be used. The * and # buttons can be used as the first digit of a feature access code.

- Trunk access codes

  A minimum of one digit. The digit can be any number in the range 1 through 9. For example, you could set 9 for local trunks and 8 for tie trunks.

Considerations

None.

Interactions

This feature controls extension number formats for video port and other extensions. It must be completed prior to using extensions and/or feature access codes on the system.

Administration

The system administrator administers the dial plan on a per-system basis. The following administration is required:

- Area code where the MCU is located (if in the United States). Blank if the MCU is located in Australia, Singapore, or the United Kingdom.
- Enter “y” in the “Uniform Dial Plan” field

Hardware and Software Requirements

No additional hardware or software is required.

Dynamic Resizing

Description

This feature allows a reservations agent to add and remove endpoints from a conference both before and during the conference. This capability includes the cascade links along with the Audio Add-On, dial-out, and Meet-Me endpoints. Using this feature, dial-out numbers can be removed and changed, and conference stop times can be changed. In addition, this feature allows dial-out numbers to be changed to dial-in numbers (and vice versa) and primary/secondary MCU types to be changed in a cascade link. It also allows the basic/enhanced service flag, redial flag, and interworking status during a conference to be changed.

Considerations

Dynamic Resizing is capable of using existing MCU resources only. The feature can also be used to deallocate Continuous Presence *Plus* resources during an active conference. If the *Continuous Presence* field in the Conference Record is set to “no,” these resources are released. The *Quad 1* through *Quad 4* fields and the *Empty Quadrant* fields on the form can be changed during an active conference.

Also, the feature can be used to dynamically disable a conference that is enabled with Executive Conferencing. Also, dynamic changes can be made to the associated *Site 1-3* and *Force Video Now To* fields in the Conference Record form.

The feature cannot be used to allocate Continuous Presence *Plus* or Executive Conferencing resources in an active conference.

The video mode of an active conference can be changed from and to any of the “H.261 types,” including “H.261-down-only,” “H.261-w/upgrade,” “H.261-CIF-Floor,” “H.261-CIF-Now,” and “H.261-QCIF-Now.”

Interactions

The Dynamic Resizing feature interacts as described in the individual feature descriptions. In particular, be sure to refer to "Conference Redial Flag" on page B-60 for details regarding how the feature operates.

Administration

No additional administration is necessary to activate the Dynamic Resizing feature.

Hardware and Software Requirements

No additional hardware or software is required. The feature is available on all MCU models.

Executive Conferencing

Description

Executive Conferencing is a customer option that enables a conference to compose a picture of two or three “other” sites (endpoints) for each conference participant. With this feature, no endpoint ever sees itself.

Considerations

Executive Conferencing is provided with a right-to-use (RTU) fee for the customer.

With this feature, panoramic images of two or three other sites are seen by all of the participants in a conference. These sites are selected from three defined eligible video sites for the conference, and they are defined as video broadcaster sites. Each broadcaster site sees and hears the other two broadcaster sites in a dual panoramic image; all of the other video sites see and hear all three broadcaster sites in an upper-panoramic, tri-screen image. However, all of the sites in a conference that are *not defined* as a broadcaster site are not eligible video sources for the conference.

An illustration of the feature is provided in the following figure.

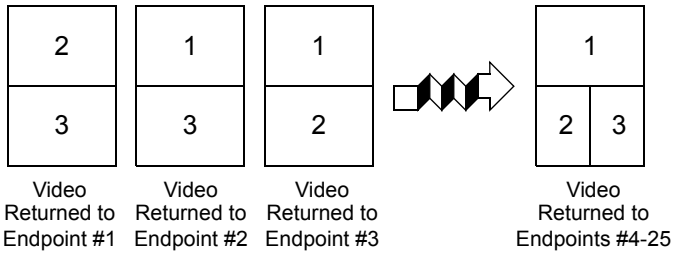


Figure B-7. Executive Conferencing

In this figure, sites #1, #2, and #3 are administered as the three eligible video sites (or broadcasters) for the conference. The remaining video sites (#4 through #25) in the conference can listen to return video but are not themselves eligible video sources for the conference.

For sites #1 through #3, the Executive Conferencing display is a dual-panoramic, no-self-view image of the other two sites. As the conference size grows beyond three endpoints, the additional video sites see an upper-panoramic, tri-image view of the three broadcaster sites.

This Executive Conferencing algorithm is based on the following rules.

- Endpoint designated as site #1 (for example, a CEO) is the main broadcaster
- All endpoints must see the site #1 (the main broadcaster) at all times
- All endpoints should see the present speaker from the eligible video sites #1, #2, and #3
- No site can ever see itself

The feature supports the 1x56k, 1x64k, 2x56k, 2x64k, 112k, 128k, 224k, 256k, 336k, 384k, 448k, 512k, 672k, and 768k video rates. The maximum received video frame rate in a conference with Executive Conferencing is 15 fps.

The user can transition to the Executive Conferencing dual-panoramic screen modes from full-screen mode or vice versa by using any of the following: UCC *Star*, UCC *Web*, MCU control commands, or OpCenter control commands.

Interactions

Executive Conferencing does not support the following: Broadcast w/Auto-Scan Mode, FECC, H.263/H.261 Transcoding, On-Screen Display, Presentation Mode, Speed Match, UCC P&C, the CTX, CTX+, MRV, and SG4 video modes, and the receipt of 30 fps with the multi-image mode enabled.

The following features and capabilities are supported with the considerations noted:

- Cascading

  Used with this feature, Executive Conferencing provides various video and audio “experiences” that differ from those provided by Cascading used with Continuous Presence *Plus.*

- Dynamic Resizing

  Executive Conferencing conferences can be dynamically disabled. Also, video sources for Executive Conferencing can be reassigned as eligible broadcasters during an active conference by administering the associated *Site 1-3* and *Force Video Now To* fields in the Conference Record form. However, Executive Conferencing resources cannot be dynamically enabled.

- Voice Activated Switching

  VAS within the panoramic panels is not supported.

Administration

For details on administering Executive Conferencing, refer to "Administering Executive Conferencing" on page 2-216.

Hardware and Software Requirements

One TN2237C, vintage 16 or higher Video Processor circuit pack per conference with Executive Conferencing is required.

One software Right-to-Use (RTU) for each active conference with the feature is required. This RTU can be purchased individually as an Executive Conferencing RTU or acquired via either the Conferencing Suite RTU or the Continuous Presence/Executive Conferencing RTU.

Facility and Non-Facility Associated Signaling

Description

This feature provides signaling for ISDN-PRI.

Facility Associated Signaling

Facility Associated Signaling (FAS) allows an ISDN-PRI DS1/E1 Interface D-channel to carry signaling information for only those B-channels located on the same DS1/E1 facility (circuit pack) as the D-channel.

Non-Facility Associated Signaling

Non-Facility Associated Signaling (NFAS) allows an ISDN-PRI DS1/E1 Interface D-channel (signaling channel) to convey signaling information for B-channels (video channels) on ISDN-PRI DS1/E1 facilities other than the one containing the D-channel. As a result, a D-channel can carry signaling information for numerous B-channels located on different DS1/E1 facilities. The MCU supports up to 20 T1s per NFAS group.

D-channel Backup

To improve reliability in the event of a signaling link failure, a backup D-channel may be administered. If a signaling link failure does occur, a switch to a backup D-channel will then take place.

D-channel Backup requires that one D-channel be administered as the Primary D-channel and that a second D-channel be administered as the Secondary D-channel. These assignments ensure that at certain times during D-channel Backup procedures that both D-channels are in the same state. This avoids the occurrence of both switches at each end of the DS1/E1 interface selecting the same D-channel to be put into service. In these cases, the Primary D-channel is given precedence over the Secondary D-channel.

The following figure shows a possible configuration involving three ISDN-PRIs between the MCU and a PBX or the public network. With DS1 (24 channel) interfaces, two of the ISDN-PRIs contain a D-channel and 23 B-channels, while the other ISDN-PRI contains 24 B-channels. One of the D-channels is the Primary D-channel, and the other is the Secondary D-channel. Together, this pair of D-channels will signal for all 70 (23+24+23) of the B-channels that are part of the three PRIs.

Since the D-channels are signaling for more than one DS1/E1 facility, the D-channel Backup feature requires the use of the NFAS feature. At any given time, one of the two D-channels will be carrying layer 3 signaling messages, while the other D-channel will be active at layer 2, but in a standby mode only. Any layer 3 messages received over the standby D-channel will be ignored. The two D-channels can provide signaling for only a predefined set of B-channels and cannot dynamically back up other D-channels on other interfaces.

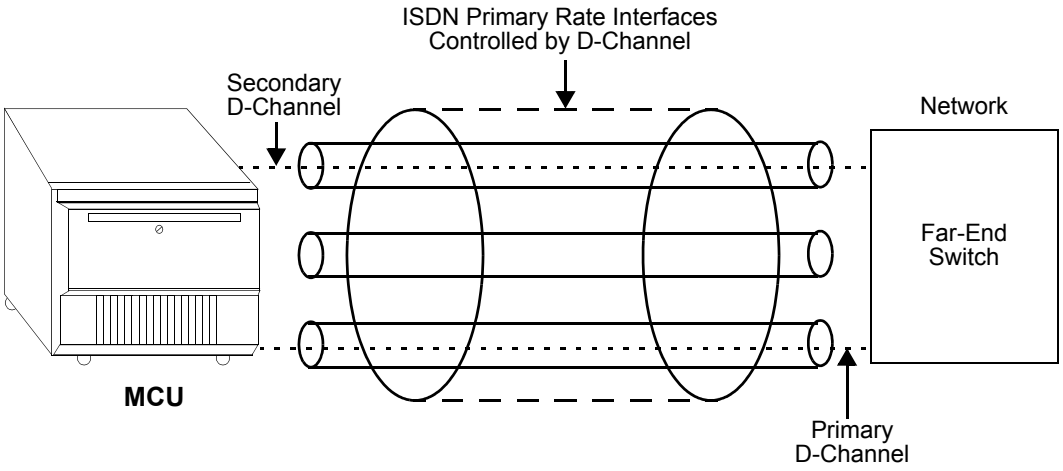


Figure B-8. Example D-channel Backup with Three ISDN-PRIs

D-channel Backup Activation

D-channel Backup can be invoked in response to the following events:

- D-channel Failure

  If the signaling link fails on the active D-channel (D1) or the hardware carrying D1 fails, then the system will send a message over the standby D-channel (D2), which requests that D2 become the active D-channel. D2 then becomes the active D-channel and will carry all subsequent signaling messages. When the signaling link or hardware on D1 recovers from the failure, D1 becomes the standby D-channel.

- System Technician Commands

  If a system technician command requests that a D-channel switch-over take place, the first action taken by the system will be to tear down the signaling link on D1. After this has been completed, a message is sent on a D2 to request that D2 become the active D-channel. D2 then becomes the active D-channel and the switch-over will be completed.

Considerations

NFAS allows four H0 calls on a DS1/E1 that does not contain a D-channel.

Only those ISDN-PRI facilities that use the NFAS feature will be capable of providing the D-channel Backup feature. The reason for this limitation is that the two D-channels must be located on different PRI DS1/E1 facilities. As a result, the

D-channels must support NFAS so that they can signal for B-channels on different ISDN-PRI DS1/E1 facilities.

When a transition from one D-channel to another occurs (D-channel Backup is activated), all stable calls (calls that have been answered already) will be preserved. Some messages may be lost, resulting in a loss of call-related information, but the calls themselves will be maintained. The effect of the transition on unstable calls (those that have not been answered yet) is unpredictable since the results depend on which messages were lost and the contents of those messages.

NOTE:
Currently, NFAS is not used much on public networks outside of the US and Canada. Also, NFAS can work on private networks using most country codes.

Interactions

None.

Administration

The following provisioning and administration must be considered when implementing FAS and NFAS. Coordinate the following with the far-end switch for the DS1/E1 facilities to be used:

- Decide which DS1/E1 facilities will use FAS.
- Decide which of the remaining DS1/E1 facilities will carry D-channel signaling information on the 16th (E1) or 24th (DS1) channel. For those channels that have a D-channel Backup, D-channel pairs must be allocated.
- Define Signaling Groups (1 through 8). A Signaling Group is a group of B-channels for which a given D-channel (or D-channel pair) will carry the signaling information. Each Signaling Group must be designated as either a FAS or NFAS Signaling Group.
  - A FAS Signaling Group must contain all the ISDN B-channels on the DS1/E1 interface associated with the group's D-channel, and cannot contain B-channels from any other DS1/E1 circuit pack. For 24-channel DS1 boards, some of the DS1 ports may use in-band (robbed-bit) signaling and be members in a tie trunk group rather than an ISDN trunk group. These tie trunks cannot be members of a Signaling Group.
  - There is no restriction on which DS1/E1 ports can belong to an NFAS Signaling Group. Normally, an NFAS Signaling Group consists of one or two D-channels and several complete DS1/E1 interfaces.

- An Interface ID must be assigned to each DS1/E1 facility in an NFAS Signaling Group. For example, if the B-channels in a Signaling Group span three DS1/E1 facilities, a unique Interface ID must be assigned to each of the three DS1/E1 facilities. This designation is required to uniquely identify the same B-channel (port) number on each of the DS1/E1 facilities in the signaling group. Therefore, this designation must be agreed upon by both sides of the interface and administered prior to initialization.
- D-channel Backup involves two or more ISDN-PRI DS1/E1 facilities that interconnect the MCU to a PBX or to the network. Two D-channels must be present on the facilities. One of the D-channels is designated as Primary and the other as Secondary. This designation must be agreed upon by both sides of the interface and administered prior to initialization.

Hardware and Software Requirements

Refer to "Integrated Services Digital Network — Primary Rate Interface" on page B-105 for hardware and software requirements.

Far-End Camera Control (FECC)

Description

FECC allows a site that requests far-end camera control to control the camera of the far-end site that it is currently viewing.

Considerations

The MCU provides FECC over a low-speed data (LSD) channel at 6.4k. A site gains access to a far-end camera via LSD token handling. An FECC-enabled conference declares and exchanges H.224-LSD commands and capabilities for an LSD channel with the participating sites. If an endpoint opens LSD but does not have H.224 capability, the token request is denied.

Whenever a 6.4k and H.224-capable terminal joins an FECC conference, the MCU opens a 6.4k LSD channel for the terminal. The terminal then requests an LSD token. If an LSD token is available, the MCU grants it. Assuming this happens, the terminal then broadcasts a list of H.224 protocols and applications over the LSD channel to all the other terminals in the conference. The terminal releases the token when it is finished with the FECC operation.

Whenever a terminal pushes the button for FECC, the request for an LSD token is passed, and the MCU grants the token. The terminal broadcasts the H.224 “packet” carrying the H.281 FECC command to control a far-end camera. The H.224 packet contains the terminal number for the camera that needs to be

controlled. The terminal that matches the terminal number in the H.224 packet responds to the FECC command. The terminal then releases the token.

The MCU never forces the terminal to release a token. However, the MCU grabs the token whenever any of the following applies to the endpoint: it is holding a token and drops; it becomes a secondary audio-only endpoint; or, it moves to another conference.

Endpoints that do not support 6.4k LSD in an FECC-enabled conference become audio-only endpoints. If an endpoint can open 6.4k LSD, the Selected Communication Mode (SCM) provides the endpoint with audio and video capabilities. If, after the endpoint opens the LSD channel, the endpoint has not declared H.224 capability or does not open the H.224 data link, FECC is not made available to the associated terminal. However, the endpoint continues to receive audio and video.

FECC requires “enhanced” endpoints that support terminal numbers. Specifically, the feature requires at least one non-basic endpoint for the MCU to exchange H.224 commands and capabilities; also, it requires at least two non-basic endpoints for any FECC operation.

FECC is enabled via administration on a per-conference basis. It is available only in non-T.120 Data Conferencing and non-CPP conferences. A currently viewed site is accessible for far-end camera control via any of the MCU conferencing modes (including VAS, Presentation, etc.).

The feature is standard for all Avaya MCU models that support Chair Control.

Interactions

FECC does not support T.120 Data Conferencing, Cascading, Continuous Presence *Plus,* or Executive Conferencing.

The following features or capabilities interact with FECC with the specific changes or considerations as noted.

- Dynamic Conference Resizing

  FECC can be disabled in an active conference; however, it cannot be enabled dynamically. If FECC is disabled dynamically during a conference, the LSD channel is closed and the SCM is reset excluding LSD as one of the common modes.

  FECC-enabled non-basic endpoints can be dynamically added to or removed from FECC-enabled conferences. Added endpoints of this type have full FECC functionality. Removing an FECC-enabled endpoint does not remove FECC functionality for the rest of the endpoints in the conference; even if the last remaining FECC-enabled endpoint is removed, the LSD channel remains open.

- Moving Endpoints

  Whenever a terminal that has the LSD token in an FECC conference is moved to another conference, the MCU takes control of the token for the original conference and makes it available to other terminals in the original conference. The LSD channel for this endpoint is closed.

  Whenever an FECC-enabled terminal is moved to an FECC-enabled conference, the terminal opens the LSD channel in the destination conference and can implement FECC there.

Administration

To enable the feature, access the Conference Record form and enter **y** into the *Far End Camera Control* field. Also, ensure that both the *Continuous Presence* field and the *T.120 Data Mode* field are set to **n**, and that the Cascade Mode field is blank. (Basic/Enhanced?: Required value: **enhanced** or **h263_enh**)

NOTE:
Value **basic** can be administered for endpoints in FECC conferences. However, these endpoints do not have access to FECC.

Hardware and Software Requirements

The TN787K, vintage 6 or higher MMI circuit pack is required.

R6.0 or greater MCU software is required. Customers with R4.x MCU software must upgrade first to R5.0 MCU software, then to R6.0 MCU hardware and software, etc.

FECC requires “enhanced” endpoints that support terminal numbers. Specifically, the feature requires at least one non-basic endpoint for the MCU to exchange H.224 commands and capabilities; also, it requires at least two non-basic endpoints for any FECC operation.

H.261 Annex D Still-Image

Description

With this feature, you can transmit still images in the video channel of the H.221 format based upon procedures specified in H.261 Annex D. Still images can be transmitted at up to four times that of CIF images.

Considerations

An endpoint usually uses this feature in conjunction with the “See-Me” feature (Contributor mode) by first requesting “See-Me” control, then waiting a half a second, sending the still image, and finally relinquishing “See-Me” control. This specific process transmits a complete still image to other endpoints in a VAS conference, and it avoids disruptions.

Interactions

This feature interacts with H.320 terminals that declare H.261 still image capability in the cap set. The feature does not support Speed Match.

A Continuous Presence *Plus* conference currently operating using full-screen switched video allows high resolution still-frame graphics (H.261 Annex D) to be transmitted in full-screen. CLI Token-Controlled Still Frame Graphics (TC-SFG) can also be transmitted.

Administration

None.

Hardware and Software Requirements

Consult your Avaya service representative.

H.263 Video Mode and H.263/H.261 Transcoding

Description

H.263 video mode is a standard feature available in non-speed-matched full-screen or CPP conferences. As an option, H.263/H.261 transcoding is available for full-screen, non-CPP, non-SM conferences.

H.263 video mode allows the following:

- H.263-compliant endpoints to participate in a non-speed-matched CPP or full-screen multipoint multimedia conference
- H.263 endpoints to interwork with H.261 endpoints in the same full-screen conference.

Considerations

H.263 video mode is a standard feature on all Avaya MCU models.

H.263 video mode is available on a per-conference basis. Therefore, the system can enable or disable this mode on a per-conference basis. The system supports H.263 video conferences and H.261 conferences that are operating simultaneously. The current video mode administration supports the “H.263/1_down only” and “H.263/1 w/upgrade” values to enable selecting H.263 video mode in a conference.

H.261 and H.263 capabilities are hierarchical; therefore, any endpoint that declares H.263 capability also declares H.261 capability.

NOTE:
An “enhanced” administered endpoint is expected to be an H.263 endpoint and therefore administered in the Conference Record form with value **h263_enh** in the *Basic/Enh* field. Otherwise, H.263 capabilities are not exchanged. However, if the endpoint does not declare H.263 capabilities, the endpoint can actually be an H.261 endpoint.

The system supports H.263/H.261 transcoding in a non-CPP full-screen conference. H.263/H.261 transcoding requires a right-to-use (RTU) fee. In a heterogeneous conference with a mix of H.263 and H.261 endpoints, the user has transcoding between H.261 and H.263 video to allow the endpoints to interwork. (Refer to "Administration" on page B-101.)

If the conference video mode is administered with one of the H.263 modes, the MCU exchanges the H.263 capabilities only with “enhanced” endpoints (that is, endpoints that can support the Multibyte Extension (MBE) capability). The endpoint must announce MBE capability before the MCU will exchange the H.263 capability set with the endpoint. The MCU will send H.263 capabilities in the cap set only for H.263 full-screen non-SM conferences. For all other conferences, such capabilities will not be sent towards the endpoints.

The TN2237C VPP circuit pack supports H.263 video mode, but it does not support H.263 capabilities and the baseline H.263_4CIF and H.263_16CIF video formats (for example, arithmetic coding and Advanced Motion Prediction). For any H.263 conference that requires the VPP circuit pack, the capabilities and the H.263_4CIF and H.263_16CIF video formats are not sent as part of the H.263 capset. Such H.263 conferences include basic CPP conferences and full screen conferences with H.263/H.261 transcoding.

For the H.263 down only value, the conference SCM video mode starts at H.263. If all the endpoints declare H.263 capability, the SCM video remains at H.263. If any one endpoint does not declare H.263, the SCM video mode is downgraded to H.261 and remains at H.261 for the rest of the conference.

The following list discusses the implications of the H.263/1 down-only value:

- If all the endpoints declare H.263 capability, the SCM video is H.263; otherwise, the SCM video for the conference is set to H.261. (The H.263-capable endpoints operate with H.261 video.)
- If the video mode is set to H.263/1 down-only, and if an endpoint that is not administered as “enhanced” joins the conference, the SCM video is downgraded to H.261.
- If the last endpoint that joins a conference causes the downgrade of SCM video to H.261, the SCM video remains at H.261 for the duration of the conference.
- For conferences with H.263 or H.261 video mode, the automatic selection of common video format and frame rate for the conference is set to the highest common of these selections among the endpoints
- If the last endpoint joining a conference causes the downgrade of the SCM video format and frame rate, the SCM video format and frame rate remains downgraded for the rest of the conference.

The H.263/1 w/upgrade value is supported for full-screen conferences only. All of the information in the previous bullet item applies to this value. In addition, if an endpoint that caused a downgrade for video from H.263 to H.261 drops out of conference, the SCM video is upgraded to H.263. Also, if the last endpoint that joined a conference and caused the downgrade of SCM video format and frame rate drops out of the conference, the SCM video format and frame rate are upgraded to the highest common of these selections.

H.261- and H.263-capable endpoints can interwork in the same non-CPP, non-SM full-screen conference whenever H.263/H.261 transcoding is enabled.

The H.263/1 down-only and w/upgrade video mode settings in an H.263/H.261 transcoded conference apply down-only or upgrade rules only for the associated video format and frame rate. Moreover, the rules are applied separately to H.263 and H.261 endpoints.

There will be two sets of highest common parameters (SCMs); one set is for the H.261 endpoints, and the other set is for H.263 endpoints.

H.263/H.261 transcoded conferences support the same transfer rates that are supported for full-screen Speed Matching but at a maximum of 768k.

Interactions

The following features or capabilities are not supported by H.263 video mode or H.263/H.261 transcoding: H.261 Annex-D Still Frame Graphics and Speed Match.

- Conference Control Commands

A conference control command can be used within homogeneous H.263 conferences to transition between CPP quad screen video and full-screen video. A command can also be used to change H.263 video mode to any fixed H.261 video.

NOTE:
This also disables H.263/H.261 transcoding.

- Conference Modes

  All conference modes, except CPP broadcast mode, are supported.

- Continuous Presence *Plus*

  Only H.263/1 down-only video mode is supported in a CPP conference. H.263/1 w/upgrade video mode and H.263/H.261 transcoding are not supported in a CPP conference.

- Dynamic Conference Resizing

  Endpoints can be added, removed or changed dynamically in an H.263 conference or an H.263/H.261 transcoded conference. However, dynamically adding or removing an endpoint may cause a change to the conference video mode because the SCM video is computed every time an endpoint joins or drops from a conference.

  The video mode can be changed dynamically from H.263 (down-only or w/upgrade) video mode to any H.261 mode.

  NOTE:
  This disables H.263/H.261 transcoding (if it was enabled) and deallocates the associated video resources (if they were allocated).

  Dynamically changing H.261 video mode to H.263 video mode is allowed only in full-screen (non-CPP, non-SM, non-transcoded conferences).

  H.263/H.261 transcoding can be disabled—but not enabled—dynamically. Whenever this capability is disabled, the video mode is changed to the highest common video mode. (If all the endpoints have H.263 video mode, the highest common video mode is H.263; otherwise, it is H.261.)

- Universal Conference Control

  UCC can be used within homogeneous H.263 conferences to transition between CPP quad screen video and full-screen video.

Administration

H.263/H.261 video transcoding is available on a conference basis. The feature is administered via the Customer-Options form and the Conference Record form. Refer to "Administering H.263/H.261 Transcoding" on page 2-239 for details.

Hardware and Software Requirements

H.263 conferences require the TN787K, vintage 6 Multimedia Interface circuit pack or higher. H.263/H.261 transcoding requires a TN2237C, vintage 16 or higher Video Processor circuit pack or higher.

If the TN2237C circuit pack either goes out of service during an H.263/H.261 transcoded conference or is not available at the start of such a conference, the conference video is changed to the highest common video mode.

H.CTX Video Mode

Description

The MCU uses the Standard Proprietary Video feature to support Compression Labs Incorporated (CLI) endpoints using H.CTX and H.CTX+ proprietary video protocols in a standards format. The MCU also supports these protocols via CLI's extension to the ITU-TSS H.230/H.243 conferencing standards, and it provides the proprietary video within the H.221 frame structure.

Considerations

H.CTX/+ is available on all models. The range is 16 to 96 ports in 16-port increments.

H.CTX and H.CTX+ are controlled via administration of a port capacity limit. Each protocol is available in 16-port increments and has a maximum capacity of 96 ports.

The MCU can simultaneously support H.261 video and standard proprietary H.CTX/+ video on separate simultaneous conferences. (Two different modes within one conference result in the noncompliant endpoint being audio-only.)

Interactions

The following features interact with the CLI extension features:

- Token-Controlled Still-Frame Graphics

  Token-Controlled Still-Frame Graphics (TC-SFG) transfers are supported in H.261, H.CTX, and H.CTX+ conferences as defined in the CLI Extensions to TSS Conferencing Standard Specification. Still-Frame Graphics allow any site to send graphics from any video source by requesting, granting, and releasing "graphic tokens."

TC-SFG is available only when the MCU is operating in VAS or Chair mode. In an H.CTX or H.CTX+ conference, once the MCU makes an endpoint that has requested the “graphics token” the video broadcaster, the MCU grants the token to that endpoint. While the token is assigned, and after the switch to the token requester, the MCU prevents Video Command Updates (VCUs) from being transmitted to the codecs. This effectively causes the Still-Frame Graphics transfer to occur without “switching” the video streams. The MCU sets a timer while the token is assigned. If the timer expires before the endpoint releases the token, the MCU reclaims the token and returns to the previous state.

Whenever an endpoint releases the “graphics token,” the MCU returns to the previous broadcast and return video sources, and it restores full-motion video. The MCU reclaims the token whenever the following happens while the endpoint is holding the token:

— Chair or Universal Conference Controller designates a video broadcaster

— Endpoint drops

If the conference is in Presentation or Broadcast with Auto-Scan mode, the MCU acknowledges graphics transfer requests only from the controlling mcu-extension. TC-SFG requests from all other endpoints are rejected. If the Chair or a UCC endpoint selects the broadcaster, the TC-SFG request is rejected unless it originates from the selected video source.

The MCU supports TC-SFG in cascaded conferences.

- Site Names

  The MCU supports the use of nonstandard capabilities, commands, and procedures to allow CLI endpoints access to terminal name information collected via H.243 standardized procedures. These procedures allow an endpoint to request the terminal name associated with another endpoint in a conference. The response is returned in another nonstandard message.

  To access this feature, the MCU must announce support of the SITE-NAMES capability in a CLI nonstandard capability set. If the endpoint is recognized as a CLI site, the MCU announces support of SITE-NAMES. Such support also enables TC-SFG.

  Whenever a codec capable of handling SITE-NAME joins the MCU, the MCU forwards the terminal names of any currently connected endpoints to the new site. If the codec signals support for unsolicited SITE NAME receipt, the MCU sends terminal names to that site once it receives them from other sites.

- H.261 Video

  Simultaneous support for H.CTX, H.CTX+, and H.261 video conferences on the same MCU is supported.

- Dynamic Conference Resizing

  This feature is supported in standard proprietary video conferences.

- Cascading

  An H.CTX or H.CTX+ conference can be cascaded with another similarly configured conference on a second MCU.

- Passwords

  Conferences with H.CTX/+ video may be password protected.

- T.120 Data Conferencing

  T.120 Data Conferencing may be enabled on H.CTX/+ conferences.

- Universal Conference Control

  An H.CTX/+ conference supports this feature.

- Basic/Enhanced Service Flag

  In an H.CTX/+ conference, the MCU must transmit MBEs to signal support for proprietary video and to turn on the video. This is required to enable TC-SFG and SITE-NAMES support.

Administration

To establish an H.CTX (or H.CTX+) conference, enter **H.CTX** (or **H.CTX+**) into the *Video Mode* field of the Conference Record form. H.CTX is supported for bandwidths between 112k and 384k, inclusive. H.CTX+ is supported for bandwidths between 336k and 1920k, inclusive.

H.CTX/+ port capacity is administered separately from the total MCU port capacity. The MCU can be administered with an H.CTX/+ port capacity greater than the system capacity; however, the system port capacity takes precedence. If the total MCU port capacity is 12, and if the H.CTX/+ port capacity is 16, only 12 ports can be active simultaneously. Otherwise, the system would support a combination of H.320 and H.CTX/+ ports up to the system capacity (although the number of H.CTX/+ ports would be limited by the administered H.CTX/+ capacity).

Hardware and Software Requirements

None.

Integrated Services Digital Network — Primary Rate Interface

Description

This feature allows connection of the system to an Integrated Services Digital Network (ISDN) by using a standard ISDN frame format called the Primary Rate Interface (PRI). The ISDN provides access to a variety of public and private network services and facilities. The MCU ISDN-PRI implementation is consistent with the International Telecommunications Union-Telecommunications (ITU-T) Recommendation Q.931 and Q.921.

The T1 is a digital transmission standard that in North America carries traffic at the digital signal level-1 (DS1) rate of 1.544 M. T1 facilities are also used in Japan and some Middle-Eastern countries. It consists of a 1.536-M signal multiplexed with an 8k framing channel. The 1.536-M signal is divided into 24 channels (DS0s) of 128k each, numbered 1 through 24. The “D” (data) channel multiplexes signaling messages for the “B” (bearer) channels carrying data. When a D-channel is present, it occupies channel 24.

The E1 is a digital transmission standard that carries traffic at a rate of 2.048 M. It is used in Europe and elsewhere. The E1 facility is divided into 32 channels (DS0s) of 64 kpbs information numbered 0-31. Channel 0 is reserved for framing and synchronization information. When a D-channel is present, it occupies channel 16.

ISDN-PRI signaling in the system is supported by the TN767D (for 24 channels). The D-channel (signaling channel) is switched through the TN794 Netpacket circuit pack.

With the ISDN-PRI, the system can interface with a wide range of other products including network switches and PBXs. These products include the following:

- Public Network switches (for example, 4ESS, 5ESS®, Northern Telecom™ DMS250, etc.)
- DEFINITY® Switch Generic 2 and System 85 R2V4
- DEFINITY Switch Generic 1
- DEFINITY Enterprise Communications Server Generic 3
- Other products that adhere to the ISDN-PRI signaling protocol

As an example of how the ISDN-PRI is used in private and public network configurations, refer to the following figures. As seen in these figures, the ISDN-PRI can be used to interface the MCU with a PBX.

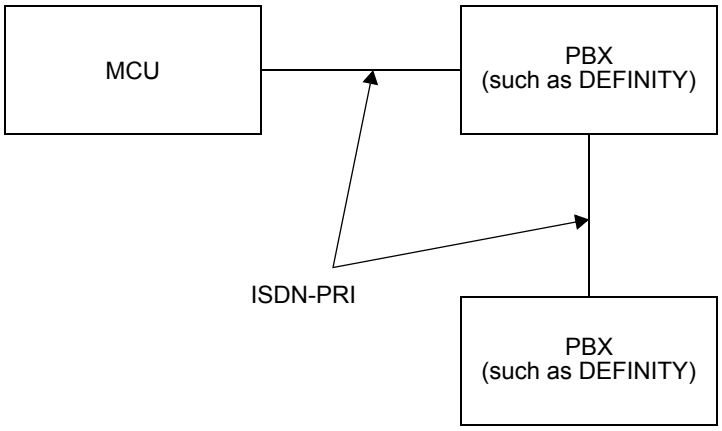


Figure B-9. ISDN-PRI Private Network Configuration

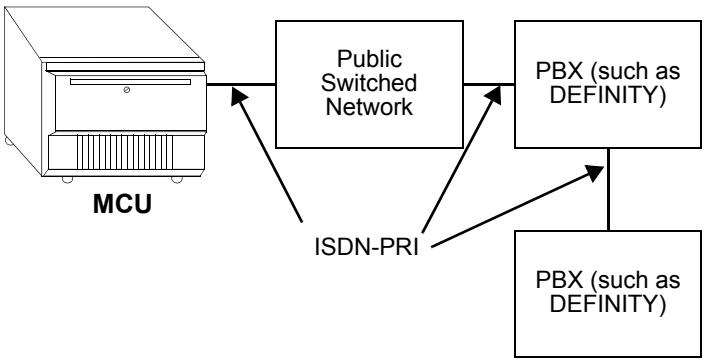


Figure B-10. ISDN-PRI Public Network Configuration

ISDN-PRI Services

The ISDN-PRI provides the following services:

- Private Network Services
- Multirate bandwidths of 112k, 128k, 168k, 192k, 224k, 256k, 280k, 320k, 336k, 384k, 448k, 512k, 672k, 768k, 1008k, 1152k, 1288k, 1344k, 1472k, 1536k, 1680k, and 1920k (both private and public networks) for video conferencing
- Call-By-Call Service Selection
- Access to Switched Network Services

Access to Switched Network Services

ISDN-PRI provides access to Switched Network Services such as Software Defined Data Network (SDDN), etc. An ISDN-PRI trunk group may be dedicated to a particular feature. Alternately, an ISDN-PRI Call-By-Call trunk group may provide access to several features. For a description of the ASN services accessible via ISDN-PRI (via either dedicated or Call-By-Call trunk groups), refer to "Call-By-Call Service Selection" on page B-48.

ISDN-PRI Call Identification Display

Two types of identification numbers are provided with the ISDN-PRI. These identification numbers may be used in the various types of displays used with the ISDN-PRI. The two types of identification numbers are as follows.

- Billing Number (BN): The calling party's billing number that is provided to an inter-exchange network via Equal Access or Centralized Automatic Message Accounting (CAMA). This number is stored at either a local or network switch. If a customer is connected directly to the network, the BN is the customer's billing number stored in that network. If the CPN is not provided on an incoming ISDN-PRI call, the system uses the BN for the station identification number.

Private Network Services

In addition to providing access to switched public networks, the ISDN-PRI can provide private network services by connecting in an Electronic Tandem Network (ETN) configuration. This gives customers more efficient private networks that support new integrated voice and data services. Services are provided as follows:

- Multirate Bandwidth

  The primary function of the Multirate Bandwidth feature is to provide support for services that require large bandwidth, such as high-speed video conferencing at 112k, 128k, 168k, 192k, 224k, 256k, 280k, 320k, 336k, 384k, 448k, 512k, 672k, 768k, 1008k, 1152k, 1288k, 1344k, 1472k, 1536k, 1680k, or 1920k. These services have traditionally been handled by dedicated facilities. With the Multirate Bandwidth feature, dedicated facilities are no longer a requirement for these large bandwidth services.

Call-By-Call Service Selection

Call-By-Call Service Selection allows the same ISDN-PRI trunk group to carry calls to a variety of services or facilities (such as a SDDN and ACCUNET). This feature is described in detail under the Call-By-Call Service Selection feature description.

Access to Software Defined Data Network (SDDN)

With ISDN-PRI, the SDDN service may be accessed. SDDN provides virtual private line connectivity via the switched network (4ESS switch). The services provided by SDDN include voice, data, and video applications. SDDN services complement the Software Defined Network (SDN) voice services.

Access to Switched Digital International (SDI)

SDI provides 128k unrestricted connectivity to international locations via the switched network. It is also the backbone for the International ISDN network. SDI complements the ACCUNET digital service already available to US locations. This service can be accessed using the Call-By-Call Service Selection feature.

Considerations

ISDN-PRI is required for video conferences at data rates greater than 112k. CBC and NFAS data channel backup are available if required.

Interactions

None.

Administration

ISDN-PRI is administered on a per-system basis by the system administrator. The following items require administration.

- Communication - Interface Link
- Communication - Interface Processor
- DS1 Circuit Pack (for DS1 and E1)
- DS1 Synchronization Plan (for DS1 and E1)

Processor Interface Circuit Pack

- ISDN-PRI Trunk Group
- GRS Routing Patterns
- Signaling Group (refer to "Facility and Non-Facility Associated Signaling" on page B-91)

Hardware and Software Requirements

- A TN767D DS1 circuit pack is required for assignment of a T1 signaling link and up to 24 ISDN-PRI Trunk Group members. The DS1 provides up to 24 ports.
- A TN2207 DS1 circuit pack is required for assignment of an E1 signaling link and up to 31 ISDN-PRI Trunk Group members. The DS1 provides up to 31 ports.
- A TN2182 Tone Clock circuit pack is required to provide synchronization for the DS1 circuit pack.

- A TN765 Processor Interface circuit pack is required for ISDN-PRI. The TN794 supports four ports (four D-channels).

ISDN-BRI Trunk Interface

Description

ISDN-BRI Trunk Interface supports ISDN-BRI connections to the public network.

Considerations

ISDN-BRI Trunk Interface is intended primarily for customers with relatively small line sizes in countries and geographic locations where BRI lines are less expensive than PRI lines. The feature is also intended for customers in countries that do not have ISDN-PRI lines.

The availability of time slots on the MCU Time-Division Multiplexing (TDM) bus for conferences using the feature depends on the conferencing features being used (for example, conference size, bandwidth, CPP, SM, etc.) and whether breakage occurs. Breakage occurs whenever the channels of an endpoint must be broken up across multiple MMI/DS1 circuit pack pairs. Since ISDN-BRI Trunk Interface does not use MMI circuit packs, 100% breakage is assumed.

ISDN-BRI Trunk Interface supports the following transfer rates: 1B, 2B, and BONDing rates up to 768k. A maximum of five TN2185 ISDN-BRI circuit packs are supported; a maximum of three TN556 circuit packs are supported; and a maximum of three TN2198 circuit packs are supported.

The TN2185 circuit pack supports point-to-point calls at the 1B and 2B rates. The TN556 circuit pack can serve as a network T-interface for tie trunk applications. However, the circuit pack cannot replace the ISDN-BRI Trunk Interface functionality offered by the TN2185 circuit pack because it does not support trunk connections to the public network. The TN2198 circuit pack is a two-wire U-interface that allows longer tie-trunk connections using ISDN-BRI.

Multirates are not supported.

Interactions

The following features or capabilities interact with ISDN-BRI Trunk Interface with the specific changes or considerations as noted.

- Audio Add-On

  BRI ports on the TN2185 ISDN-BRI circuit pack can be used for including Audio Add-On endpoints into conferences. Therefore, whenever TN2185 ISDN-BRI circuit packs are being used, a DS1 TN767 circuit pack is not required to enable Audio Add-On.

- BONDing

  The TN2185 ISDN-BRI circuit pack supports BONDing at rates between 2B and 768k, inclusive.

- Dial-Out

  Whenever the TN2185 ISDN-BRI circuit pack is used to provide a BRI network interface, Dial-Out is supported.

- Direct Connect

  Endpoints can directly connect to the MCU via the TN556 ISDN-BRI circuit pack in configurations where the TN2185 ISDN-BRI circuit pack(s) are providing an ISDN-BRI network interface. However, the maximum number of TN2185 ISDN-BRI circuit packs is reduced in such a case due to the time slot usage by the directly connected endpoints.

- Universal Conference Control

  The TN2185 ISDN-BRI circuit pack supports UCC endpoints. Therefore, whenever TN2185 ISDN-BRI circuit packs are being used, a DS1 TN767 circuit pack is not required to enable UCC.

Administration

The following table shows the maximum possible number of conferences using ISDN-BRI Trunk Interface for varying bandwidths and conference sizes, and assuming a maximum of five TN2185 ISDN-BRI circuit packs.

Table B-13. Maximum Number of Conferences Using ISDN-BRI Trunk Interface

Conference Bandwidth	Conference Size (Number of Participants)		
	4	12	20
2B	10	3	2
6B	3	1	0
12B	1	0	0

To administer the feature, populate the forms discussed in the following sections according to the directives provided.

Customer Options Form

Populate the appropriate *Maximum Port Capacity* fields. Also, set the *BONDed Use Same DS1* field to **n**.

Optional Features Form

Ensure that the *ISDN-BRI Trunks* field in the Optional Features form is set to **y**. If the field is disabled, the BRI Trunk form is not accessible.

Feature Access Code Form

Populate the *ISDN Access Code* field with a four-digit code number. The number can contain any digits 0 through 9 along with the # and * symbols in any position (for example, ***256**).

System Capacities Form

Populate the I*SDN-BRI Ports* field with a value indicating the appropriate number of ISDN-BRI ports.

BRI Trunk Form

Populate the fields in the form according to the directives in "Administering ISDN-BRI Trunk Interface" on page 2-244.

Trunk Group Form

Populate the fields in the form according to the directives in "Administering ISDN-BRI Trunk Interface" on page 2-244.

Hardware and Software Requirements

The TN2185 circuit pack is required.

Lip Synchronization

Description

Lip Synchronization allows users to select the lip synchronization profile of their conferences. Such conferences can involve the TN2237C, vintage 16 or higher Video Processor Plus circuit pack.

Considerations

Lip Synchronization is standard for all MCU models. The feature may be used on a per-conference basis for Continuous Presence *Plus*, Executive Conferencing, Speed Match, and H.263/H.261 Transcoding conferences.

Two Lip Sync modes are available:

- Preserved Lip Sync Mode

  With this mode enabled, the MCU provides additional audio delay for conferences in quad-screen mode and when the MCU is processing the video. This is done to preserve lip synchronization. The audio of all multimedia endpoints in the conference (except for the Presenter) is delayed in quad mode. The audio delay is implemented either automatically or via customer administration.

  NOTE:
  This includes “secondary” or “quad-view only” endpoints (that is, endpoints that can view the quad-image but cannot be a source into the CP conference).

  If the conference goes to full-screen mode, the MCU does not provide any deliberate audio delay because the MCU does no video processing in this mode.

  Preserved Lip Sync Mode can vary according to the type of video processor circuit pack used; it can also vary according to the transfer rate and frame rate of the Continuous Presence *Plus* conference.

- Audio Priority

  For this mode, the MCU provides no audio delay in either full-screen mode or quad-screen mode.

  This mode may be desirable for highly interactive conferences where minimizing the audio delay will prevent talkover annoyances. This mode may also be desirable in conferences where video cameras are not focused on the face and lips of any participants and, therefore, Lip Sync is not critical.

Interactions

Lip Sync Mode supports the following features or capabilities with specific changes or considerations as noted.

- Audio Add-On

  Lip Sync Mode has no impact on the voice path associated with Audio Add-On endpoints.

- Cascading

For a cascaded MCU configuration with Continuous Presence *Plus* (CPP), the conference at the primary MCU must be optioned with Continuous Presence *Plus* in either Presentation mode or Voice-Activated Switching (VAS) mode. If Preserved Lip Sync is enabled on the primary MCU, and if the primary MCU is in VAS quad-mode, the audio delay is applied to all CPP-compliant video endpoints on the primary MCU, including the inter-MCU link. If Preserved Lip Sync is enabled on the primary MCU, and if the primary MCU is in Presentation mode, the audio delay is applied to the inter-MCU link since this link can be the video source for one of the quads in the quad-image returning to the Presenter. However, audio-delay is disabled for the Presenter.

The secondary MCU must be administered as a non-CPP Presentation mode conference to force the inter-MCU link to be the full-screen broadcaster. Since this MCU is in non-CPP mode, Preserved Lip Sync cannot be administered on this MCU.

- Presentation Mode

  If Preserved Lip Sync is enabled on a CPP conference with Presentation mode, and if the Presenter is viewing a quad-screen, the audio from the non-Presenter sites is delayed. However, if the Presenter requests to view full-screen, the audio delay is removed from all the endpoints. The audio from the Presenter in a CPP conference is never delayed in any case.

Administration

Lip Sync mode is enabled via several forms. The feature can also be enabled during an active conference. For details, refer to "Administering Lip Synchronization" on page 2-233.

Hardware and Software Requirements

The feature requires TN787K, vintage 6 or higher MMI circuit packs. The TN787K firmware is backward compatible with all previous MCU software releases.

Low-/High-Speed Interworking

Low-/High-Speed Interworking allows lower-speed (56k and 64k) endpoints to join a higher-speed conference as Audio Add-On endpoints.

Description

A lower-speed endpoint can connect with a single channel to a single channel higher-speed conference as an audio-only endpoint. There is no limit to the number of low-speed endpoints that can join the conference in this way.

Considerations

Low-/High-Speed Interworking is allowed only for 56k and 64k endpoints. The low-speed endpoint connects with only one channel and only to high-speed single channel conferences. During a conference, this feature can be administered from off to on but not on to off.

Interactions

The Low-/High-Speed Interworking feature interacts with the following features.

- CDR

  CDRs for the call indicate the number of channels used by each call.

- Cascading

  Low-speed calls coming on a cascade link are blocked.

- BONDing

  The feature is not allowed in a BONDed conference.

- Dial-In/Dial-Out

  Only dial-in endpoints can use this feature.

- Passwords

  If passwords are administered for the conference/endpoint, the MCU requests a password from the low-speed endpoint even if that endpoint is joining as an audio-only endpoint.

- T.120 Data Conferencing

  Since low-speed endpoints join as audio-only, they cannot access the T.120 Data Conferencing features.

- Chair Control

  The MCU denies chair control to any audio-only endpoint.

- CRCS

  If interworking is enabled for a conference, then CRCS relaxes conditions for selecting endpoints but still does not allow BONDed ports since interworking is blocked in conferences with BONDed endpoints.

- Dynamic Resizing

  If dynamic resizing is enabled for a conference, then interworking can be administered from off to on during the conference. Interworking can never be administered from on to off during a conference.

Administration

Low-/High-Speed Interworking is enabled by administering it on the conference form for each conference.

Hardware and Software Requirements

Low-/High-Speed Interworking is available only on release 3.0 or later of the MCU.

Multirate Bandwidth

Description

The ISDN-PRI divides a T1 (E1 for international switches) trunk into 23 or 24 (30 for E1) information channels and one signaling channel for standard narrowband communication. Certain applications, such as video conferencing, require greater bandwidth, and it becomes necessary to aggregate several of those narrowband channels into one “wideband” channel to accommodate the extra bandwidth requirement. The Multirate Bandwidth feature provides an MCU with the ability to receive 112k, 128k, 168k, 192k, 224k, 256k, 280k, 320k, 336k, 384k, 448k, 512k, 672k, 768k, 1008k, 1152k, 1288k, 1344k, 1472k, 1536k, 1680k, or 1920k calls.

Technical Description

The Multirate Bandwidth feature provides end-to-end connectivity between endpoints according to the ITU-T and ANSI standards for 112k, 128k, 168k, 192k, 224k, 256k, 280k, 320k, 336k, 384k, 448k, 512k, 672k, 768k, 1008k, 1152k, 1288k, 1344k, 1472k, 1536k, 1680k, or 1920k calls.

NOTE:
Typically, a T1 facility provides for 23 B-channels and 1 signaling while an E1 facility provides 30 B-channels and 1 D-channel. If however, Non-Facility Associated Signaling (NFAS) is used, a group of T1/E1 facilities can be configured to share a single signaling channel allowing all but one of the T1/E1 facilities to be configured with an extra B-channel. The MCU supports up to 25 T1/E1 facilities.

An MCU can be configured for Multirate Bandwidth to support multipoint conferences at 112k, 128k, 168k, 192k, 224k, 256k, 280k, 320k, 336k, 384k, 448k, 512k, 672k, 768k, 1008k, 1152k, 1288k, 1344k, 1472k, 1536k, 1680k, or 1920k. Each B-channel can provide 64k transmission rates. There are two service types for encoding the aggregation of channels, both of which are supported by the MCU.

Nx64 allows the aggregation of any channel groupings, while 384k (H0) and 1536K (H11) have fixed channel assignments.

Channel Allocation

Multirate bandwidth channel allocation is performed using one of three allocation algorithms: fixed, flexible, or floating.

- Fixed allocation provides contiguous channel aggregation and the starting channel is constrained to a predetermined starting point. (This is used only for 384k (H0), 1536K (H11), and H12 calls.)
- Flexible allocation allows an Multirate Bandwidth call to occupy non-contiguous positions within a single T1 or E1 facility.
- Floating allocation enforces contiguous channel aggregation but the position of the first channel is not constrained like it is in fixed allocation.

Considerations

Blocking is the most pertinent trunking consideration when using Multirate Bandwidth.

Blocking

Blocking occurs when the number of B-channels required to make a call are not available. Narrowband (128k) calls require two channels and are usually not blocked. However, blocking occurs for Multirate Bandwidth calls when bandwidth is not available in the appropriate format (that is, fixed, floating, or flexible). (Refer to the earlier description.)

Interactions

The following features interact with the Multirate Bandwidth feature:

- ACA

  Treats Multirate Bandwidth calls as single trunk calls so that only a single ACA referral call is made if an ACA referral call is required. The referral call is on the lowest B-channel associated with the Multirate Bandwidth call.

- CDR

  Multirate Bandwidth calls trigger CDR records containing the Multirate Bandwidth Bearer Capability Class (BCC) and the call bandwidth.

- ISDN-PRI

  Standard ISDN-PRI interfaces can be administered for Multirate Bandwidth switching.

Administration

Multirate bandwidths are administered on a per-system basis via the Optional Features form. Also, the Trunk Group (ISDN-PRI) form must be administered for Multirate Bandwidth service.

Trunk Groups

Trunk group administration is required to specify the Multirate Bandwidth services that are to be supported by each trunk group. The parameters 384k (H0), 1536K (H11), and NXDS0 must be administered to identify the algorithm that the trunk group uses to provide Multirate Bandwidth service.

Hardware and Software Requirements

The TN767D or TN2207 circuit pack must be used for any facility that carries Wideband traffic. The only other additional hardware or software required for Multirate Bandwidth is that the PRI endpoints must adhere to the ISDN-PRI wideband interface requirements and to PRI line-side requirements.

The TN2207 is required for E1 facilities.

MultiRate Video (MRV)

Description

The Avaya MCU supports INTEL® ProShare™ endpoints using MRV proprietary video protocols in a standard format. The MCU supports MRV protocols via the INTEL extension to the ITU-T H.230/H.243 conferencing standards, and it provides the proprietary video protocols within the H.221 frame structure for multipoint calls.

Considerations

MRV video is available as a standard feature on all models.

The MCU can support simultaneously H.261 video as well as the following standard proprietary videos on separate simultaneous conferences: MRV, H.CTX, H.CTX+, and SG4. Any endpoint that does not support the Selected Communications Mode (SCM) is an audio-only endpoint.

MRV video makes use of conventional H.320 ports, and it is supported by the maximum number of ports allowed within the Avaya MCU. All port types except for Audio Add-On and UCC ports may be used as MRV ports within an MRV conference. INTEL ProShare endpoints support MRV video rates up to 128k.

Interactions

MRV video does not support Continuous Presence *Plus*. The following features are supported with specific changes or considerations as noted:

- Basic/Enhanced Flag

  In an MRV conference, the MCU must transmit Multiple Byte Extensions (MBEs) to all endpoints (including “basic” endpoints) to “turn on” video capabilities. MRV endpoints can therefore be designated as either “basic” or “enhanced” endpoints and receive video within an MRV conference.

  NOTE:
  With “basic” enabled, the user cannot access certain features or functions, such as Terminal Names and Chair Control.

- Cascading

  An MRV conference can be cascaded with another similarly configured conference provided each MCU involved is an Avaya MCU.

- Dynamic Conference Resizing

  The *Video Mode* field of the Conference Record, which may contain a value for MRV video, cannot be changed during an active or in-use conference.

- Rate Adaptation

  This feature is supported at a 56/64k rate for two channels.

- T.120 Data Conferencing

  Either a fixed-rate or variable-rate MLP data stream can be supported in an MRV conference.

- Universal Conference Control (UCC)

  UCC commands for Continuous Presence *Plus* are not supported.

Administration

The Conference Record form is used to administer MRV video on a per-conference basis. For instructions, refer to "Administering Video Modes" on page 2-175.

Hardware and Software Requirements

MRV video requires the TN787K, vintage 6 or higher circuit pack.

Networking and Call Handling

Description

The MCU provides a flexible and robust networking interface. This networking interface consists of the network trunks (DS1 and PRI) that provide the physical connection to the network (private or public) and the call handling software that processes the incoming and dial-out calls. Additionally, the network interface supports flexible call handling such that each video port supports variable bandwidths (transmission rates) on a per-conference basis. Therefore, no hardware nor software modifications are required to the system beyond the setting of the bandwidth parameter on the Conference Record form. As an example, video port 51000 can be administered in a 128k conference that lasts from 10:00 to 11:00. At 12:00, a new conference administered for 384k (H0) can reuse video port 51000 without any hardware or software modifications.

The MCU supports Robbed-bit DS-1 and ISDN-PRI trunks for connecting to the public switched network or a PBX (refer to "Integrated Services Digital Network — Primary Rate Interface" on page B-105). All video calls gain access to the MCU via these trunks. For each incoming call, the MCU expects to receive an MCU number (that is, a network number assigned to the MCU). The received MCU number can be used by the reservations agent (or system administrator) to help identify which endpoint originated the call and is always used by the MCU to identify the video port to which the call is to be connected. As with other equipment connecting to a network, it is expected that the network dial plan and call routing is already provisioned and in place prior to attempting video calls to the MCU. In the same way, outgoing (dial-out) requires the MCU dial plans, trunk groups, and routing be provisioned and in place prior to attempting a video call to the network.

Considerations

The objective of the Network/Call Handling Subsystem is straightforward in that calls are received from or sent to the network and connected to the proper video port within the MCU. Once the MCU is connected to the network, and the network administrator has provisioned the network dial plan, calls to the MCU can be made and the dial-out feature can be used to make calls. For each incoming video call, the MCU receives the incoming digits (that is, MCU number). (Refer to "Dial-Out" on page B-83 for details on outgoing call (dial-out) MCU numbers.) This MCU number is used internally to route the call to the proper video port. Each video port is identified via its extension (that is, video port extension). Once internal processing of the MCU number is completed, the call is connected to a video port.

Interactions

To implement the function outlined above, the networking or call handling subsystem uses the following MCU features:

- DS-1 Trunk Service

  Enables administration of one to several DS-1 trunks groups.

- ISDN-PRI

  The ISDN-PRI feature enables the administration of the ISDN-PRI parameters for trunks administered for ISDN-PRI signaling.

- Dial Plan

  Enables the administration of the video port extensions.

- AAR

  AAR provides the call handling capability. MCU numbers for incoming calls are analyzed and, in turn, converted to the appropriate Video Port extension. The Video Port extension is then used to connect the call to the appropriate video port.

To handle incoming calls properly, the following steps must be completed:

1. Each trunk group must be administered to prepend an 8 on each MCU number received from the network

   NOTE:
   The network administrator is responsible for properly administering the network to deliver the entire MCU number (that is, network number).

   The network should be provisioned to deliver to the MCU the MCU numbers such that they correspond to the numbers distributed by the Reservations Agent and thus the number dialed by the end user. To join a 128k or 384k conference, a MCU number must have an administered bandwidth of 128k/384k. To join a 112k conference, a MCU number may have an administered bandwidth of 112k or 128k/384k.

2. The Dial Plan feature must be administered. Once completed, the Video Port extensions exist (4- or 5-digit extensions) and the AAR feature access code (8) is provisioned.

3. The AAR Digit Conversion Table must be administered such that each MCU number exists in the “Matching Pattern” field.

   NOTE:
   The full 7-, 10-, 4-digit (or whatever dial plan is implemented in the network and in turn passed to the MCU) number must be entered in this field. Directly across from each entered MCU number in the “Replacement String” field is a Video Port extension. The Video Port

extension must correspond to the Dial Plan administered via the Dial Plan feature.

Refer to "Dial-Out" on page B-83 for details of the requirements that need to be met to handle outgoing (dial-out) calls properly.

Administration

Refer to the individual feature.

Hardware and Software Requirements

Refer to the individual feature.

Notification Package

This feature includes conference tones and text messages.

Description

Conference tones and text messages are provided during MCU conferences to alert users of the following: endpoints joining the conference, endpoints dropping from the conference, and impending conference end (warning tones and messages).

NOTE:
Refer to "On-Screen Display" on page B-122.

Considerations

NOTE:
Refer to "On-Screen Display" on page B-122.

Interactions

NOTE:
Refer to "On-Screen Display" on page B-122.

Administration

NOTE:
Refer "On-Screen Display" on page B-122.

Hardware and Software Requirements

NOTE:
Refer to the "On-Screen Display" on page B-122.

On-Screen Display

Description

On-Screen Display (OSD) provides various Notification Package enhancements and Automatic Number Identification (ANI) codes within the MCU video image. The feature enables images to be intertwined into an endpoint's decoded video stream and then encoded back as return video. OSD is provided only in non-speed-matched homogeneous CPP-only conferences. The following OSD applications are supported:

- End Notification — Text string display providing the traditional 10 minute end-of-conference warning notification (for example: "10 Minutes Remaining in Conference") as well as a subsequent two minute remaining warning (for example, "Less than Two Minutes Remaining"). The first string is displayed for approximately 10 seconds, and the latter string is displayed continuously.

  NOTE:
  The traditional audible tone for the 10 minute warning/end notification can be provided along with the text message. However, no two minute remaining tone is provided.

- Entry Notification — Either a text message display indicating the site name of the endpoint that has just joined the conference (for example: "Welcome NY") or the Automatic Number Information (ANI) code (for example, "7325551234 has joined") for such an endpoint. The message or ANI code is provided for both video and Audio Add-On endpoints. The first 15 characters of the site name as administered in CRCS or on the Conference Record form are displayed.

  NOTE:
  The traditional audible tone for entry notification can be provided along with the text message.

- Exit Notification — Either a text message display indicating the site name of the endpoint that has just left the conference (for example: "Goodbye NY") or the Automatic Number Information (ANI) code (for example, "7325551234 has exited") for such an endpoint. The message or ANI code is provided for both video and Audio Add-On endpoints. The first 15

characters of the site name as administered in CRCS or on the Conference Record form are displayed. Any additional characters in the site name are truncated.

NOTE:
The traditional audible tone for exit notification can be provided along with the text message.

Considerations

There is no individual right-to-use (RTU) fee associated with the OSD feature itself. Rather, the OSD capability is included within right-to-use fee for Continuous Presence *Plus* video processing. OSD functions at up to 30 fps at all CPP transfer rates up to 768k.

OSD is supported only in homogeneous CPP-only conferences. This implies that the feature can be administered only for a non-speed-matched CPP conference. The CPP conference must also be an H.261 homogeneous conference or an H.263 homogeneous conference. In addition, the OSD text messages can be displayed only whenever the CPP conference is in quad-screen or panoramic mode; the messages cannot be seen whenever the conference is in full-screen mode. However, if the conference switches from full-screen mode to either quad-screen or panoramic mode, the text messages are displayed.

The text strings for indicating conference end notification, site entry identification, and site exit identification are displayed across the top of the lower two quadrants (that is, quads 3 and 4). The text messages are displayed for an appropriate length of time to allow for the proper acknowledgment from conference participants. Thereafter, the messages are removed from the quad image to minimize any disruption to the natural meeting experience.

OSD text messages comprise white text encapsulated in a black box to ensure optimal visibility independent of the color composition of the live video stream from the sites in quads 3 and 4.

The intention of the OSD text messages is also fulfilled via the existing audible tone notification. The appropriate tone ensures that the conferees receive the appropriate notification in any case and, particularly, if the CPP conference switches to a full-screen conference. The tone also prompts the conferees to acknowledge the OSD message (if provided) before it is removed from the screen.

For OSD text messages to be displayed, the conference must be in CIF mode.

If numerous endpoints join a conference within a relatively short period of time, the entry notifications for the latest endpoints are queued and displayed after the OSD entry notifications for all endpoints that joined the conference previously have been displayed for the full length of time.

Interactions

OSD does not support the proprietary algorithms (including SG4, H.CTX, and MRV). The following features or capabilities interact with OSD with the changes or considerations noted.

- CPP Presentation Mode

  In CPP Presentation mode, only the presenter (who is viewing a quad-image) sees the text overlays. All other conferees with video capabilities see the presenter in full-screen and receive only the audible tone warnings.

- H.261 and H.263 Video Modes

  The OSD text overlay options are supported in H.263 homogeneous CPP-only conferences as well as in H.261 homogeneous CPP-only conferences.

- OneNumber Access

  For conferences with OneNumber Access, whenever the OSD text overlay associated with the entry/exit notification is tied directly to the data in the site names field for each endpoint, there is no clear way to associate a particular site with a specific conference endpoint number since many sites may share the same MCU extension. A variable number of endpoint numbers are available to each endpoint entering the conference. The endpoint number assigned in each case depends on the order in which the associated endpoint enters the conference. Therefore, the “text” and “text/tone” options for entry/exit alert are not allowed whenever OneNumber Access is being used within the conference.

- QCIF Mode

  With this mode, the text resolution is insufficient. Therefore, OSD text messages are suppressed.

- Terminal Names/Site Names

  The site name information provided via the OSD text overlay is the information manually administered within the MCU/CRCS via the ResCenter database or via the MSM Conference Record form.

Administration

This feature is administered via the Customer-Options form and the Conference Record form. Refer to "Administering On-Screen Display" on page 2-241.

NOTE:
It is highly recommended that text or ANI notifications along with tone notifications be provided to conference participants rather than just text or ANI notifications. This recommendation is made with regard to the various possible conference profiles within conferences that may not always allow

text or ANI notification. For example, some conferences may include Audio Add-On or secondary audio-only endpoints; obviously, such endpoints cannot receive OSD notification if the text- or ANI-only option is enabled. Another benefit of using the text/tone or ANI/tone option is within CPP conferences that are in full-screen mode because such conferences are unable to display OSD text or ANI. Finally, even within conferences where text or ANI messages can be displayed, sounding an audio tone in conjunction with displaying a text message or ANI draws the attention of the conference participants to the monitor for their respective endpoints and therefore ensures that the participants read the text notification or ANI before it disappears.

Hardware and Software Requirements

The system must have CPP RTUs and TN2237C, vintage 16 or higher circuit packs to support OSD capabilities.

OneNumber Access

Description

OneNumber Access is a customer option that allows multiple endpoints in a conference to access the MCU from the same external extension. A OneNumber Access extension is a duplicated MCU-extension within a single conference. Endpoints sharing a OneNumber Access extension are not preassigned to a specific conference endpoint number; instead, these endpoints share a pool of endpoint numbers and receive a conference endpoint ID based on when they join the conference.

Considerations

Each MCU conference can have multiple OneNumber Access extensions. Conferences can be configured to allow a mixture of endpoints that use the OneNumber Access extension as well as the conventional unique number per endpoint (Meet-Me number) access. Also, OneNumber Access can be used when the Dial-Out feature is enabled.

Audio Add-On ports can use OneNumber Access; however, as in previous MCU releases, such ports use a different set of MCU-extensions from H.320 endpoints.

A OneNumber Access extension *cannot* be used by the following endpoint types:

- BONDed (BOND)
- Cascaded (CAS)

- BONDed Cascaded (BCAS)
- Controlling extension in Presentation mode (including one for a fixed extension or Empty Quadrant Extension)
- Dedicated Access (DA)
- Universal Conference Control (UCC)

Moreover, OneNumber Access supports only those transfer rates that allow H.320 endpoints. An example of an excluded rate is 336k, which can be used only by BONDed and DA endpoints. The feature supports Audio Add-On endpoints at any transfer rate.

All endpoints using the same OneNumber Access extension must have the same setting for the *Password*, *App Comp* (Application Compliant), and *Basic/Enh* (Basic/Enhanced) fields in the Conference Record form.

OneNumber Access is standard on all MCU models. There is no limit to the number of conferences for a given MCU that can use this feature. Also, there is no limit to the number of OneNumber Access extensions that can be used within a single MCU conference.

OneNumber Access is intended for 2x56k and 2x64k conferences in an Integrated Services Digitial Network (ISDN) environment where calling party information is available from all sites joining the conference via a common MCU-extension. Environments where calling party information is not available (for example, robbed-bit facilities) are not supported.

OneNumber Access for H.320 endpoints can be used in single-channel conferences where BONDing and DA are not used to access the conference. This implies that single-channel OneNumber Access is limited to Wideband non-BONDED (for example, H0 or multirate) calls.

OneNumber Access for Audio Add-On or single-channel endpoints does not require the availability of Calling Party Number (CPN) information.

Interactions

OneNumber Access supports the following features or capabilities with specific changes or considerations as noted.

- Dial-Out

  Dial-out endpoints are blocked from using an MCU-extension that occurs more than once in a conference; therefore, in such a case, OneNumber Access cannot be used by this endpoint type.

- Dynamic Conference Resizing

  OneNumber Access can be enabled during an active conference. This is done by changing the value of the *OneNumber Access* field in the Conference Record form from **n** to **y**. Changing the field value from **y** to **n** is not allowed.

  Additional occurrences of an MCU-extension are allowed if OneNumber Access is enabled. However, any endpoint using a repeated extension cannot be changed to a dial-out endpoint. Also, such an endpoint cannot be removed from a conference that is active or in use.

- Password Protection

  Conference reservation allows the administration of conference-level passwords for conferences using OneNumber Access extensions. All endpoints using the same extension must have a common setting for the *Password* field (either **y** or **n**).

- Universal Conference Control

  UCC is allowed in conferences using OneNumber Access. However, a UCC endpoint cannot use an MCU-extension that has been previously used. Therefore, conference reservation blocks the entry of a duplicated MCU-extension for the UCC endpoint type.

Administration

OneNumber Access is enabled via the Conference Record form. Refer to "Administering OneNumber Access" on page 2-219.

Hardware and Software Requirements

None.

Passwords

The passwords feature provides additional conference security by requiring a password entry for access to a conference on a per-conference basis.

Description

With per-conference passwords set at the conference reservation, the MCU prompts each conferee as they attempt to join the conference.

Audio-only conferees are given a single chance to provide the correct password and, if a password is incorrect, the endpoint is dropped from the conference. All other conferees are given three chances to enter the correct password before

being dropped. In either of these cases, the Status Conference form shows “invalid password” as the drop reason for that endpoint.

Considerations

Audio Add-On Dial-Out calls are not prompted for a password.

Interactions

The following features are supported with the considerations noted:

- Dial-Out

  When the MCU dials out for an endpoint that is set for auto-answer, the MCU prompts for the password after the endpoint answers. After a timeout with no endpoint entry (administered in the range 30-300 seconds) the MCU prompts a second time. If the endpoint still does not respond within the timeout, the MCU prompts a third time. If there is still no response from the endpoint, that endpoint is dropped from the conference. In this case, the reason for drop is set to “UIN/password timeout.”

Administration

The timeout value for auto-answer endpoints must be set to a value in the range 30-300 seconds. The timeout value is the same for all conferences. The password flags for per-conference for each conference must be selected at reservation time. The password flag must be selected at each time a conference is reserved.

Hardware and Software Requirements

None.

Rate Adaptation

Rate Adaptation provides a way for interaction of 2-channel (56k or 64k) endpoints in a conference.

Description

With Rate Adaptation, 56k endpoints can be included into a 64k conference. If a 56k endpoint joins a 64k conference, the 64k endpoints are dynamically altered to an effective rate of 56k. The 56k rate remains in effect until the conference ends.

Considerations

None.

Interactions

The Rate Adaptation feature interacts with the following:

- Dial-Out

  Dial-Out is capable of initiating calls using Rate Adaptation.

- Dynamic Resizing

  Rate Adaptation can be enabled (turned on) during a conference if Dynamic Resizing is enabled. It can never be changed from on to off during the conference.

Administration

The conference record must be administered to allow or disallow 56k or 64k rate adaptation in the conference.

Hardware and Software Requirements

None.

Recent Change History

Description

The Recent Change History feature allows the system administrator or reservations agent to view or print out a history report of the most recent administration and maintenance changes. This report may be used for diagnostic or information purposes.

The system maintains a log in a software buffer of the most recent administration and maintenance commands, up to a maximum of 250 data commands. The log is called the transaction log. The commands must be ‘‘data affecting’’ and successfully entered to be saved in the transaction log. The ‘‘data affecting’’ commands are called data commands.

The transaction log can be displayed or printed as a report by entering the **list history** or **list history print** command at the Management Terminal, or a remote terminal by the following users:

- Local Customer Administrator

- Local System Technician
- Remote Customer Administrator
- Remote System Technician

Considerations

A maximum of 250 data commands are stored in the transaction log.

The Permission Administration form shows the command permission categories that a user can access; for example, ‘‘Administer Features.’’ There are no permission restrictions for access to the Recent Change History reports. The local and remote customer and system technician administrators have unrestricted access.

Interactions

The following features interact with the Recent Change History feature.

- Other Users

  When a user requests a Recent Change History report, it takes a little time to read all the pages of the report. If during this time other users are entering data commands and altering the transaction log, the oldest entries in the transaction log may have been overwritten by the data commands entered by these other users.

- Set Time Command

  The use of the maintenance command **Set Time** to change the system clock could make the Recent Change History report look as if it were not in true last-in, first-out order.

Administration

None.

Hardware and Software Requirements

No additional hardware or software is required.

Report Scheduler and System Printer

Description

This feature allows the system administrator to schedule selected administration commands to be printed by an asynchronous printer. Reports are scheduled at 15-minute intervals for any combination of days of the week. Most **list**, **display**, or **test** commands may be scheduled.

Reports may be scheduled, changed, listed, and removed via the system's Management Terminal.

Considerations

With the Report Scheduler and System Printer, the system administrator can schedule most **list**, **test**, and **display** administration commands to be printed at various times on an asynchronous printer. By scheduling these reports to print automatically at the desired times, the system administrator saves valuable time that can be used to perform other administrative duties.

The system administrator can schedule a maximum of 50 individual reports. The system has a single asynchronous printer connection dedicated for use by the report scheduler. The system can be configured with other printers in the system such as those connected to the MCU-MT and the CDR printer. These are not used by the Report Scheduler feature.

Reports scheduled for the same time and day are printed according to their order in the Report Scheduler queue. The first report in the queue will be printed first.

To present the least possible impact on system performance, it is recommended that reports be scheduled at off-peak hours and staggered so they are not all scheduled to be printed at the same time.

Reports that are added to the scheduler queue and that are scheduled to be printed during the current time interval will not be printed until the next scheduled time.

If a system error is encountered while trying to print a scheduled report, the error will be printed on the report, just as it would be displayed for the same command on the Management Terminal screen.

Interactions

There is only one processor board EIA port available for asynchronous output. The port cannot be administered for both CDR and the Report Scheduler System Printer on the System-Parameter Feature form.

Administration

The system administrator may schedule, list, change, and remove the desired reports as previously described in this description. Before these procedures can be done, however, the system administrator must supply printer information on page 4 of the System-Parameters Features form by entering the following information:

- **Printer Extension:** "EIA" for the EIA port or a valid data module extension if the EIA port is not to be used.

  The system administrator must specify the printer link by selecting either the EIA port, if available, or a data-module extension. If the data-module extension is chosen, the system administrator must have administered the extension previously using the **add data-module** command.

- **EIA Device Bit Rate:** The speed of the printer (1200, 2400, 4800 or 9600 baud). The default is 1200.

- **Lines per Page:** The number of printed lines per page (24 to 132). The default is 60.

Hardware and Software Requirements

The asynchronous printer can be connected to the switch using either of the following methods:

- The printer can be connected directly to the EIA port on the switch's processor board. In this case, the appropriate cable is required.
- The printer can be connected to the MCU with a 7400B data module and a port on a TN754B Digital Line circuit pack.

There is a single EIA port in the MCU. There may be contention between the CDR and the Report Scheduler feature for use of this port. If the Report Scheduler feature is using the EIA port and you would like to enable the CDR feature, it is recommended that you disconnect the system printer from the EIA port and use a data module for its connection, freeing the port for use by CDR.

A 475 or 572, or compatible printer that uses a serial interface may be used as the System Printer. A PC may be connected to the system printer port for collection of data; however, a serial interface on the PC must be provided for the connection.

RS366 Dialing

Description

RS366 Dialing is a companion feature to the V.35/RS449/EIA-530 data interface capability. RS366 Dialing enables the MCU to process dialing strings received from endpoints and devices connected to the MCU via a V.35/RS449/EIA-530 data interface. Specifically, H.320, H.CTX, and SG4 endpoints connected in this manner can do the following:

- Dial in to multipoint audio, video and/or data conferences
- Make spontaneous point-to-point calls at any rate except BONDed rates

The feature also provides a basis for including H.323 Local Area Network (LAN) endpoints into multimedia conferences with H.320 endpoints. To this purpose, a gateway is required.

Considerations

RS366 Dialing enables the following.

- H.320/H.CTX/SG4 codecs directly connected to the MCU via a V.35/RS449/EIA-530 interface to do the following:
  - — Dial in to multimedia, multipoint conferences. Accordingly, endpoints can join conferences after the conference start time, drop from conferences early, or participate in another conference or call.
  - — Place and receive spontaneous non-BONDed point-to-point calls with other endpoints that are directly connected to the MCU or reside anywhere else in the network via ISDN or robbed-bit trunks.
- H.323 endpoints connected behind H.323 gateways to participate in multimedia, multipoint conferences where the connection between the gateway and the MCU is V.35/RS449/EIA-530 (for which the rates are greater than 2B). The endpoints are provided dial-in capabilities.

The feature does not support BONDed spontaneous point-to-point calls from directly connected endpoints. However, such endpoints can participate in a conference or call with another endpoint that has joined at a BONDed rate.

RS366 Dialing from the MCU to devices such as inverse multiplexors (IMUXs) is not allowed. Therefore, endpoints behind IMUXs cannot participate in multimedia conferences as dial-out participants unless the connections from the IMUX to the endpoint are “fixed.” With the V.35/RS449/EIA-530 data interface capability, endpoints included within a switched network can participate in conferences only through manual dialing either from the endpoint into an IMUX or from an IMUX.

All transfer rates supported for conferencing by the Data Interface (DI) circuit pack within the MCU are supported for RS366 Dialing. These rates include the

following: 56k, 64k, 112k, 128k, 168k, 192k, 224k, 256k, 280k, 320k, 336k, 384k, 448k, 512k, 672k, 768k, 1008k, 1152k, 1344k, 1472k, 1536k, 1680k, and 1920k. H.320/H.CTX/SG4 and H.323 endpoints using RS366 Dialing can join conferences at any of these rates. Like the DI circuit pack, the feature does not support the following transfer rates: 1064k, 1176k, 1288k, 1400k, 1512k, 1624k, and 1736k.

H.320/H.CTX/SG4 and H.323 endpoints can make spontaneous point-to-point calls at any non-BONDed transfer rate that is a multiple between 1 and 30 of 56/64k, except for the rates not supported by the DI circuit pack. The lowest rate is 56/64k, and the highest rate is 1680/1920k.

The Avaya MCU supports at least 32 V.35/RS449/EIA530 ports at BONDed or multirate transfer rates up to and including 768k. The maximum number of 2B ports is at least 16 ports (alternatively, a maximum or 32 1B ports is allowed), with a maximum of at least 20 ports for the 1536k rate and 16 ports for the 1920k rate. RS366 Dialing is optional for this maximum number of ports.

If an endpoint supporting RS366 Dialing drops early from conference, the associated port is made available in another conference (that is, for another call). Also, if such an endpoint enters a conference by dialing in, and if the conference has been scheduled via the MCU-MT, the endpoint may drop from the conference prior to the scheduled end time of the conference, and it may enter another conference or make another call prior to the end time of the conference it has left. Whenever an RS366 dial string is received by the MCU on a DI circuit pack, the LED indicator for the circuit pack is yellow.

Interactions

The following features are supported with the changes or considerations noted.

- BONDing

  The feature does not support BONDed spontaneous point-to-point calls from directly connected endpoints. However, such endpoints can participate in a conference or call with another endpoint that has joined at a BONDed rate.

  NOTE:
  One solution for the lack of support for BONDed spontaneous point-to-point calls from directly connected endpoints is to create a two-party dial-in conference at the desired rate.

Administration

The feature is administered via the Customer-Options form, the Conference Record form, and the Access Endpoint form. Refer to "Administering RS366 Dialing" on page 2-243.

Hardware and Software Requirements

RS366 Dialing from the MCU to devices such as inverse multiplexors (IMUXs) is not allowed. Therefore, endpoints behind IMUXs cannot participate in multimedia conferences as dial-out participants unless the connections from the IMUX to the endpoint are “fixed.” With the V.35/RS449/EIA-530 data interface capability, endpoints included within a switched network can participate in conferences only through manual dialing either from the endpoint into an IMUX or from an IMUX.

Security Violation Notification

Description

This feature notifies the maintenance alarm terminal of an attempt to breach system administration access via an invalid login or Remote Access via an invalid barrier code. Information specific to access violations is available through the Monitor Security Violations status report.

Considerations

A maximum of one feature button (per system) may be assigned for each component of the security violation notification (SVN) feature [one for login security violations (LSVN) and one for Remote Access security violations (RSVN)].

An activated SVN feature button cannot be deleted by administration. The system will deny an attempt to delete an active SVN feature button.

Activation of an administered SVN feature button from the maintenance alarm terminal will be prohibited if the appropriate SVN feature component (either login or Remote Access) is not enabled in the Feature-Related System Parameters screen.

A maximum of one Referral Destination may be administered per MCU for each component of the SVN feature.

The Call Coverage, Call Forwarding, and Call Pickup (for example, within pickup group) features are not supported for SVN.

Unlike the ACA referral call, the SVN referral call is a priority call.

SVN does not currently support Speech Synthesis Circuit pack functionality.

Interactions

- ACA

  The originating extensions for login and remote access security violations cannot be the same as the originating extensions for ACA long and short holding time originating extensions. The destination extensions for both features can be the same.

Administration

The SVN feature is activated when either or both of the SVN Login Violation Notification Enabled or SVN Remote Access Violation Notification Enabled fields on the Feature-Related System Parameters form are enabled.

When the SVN Login Violation Notification Enabled field is enabled, the following additional fields appear on the Feature-Related System Parameters screen:

- Originating Extension

  This field requires the entry of an unassigned extension that is local to the switch and conforms to the dial plan for the purpose of originating and identifying SVN referral calls for Management Applications login violations.

  The originating extension initiates the referral call in the event of a login security violation. It also triggers the display of the appropriate alerting message on the referral destination's display module.

  NOTE:
  The SVN feature button does not have to reside on the referral destination station. It can be administered on the maintenance alarm terminal, but must be active if referral calls are to be placed.

- Referral Destination

  This field requires the entry of a previously administered maintenance alarm terminal. The destination may enable or disable the referral call through a feature button. The SVN feature buttons do not have to reside on the station(s) that is/are the referral destination(s). A referral call will not be made to the administered destination if its corresponding feature button is deactivated.

  The Referral Destination is the extension assigned to the maintenance alarm terminal that will receive the referral call in the event of a login security violation.

- Login Threshold

  This field requires the entry of the minimum number of invalid login attempts that will be permitted before a referral call is made. The value of this field, in conjunction with the Time Interval field, will determine whether a security violation has occurred.

- Time Interval

  This field requires the entry of the time period in which the login security violations must occur. The range for the time interval is one minute to eight hours (00:01 to 07:59), and is entered in the form xx:xx. For example, if you want the time interval to be one minute, you would enter 00:01. If you want the time interval to be seven and one-half hours, you would enter 07:30.

- Activating Station

  The Activating Station must have an LSVN call button to activate and deactivate this feature.

When the SVN Remote Access Violation Notification Enabled field is enabled, the following additional fields appear on the Feature-Related System Parameters screen:

- Originating Extension

  This field requires the entry of an unassigned extension that is local to the switch and conforms to the dial plan for the purpose of originating and identifying SVN referral calls for remote access barrier code violations.

  The originating extension initiates the referral call in the event of a login security violation. It also triggers the display of the appropriate alerting message on the referral destination's display module.

  NOTE:
  The SVN feature button does not have to reside on the referral destination station. It can be administered on the maintenance alarm terminal, but must be active if referral calls are to be placed.

One SVN feature button (per system) may be assigned for each component of the SVN feature (one for login security violations and one for Remote Access security violations).

Hardware and Software Requirements

No additional hardware or software is required.

Selected Communications Mode (SCM) Upgrades

Description

The SCM configures conferences as endpoints join using the highest common approach for optimum audio mode, video resolution, and minimum picture interval (MPI). This feature also automatically upgrades the audio mode, video resolution, and MPI as endpoints leave the conference.

Consider the following example. If all the endpoints in a given conference support G.728, the audio mode is automatically set to G.728. If an endpoint joins the conference but does not support G.728 (and the conference does not require data sharing), all endpoints are downgraded to the audio mode that the new endpoint supports. If the new endpoint subsequently disconnects from the conference, all the endpoints are upgraded again automatically back to G.728. The same is true for upgrade and downgrade of QCIF or CIF video resolution and MPI.

Considerations

None.

Interactions

SCM upgrade interacts with the following features.

- Dynamic Resizing

  Dynamic resizing allows the automatic upgrading and downgrading during active conferences.

- Cascading

  SCM upgrade or downgrade is not allowed in a cascaded conference.

- Rate Adaptation

  SCM upgrade and downgrade are allowed in a conference that uses rate adaptation.

Administration

SCM upgrade can be administered on a per-conference basis.

Hardware and Software Requirements

None.

Service Flags

Description

Endpoints from several vendors tend to crash whenever these endpoints receive certain standard BAS commands/caps. To prevent this problem the Basic/Enhance Service Flag in the Conference Record can be set to *basic* (default). This disables commands/caps that are known to cause problems. If no

such problems are apparent, the flag should be set to *enhanced*, where appropriate. Also, the basic/enhanced service and application compliance flags allow the types of messages allowed in a given conference to be identified.

Some endpoints do not operate properly with T.120 Data Conferencing messaging and must be identified in the conference to prevent problems. If all the endpoints in a conference can use the T.120 Data Conferencing messaging, the application compliance flag is set to allow those messages.

Considerations

None.

Interactions

The service flags feature interacts with the following features:

- T.120 Data Conferencing

  The application compliance flag is pertinent only to systems that have the T.120 Data Conferencing feature option.

Administration

Each conference record must be administered at conference reservation for these flags.

Hardware and Software Requirements

None.

SG4 Video Mode

Description

The Standard Proprietary feature allows the MCU to support PictureTel endpoints utilizing SG4 proprietary video protocols in a standards format. The MCU supports these protocols via the PictureTel extension to the ITU-TSS H.230/H.243 conferencing standards. Also, the MCU provides the proprietary video within the H.221 frame structure.

Considerations

SG4 is supported for bandwidths between 112k and 1920k inclusive.

SG4 is controlled via administration of a port capacity limit. It is available in 16-port increments, and it has a maximum capacity of 96 ports.

The MCU can simultaneously support H.261 video and standard proprietary SG4 video on separate simultaneous conferences. (Two different modes within one conference result in the noncompliant endpoint being audio-only.)

Availability

SG4 is available on all models. The range is 16 to 96 ports in 16-port increments.

Interactions

The following features interact with SG4:

- Audio Add-On

  A maximum of 25 Audio Add-On parties can be added to an SG4 conference.

- Still-Frame Graphics

  SG4 Standard Proprietary Still-Frame Graphics is supported.

- Selected Communications Mode (SCM)

  The Highest Common Video SCM is not applied to SG4 conferences. However, the Highest Common Audio SCM is applied to SG4 conferences.

- H.261 Video

  If an endpoint that supports only SG4 attempts to join a conference that is administered as H.261-down-only, H.261-w/upgrade, H.261-CIF-Floor, H.261-CIF-Now, H.261-QCIF-Now, H.CTX, or H.CTX+, the endpoint joins as a secondary (audio-only) terminal.

  NOTE:
  The Conference Reservation and Control System does not allow this to be administered.

  The same applies to an H.261 endpoint that attempts to join an SG4 conference.

- Dynamic Conference Resizing

  All fields that can be changed on an active conference can be changed for an SG4 conference. However, the video mode may not be changed to or from SG4 while a conference is active.

- Rate Adaptation

  Rate Adaptation is supported for SG4 conferences.

- Cascading

  An SG4 conference can be cascaded with another similarly configured conference on an MCU. An SG4 conference can be cascaded with another SG4 conference on a non-Avaya MCU if the Avaya MCU is the primary MCU. Interoperability as a secondary MCU is not guaranteed.

- Passwords

  SG4 conferences may be password protected.

- T.120 Data Conferencing

  T.120 Data Conferencing may be enabled on SG4 conferences.

- Universal Conference Control

  An SG4 conference supports one UCC endpoint.

Administration

To establish an SG4 conference, enter “SG4” into the “Video Mode” field of the Conference Record form.

SG4 port capacity is administered separately from the total MCU port capacity. The MCU can be administered with an SG4 port capacity greater than the system capacity; however, the system port capacity takes precedence. If the total MCU port capacity is 12, and if the SG4 port capacity is 16, only 12 ports can be active simultaneously. Otherwise, the system would support a combination of H.320 and SG4 ports up to the system capacity (although the number of SG4 ports would be limited by the administered SG4 capacity).

Hardware and Software Requirements

None.

Speed Match

Description

Speed Match enables endpoints with varying transfer rates to participate in the same conference. The feature enables low-speed desktop video endpoints to interwork with high-speed group system video endpoints in a multipoint conference with full video and audio capabilities. Therefore, for example, 128k endpoints can join and participate in the same conference as 384k endpoints, and each endpoint can see and hear the other endpoints.

Considerations

Speed Match is an optional feature for all Avaya MCU models. The feature is available in both full screen and Continuous Presence *Plus* (CPP) conferences. Speed Match can be enabled or disabled in a conference only when the conference is inactive. The feature requires the TN2237C, vintage 16 or higher Video Processor circuit pack.

The MCU supports a maximum of eight Video Processor circuit packs. These circuit packs can accommodate a mixture of full screen-only Speed Match conferences, CPP Speed Match conferences, CPP-only conferences, H.263/H.261 Transcoding conferences, and Executive Conferencing conferences. The number of simultaneous conferences using some form of video processing is controlled by the number of each of the three right-to-use permissions as displayed on the Customer-Options form. In particular, the sum of the CPP-only, full screen Speed Match (SM), combination SM/CPP, H.263/H.261 Transcoding, and Executive Conferencing right-to-use permissions may not exceed eight since one dedicated Video Processor circuit pack is required to support each of these conference types. CPP permissions are valid only for non-Speed Match, single transfer rate CPP (or CPP-only) conferences. SM permissions are valid only for full screen SM or H.263/H.261 Transcoding conferences. However, Conferencing Suite permissions can be used to provide a CPP-only conference, a full screen-only SM conference, an SM conference that also provides CPP video to and from endpoints at various transfer rates, an H.263/H.261 Transcoding conference, or an Executive Conferencing conference. Therefore, as long as all of the available Conferencing Suite right-to-use permissions have not been used, any such available permissions may be applied to administer the conference types listed in the previous sentence.

Speed Match conferences support the following transfer rates: 56/64k, 2x56k, 2x64k, 112k, 128k, 224k, 256k, 336k, 384k, 448/512k, and 672/768k. At the 448/512k and 672/768k transfer rates, the maximum number of simultaneous SM conferences supported by the system is reduced. (Refer to "Administration" on page B-147.)

The feature supports H.320, V.35, and Dedicated Access endpoints as well as multirate, BONDing, and cascaded network connections. Also, UCC and Audio Add-On endpoints interwork in Speed Match conferences. Both Meet-Me and Dial-Out endpoints are supported. UCC can be used in CPP Speed Match conferences to transition from quad screen to full screen and vice versa. The feature does not support H.CTX, H.CTX+, MRV, or SG4 endpoints.

For cascaded MCUs, Speed Match hardware and software are required only at the primary MCU. The primary MCU conference can be configured as a Speed Match conference. The secondary MCU conference can be configured as a full-screen conference with the bandwidth set to one of the operating transfer rates in the primary MCU conference. This enables a larger number of participants in a Speed Match conference. Also, the secondary MCU conference cannot be a Speed Match or Continuous Presence Plus conference.

Speed Match is available in H.320 conferences at a maximum of 15 frames per second (fps). Endpoints within a Speed Match conference can operate at a maximum of four different transfer rates from the transfer rates supported for Speed Match. Each transfer rate can have a different video format and video frame rate.

Regardless of their transfer rates, all the speed-matched endpoints within a CPP SM conference see the same quad screen image. For example, in a CPP conference with one 2x64k endpoint and three 384k endpoints, the 2x64k endpoint sees itself in one quadrant and the speed-matched 384k endpoints in the other quadrants. The 384k endpoints see the other 384k endpoints as well as the 2x64k endpoint in the same CPP quad image. In a full screen SM conference, the broadcaster sees the last VAS party, and the other endpoints see the broadcaster.

An endpoint that does not arrive at the pre-administered endpoint transfer rate is allowed to join the conference as a secondary, audio-only endpoint. However, multirate calls are denied if the endpoint is not administered as a multirate endpoint, or if the endpoint is administered as a multirate endpoint, but the call transfer rate is higher than the administered transfer rate. All CPP features and functions operate within Speed Match conferences.

Speed Match is enabled and disabled on a conference basis. The MCU supports speed-match as well as non-speed-match conferences simultaneously.

Full-screen and CPP Speed Match conferences support Voice-Activated Switching (VAS) and Chair Control. VAS is used to determine the image seen by all the endpoints. All the image selection rules and algorithms that apply to VAS conferences apply to Speed Match VAS conferences; this includes mixing images in CPP conferences with five or more parties. Also, Broadcast and Presentation conference modes are supported in non-CPP full-screen speed-matched conferences. This allows Broadcast and Presentation conferences to support endpoints at different transfer rates.

If the required TN2237C circuit pack(s) are not available at the start of a Speed Match conference, the speed match for that conference is disabled. Also, the conference converts to full screen at the primary transfer rate; this allows the endpoints at the primary transfer rate to have video and audio capabilities. Depending on administration, speed-matched endpoints coming into such a conference may function as audio-only endpoints.

Interactions

Speed Match conferences support the following features, functions, and capabilities in the same manner as non-Speed Match conferences: Cascading, Meet-Me conferencing, and passwording.

Speed Match conferences do not support the following features or capabilities: Executive Conferencing, H.263 video mode, OneNumber Access, Lo-/Hi-Interworking, Rate Adaptation and Still-Frame Graphics.

The following features or functions interact with Speed Match with specific changes or considerations as noted.

- Audio Modes and Interworking

  Audio mode interworking is allowed in a Speed Match conference whenever the “automatic” audio mode is selected. Endpoints with G.728 audio mode interwork with G.711 audio mode endpoints. Similarly, G.722 audio mode endpoints interwork with G.711 audio mode endpoints. However, G.728 audio mode endpoints do not interwork with G.722 audio mode endpoints.

  The system automatically selects the highest common audio for endpoints operating at the same transfer rate. For example, in the same Speed Match conference, G.728 can be the highest common audio for all the 112k endpoints in the conference, and G.711 can be the highest common audio for all the 384k endpoints in the conference.

  G.711/G.728 interworking allows a 112/128k endpoint to operate at G.728 audio mode (lower bandwidth audio); endpoints in the same conference with a rate higher than 112/128k can operate at G.711 audio mode. G.711/G.728 interworking is selected if any of the transfer rates pre-administered in a conference is 112/128k.

  If all the transfer rates in a conference are higher than 112/128k, G.722 is selected as the highest common audio mode. Endpoints that do not support G.722 audio mode operate at G.711 audio mode in the same conference. For example, in the same Speed Match conference, G.711 can be the highest common audio for all the 336k endpoints in the conference, and G.722 can be the highest common audio mode for all the 384k endpoints in the conference.

  All the automatic audio interworking decisions for a Speed Match conference are made once the first endpoint joins the conference and, accordingly, the conference status changes to “in-use.” Therefore, if a 112/128k transfer rate is not administered in the conference before the conference status changes to “in-use,” and if a 112/128k endpoint is subsequently added dynamically, the audio interworking is not changed to accommodate G.728 at the time this endpoint is added. As a result, a dynamically added 112/128k endpoint in this case has a lower video bandwidth because the G.711/G.722 audio requires a higher bandwidth.

  No audio interworking is allowed whenever an audio mode for a conference is administered to a *fixed* mode of G.711, G.722. or G.728. Any endpoint of any rate and not meeting the fixed audio mode is forced to operate as a secondary, audio-only endpoint.

With this option, G.728 and G.722 can interwork in Speed Match conferences. Endpoints joining at a transfer rate less than or equal to 2B can experience G.728 audio; endpoints joining at a transfer rate greater than 2B transfer can experience G.722 audio.

- Continuous Presence *Plus*

  Continuous Presence *Plus* can be disabled within a CPP Speed Match conference. If this happens, the conference changes to a full screen Speed Match conference. Also, if CPP Speed Match ports are administered in the System Parameters Customer Options form, and if there are no CPP Speed Match conferences active at a given time, the appropriate number of MCU resources are freed up to allow one or more additional CPP-only or full screen Speed Match conferences.

- Dial-Out

  The Dial-Out rate within a Speed Match conference can be either the default primary rate or an additional transfer rate.

- Dynamic Conference Resizing

  A endpoint that is added to an ongoing Speed Match conference can be speed-matched. The newly added endpoint can have one of the following transfer rates: the default primary transfer rate; an existing additional rate at which another endpoint in the conference is administered; or a new additional transfer rate, as long as there are no more than three additional transfer rates in the conference. For each scenario, the added endpoint interworks with the other endpoints by matching its transfer rate to the other operating transfer rates within the conference.

  An endpoint can be removed dynamically from a Speed Match conference without disrupting the ongoing speed matching within the conference. In each case, the endpoint is dropped if it has been used, and the remaining conference continues to operate in speed matching mode. Also, the endpoint level resources are deallocated.

  The transfer rate of an endpoint cannot be changed *dynamically*. However, you can change an endpoint's rate by first removing it from the conference and then adding it back to the conference at the desired new rate.

  Finally, CPP within a Speed Match conference can be disabled; this changes the conference to a full screen Speed Match conference.

  An endpoint at a specific transfer rate can drop from a Speed Match conference without terminating the speed matching for that endpoint's transfer rate or any other transfer rates in conference. If an endpoint at a specific transfer rate drops, the remaining endpoints in the conference at that transfer rate continue to speed match. The remaining endpoints at other transfer rates also continue to operate and speed match with other endpoints.

- Lip Synchronization

  This feature is supported in both full screen Speed Match conferences and CPP Speed Match conferences.

  Full-screen SM and CPP/SM conferences support the automatic (“auto”) and “custom” audio delay options of Lip Synchronization. For the “custom” option, the customer can define his or her own set of custom “default” audio delay values.

  Automatic Lip Sync is set by default. It can be disabled by setting the appropriate *Lip Sync* field in the Conference Record form to **none**.

  Automatic Lip Sync continues to use the current algorithm used to provide Lip Sync in a CPP conference. However, since there can be several transfer rates operating in a Speed Match conference, the audio delay for each transfer rate is computed separately.

- OneNumber Access

  Speed Match supports OneNumber Access only for Audio Add-On endpoints. Multimedia endpoints are not supported.

- T.120 Data Conferencing

  T.120 Data Conferencing at the following fixed MLP rates is allowed within SM conferences: 6.4k, 8k, 14.4k, 16k, 22.4k, 24k, 30.4k, 32k, and 38.4k. The feature at the following fixed MLP rates is not allowed within SM conferences: 40k and 46.4k. (This RTU allows all fixed MLP rates within SM T.120 Data Conferencing conferences.) Also, variable rates (indicated by value “var_mlp”) are not allowed.

  SM T.120 Data Conferencing conferences are allowed with MLP rate “fixed” (and not “var_MLP”). Also, these conferences are allowed with audio mode “auto” and MLP rate “6.4k.”

- Video Modes

  Speed Match is supported for the standard H.261 fixed or automatic video modes. Proprietary video modes (for example, H.CTX+, MRV, and SG4) and H.263 video mode are not supported.

  The H.261 video mode can be administered for an automatic selection of video format and the video frame rate (H.261-down-only or H.261-w/upgrade), or it can be fixed to a specific format and frame rate (H.261-CIF-floor, H.261-CIF-now, or H.261-QCIF-now video format along with fixed or automatic frame rate). The maximum frame rate is restricted to 15 fps. The administered video mode applies to all the transfer rates in a speed-matched conference, and the mode is managed separately per transfer rate. The default and recommended video mode is “auto.”

  If the video mode is one of the fixed modes (H.261-CIF-floor, H.261-CIF-now, or H.261-QCIF-now), all the endpoints must operate at the designated fixed video mode. For example, if the video mode is H.261-CIF-floor at maximum of 15 fps, all the endpoints, regardless of the transfer rate, must operate at H.261-CIF-floor at a maximum of 15 fps. Any

endpoint that is incapable of that video mode becomes a secondary, audio-only endpoint. However, if the mode is one of the automatic modes (H.261-down-only or H.261-w/upgrade), the video format (CIF/QCIF) and the video frame rate can fluctuate within each transfer rate in a conference. For example, in a speed-matched conference with two transfer rates (for example, 384k and 2x56k), all the 384k endpoints can operate with CIF format at maximum of 15 fps, and all the 2x56k endpoints can operate with QCIF at 7.5 fps.

Note that the highest common video modes for all the transfer rates can be the same if the highest common video mode for the endpoints in each transfer rate domain settles down to be the same video mode. On the other hand, there can be up to four different video modes operating in a speed-matched conference (that is, one video mode for each transfer rate in the conference).

Administration

Speed Match is an optional feature for all Avaya MCU models. The feature is available in both full screen and Continuous Presence *Plus* (CPP) conferences. Speed Match can be enabled or disabled in a conference only when the conference is inactive.

The MCU supports a maximum of eight Video Processor circuit packs. These circuit packs can accommodate a mixture of conference types, including SM.

The right-to-use option for Speed Match is preset by the Technical Assistance Center upon delivery to the customer. To disable the feature, the port capacity for Speed Match and Conferencing Suite must be set to **0** on the Customer-Options form. To enable the feature, the port capacity must be set to a non-zero number corresponding to the “right-to-use” number for the feature desired by the customer.

A maximum of eight conferences administered via the *CPP/SM* field at transfer rate 448/512k is allowed. A maximum of six such conferences administered at transfer rate 672/768k is allowed.

NOTE:
These conference maximums assume a three-party BONDed configuration with two parties administered at the indicated “high” rate and one-party administered at the 2B rate.

By default, all the endpoints within a Speed Match conference operate at the primary transfer rate. The transfer rates of the endpoints (except Audio Add-On and UCC endpoints) that will operate at a rate other than the primary transfer rate must be administered.

For complete details on administration, refer to "Administering Speed Match Conferences" on page 2-235.

Hardware and Software Requirements

The feature requires one TN2237C, vintage 16 or higher Video Processor Plus circuit pack for each Speed Match conference administered. Therefore, since the MCU can support a maximum of eight Speed Match conferences, eight TN2237C circuit packs are required to support full Speed Match capabilities per MCU. These circuit packs are treated as a pool of resources. Depending on the administered capacities, some of the circuit packs can be used for full screen or CPP Speed Match conferences, and the rest of the circuit packs can be used for CPP conferences.

System Measurements

Description

System measurements provide reports on items such as trunk group usage, hunt group usage and efficiency, maintenance alarm terminal activity and efficiency, and security violations.

Individual reports are available as detailed in Chapter 3 of this document.

All reports are on-demand reports. None are given automatically. Reports are available on the remote administration terminal. The reports can be printed if a printer is associated with the terminal. The reports can also be scheduled to print at the system printer via the Report Scheduler and System Printer feature.

Considerations

Reports provided by System Measurements contain data that is useful to determine group efficiency.

Traffic measurements are automatically accumulated by the system and are available on demand. However, reports are not archived. If needed, reports must be requested periodically. Obtaining a printed copy can aid in maintaining a history of the system traffic.

Detailed information of each call handled by a specific trunk group, if required, must be provided by the CDR feature. Processed CDR data can also provide detailed information on trunk group usage. However, if individual call details are not required for bill-back or cost-allocation, System Measurements should be considered as the means to determine and maintain trunk group efficiency.

Interactions

None.

Administration

Measurements for the Coverage Paths, Coverage Principals, Route Patterns, Trunk Group Hourly, and Wideband Trunk Group Hourly reports are only collected for objects that have been administered using the **change meas-selection** commands.

Hardware and Software Requirements

System administration terminals are required to monitor system measurements. A system printer is required to generate paper copies of the reports. No additional software is required.

System Status Report

Description

The system status report allows the user to view data associated with the maintenance alarm terminal, major and minor alarms, and traffic measurements. The information is displayed on the Management Terminal, and it presents a basic picture of the system condition. The report can only be displayed by the system administrator and maintenance personnel.

The Status Report is displayed by entering one of the commands listed below. Once the command is entered, the system continually displays the report until it is canceled.

NOTE:
Canceling a **monitor system view1** or **monitor system view2** report results in automatically logging the user off the system.

- **monitor system view1**

  This command displays the following information:

  — Activation status of the maintenance alarm terminal (updated every minute)

  — Maintenance status, which includes major and minor alarms for trunk ports, terminal ports, and all maintained objects in the system except terminals and trunks (updated every minute)

  — Traffic measurements for trunk groups, hunt groups, and the maintenance alarm terminal (updated every hour)

- **monitor system view2**

  This report is a subset of the view1 report and displays the same information listed for the view1 report except the last hour's measurement for the hunt groups.

Considerations

In addition to providing status reports, this feature also provides an indication that the administration terminal is functional. Any attempt to stop the "monitor system view1/view2" reports logs the administration terminal off the system. Therefore, no unauthorized administration can be performed.

Interactions

None.

Administration

None required.

Hardware and Software Requirements

No additional hardware or software is required.

T.120 Data Conferencing

The MCU supports a multipoint data conferencing feature based on the H.221 MLP and the T.120 protocol stack, as specified in ITU-T Recommendations T.122, T.123, T.124 (Generic Conference Control) and T.125 Multipoint Communication Service (MCS). T.120 Data Conferencing is a customer option available in standalone MCU environments.

Description

T.120 Data Conferencing supports multipoint service for the interactive, network-independent transport of data. The feature is not directly used by conferees but is accessed via the use of other conference applications that use T.120 Data Conferencing primitives to access this feature via the Avaya MCU. Users within a T.120 Data Conferencing conference can set up dynamic sub-conferences where any one of the users can broadcast data.

Considerations

The Avaya MCU provides the following types of T.120 Data Conferencing services:

- As many as 24 T.120 Data Conferencing connections per ESM
- Both static and dynamic channel IDs
- Normal send and uniform send of multicast data
- Multiple users per node

These services support T.120 Data Conferencing applications such as whiteboard, application sharing, and file transfer.

In addition, the T.124 stack is called Generic Conference Control (GCC), and it is based on a protocol implementation from Databeam. GCC provides several conference control functions, including the following:

- Establishing and terminating conferences
- Managing the roster of terminals participating in a conference
- Managing the roster of applications at each terminal
- Computing application abilities
- Providing registry services for use by applications
- Coordinating conference conductorship

GCC provides equal support for standard and non-standard applications. It enables these applications to declare and discover that they implement specific application protocols. An instance of an application protocol executing an MCU is called an application protocol entity. Different application protocol entities communicate among themselves in one or more distinct sessions.

The feature is supported within H.320 MCU conferences at all network transfer rates between 1B and 1920k. All fixed MLP rates between 6.4k and 46.4k are supported within non-SM T.120 conferences, with one exception: MLP rates 40k and 46.4k are not supported within nx56k conferences.

Variable rate MLP is also supported. Variable-rate MLP uses the initial channel capacity that remains in the initial channel (56/64k per second) after deducting the framing signals (1.6k per second) and the audio bit rate (16k, 48k, or 56k per second). Variable-rate MLP can use fixed-rate MLP channels.

The Expansion Services Module (ESM) is required to support T.120 Data Conferencing.

Interactions

The feature supports Continuous Presence *Plus* and H.263 video. The feature can use any MLP rate within same-rate, full-screen conferences. Also, both enhanced and basic endpoints can be included into such conferences. The feature does not support Cascading and H.263/H.261 transcoding.

T.120 Data Conferencing feature interacts with the following features with the changes or considerations noted:

- Audio Mode

  The feature supports the G.711, G.722, and G.728 audio modes, as well as the “auto-w/upgrade” and “auto-down_only” options. However, G.711, G.722, “auto-w/upgrade,” and “auto-down_only” are allowed only for MLP rate 6.4k.

  SM T.120 Data Conferencing conferences are allowed with MLP rate “fixed” (and not “var_MLP”). Also, these conferences are allowed with audio mode “auto” and MLP rate “6.4k.”

- Cascading

  The feature is not supported over a cascaded link to another MCU.

- Dynamic Resizing

  T.120 Data Conferencing endpoints can be added or dropped during a conference. However, T.120 Data Conferencing cannot be enabled or disabled for an active conference. The T.120 Data Conferencing option is set at the time the conference is reserved and cannot be changed dynamically.

- Application Compliance Flag

  When the application compliance flag is turned off for an endpoint that supports both var-MLP and G.728, the Avaya MCU blocks any data sends or receives to or from that endpoint.

- Selected Communication Mode (SCM)

  The SCM of a conference specifies whether or not the conference is using MLP. Whenever the MLP option is off, no MLP data channels are opened for the conference; this is true regardless of whether the endpoints support MLP. Whenever the MLP option is in effect, an MLP channel is opened only to the endpoints that support both var-MLP and G.728 (LD-CELP). Endpoints that do not declare a suitable MLP capability become audio-only secondary endpoints upon joining the conference. Endpoints that declare an acceptable MLP capability but do not declare G.728 (LD-CELP) also become audio-only secondary endpoints.

- Speed Match

  T.120 Data Conferencing at the following fixed MLP rates is allowed within Speed Match conferences: 6.4k, 8k, 14.4k, 16k, 22.4k, 24k, 30.4k, 32k, and 38.4k. The feature at the fixed MLP rate 40k or 46.4k is not allowed within SM conferences. Also, variable MLP rates (var_mlp) are not allowed.

  SM T.120 Data Conferencing conferences are allowed with MLP rate “fixed” (and not “var_MLP”). Also, these conferences are allowed with audio mode “auto” and MLP rate “6.4k.”

Administration

T.120 Data Conferencing is activated on a per-system basis. To enable T.120 Data Conferencing, specific fields in a number of forms must be populated correctly. For details, refer to "Administering T.120 Data Conferencing" on page 2-218.

Hardware and Software Requirements

T.120 Data Conferencing requires an ESM module and two TN787K, vintage 9 or higher MMI circuit packs. One MMI (H.221-MMI) is used to terminate the H.221 bit stream and the second one (ESM-MMI) performs the MLP bit rate adaptation. Also required is the TN2207 UDS1 circuit pack.

The MSM and ESM hardware are required for a Avaya MCU to use the T.120 Data Conferencing features. The MSM and ESM should be within 50 feet of each other.

Terminal Names

Description

Terminal names allows the MCU to query and pass endpoint terminal names as defined in the ANSI243 (ANSI version of H.243) recommendation. With the terminal names option, endpoints can identify themselves and other endpoints involved in a conference.

Considerations

None.

Interactions

None.

Administration

Terminal names can be administered on a per-conference basis.

Hardware and Software Requirements

None.

Universal Conference Control

This feature is a customer option that enables an endpoint to manage an H.320 conference out-of-band. Universal Conference Control (UCC) is intended to provide a number of powerful services similar to and in lieu of H.243 Chair Control.

Description

The controlling terminal for UCC is a regular touchtone telephone, such as that used by an Audio Add-On party. This terminal *need not be* H.320-compliant. The terminal is joined to the conference solely for control purposes. As such, the terminal does not receive audio, video, or data from the conference it is managing, and it does not transmit this media to the H.320 conference multiplex. To join a conference, the UCC controlling terminal dials a specific MCU-extension.

Unlike Chair Control, requests from the UCC controlling terminal reach the MCU through a touchtone interface rather than via BAS commands. Accordingly, the user can use touchtone control to send commands to the MCU to do the following:

- Control the broadcast video source (the return video of the selected broadcaster is voice energy-switched)
- Change the conference mode to Voice Activated Switching (VAS) (this cancels any previous request to force the video broadcaster and revert back to the VAS method of video switching)
- Mute one endpoint or all endpoints except for a specific endpoint
- Unmute a single endpoint or all endpoints
- Cause selected endpoints to be dropped from the conference
- Terminate the conference (this request drops all the endpoints connected to the conference, including the controller itself)
- Adjust the audio volume for an Audio Add-On party
- Manipulate the most recent endpoint to join the conference (for example, broadcast the endpoint, mute the endpoint, etc.)

In addition, UCC can perform the following actions if Continuous Presence *Plus* is enabled:

- Transition full-screen image to panoramic (quad, upper, lower, or dual) video and vice-versa
- Place a specified endpoint into a specified quadrant

Also, UCC can perform the following actions if Executive Conferencing is enabled:

- Transition a full-screen image to an executive image and vice-versa
- Place a specified endpoint into a specified sub-picture

A number of options (explained later in this section) are available to perform these functions.

Considerations

A maximum of 1 UCC endpoint is allowed per MCU conference. UCC is not allowed in a Chair conference or a Broadcast w/Auto-Scan conference.

A tone is provided to the UCC controller after it is successfully connected to the conference. A tone is also given to the UCC controller to indicate positive or negative feedback after every command entered.

A positive feedback tone is given if the MCU is able to switch to the specified broadcaster. The MCU plays a negative feedback tone and disregards the controller's request to broadcast an endpoint if the endpoint does not satisfy certain conditions. (Refer to "Select Broadcaster" on page B-155.)

The UCC controller can also cause selected endpoints to be dropped from the conference, including itself. In addition, the UCC controller can terminate the conference. In so doing, it drops all endpoints connected to the conference, including the controller itself.

Options

This section fully discusses the UCC options. For a summary of the options, refer to "Accessing and Implementing Universal Conference Control Services" on page 4-4.

Select Broadcaster

This option allows the controller to select the video broadcaster. The broadcaster is viewed in full screen. This service is allowed in VAS conferences but not in conferences with Presentation mode since this mode implies that the video broadcaster (that is, the Presenter) may not be changed. Also, this service may be used in conferences with or without Continuous Presence *Plus* or Executive Conferencing.

When the controller activates this service, the conference operates in a manner similar to a Chair conference, in which the Chair terminal sends the Video Command Broadcast (VCB) BAS code. The selected video broadcaster is essentially “locked” as a result of this request.

When the controller enters the Select Broadcaster command followed by an endpoint number in the range of 1 through 25, the MCU broadcasts the full-screen video of the specified endpoint to other endpoints in the conference. All the other endpoints view the video of the selected endpoint in full screen. The return video of the selected broadcaster is chosen based on the voice-activated switching (VAS) algorithm. The broadcaster designated by the controller remains the video broadcaster until any one of the following occurs:

- Controller chooses another endpoint with the Select Broadcaster command.
- Controller requests the Rollcall feature.
- Selected broadcaster drops or becomes an invalid video source.
- Video locks are cleared with the Unlock Video command.

  NOTE:
  The current broadcaster may actually remain the broadcaster if the VAS algorithm selects that endpoint.

- Image transitions to a quad/upper/lower/dual/exec panoramic screen with the Force Image to Quad/Upper/Lower/Dual/Exec command.
- UCC drops.
- Conference ends.

This service can be requested at any time during the conference. For example, the controller may select a new broadcaster while a fixed broadcaster is currently in force, while an MCV broadcaster is in force, or when the conference is operating in VAS mode. In all cases, the MCU attempts to switch to the specified endpoint. For an MCV broadcaster, the controller's request to change the broadcaster overrides the current MCV broadcaster's status. If Rollcall or Browse is in effect, a request to select a broadcaster cancels these services.

If the conference is currently viewing a quad-/panoramic-screen image, a request for this service first causes an automatic transition to full screen with the specified endpoint as the broadcaster. Video locks imposed on the quadrature/panoramic image remain unaffected. For example, a previous request to change the composition of the quad/panoramic screen via an administrative change to the Conference Record, CRCS Agent control, MT conference control interface, or UCC Set Quadrant command is unaffected. If the image transitions back to quad/panoramic screen, the most recent composition requested is shown.

The MCU broadcasts an endpoint if it has video suppressed (sent VIS), but not if it is an invalid video source (sent video-off, etc.). If an endpoint suppresses its video

while it is the fixed broadcaster, the MCU does not switch away. However, the MCU removes the lock on the selected broadcaster if the endpoint becomes an invalid video source. In such a case, another broadcaster is chosen from the speaking endpoints. If the UCC party disconnects from the conference, the MCU retains the lock on the selected broadcaster.

The controller hears a positive feedback tone if the MCU is able to switch to the specified broadcaster. The MCU plays a negative feedback tone and disregards the controller's request to broadcast an endpoint if any of the following are true:

- Endpoint number is not in the range 1 through 25.
- Specified endpoint is not video source capable.
- Specified endpoint is not reserved in the conference.
- Specified endpoint is not joined to the conference.
- Conference is administered as a Presentation conference.

Unlock Video

This service allows the controller to cancel any video locks imposed on the conference by CRCS Agent Control, the MT conference control interface, or UCC commands. This command essentially returns the conference back to the operation mode specified by conference administration. This service may be used in conferences administered with VAS or Presentation mode. In addition, it may be used in conferences optioned with Continuous Presence *Plus* or Executive Conferencing.

For a VAS administered conference that is currently viewing a full-screen image, a request for this service cancels any previous control command to lock a video broadcaster. For example, this service cancels any locks created by the Select Broadcaster, Rollcall, or Browse commands, and it returns the conference back to the VAS administered method of selecting a broadcaster. In VAS mode, a video broadcaster is chosen from among those endpoints who are speaking.

For a Presentation conference in which the Presenter is currently viewing a full-screen image of a return video broadcaster that has been locked due to the Browse command, the Unlock Video command cancels the fixed status of the return broadcaster and returns to the VAS administered method of selecting the return video.

If the conference is viewing a quad-screen image in either a Presentation or VAS conference, this service cancels all locks created by any of the control interfaces (including the UCC Set Quadrant command) and returns the conference back to the administered view of the conference.

The controller hears a positive feedback tone if the MCU is able to honor a request for this service. This request is disregarded by the MCU and a negative feedback tone is provided if the current broadcaster has not been designated by a controller (for example, the current broadcaster is an MCV broadcaster). This

service does not cancel any mute controls requested by the Mute and Solo Audio commands.

If the conference is already operating with its administered defaults, the MCU takes no action. However, a positive feedback tone is provided to indicate that the conference is in the requested mode.

This feature does not prevent the controller from controlling the conference. It simply clears all controlled video locks. Services that lock video broadcasters (for example, Set Quadrant, Select Broadcaster, Browse, and Rollcall) may be requested by the controller any time after the Unlock Video command is issued.

This service is similar to canceling a Video Command Broadcast request (cancel-VCB) in Chair Controlled conferences.

Drop Endpoint

The controller can drop an endpoint from the conference at any time. When this command is issued, the MCU disconnects the selected endpoint from the conference and drops all calls associated with that endpoint. If the conference is optioned with tones, an exit tone is heard by the remaining parties on the conference when the endpoint is disconnected. If the endpoint is a dial-out endpoint, the MCU does not attempt to retry that endpoint. After being dropped, a dial-in endpoint may redial its mcu-extension and be reconnected to the conference.

The controller hears a positive feedback tone if the MCU is able to drop the specified endpoint. The MCU plays a negative feedback tone and disregards the controller's request to drop an endpoint if:

- Endpoint number is not in the range 1 through 25.
- Specified endpoint is not reserved in the conference.
- Specified endpoint is not joined to the conference.

The controller is able to drop any endpoint associated with the conference, including the UCC party itself. If the controller drops itself, no exit tone is heard by the parties remaining in the conference.

This feature is similar to dropping an endpoint with the CCD BAS command (Chair Command Disconnect) in Chair Controlled conferences.

End Conference

This service drops all endpoints joined to the conference, including the controller itself. The effect of this service is the same as all the parties in the conference intentionally hanging up and ending the conference.

For this service, the MCU does not automatically retry dial-out endpoints in the conference. Also, it does not change the status of the conference to “file” (if the

conference was administered as “dedicated”) or “inactive” (if the conference was administered as “reserved”). For a “reserved” conference, the MCU does not retry dial-out parties until the conference reaches its Stop Time and then becomes active again by changing the conference type to “file” and also the Start and Stop Time.

Since the status of the conference does not change, endpoints may join either a reserved conference that has not yet reached its Stop Time or a dedicated conference after this service is requested. The controller hears a positive feedback tone. However, a dial-out endpoint cannot be redialed.

This feature is similar to terminating a conference with the CCK BAS command (Chair Command Kill) in Chair Controlled conferences.

Browse

This service allows a fixed, full-screen broadcaster to scan the other endpoints in the conference. This service is similar to Broadcast with Auto-Scan with one exception: the UCC party controls when the next scan of return video is to take place. Only the return video seen by the broadcaster changes; all other participants continue to view the broadcaster in full-screen.

Browse may be used in VAS or Presentation mode administered conferences in which a full screen broadcaster has been fixed with the Select Broadcaster command. In full-screen Presentation conferences, Browse allows the Presenter to scan in full screen the other endpoints currently in the conference.

This service is invoked by entering the Browse feature access code. The MCU immediately locks the return video on the endpoint with the lowest endpoint number, and a positive tone is given. A request for this service is valid only if the current broadcaster is currently fixed with the Select Broadcaster feature or if the broadcaster is the Presenter in a Presentation conference. This command is denied if:

- Broadcaster has not been fixed with the Select Broadcaster command, and the broadcaster is not the Presenter
- Current broadcaster is an MCV broadcaster

Once in Browse, the "#" key selects the next return video. The endpoints are scanned in order of endpoint number given to each endpoint at conference reservation. The current broadcaster is skipped in Browse unless it is the only party in the conference. A positive tone is given to indicate a switch of new return video.

While in Browse, the return video is essentially “locked,” and speaking conference participants therefore do not cause any video switch. MCV requests are denied while Browse is in effect; however, the request for MCV is remembered. The MCU continues to respond to scan requests as long as the "#" key is pressed.

The MCU broadcasts an endpoint selected for Browse if it has video suppressed (sent VIS), but not if it is an invalid video source (sent video-off, etc.). If an endpoint suppresses its video while it is providing the return video during Browse, the MCU does not switch away. However, the MCU switches to the next endpoint in Browse if the endpoint becomes an invalid video source.

If the return video in Browse drops, the next endpoint in Browse is automatically selected by the MCU.

Browse is canceled if any of the following occurs:

- Another broadcaster is selected with the Select Broadcaster command.
- Controller requests the Rollcall feature.
- Video locks are cleared with the Unlock Video command.
- Broadcaster drops or becomes an invalid video source.
- Conference transitions to quad/panoramic screen.
- Conference ends.

Rollcall

This service allows the controller to enable each endpoint in turn to be the broadcast video source. In Rollcall, all participants view the broadcaster in full screen, including the broadcaster itself. (The broadcaster receives looped video.) The UCC party controls when the next endpoint in the conference becomes the broadcaster. Rollcall is allowed only in VAS administered conferences. It is not allowed in Presentation conferences.

It is not necessary to “fix” a broadcaster prior to activating the feature. However, since Rollcall is a full-screen feature, the MCU automatically transitions the conference to full screen if this service is requested while viewing quad screen.

Rollcall is invoked by entering the Rollcall feature access code. If the conference is currently viewing a quad screen, the conference is first transitioned to full screen. The MCU then immediately locks the broadcast video on the lowest numbered endpoint, and positive tone is given.

If there is a full-screen MCV broadcaster, the controller's request to begin Rollcall overrides the current MCV broadcaster's status, and the BAS code *VCR* is sent to the current broadcaster. Rollcall automatically cancels the Select Broadcaster and Browse features.

Once in Rollcall, the “#” key causes the MCU to select the next broadcast video. Positive tone is given to indicate a switch to the new broadcaster. The endpoints are scanned in endpoint number order. While in Rollcall, the broadcast video is “locked” and speaking conference participants do not cause any video switch. Therefore, requests for MCV are also denied while Rollcall is in effect. The MCU continues scanning as long as the "#" key is pressed.

The Rollcall command is denied if at least one of the following is true:

- Conference is administered as a Presentation conference.
- There are no valid video sources in the conference.

The MCU broadcasts an endpoint selected for Rollcall if the endpoint has video suppressed (sent VIS), but not if it is an invalid video source (sent video-off, etc.). If an endpoint suppresses its video while it is the broadcast video during Rollcall, the MCU does not switch away.

Rollcall is canceled if any of the following occurs:

- New broadcaster is selected with the Select Broadcaster command.
- Video locks are cleared with the Unlock Video command.
- Broadcaster drops or becomes an invalid video source.
- Conference transitions to quad/panoramic screen.
- Conference ends.

Transition Video Image

In a conference optioned with Continuous Presence *Plus*, the UCC controller is able to transition the conference between the panoramic and quad-screen mixed video operations and full-screen switched video. This service provides commands to transition to quad-screen, panoramic, and full screen. Both commands may be used in Voice-Activated Switching and Presentation conferences. In a conference optioned with Executive Conferencing, the UCC controller is able to transition the conference between the dual- or upper-panoramic mixed video operations and full-screen switched video.

Force Image to Dual-Panoramic View

If the conference is currently viewing a full-screen image and this service is requested, the MCU immediately transitions the conference to dual-panoramic view.

Force Image to Lower-Panoramic View

If the conference is currently viewing a full-screen image and this service is requested, the MCU immediately transitions the conference to lower-panoramic view.

Force Image to Upper-Panoramic View

If the conference is currently viewing a full-screen image and this service is requested, the MCU immediately transitions the conference to upper-panoramic view.

Force Image to Executive Conferencing

If the conference is currently viewing a full-screen image and this service is requested, the MCU immediately transitions the conference to Executive Conferencing view.

Force Image To Quad Screen

If the conference is currently viewing a full-screen or any panoramic image and this service is requested, the MCU immediately transitions the conference to a quad-screen operation. When this happens, all controlled video locks imposed on the conference while in the full or panoramic screen are canceled. For example, if Rollcall, Browse, or Select Broadcaster is active and the controller requests a transition to quad screen, a request for any of these services is canceled and is not remembered if the conference subsequently transitions to full screen. In addition, the MCV locking effect on the full-screen broadcast video is broken (and the BAS code VCR is sent to the current broadcaster). Transitioning the image to quad screen does not cancel any Mute Controls activated by UCC.

A request to transition the conference to quad-screen causes no effect if the conference is already operating in quad screen. Positive feedback tone is given to indicate the conference is operating in the requested mode. This service is denied and negative tone is provided if either of the following is true:

- Conference is not optioned with Continuous Presence *Plus*
- Continuous Presence *Plus* is optioned for the conference, but resources have become unavailable.

Force Image To Full Screen

If the conference is currently viewing a quad-screen, panoramic, or Executive Conferencing image and this service is requested, the MCU immediately transitions the conference to full-screen operation. When this happens, the current composition of the quad/panoramic image is remembered and is not automatically cleared as a result of switching to full screen. However, other control interfaces (including UCC) may change the “current” composition while viewing full screen. Transitioning the image to full screen does not cancel any Mute Controls activated by UCC.

Once the conference is in full-screen mode, it operates according to the video mode administered on the Conference Record form. Specifically, the *Video Mode* field indicates how the MCU should manage video capabilities for the conference while it is in full screen. For example, if *Video Mode* indicates that capability upgrades are enabled for the conference, the MCU initiates a cap exchange as a part of transitioning to full-screen mode.

A request to transition the conference to full screen causes no effect if the conference is already operating in full screen. Positive feedback tone is given to indicate that the conference is operating in the requested mode.

This service is never denied since a conference must always be able to transition to full screen.

Set Sub-Pict

This service allows the UCC controller to change the composition of the quad image. It may be used in both VAS and Presentation conferences that are optioned with Continuous Presence *Plus*. The service allows the controller to broadcast the video of a specific endpoint in a quadrant. It also allows a quadrant to be designated as a VAS quadrant. In a VAS quadrant, the video displayed in that quadrant is chosen from speaking endpoints according to the VAS algorithm. Therefore, this service allows the quadrant to be “locked” as either a “fixed” or VAS quadrant.

To use this service, the UCC controller enters the Set Sub-Pict command followed by a single-digit quadrant number in the range of 1 through 4. Following the quadrant number is the endpoint number. To designate the quadrant as voice-energy switched (VAS), the endpoint number should be 0. To fix a specific endpoint in a quadrant, the endpoint's number (from 1 to 25) should be entered. A command to fix an endpoint in a quadrant overrides the current designation of the quadrant. If another endpoint is currently broadcasting in the quadrant, it is removed from the quad image and the video of the new endpoint is displayed.

NOTE:
This endpoint may reappear in a different quadrant due to VAS selection or if a control interface fixes it in a different quadrant.

Placing an endpoint into a quadrant has no effect on other fixed quadrants in which it is already broadcasting. Therefore, if an endpoint is already broadcasting in fixed quadrant 1 and is then placed into fixed quadrant 2, it remains in both quadrants. However, if the endpoint is already broadcasting in a VAS quadrant, the VAS algorithm removes it and replaces it with another speaking endpoint (if available).

There is no restriction on how often a single endpoint can be designated as broadcasting in the quad-image. In other words, the controller is allowed to place a specific endpoint into more than one quadrant. Therefore, for example, if endpoint 3 is already “fixed” in quadrant 1, the controller can also use the Set Sub-Pict command to place endpoint 3 into quadrant 2, 3, or 4. Similarly, one or more quadrants can be designated as VAS quadrants. With this command, the controller is also able to compose the image such that the video of the "Empty Quadrant Endpoint" occupies one or more quadrants.

Optioning this service has an immediate visual effect only if the conference is viewing a quad-screen image. For example, if the conference is viewing a quad-screen image and a change to quadrant composition is requested, the quad-image is immediately updated to reflect the controller's request. However, if the conference is currently viewing a full-screen image, the requested composition is stored. The conference remains in full-screen mode and does not

transition to quad-screen mode until there is an explicit request to do so. When the conference does transition to quad screen, the most recent composition requested by the controller is provided.

The controller hears a positive feedback tone if the composition can be changed as requested. Negative feedback tone is provided if any of the following are true:

- Endpoint number is not 0 (for VAS) or not in the range 1 through 25
- Quadrant number is not a single digit in the range 1 through 4
- Specified endpoint is not reserved in the conference.
- Specified endpoint is not joined to the conference.
- Specified endpoint is the UCC party or an Audio Add-On party
- Specified endpoint is the Presenter.

An endpoint that is an invalid video source or has its incoming video suppressed (because either the MCU received VIS from the endpoint or a control interface requested that video be suppressed) is allowed to be selected as a fixed broadcaster in a quadrant. If an endpoint occupies a fixed quadrant, and if the endpoint's video is subsequently suppressed or the endpoint becomes an invalid source, the MCU does not choose another endpoint to occupy that quadrant. Instead, the video of the Empty Quadrant Endpoint or a default fill is broadcast until the endpoint's video is unsuppressed and/or the endpoint becomes a valid source. This strategy also applies to endpoints that are designated in fixed quadrants and are not yet joined or are in the process of joining the conference (that is, have not yet reached primary status). A fill pattern is displayed in the quadrant until the endpoint is able to transmit video.

A endpoint loses its fixed status in a quadrant *only if* the endpoint drops or a control interface requests that a change be made to the quadrant.

With UCC, the controller is able to change only one quadrant at a time. Other control interfaces (for example, CRCS Agent and the MCU-MT) can change more than one quadrant at a time.

Mute Controls

The UCC controller is able to affect the incoming audio of endpoints in the conference with various UCC Mute commands. These commands can be used to isolate “noisy” endpoints and essentially create a broadcast conference where only one endpoint in the conference can be heard. UCC Mute options can be used in VAS and Presentation conferences, regardless of the audio mode (G.711, G.728, or G.722) or the bandwidth (2B, 336k, 384k, 768k, etc.).

Mute controls are intended for every endpoint in the conference except the UCC endpoint. Accordingly, the Presenter, the full-screen broadcaster, an endpoint broadcasting in a quad image, or an audio-only endpoint can all be muted and unmuted. Any UCC service, such as Rollcall, Browse, or Select Broadcaster, may

be used while a mute feature is in effect. The Status Conference form indicates the UCC-muted status of each endpoint.

Video is provided to the conference even if mute options are activated. For example, video broadcasters are chosen first from the speaking (unmuted) endpoints by the VAS mechanism. However, the VAS algorithm arbitrarily selects a video broadcaster from silent or muted endpoints if the MCU needs to select a video source but is unable to select one from the speaking endpoints (because, for example, none of these endpoints are a valid video source).

Mute Endpoint

This option allows the controller to mute the incoming audio of the specified endpoint. Whenever this option is activated on an endpoint, audio from that endpoint is not included into the conference. Accordingly, other endpoints in the conference do not hear that endpoint if the endpoint speaks, and the MCU does not consider that endpoint whenever it is selecting a speaking endpoint for VAS.

This option has no effect on the audio being transmitted to that endpoint; the endpoint can still hear the conferenced audio. This behavior is similar to what happens when the MCU receives the Audio Indicate Mute (AIM) BAS code from that endpoint. (This code indicates that the endpoint has muted.)

The MCU sends the AIM BAS code to all endpoints not receiving any audio due to UCC muting or local endpoint muting. AIM is sent to indicate that an endpoint is hearing no audio. Upon receiving this command, an endpoint can display “far-end mute,” provided the endpoint is equipped to do so.

The Mute Endpoint command is denied if any of the following are true:

- Endpoint number is not in the range 1 through 25
- Specified endpoint is not reserved in the conference
- Specified endpoint is not joined to the conference
- Specified endpoint is the UCC party.

If a UCC-muted endpoint subsequently unmutes its local audio by sending the BAS code Audio Indicate Active (AIA), the MCU remembers that AIA has been sent but does not allow the endpoint's audio to be included into the conference until the UCC Mute option is canceled on that endpoint. This option is canceled via a UCC Unmute command, which is discussed in the next section.

If the controller requests that an endpoint be muted, but the endpoint has already been muted by UCC, positive tone is provided.

Except for in a conference with Solo Audio mode (explained later), a UCC-muted endpoint that disconnects from a conference and later rejoins the conference rejoins the conference as an *unmuted* endpoint.

If the UCC party disconnects from the conference, the Mute option (if enabled) is retained for the specified endpoint.

Unmute Endpoint

This option allows the controller to cancel the UCC Mute feature on an endpoint. Therefore, the option allows audio from that endpoint to be included into the conference. However, the option does not override the endpoint's AIM status. If the endpoint has sent AIM, the MCU does not include its audio into the conference until the endpoint sends AIA. In other words, an endpoint is considered unmuted only if it is sending AIA and is not muted by UCC.

As a result of UCC Unmute, the MCU sends the AIA BAS code to other endpoints if AIM was previously sent to all the endpoints. Accordingly, each endpoint can remove the “far end mute” message.

The Unmute Endpoint command is denied if any of the following are true:

- Endpoint number is not in the range 1 through 25
- Specified endpoint is not reserved in the conference
- Specified endpoint is not joined to the conference
- Specified endpoint is the UCC party.

If the controller requests that an endpoint be unmuted but has already been unmuted by UCC, positive tone is provided.

Solo Audio

This option allows the controller to mute all endpoints in the conference except the specified endpoint. Whenever this option is activated, only the audio of the specified “solo” endpoint is included into the conferenced audio. This gives the effect of a “Broadcast” conference.

With Solo Audio optioned, the solo endpoint does not hear the audio of any endpoint in the conference. The behavior of muting endpoints with the Mute Endpoint command (described previously) also applies to the Solo Audio option. For example, the AIM and AIA status of each endpoint is tracked by the MCU.

Once this option is activated, the conference enters Solo Audio mode. All other endpoints that have either already joined the conference or will join it once this option is activated join the conference in a muted state.

The UCC controller may use any of the Mute features after the conference is in Solo Audio. For example, the Unmute option can be used to select some endpoints to be heard. However, unmuting any endpoint after Solo Audio is active turns off the Solo Audio state. The other muted endpoints remain muted in this case, but any endpoints joining the conference thereafter do not join muted.

If the Solo Audio command is used while the conference is already in Solo Audio mode, the MCU reconfigures the audio to satisfy the request.

The Solo Audio command is denied if:

- Endpoint number is not in the range 1 through 25.
- Specified endpoint is not reserved in the conference.
- Specified endpoint is not joined to the conference.
- Specified endpoint is the UCC party.

Solo Audio is also canceled with the Unmute All Endpoints option (discussed in the next section) or if the solo endpoint drops. Once this option is canceled, the audio for all endpoints is included into the conference. If the UCC party disconnects from the conference, the Solo Audio option (if enabled) is retained for the specified endpoint.

Unmute All Endpoints

This option allows the controller to unmute quickly all endpoints (if any) that have been muted by UCC. The option also cancels the Solo Audio feature. The Unmute All request is never denied.

Adjust Audio Volume for Audio Add-On Party

This option allows you to increase, decrease, or reset the volume of specified endpoints. It can be accessed only via UCC; it is not available via CRCS, conference control command, or administration.

The endpoint number within the command for the option must contain two digits. For endpoint numbers less than 10, a ‘0’ must be placed before the digit (for example, 01, 02, 07, etc.). Also, endpoint number ‘00’ indicates that the specific Adjust Audio Volume request is to be applied to all Audio Add-On parties within the conference.

The commands for this option are denied if the specified endpoint has not joined the conference or is not an Audio Add-On party.

Whenever you enter a valid command for this option, the conference is put into an audio volume control mode. This mode allows you to adjust the volume by merely entering the volume control digit (7, 8, or 9); you need not reenter the associated endpoint number. The MCU ensures that the audio level of the endpoint never exceeds a 3 db gain or a 15 db loss.

For example, entering ****64 02 7** decreases the audio level of endpoint 2 by 3 db. Thereafter, entering **9** increases the endpoint’s audio level by 3 db. Entering **9** again increases the endpoint’s audio level by another 3 db. Thereafter, entering **7** decreases the endpoint’s audio level by 3 db. Finally, entering **8** resets the endpoint’s audio level back to the default (6 db loss).

To exit audio volume control mode, enter **#**. If you enter a valid command followed by **#**, the MCU first processes the command and then exits audio volume control mode. For example, if you enter ****64 02 7#,** the MCU first decreases the audio level of endpoint 2 by 3 db and then exits audio volume control mode.

You can also exit audio volume control mode by entering the command for any other UCC option (including Select Broadcaster, Rollcall, etc.).

Manipulate Most Recently Joined Endpoint

This option allows you to perform various operations on the endpoint that most recently joined the MCU conference. These operations include broadcasting the endpoint, muting the endpoint, etc.

If the most recent endpoint to join the conference is an invalid video source, entering ***99** (to broadcast the most recently joined endpoint) is denied. Also, if there are no endpoints currently joined to the conference (except for UCC endpoints), all commands for this option are denied.

Interactions

The UCC feature interacts with the following:

Audio Add-On

An Audio Add-On endpoint and a UCC endpoint are allowed to be joined to the same conference. UCC and Audio Add-On parties share the same pool of mcu-extensions. However, UCC and Audio Add-On have separate port capacities. These capacities are administrable on the Customer-Options form. On the Conference Record form, a UCC party is distinguishable from an Audio Add-On party by its endpoint type, which is “UCC.” The UCC controller can drop an Audio Add-On party in a conference by issuing UCC Drop Endpoint or End Conference commands. Also, the UCC party can use any of the Mute commands on the Audio Add-On party.

If the controller attempts to select the Audio Add-On party for a video broadcaster by using the Select Broadcaster or Set Quadrant command, the MCU provides a negative feedback tone and disregards the request.

Application Compliant Flag

A UCC party cannot participate in an MLP data conference. Therefore, there is no interaction with this feature, and the *App Comp* field for the UCC party in the Conference Record is blank.

Basic/Enhanced Service Flag

A UCC party cannot participate in multimedia functions. Therefore, there is no interaction with this feature, and the *Basic/Enhanced* field for the UCC party in the Conference Record form defaults to **basic**. However, this field may be set to **enhanced** with no effect.

Conference Bandwidth

A UCC endpoint may be added to a conference of any bandwidth that is administered in VAS or Presentation conference mode.

Conference Redial Flag

A dial-out endpoint dropped by the UCC party can be redialed by setting the endpoint's per-user conference *Redial?* flag in the Conference Record to **yes**.

For a UCC party, the *Redial?* field *cannot be set* to **yes** because UCC is restricted to dial-in endpoints only. Therefore, this field will be blank.

CRCS Monitoring

The CRCS real-time monitoring interface recognizes any updates made to the conference via UCC. The CRCS polls the MCU approximately every five seconds for status. This allows the CRCS to update screens to reflect current broadcasters, muted or unmuted status, etc.

Cascading

UCC can be used in cascaded conferences. Required entries to the Conference Record include **UCC** in the *Type* field and an appropriate nonblank value in the *Cascade Mode* field.

A UCC party located on either the primary MCU or secondary MCU may select the inter-MCU link as a video broadcaster. However, in cascades with Continuous Presence *Plus* optioned, the secondary MCU is administered in Presentation mode and the inter-MCU link is administered as the Presenter. Therefore, the same UCC restrictions that apply to a noncascaded Presentation conference also apply to a cascaded Presentation conference (that is, Select Broadcaster and Rollcall are not allowed).

Chair Control

UCC cannot be used in a Chair-controlled conference. Therefore, “UCC” endpoint types cannot be administered in “Chair” conferences. Moreover, an H.320 endpoint is not granted a request for the Chair token in a VAS or Presentation administered conference. If an endpoint requests the Chair token by sending the

Chair Command Acquire (CCA) BAS code, the MCU denies the request by sending the Chair Command Refuse (CCR) BAS code back to that endpoint.

Continuous Presence *Plus*

UCC can control conferences optioned with Continuous Presence *Plus*. Interactions between UCC and Continuous Presence *Plus* are briefly discussed in the following list:

- UCC can change the composition of the quad image by placing a specific endpoint into a quadrant, or by designating a quadrant as a VAS quadrant with the Set Sub-Pict command.
- UCC can transition the image in a Continuous Presence *Plus* conference between full screen, panoramic, and quad screen with a set of commands.
- Full-screen options, such as Select Broadcaster, Browse, and Rollcall, can be used in Continuous Presence *Plus* conferences. However, these options cause an immediate transition to full screen if the conference is currently viewing quad screen.
- The Browse option can be used in Continuous Presence *Plus* conferences. However, the conference can be viewing full screen, or it can be in presentation quad mode. The MCU does not automatically transition the conference to full screen when this command is requested.
- The UCC Unlock Video command can be used in Continuous Presence *Plus* conferences. If this command is requested when the conference is in full-screen mode, the command cancels all video locks created by the UCC full-screen options (such as Select Broadcaster, Browse, or Rollcall). If the conference is in quad-screen mode, the command returns the quad composition back to the administered defaults.
- UCC Mute Controls can be used on endpoints during a Continuous Presence *Plus* conference. This option can be used on any endpoint, regardless of whether the video for the endpoint is currently being displayed in a quadrant. If an endpoint is muted in a VAS-designated quadrant, the VAS algorithm attempts to replace it with a speaking endpoint.
- The UCC Drop Endpoint and End Conference options do not have any specific interactions with Continuous Presence *Plus*. Endpoints are dropped.
- Whenever the UCC party disconnects from a Continuous Presence *Plus* conference, video locks imposed on the full-screen image are removed. However, video locks created for the quad-screen image by UCC or other control interfaces are not cleared.

Dedicated Access

UCC endpoints cannot access the MCU via dedicated DS1 facilities. Dedicated Access endpoints have a unique type on the Conference Record that distinguish them from UCC endpoint types.

Direct Connect

A UCC endpoint cannot be a locally attached BRI/DCP endpoint. If a locally attached voice endpoint dials a UCC mcu-extension, it is not allowed into the conference.

Echo Cancellation for Audio Add-On

The UCC party cannot cause other parties in the conference to hear echo because it is not providing (or receiving) audio to the audio conference.

Executive Conferencing

Many of the UCC options can be used for Executive Conferencing. However, the only UCC options causing a screen mode change that can be used for the feature are those that change Executive Conferencing mode to full-screen mode, and vice versa. Therefore, options involving dual-panoramic, upper-panoramic, lower-panoramic, and quad-screen are rejected. For UCC *Star*, reject notification is provided via feedback tones.

UCC commands can be used to assign conference sites within an Executive Conferencing conference to a particular sub-picture. Also, UCC control can be used to establish an Executive Conferencing endpoint as a broadcaster endpoint. This includes such endpoints that are moved from one conference to another.

H.CTX and H.CTX+

UCC control is allowed in conferences configured with these proprietary videos from CLI. However, since Continuous Presence *Plus* cannot be optioned in H.CTX conferences, use of the Continuous Presence *Plus* commands specific to UCC are denied in such conferences.

SG4

UCC control is allowed in conferences configured with PictureTel's SG4 video. However, since Continuous Presence *Plus* cannot be optioned in SG4 conferences, use of the Continuous Presence *Plus* commands specific to UCC are denied in such conferences.

International MCUs

UCC can be used on internationally-configured MCUs. The TN744C circuit pack detects touchtones generated by switching systems located internationally. The interdigit pause time can be administered on the System-Parameters Country-Options form.

Positive and negative feedback tones generated by the TN780 circuit pack are consistent for the country administered. If the default feedback tones chosen (for example, “Call Waiting” and “Hold Recall”) are inappropriate for the country, custom tones may be administered by changing the System-Parameters Country-Options form.

Low-/High-Speed Interworking

Like an Audio Add-On party, a UCC party may join a conference of any bandwidth. Therefore, a UCC party arriving on 56k or 64k facilities may join higher bandwidth (for example, 112k/128k 2B, H0, 336k/384k BONDed, 768k, etc.) conferences. The UCC party does not cause any changes to the selected communications mode (SCM) of the conference.

Notification Signaling

Video source BAS indications (VIN and VIN2) are sent by the MCU to an endpoint. These indications serve to identify to the endpoint the video source that the endpoint is viewing. The indications are also sent whenever the UCC selects a video source.

However, video source indications are not sent to endpoints in conferences with Continuous Presence *Plus* optioned. Therefore, VIN is not sent as a result of UCC selecting endpoints for full-screen or quad-screen.

Password Protection

UCC provides an optional Digital Tone Multifrequency (DTMF) password security capability. Also, the UCC party uses the same password as Audio Add-On parties. Whenever the *Password Scope* field in the Conference Record form is administered as **audio** or **all**, the UCC party is required to enter a password before being allowed to join the conference.

Presentation Mode

A UCC party is allowed in a conference administered with Presentation mode. The following UCC options are allowed in Presentation mode:

- Browse
- Unlock Video
- Mute, Unmute, Solo Audio, Unmute All

- Force to Quad, Set Sub-Pict (only if administered for Continuous Presence *Plus*)
- Force to Full
- Drop Endpoint
- End Conference

The Select Broadcaster and Rollcall options are denied in Presentation mode.

See-Me (MCV)

See-Me is a full-screen feature used by H.320 endpoints to request that the MCU broadcast its video to all other participants in the conference. Endpoints make this request by sending to the MCU the MultiPoint Command Visualize (MCV) BAS code. A request from the UCC controller to select the full-screen video broadcaster overrides any endpoint's request for MCV. However, all MCV requests are still remembered by the MCU, even if they are overridden by the UCC party.

The following list summarizes the interactions between UCC and MCV:

- If the UCC party requests that the conference return to the VAS method of video switching (via Unlock Video), and if an MCV broadcaster is in effect, the MCU disregards the UCC request and provides a negative feedback tone. The current MCV broadcaster retains its MCV status.
- If the UCC party requests a change in broadcaster, and if an MCV broadcaster is in effect, VCR is sent to the current MCV broadcaster, and the endpoint selected by the UCC party becomes the new broadcaster (if it is a valid video source).

  If the endpoint selected by the UCC party is currently broadcasting due to MCV, the endpoint loses its MCV status, VCR is sent toward it, and it continues to broadcast.

  In both cases, the MCU remembers that the endpoint had sent MCV until cancel-MCV is received. If an Undo Video Locks command is received at this point, an MCV requestor (if any) is selected as broadcaster.
- If the UCC party disconnects from the conference while an MCV broadcaster is in effect, the broadcaster is unaffected, and it retains its MCV status.
- If the conference is changing back to VAS via the Unlock Video command, the MCU first chooses a video broadcaster from those endpoints that have requested MCV. If no endpoints are currently requesting MCV, the VAS algorithm chooses a broadcaster from the speaking endpoints. If no endpoints are speaking, the current broadcaster remains (if it is a valid video source).

- If a conference transitions from full screen to quad screen, and if an MCV broadcaster is in effect, VCR is sent to the MCV broadcaster, and the image transitions to quad screen. The MCU remembers that the endpoint has sent MCV until a cancel-MCV is received.

Terminal Names and Numbers

The UCC party is not considered part of the multimedia conference. Therefore, the MCU does not assign a terminal number to it (via TIA), and other terminals are not notified of its presence (via TIN or TIL). Also, the MCU does not query the UCC party for a terminal name (via TCS-2) or provide a name to other terminals (via TIP).

TN744 Resource Failure

If a port on the TN744 Call Classifier fails while actively connected to a UCC party, the MCU disconnects the UCC party. To reenter the conference, the UCC party must dial back into the MCU. Status conference reports that a resource failure caused the drop.

Video Switching Mode and Broadcaster Notification

A proprietary nonstandard command (ns-cmd) is used to announce a change in the current video switching mode and/or broadcaster to all endpoints. A unique value for the switching mode is used to indicate that the broadcaster has been designated by the UCC controller. An ns-cmd is sent to all endpoints whenever any of the following occurs:

- UCC party designates a new broadcaster with Select Broadcaster or Rollcall. (A new broadcaster is sent in the command and mode changes to UCC.)
- UCC party cancels all video locks with Unlock Video. (The conference mode is changed from UCC to VAS or Presentation.)
- UCC party disconnects from the conference, and a fixed full-screen UCC broadcaster is in effect. (The conference mode is changed from UCC to VAS.)
- Browse is canceled while in Presentation mode. (The conference mode is changed from UCC to Presentation.)
- UCC party drops a broadcaster. (A new broadcaster is sent in the command.)
- UCC broadcaster becomes a non-video source. (A new broadcaster is sent in the command, and the mode changes from UCC to VAS.)
- Broadcaster and/or mode notification are not supported in Continuous Presence *Plus* conferences. Therefore, there is no command sent when endpoints or VAS are selected for quadrants or when transitioning between full and quad-screen.

- If the MCU disregards a UCC request to change the broadcaster or clear video locks, the MCU does not honor the request, and no ns-cmd is sent. A negative feedback tone is provided to indicate that no action was taken.

Resource Availability—24 Hour Scheduler/CRCS

The resource availability checks performed by the conference scheduler (both on-line 24-hour and CRCS) ensure that the number of UCC controlling parties active in the MCU at the same time does not exceed the system capacity administered on the System-Parameters Customer-Options form. This port capacity check is performed when the conference form is submitted via either the **add conference** or **change conference** command.

The port capacity calculation reflects that a single UCC port type consumes no VC or MMI resources. The UCC port uses one TDM timeslot for transmitting touchtones to the MCU.

The advertised maximum port capacities assume that UCC and Audio Add-On parties are not administered in any conference. Therefore, including a UCC party and/or an Audio Add-On party in any conference may decrease the maximum port capacity for any random mix of rates

Notification Tones

The UCC party is not a part of the multimedia conference. Therefore, an entry tone is not played to endpoints in the conference just before the UCC party joins the conference. Also, an exit tone is not played to conference participants after the UCC party disconnects.

The UCC Mute feature does not affect entry, exit, and warning tones. Even if an endpoint is muted, it can still hear these tones. Also, an exit tone is still played if the endpoint drops.

Dynamic Conference Resizing

Dynamic Conference Resizing allows a UCC party to be added to or removed from a conference once that conference becomes active. This process is subject to the UCC administered port capacity for the time period of the conference and to the one UCC party per conference limit. If a UCC party is removed by administration from the conference, it is dropped from the conference, and subsequent incoming calls to the deleted mcu-extension are rejected and given intercept tone if this mcu-extension is unused in another conference. If added to a conference in progress, the UCC party can immediately dial its mcu-extension number and conference password (if applicable) and be connected to the conference.

UCC parties can be added to a conference via this feature by the CRCS reservations agent or by submitting the appropriate Conference Record from the MCU-MT.

Impact on Endpoint Numbering

The addition and/or removal of endpoints other than the UCC party can cause endpoint numbering to change. For example, an endpoint might be removed from the conference but then added back to the conference via a location number that is different from the one established for the endpoint on the Conference Record. In such a case, the mcu-extension for the endpoint is also different from the one originally established at conference reservation. Moreover, endpoints removed or added are not reflected on the original confirmation report provided by CRCS. Whenever the addition or removal of participants occur, CRCS guarantees that endpoint numbering between the MCU and the CRCS remains consistent. Consistent numbering is also maintained when information about a conferee is changed (dial-out number, type, etc.).

Since these numbers are essential to the endpoint specific features of UCC, it is recommended that resizing changes that result in changes to endpoint numbering are prevented in UCC conferences. However, if conference resizing is performed, a new CRCS confirmation report should be printed, faxed, or electronically mailed to reflect the most current endpoint numbering.

UCC Control Overrides

Changes made by UCC can be overridden via dynamic changes to the Conference Record. For example:

- Changing the fields that control the picture composition for Continuous Presence *Plus* overrides any composition made via the UCC Set Sub-Pict command.
- Changing the field that allows the conference to be optioned with Continuous Presence *Plus* can be turned off, causing a transition to full screen. This overrides a previous UCC request to transition to quad screen.

The UCC party does not receive any feedback when a previous request is cancelled or overridden.

Dial-Out

UCC-controlling parties can be Dial-Out parties.

Video Modes

UCC control is allowed in conferences configured with the H.CTX and H.CTX+ proprietary videos from CLI. However, since Continuous Presence *Plus* cannot be

optioned in H.CTX conferences, use of the Continuous Presence *Plus* commands specific to UCC are denied in such conferences.

UCC control is also allowed in conferences configured with PictureTel's SG4 video. However, since Continuous Presence *Plus* cannot be optioned in SG4 conferences, use of the Continuous Presence *Plus* commands specific to UCC are denied in such conferences.

Call Detail Recording

The MCU provides Call Detail Recording (CDR) output for incoming and outgoing trunk calls. Calls occurring on a UCC mcu-extension are included into the CDR record in a manner similar to calls occurring on an Audio Add-On mcu-extension.

Administration

The UCC feature must be administered on the Customer-Options form. For each conference that allows UCC, the Conference Mode must be set appropriately on the conference form. Also, the conference must be enabled with Voice-Activated Switching (VAS). Finally, the feature is implemented in 4-port increments.

Hardware and Software Requirements

This feature can be upgraded in increments of eight UCC endpoints to a maximum of 24 and is available only with the Release 3.0 or later version of the MCU. One TN744C Call Classifier circuit pack for every eight UCC ports is required for this feature.

On the Customer-Options form, the *UCC* field must include one of the following values: **0**, **1**, **2**, **4**, **8**, **12**, **16**, **20**, or **24**.

Uniform Dial Plan

Description

The Uniform Dial Plan (UDP) provides a common 4- or 5-digit dial plan (specified by Dialplan administration) that can be shared among a group of MCUs. UDP maps an incoming 7-digit number into a local MCU number.

Interactions

The following features interact with the UDP feature.

- AAR

  After the system determines the RNX of the switch being called, AAR routes the call to the correct switch. The required subset of AAR is provided with the UDP software. If the AAR feature is provided in addition to the UDP, the seven-digit AAR number will provide the exact same routing as the UDP.

- Dial Plan

  All of the extension numbers on a switch are not necessarily part of the UDP. Any that do not belong to the UDP are handled by a regular, non-UDP dial plan associated with the local switch. When administering the dial plan and designating a group of extensions as UDP non-local, you can specify on the Dialplan form whether you want to search for local extensions first or last. This allows some flexibility in the changing of extensions from local to non-local. However, after the dial plan is changed to make an extension UDP, nothing can be administered with these extensions on the local switch.

Administration

The UDP is administered by the system administrator. The following items require administration:

- Whether UDP has 4- or 5-digit extension numbers PBX Codes (expands first one, two, three, or four digits of dialed extension to an RNX)
- AAR Analysis Table (used by AAR to route calls to the correct switch)
- Routing Patterns
- Node Number Routing (used to route ENP calls)
- Extension Codes and type(s) of conversion
- AAR Digit Conversion (to define conversions for AAR Code extensions or to define home location codes)

NOTE:
If the user changes the Uniform Dialing Plan field value from a “y” to an “n,” then a warning message is generated to inform them that this action causes all UDP extension codes to be lost. The same warning message is applied if the Plan Length field value is changed from a “4” to a “5” or from a “5” to a “4.”

Hardware and Software Requirements

UDP software is required.

Video Conference Control

Description

Video conference control is performed using one or more of the following methods:

- Voice-activated switching control (sometimes referred to as automatic control)
- Chair control (part of user control)
- Presentation (part of advanced control)
- Broadcast with auto-scan (part of advanced control)

A detailed description for each is provided in the following sections.

NOTE:
Several features interact with video conference control methods. In particular, refer to "Continuous Presence Plus" on page B-63 and "Executive Conferencing" on page B-89.

Voice-Activated Switching

A speaker's endpoint becomes the broadcasting endpoint. The broadcasting endpoint sees the last broadcaster. MCU software and hardware provides for suppression of a ''ping-pong'' effect to avoid excessive switching during a rapid conversation. As an example, imagine a four-party video conference between endpoints named Site A, Site B, Site C, and Site D. Site B is the first endpoint to speak. When Site B finishes speaking, Site A begins to speak. As Site A begins, the voice-activated switching function displays Site A to the other three endpoints, while Site B is still displayed on Site A's screen as depicted in the following figure.

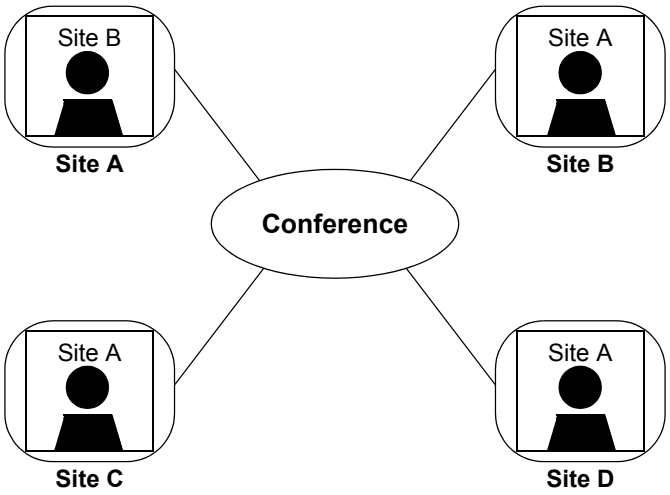


Figure B-11. Previous Speaker=Site B

The following figure illustrates the scenario when the speaker at Site A relinquishes to the speaker at Site B. In this setting, Site B sees Site A (the previous speaker), while all of the other endpoints see Site B (the current speaker).

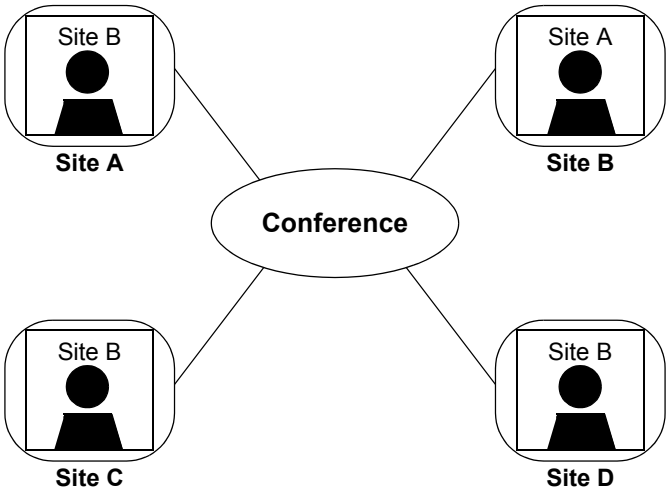


Figure B-12. Previous Speaker=Site A

In the final voice activated switching example, Site D begins to speak after Site B finishes, as shown in the following figure. Site D sees Site B on their screen while all other endpoints see Site D.

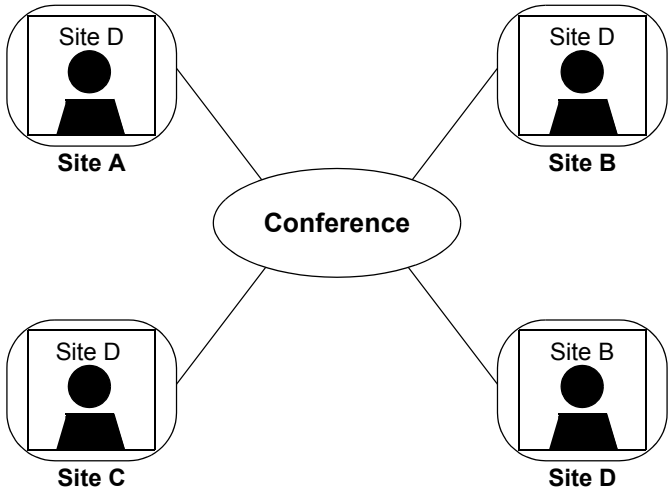


Figure B-13. Previous Speaker=Site B

Contributor

This video function can be used for tasks such as sending high-resolution video still images to other endpoints. It allows a user to broadcast graphics to all the other conferees. To do so, the broadcasting endpoint uses a code to gain the broadcast control. After broadcasting, the endpoint sends a second code to relinquish control. This is sometimes called the ‘‘See Me’’ function.

Chair Control

This video function allows a conference chair to select which endpoint video is being broadcast to all the other endpoints. An endpoint with chair control can request and relinquish control and drop conferences. The endpoint that claims ‘‘chair control’’ is the chair endpoint. In the following figure, Site A has the chair token and has selected Site C as the broadcast source while Site D is speaking. In this example, Site C (the broadcaster) is displayed at all endpoints except Site C. Site C sees Site D (the speaker).

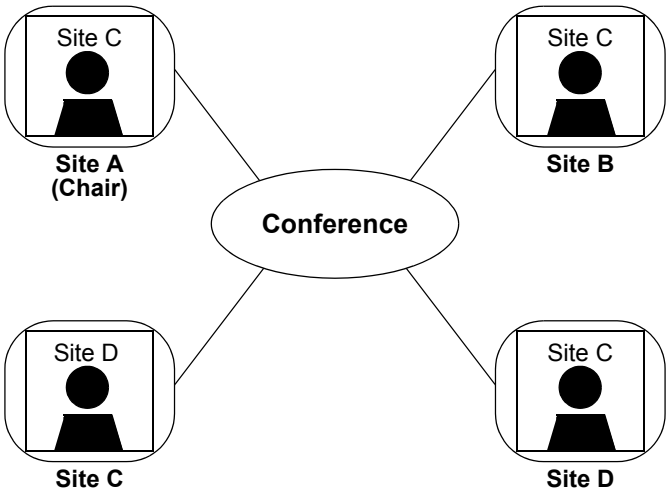


Figure B-14. Broadcaster=Site C, Speaker=Site D

After a time, Site D finishes talking and Site C resumes talking. No change occurs to the video streams as shown in the following figure.

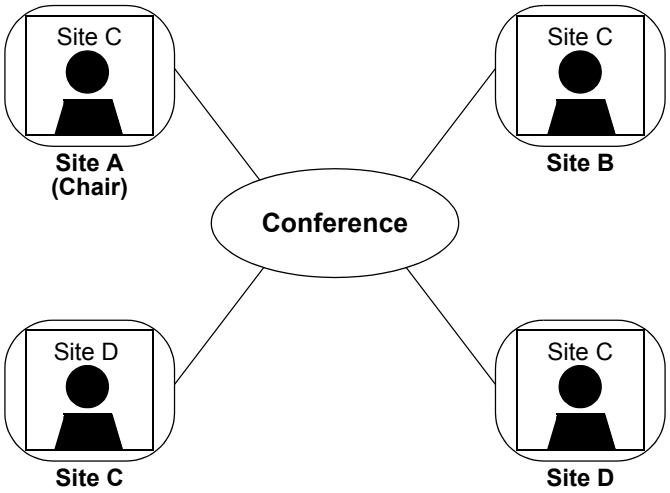


Figure B-15. Broadcaster=Site C, Speaker=Site C

Site A begins to talk when Site C asks for responses. Now, as shown in the following figure, Site C sees Site A (the speaker) on their screen while all other endpoints continue to see Site C (the broadcaster).

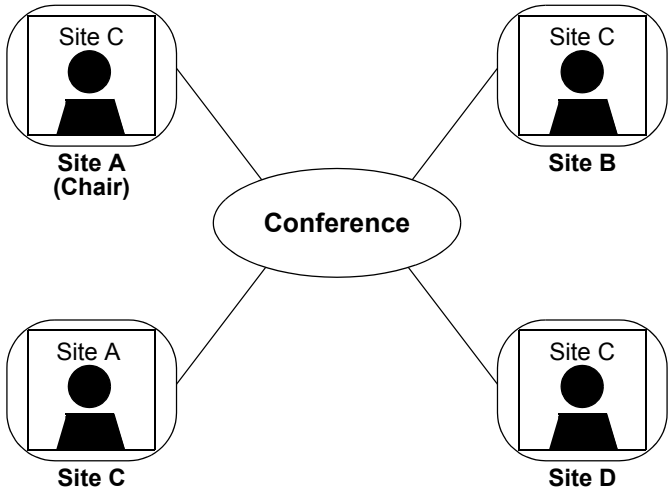


Figure B-16. Broadcaster=Site C, Speaker=Site A

Presentation

This function does not require special endpoint support. It is a standard feature on all MCU models. This function configures the system to broadcast a single endpoint (*presenter*) to all other endpoints. The receiving endpoints are set to *voice-activated switching* so the broadcaster sees the endpoint selected by that function while all other endpoints see the broadcaster. One endpoint is administered as the broadcaster on the MCU prior to the conference. In the following figure, Site A is administered as the broadcaster while Site D is speaking. In this case, Site A (the broadcaster) sees Site D (the speaker) while all other endpoints see Site A.

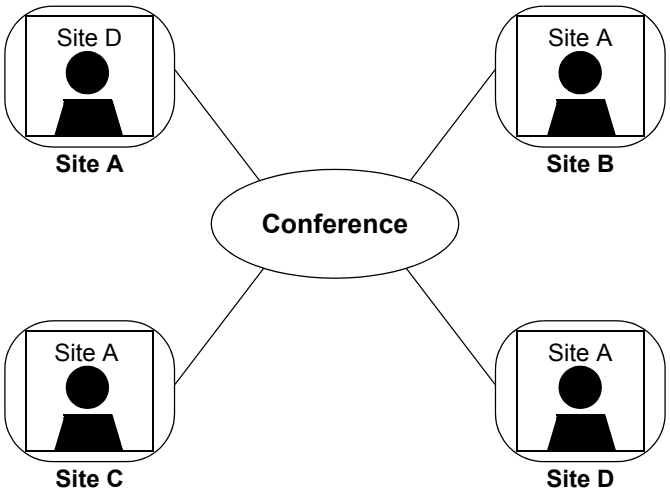


Figure B-17. Speaker=Site D

The following figure illustrates what happens when Site D stops speaking and Site C begins. Site A remains the broadcaster and sees Site C (the speaker) while all other endpoints still see Site A.

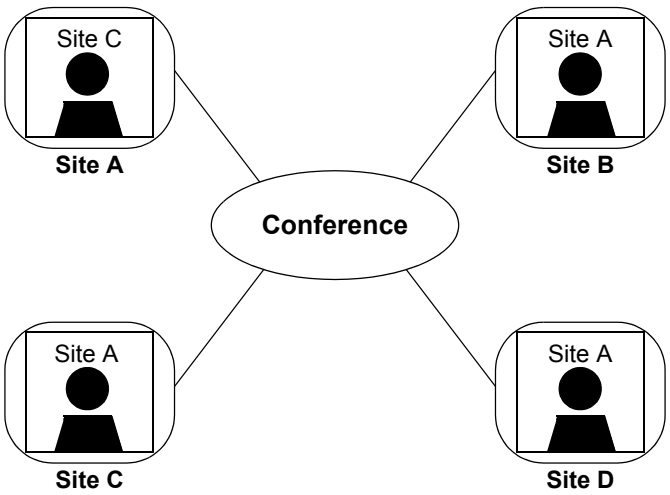


Figure B-18. Speaker=Site C

Broadcast with Autoscan

This is a function that does not require special endpoint support. Broadcast with auto-scan provides for a single endpoint to broadcast audio and video to all other endpoints. The broadcasting endpoint does not receive audio but sees video from each of the endpoints one at a time. The interval each endpoint is displayed is administrable on the MCU. In the following figure, Site A was identified as the broadcast endpoint when the conference was scheduled. The scanning period was also set during conference reservation. Site A views each endpoint in turn for the scanning period one at a time until the conference ends. All other endpoints see and hear Site A the entire time.

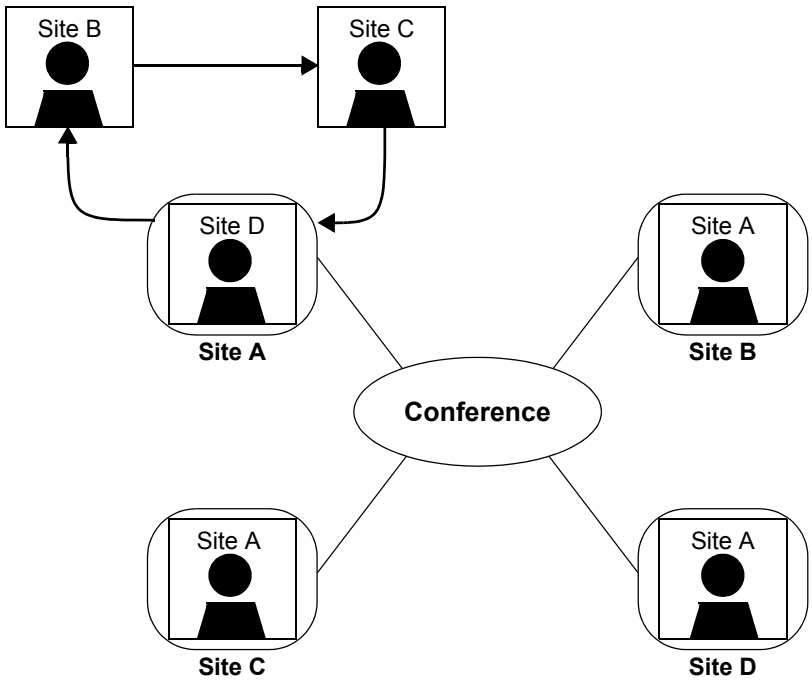


Figure B-19. Broadcast with Autoscan

Considerations

As described in the detailed descriptions of video conference methods.

Interactions

None.

Administration

None.

Hardware and Software Requirements

Consult your Avaya service representative.

Video Modes

Description

The Avaya MCU supports the following standard video modes:

- H.261 and its variations, including H.261-down_only, H.261-w/upgrade, H.261-CIF-Floor, H.261-CIF-Now, and H.261-QCIF-Now
- H.263 and its variations (which involve H.263/H.261 transcoding), including H.263/1-down_only and H.263/1-w/upgrade

The MCU also supports the following proprietary video modes:

- H.CTX/H.CTX+
- SG4
- Multirate Video (MRV) and variation MRV-w/upgrade

Considerations

The MCU also supports H.263/H.261 transcoding.

Some MCU conferences may not accommodate all video modes due to feature interactions.

Interactions

Refer to the following sections concerning video modes for a complete discussion of the feature interactions for the appropriate video mode: "H.263 Video Mode and H.263/H.261 Transcoding" on page B-98; "H.CTX Video Mode" on page B-102; "MultiRate Video (MRV)" on page B-117; and "SG4 Video Mode" on page B-139.

In addition, be sure to refer to the “Interactions” sections in this appendix for the following features, for which there is a discussion of one or more video mode interactions: Continuous Presence *Plus* (page B-68), On-Screen Display (page B-124), Speed Match (page B-143), T.120 Data Conferencing (page B-152), and Universal Conference Control (page B-168).

Administration

Video modes are administered via the *Video Mode* field in the Conference Record form, which is discussed in Chapter 1 of this document. Refer to the “Video Mode” bullet item on page 1-16 within the “Conference Record Form” section for details on administering video modes.

To administer H.263/H.261 transcoding, refer to "Administering H.263/H.261 Transcoding" on page 2-239.

Hardware and Software Requirements

Consult your Avaya representative.

Administration Commands

C

Overview

This appendix provides a summary of the available MCU administration commands and their associated objects. You can display a list of the available actions, objects and qualifiers at any time by pressing the Help key. The list that appears contains only those words that are appropriate based on your login permissions and the words already entered on the command line.

Usage Restrictions

You cannot execute an administration command if any of the following are true:

- You do not have permission to execute the command.
- System configuration does not require a command.
- Command is a member of a set of commands that is being used by another user.

Add

The **add** command allows you to add objects to the system. The object that you add must not already exist in the system. For example, if you enter the **add conference *124*** command, there must not already be a “conference 124” in the system. If the name you selected already exists, an error message appears, and you must rename the object.

The following objects are available for use with the **add** command. You can display this list by pressing the Help key after you enter the **add** action word.

- ***access-endpoint***
- ***administered-connection***
- ***bri-trunk-board***
- ***conference***
- ***data-module***
- ***ds1***
- ***hunt-group***
- ***intra-switch-cdr***
- ***ip-route***
- ***mcu-extension***
- ***modem-pool***
- ***second-digit***
- ***signaling-group***
- ***station***
- ***trunk-group***

Busy

The **busy** command allows you to busyout an object that is currently administered in the system. You can busyout the following objects.

- ***access-endpoint***
- ***board***
- ***cdr-link***
- ***data-module***
- ***link***
- ***modem-pool***
- ***port***
- ***signaling-group***
- ***sp-link***
- ***station***
- ***tdm***
- ***trunk***

Change

The **change** command allows you to change an object that is currently administered in the system. You can change the following objects.

- ***aar***
- ***access-endpoint***
- ***administered-connection***
- ***alphanumeric-dial-table***
- ***ars***
- ***bri-trunk-board***
- ***bulletin-board***
- ***circuit-packs***
- ***communication-interface***
- ***conference***
- ***cor***
- ***cos***
- ***data-module***
- ***daylight-savings-rules***
- ***dialplan***
- ***digit-absorption***
- ***display-messages***
- ***ds1***
- ***extended-pickup-group***
- ***feature-access-codes***
- ***hunt-group***
- ***ip-interfaces***
- ***ip-parameters***
- ***ip-route***
- ***isdn***
- ***ixc-codes***
- ***locations***
- ***login***
- ***mcu-extension***
- ***meas-selection***

- ***modem-pool***
- ***mst***
- ***node-names***
- ***partition-route-table***
- ***password***
- ***permissions***
- ***report-scheduler***
- ***rhnpa***
- ***route-pattern***
- ***second-digit***
- ***signaling-group***
- ***station***
- ***synchronization***
- ***system-parameters***
- ***toll***
- ***trunk-group***
- ***udp***

Clear

The **clear** command allows you to clear measurements for security violations and to turn off message waiting lamps. You can clear the following objects.

- ***audits***
- ***clan-port***
- ***errors***
- ***fw-log***
- ***hardware-group***
- ***events***
- ***interface***
- ***isdnpri-testcall***
- ***link***
- ***measurements***
- ***mst***
- ***pkt***

- ***port***

Disable

The **disable** command allows you to disable an object for maintenance purposes.

The following object words are available for use with the **disable** command.

- ***administered-connection***
- ***all***
- ***fw-log***
- ***MO***
- ***MO-all***
- ***mst***
- ***suspend-alm-orig***
- ***synchronization-switch***
- ***test-number***

Display

The **display** command allows you to view parameters that are associated with a specific object/qualifier. For example, if you enter the **display station *4444*** command, the voice terminal screen form currently administered for extension 4444 is displayed. If you use the ***print*** qualifier (for example, **display station 4444 *print***), the form is printed on the printer associated with the administration terminal.

The following object words are available for use with the **display** command.

- ***aar***
- ***access-endpoint***
- ***administered-connection***
- ***alarms***
- ***alphanumeric-dial-table***
- ***ars***
- ***available-ports***
- ***bri-trunk-board***
- ***bulletin-board***
- ***button-location-aca***

- ***capacity***
- ***circuit-packs***
- ***communication-interface***
- ***conference***
- ***cor***
- ***cos***
- ***data-module***
- ***daylight-savings-rules***
- ***dialplan***
- ***digit-absorption***
- ***disabled-tests***
- ***display-messages***
- ***ds1***
- ***errors***
- ***extended-pickup-group***
- ***feature-access-codes***
- ***hunt-group***
- ***initcauses***
- ***internal-data***
- ***ip-interfaces***
- ***ip-parameters***
- ***ip-route***
- ***isdn***
- ***ixc-codes***
- ***locations***
- ***login***
- ***mcu-extension***
- ***meas-selection***
- ***memory-configuration***
- ***modem-pool***
- ***mst***
- ***node-names***
- ***partition-route-table***

- ***permissions***
- ***port***
- ***rhnpa***
- ***route-pattern***
- ***second-digit***
- ***signaling-group***
- ***software***
- ***station***
- ***synchronization***
- ***system-parameters***
- ***time***
- ***toll***
- ***trunk-group***
- ***udp***

Enable

The **enable** command allows you to enable objects that were disabled using the **disable** command. The following objects are available for use with the **list** command.

- ***administered-connection***
- ***all***
- ***fw-log***
- ***MO***
- ***MO-all***
- ***mst***
- ***save-translation***
- ***suspend-alm-orig***
- ***synchronization-switch***
- ***test-number***

List

The **list** command allows you to display parameters that are associated with groups of objects. Use this command to obtain a list of either all or a range of voice terminals, trunks, and other features that have been administered. You can

use the **list** command and its associated qualifiers to retrieve data for either all the ports in the system or a specified subset of ports. The following objects are available for use with the **list** command.

- ***aar***
- ***aca-parameters***
- ***access-endpoint***
- ***administered-connection***
- ***ars***
- ***asg-history***
- ***conference***
- ***configuration***
- ***cor***
- ***data-module***
- ***disabled-MOs***
- ***extension-type***
- ***history***
- ***hunt-group***
- ***intra-switch-cdr***
- ***ip-route***
- ***isdnpri-testcall***
- ***logins***
- ***marked-ports***
- ***mcu-extension***
- ***measurements***
- ***members***
- ***mmi/mp***
- ***modem-pool***
- ***mst***
- ***partition-route-table***
- ***performance***
- ***report-scheduler***
- ***route-pattern***
- ***signaling-group***
- ***station***

- ***suspend-alm-org***
- ***sys-link***
- ***toll***
- ***trunk-group***
- ***udp***
- ***video-processors***

Netstat

The **netstat** command allows you to display

- ***ip-route***

Ping

The **ping** command allows you to check the network connection.

- ***ip-address***
- ***node-name***

Release

The **release** command allows you to.

- ***access-endpoint***
- ***board***
- ***cdr-link***
- ***data-module***
- ***link***
- ***modem-pool***
- ***port***
- ***signaling-group***
- ***sp-link***
- ***station***
- ***tdm***
- ***trunk***

Remove

The **remove** command allows you to display the form for the associated object and then delete the object from the system. For example, if you type the **remove station *8000*** command, the form for station 8000 appears. If you want to remove this station, press ENTER to delete it from the system. Press CANCEL to leave the station as it is. The following objects are available for use with the **remove** command.

- ***access-endpoint***
- ***administered-connection***
- ***bri-trunk-board***
- ***conference***
- ***data-module***
- ***ds1***
- ***hunt-group***
- ***ip-route***
- ***login***
- ***mcu-extension***
- ***modem-pool***
- ***report-scheduler***
- ***second-digit***
- ***signaling-group***
- ***station***
- ***trunk-group***

Reset

The **reset** command allows you to reset the object.

- ***board***
- ***esm***
- ***interface***
- ***io-processor***
- ***maintenance***
- ***packet-interface***
- ***port***
- ***switch-control***

- ***system***

rp

The **rp** command allows you to:

- ***angel***
- ***byte***
- ***main***

Status

The **status** command displays the operational status of the facility indicated by the object word. The following object words are available for use with the **status** command. You can display this list by pressing the Help key after you enter the **status** action word.

- ***access-endpoint***
- ***administered-connection***
- ***all-conference***
- ***audits***
- ***bri-port***
- ***card-mem***
- ***cdr-link***
- ***clan-ip***
- ***clan-port***
- ***cleared-alarm-notif***
- ***conference***
- ***data-module***
- ***esm***
- ***gatekeeper***
- ***hardware-group***
- ***health***
- ***interface***
- ***isdnpri-testcall***
- ***link***
- ***logins***

- ***mst***
- ***packet-interface***
- ***periodic-scheduled***
- ***processor-channels***
- ***signaling-group***
- ***sp-link***
- ***station***
- ***synchronization***
- ***sys-link***
- ***system***
- ***trunk***
- ***ww-conference***

Trace

The **trace** command allows you to

- ***ip-address***
- ***node-name***

Upgrade

The **upgrade** command allows you to perform an upgrade.

- ***firmware***

Upload

The **trace** command allows you to

- ***fw-log***
- ***translation***

wp

The **wp** command allows you to

- ***angel***
- ***byte***
- ***main***

The Former Enterprise Networks Group
of Lucent Technologies

MultiPoint Conferencing Unit (MCU)
Release 7.1

Installation and Test

555-027-741
Comcode 700014178
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Product Overview

1

Overview

This document is intended for technical center engineers and authorized installers of the Avaya MultiPoint Conferencing Unit (MCU).

MCU Components

The Avaya MCU is a networking device that allows multiple remote video endpoints to participate on a single H.320 video conference call. It is a multimedia product because it combines audio, data, and video.

The Avaya MCU can be connected directly to a network or behind a Private Branch Exchange (PBX), including the DEFINITY® Enterprise Communications Server (ECS). The Avaya MCU connects to many different PBXs, Central Offices (COs), and Interexchange Carriers (IXCs). Several network services are supported.

The Avaya MCU is fully compliant with the H.320 standards for multimedia communications recommended by the International Telecommunications Union (ITU-T, formerly CCITT) and supports compliant H.320 terminals. H.323-compliant Voice over IP (VoIP) terminals are supported in conferences as Audio Add-on (audio participants only).

Video Standards

The MCU supports the following video standards:

- H.221 Frame Structure
- H.224 Low-Delay Application Protocol
- H.230 Control Capabilities
- H.231 Multipoint Conferencing Units
- H.242 Establishing Point-to-Point Communications
- H.243 Establishing Multipoint Communications
- H.261 Video Coding (FCIF, QCIF)
- H.320 Terminal Specifications
- H.263 Video Coding
- H.281 Recommendation for Far-End Camera Control Operations

Data Standards

The MCU supports the following data standards:

- T.122 MCS Service Definition
- T.123 Network Protocol Stacks
- T.124 Generic Conference Control
- T.125 MCS Protocol Specifications
- T.126 Multipoint Still Image (SI) and Annotation Protocol
- T.127 Multipoint Binary File Transfer Protocol

Audio Standards

The MCU supports the H.323 audio as G.711, G.723 (at 5.6 kbps and 6.4 kbps) and G.729. It also supports H.320 audio add-on endpoints as G.711, G.722 and G.728 multimedia terminals.

Optional Algorithms

The MCU supports the following optional algorithms:

- SG4™
- H.CTX™, H.CTX+™ (Service Providers Only)
- INTEL Indeo® MultiRate Video (MRV)

System Configurations and Capacities

The following table provides various MCU system configurations and capacities:

Table 1-1. MCU System Configurations and Port Capacities per System

System Configuration	Maximum
2B	96 ports
H0	96 ports
112/128k (BONDing, Multirate ISDN)	96 ports
168/192k (BONDing, Multirate ISDN)	96 ports
224/256k (BONDing, Multirate ISDN)	96 ports
280/320k (BONDing, Multirate ISDN)	96 ports
336/384k (BONDing, H0, Multirate ISDN)	96 ports
448/512k (BONDing, Multirate ISDN)	72 ports
672/768k (BONDing, Multirate ISDN)	48 ports
1008/1152k (Multirate ISDN)	28 ports
1288/1472k (Multirate ISDN)	24 ports
1344/1536k (Multirate ISDN)	24 ports
1680/1920k (Multirate ISDN)	24 ports
Integrated Audio Conferencing and VoIP	32 ports
Basic Rate Interface (BRI) Direct Connect	36 ports
Data Interface (DI) Direct Connect	32 ports
Distributed Communications Protocol (DCP) Direct Connect	36 ports
Mixed BRI Direct Connect and DCP Direct Connect	36 ports
H.323 media (video with audio) up to 384k	96 ports
H.323 media up to 768k	48 ports
Speed Match Conferences	8
Executive Conferences	8
H.261/H.263 Transcoded Conferences	8
Continuous Presence *Plus* Conferences	8
T.120 MultiPoint Data Conferencing	24 ports
Universal Conference Control (UCC)	24 ports
Active conferences per MCU	24

Table 1-1. MCU System Configurations and Port Capacities per System

System Configuration	Maximum
MCUs Controlled by one CRCS	10
H.320 Ports with Cascading (H.243)	600 ports
H.320 Conferences with Cascading (H.243)	24
Star Cascading	25 cascades

Table 1-2. MCU Configurations and Port Capacities per Conference

System Configuration	Maximum
H.320 Ports per Conference	25 ports
H.323 Ports per Conference	25 ports
Continuous Presence *Plus* Ports per Conference	1
T.120 MultiPoint Data Ports per Conference	24
UCC Ports per Conference	1 port
H.320 or H.323 Audio Add-ons per Conference	25
MCUs Cascaded per Conference (H.243)	25

Network Interfaces

The MCU supports the following network interfaces:

- T1/ISDN PRI
- ISDN-BRI
- E1 (ETSI 300)
- V.35/RS449/EIA-530
- 10/100 base-T Ethernet

Reservation Capabilities

MCU conferences can be reserved via the following:

- Conference Reservation and Control System (Optional)
- Built-in MCU Scheduler
- Web-based Reservation Requests (Optional)

Transcoding Capabilities

The following table indicates transcoding capabilities for the MCU.

Table 1-3. MCU Transcoding Capabilities

Category	Interacting Standards
Audio Transcoding	G.711/G.722/G.723.1/G.729
	G.711/G.728 /G723.1/G.729
Video Transcoding	Frame Rates (7.5 FPS to 30 FPS)
	Resolutions (CIF/QCIF)
	Compression (H.261/H.263)
Network Access	H.320 ISDN Rates (56k to 1920kbps) Modes (BONDing, Multirate, Multichannel)
	H.323 IP Rates (56k to 768k) Modes (10/100BaseT)
MultiPoint Protocols	H.320 and H.323
T.120 Data Conferencing	Allowed in Transcoded Conferences
	H.320/H.323 mix (through a gateway)

Technology Derived from the DEFINITY ECS

The MCU derives its processor, memory, backplane, cabinets, and software platform from the DEFINITY ECS. It also uses the latest Digital Communications Protocol (DCP) circuit packs, tone circuit packs, DS1 circuit packs, and data interface circuit packs.

The MCU circuit packs are housed in a cabinet called a Multimedia Server Module (MSM). For conferences involving T.120 Data Conferencing, additional circuit packs are housed in a cabinet called an Expansion Services Module (ESM).

The MSM can be an Enhanced Single-Carrier MSM (ESCC-MSM), a Single-Carrier MSM (SCC-MSM), or a Multicarrier MSM (MCC-MSM). To support H.320 video and H.323 audio exchange, the MCU has two multimedia conferencing circuit packs: the Multimedia Interface (MMI) circuit pack and the Voice Conditioner (VC) circuit pack.

The MMI is a TN787K circuit pack that receives multimedia input from remote video endpoints via a DS1 circuit pack. It terminates H.320 H.221 protocol and aligns B-channels from an endpoint. The MMI multiplexes and demultiplexes the multimedia stream into separate audio, video, and data for conference purposes. The cable-ready MMI is connected directly to the DS1 circuit pack to increase efficiency and free up valuable resources on the TDM Bus.

The VC is a TN788B circuit pack, and it supplies the audio-conferencing functions for multipoint conferences. It decodes G.728 (LD-CELP) to G.711 (PCM) and encodes G.711 (PCM) to G.728 (LD-CELP) when requested for a conference. It detects voice energy and level to determine who is viewed as the speaker by the conference participants. It gates off background noise and eliminates audio feedback for optimum voice quality.

The Data Interface (DI) is a TN2236B circuit pack, and it provides MCU system connections involving various data interfaces, including EIA-530, RS449, and V.35. Endpoints connecting to the MCU for single-channel calls require one DI. Endpoints connecting to the MCU for 2B calls require two DIs. Endpoints using the 672k or higher bandwidths require that the DI be connected to a dedicated MMI with a DI-MMI-Y cable.

To support T.120 Data Conferencing, the MCU system requires an ESM, which is connected to the MSM. The ESM is based on the MAP/40 architecture. If an ESM is included into the MCU system, additional circuit packs (including the ESM-DS1/-UDS1 and the ESM-MMI) must be added to the MSM.

Table 1-4. MCU Internal Hardware

Circuit Pack	Number	Function
Analog Line	TN746 TN716	Supports remote modem pooling access to the MCU
Call Classifier	TN744	Provides out-of-band, touch-tone conference control (Universal Conference Control [UCC]).
Call Classifier	TN744	Enhanced Call Classifier circuit pack. Provides the capabilities of the TN744B, TN748D, and TN420C circuit packs jointly.
Control LAN (C-LAN)	TN799B	Control LAN NIC intface for RAS, Q.931, H.245, etc.
Data Interface	TN2236B	Supports EIA-530, RS449, and V.35 data interfaces to the MCU
Digital Line	TN754 TN2224 TN2214	Supports maintenance alarm terminals (alarms and Automatic Circuit Assurance) and provides data connectivity for the MCU Scheduling Terminal (MCU-ST) and for the optional system printer and Call Detail Recording (CDR)
DS1 (MSM and ESM versions)	TN767 TN2207	Terminates incoming DS1 trunks to the MCU
Media Processor	TN2303	IP trunk and media processor for H.323 audio streams (VoIP). Supports G.723.1 and G.729 audio transcoding, DiffServ, etc.
ISDN-BRI	TN2185	Provides a four-wire ISDN-BRI connection between the MCU and the network. This circuit pack is required for the ISDN-BRI Trunk Interface feature.
ISDN-BRI	TN2198	Provides a two-wire connection between the MCU and the network that allows longer tie-trunk connections using ISDN-BRI.
ISDN-BRI Maintenance	TN556	Provides support for ISDN-BRI endpoints
Maintenance/Test	TN771	Provides a standalone mode for inspecting the Packet Bus for faults

Table 1-4. MCU Internal Hardware (Continued)

Circuit Pack	Number	Function
Multimedia Interface (H.221 and ESM versions)	TN787K	Terminates the H.221 H.320 protocol (H.221-MMI). Also, manipulates the T.120 data stream (ESM-MMI), and enables conferences with H.263 video mode
NetPacket	TN794 *or* TN794/ TN2400	Control complex; replaces TN777 Netcon
Processor	TN790B	Provides high-level control handling
Tone Detector	TN748 TN420	Collects incoming digit information from trunks and supports testing of MCU resources
Tone/Clock	TN768 TN780 TN2182	Provides conference tones and supports testing of MCU resources
Video Processor	TN2237C	Supports Continuous Presence *Plus,* Video Speed Match, and H.261/H.263 Transcoding
Voice Conditioner	TN788B	Provides audio-conferencing support including summing, gain control, and voice detection

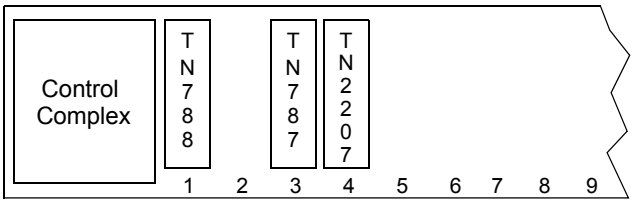


Figure 1-1. Basic Avaya MCU Configuration (4 Ports)

NOTE:
For other Avaya MCU configurations, refer to the MCU Administration document.

Avaya Video Product Family

To provide a complete video solution to our customers, the MCU supports the Avaya Group Video System (when upgraded to support H.320 with the LINK 64E option installed).

MCU Components

The current version of the Avaya MCU is offered in administrable 4-port increments up to 96 ports. This increment is applicable to each port type (multimedia, BONDing, data, Audio Add-on, or UCC) as long as the maximum allowable number of ports is not exceeded.

A 96-port MCU model has the capacity to support, for example, five simultaneous 12-party, 2-channel 112k or 128k conferences. Larger conferences can be achieved by connecting two Avaya MCUs (known as “cascading”). By using the cascading feature with two 24-port models, for example, Avaya can support various combinations of port types (for example, 46 multimedia participants [known as “conferees”] plus two Audio Add-on participants, 44 multimedia participants plus four Audio Add-on participants, etc.).

For a three-cabinet system (required for 64-port configurations), the first Single-Carrier cabinet (SCC) is installed in position A, and the second and third SCCs are installed in positions B and C, respectively.

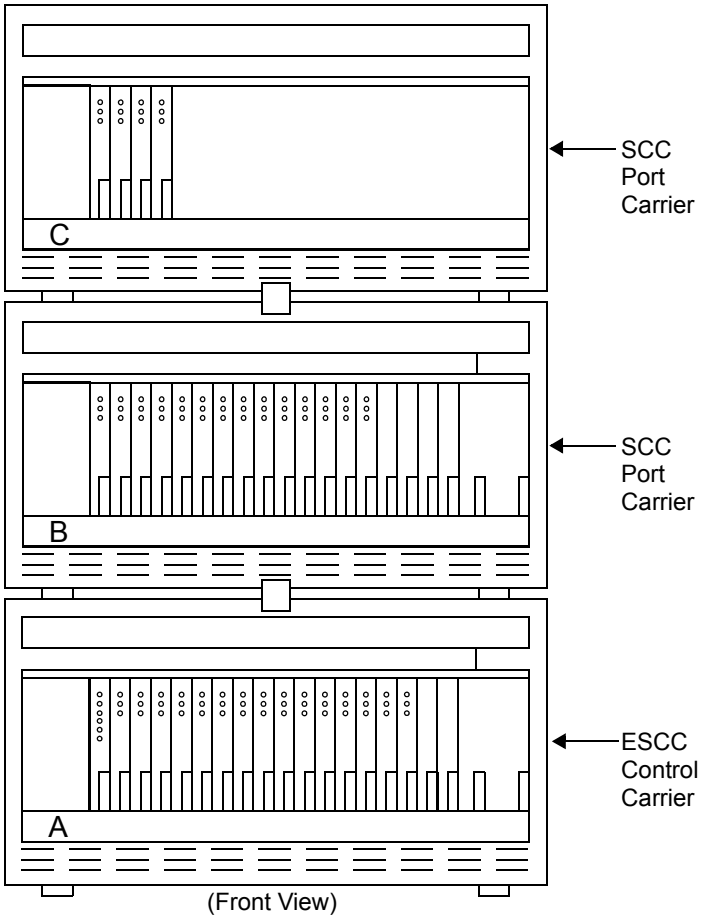


Figure 1-2. Avaya MCU 64-Port Configuration

External Components

The Avaya MCU product offer includes the following equipment:

- **MCU Management Terminal (MCU-MT) [optional]:** A 715GBCS-2 terminal is used by the telecommunications manager to perform system administration, maintenance and troubleshooting. Ideally, it should be installed in close proximity to the MCU. It can also be used as an MCU-ST.
- **MCU Scheduling Terminal (MCU-ST) [optional]**: A 715GBCS-2 terminal connected to the MCU via a data module (7400B) is used for scheduling conferences, registering endpoints, and basic troubleshooting. This terminal is optional for non-CRCS systems that need a second terminal in addition to the provided MCU-MT.

  NOTE:
  An optional PC-based reservation system, the Avaya Conference Reservation and Control System (CRCS), automates the conference reservation process. It is a plug replacement for the MCU-ST.

- **Remote Access Port for Maintenance:** This port provides the connection to INADS and the technical center for alarms, remote administration and maintenance. The connection to INADS is only for alarms designated as major or minor. The customer supplies an analog line for remote access.
- **Call Detail Recording Interface:** This port connects to an optional system printer to provide records on MCU port usage and length of call per endpoint for billing purposes.
- **System Printer:** An optional system printer can be connected through a data module (7400B) to print alarms and system reports. Printers can also be connected directly to the MCU-MT and the MCU-ST to print conference information and screens.

Supported Network Configurations

The MCU connects to a serving network (Avaya, other IXC, LEC, or private PBX) via DS1 Robbed Bit Signaling (RBS), DS1 or UDS1 ISDN-PRI signaling, ISDN-BRI trunking, or rChannel Associated Signaling (CAS). The MCU supports connectivity over T1 or (only when it is behind the PBX) E1 facilities. E1 facilities are used to support international MCU capabilities and require use of the UDS1 TN2207 circuit pack. Only digital trunks are supported, including RBS, ISDN-PRI or CAS. Two ISDN-PRI features, Non-Facility Associated Signaling (NFAS) and D-channel backup, are supported in North America but not internationally.

The MCU can also be configured to connect directly to endpoints involving a combination of the following: a maximum of 36 endpoints via Digital Communications Protocol (DCP) direct connect or a mix of DCP and ISDN-BRI. In addition, the MCU can be configured to allow endpoints in private networks to access the MCU via dedicated T1 or E1 *non-signaled* connections.

The MCU can also connect to an H.320, H.CTX, or SG4 codec via an EIA-530, RS449, or V.35 data interface either directly or by using RS366 Dialing. These data interfaces allow endpoints either connected directly to the MCU or behind an encryption device or proprietary inverse multiplexor to participate in multipoint conferences at a rate in the range 112k to 1920k. RS366 Dialing can also use any of these data interfaces to enable H.323 endpoints connected behind H.323 gateways to participate in MCU conferences.

The MCU can inter-operate with the Avaya PacketStar AC60 to provide integrated access to private and public asynchronous transfer mode (ATM) networks. It also interoperates with the L2W323 Gateway from RADVision to provide H.323 and H.323/H.320 multimedia conferencing.

The MCU can be set up to function as a tandeming switch for video (but not audio or data) traffic with either another MCU or a DEFINITY ECS. For this setup, ISDN-PRI is required.

Calls to and from the Avaya MCU can be 1x56k, 1x64k, 2x56k or 112k (where the MCU combines two DS0s), 2x64 or 128k (where the MCU combines two DS0s), or 384k (H0); a multirate ISDN bandwidth, including 128k, 192k, 256k, 320k, 384k, 512k, 672k, 768k, 1008k, 1152k, 1288k, 1344k, 1472k, 1536k, 1680k, or 1920k; or a Bandwidth on Demand (BONDed) rate, including 112/128k, 168/192k, 224/256k, 280/320k, 336/384k, 448/512k, or 672/768k.

56k multirate ISDN rate increments are available only for data interface (DI) and access endpoints. An access endpoint is a dedicated endpoint for which there is no signaling.

Signaling is ISDN-PRI, ISDN-BRI, RBS, or CAS; framing is D4 or ESF; and linecoding is B8ZS or ZCS. All calls are data calls.

Connections Behind a PBX

The MCU connects to a PBX via DS1, UDS1, or DI trunks. The PBX functions as a tandem in front of the MCU so that calls terminate on the MCU and not the PBX. The PBX networking software determines the digits passed to the MCU.

DS1 (UDS1) trunks connecting the PBX to the network may be shared between PBX endpoints and the MCU. All Avaya PBXs with a DS1 (UDS1) ISDN-PRI/CAS interface support MCU connectivity for 56k/64k bandwidth. Also, all Avaya PBXs with a DS1 RBS interface supports MCU connectivity for 56k bandwidth.

Where the cost of ISDN-PRI is prohibitive, trunk side ISDN-BRI may offer a less expensive alternative. With this release of the MCU, a maximum of 3 TN2198, TN2185 and TN556 boards are supported to offer up to 36 ISDN-BRI trunk ports. Calls are supported at the following rates: 1B, 2B, BONDed 112/128 kbps, BONDed 168/192 kbps, BONDed 224/256 kbps, BONDed, 336/384 kbps, BONDed 448/512 kbps, and BONDed 672/768 kbps.

NOTE:
The MCU does not perform the BONDing, but does support BONDing performed by the endpoints (ports being aggregated by the endpoint to achieve the higher rates).

The TN566 can also serve as a network-side T interface for tie trunk applications. Although it cannot replace the trunk side ISDN-BRI functionality of the TN2198 as the TN566 does not support connections to the public network.

For 384k bandwidth, the Avaya MCU can be behind a DEFINITY ECS Release 6.3 (or higher) to support trunk side ISDN-BRI which is connected to switched digital 384 services or networked privately to other DEFINITY ECS Release 6.3 (or higher). For a 336k or 384k BONDing connection, the caller must set up six calls using the same SDDN number.

Ethernet 10/100 Base-T

The Audio Add-on feature now supports Voice over IP (VoIP) via the Media Processor and C-LAN circuit packs for H.323-compliant voice applications.

Connections Involving BONDing Compliant Inverse Multiplexer (IMUX)

The MCU may be served by an ANSI BONDing compliant IMUX that is directly connected to the switched network. Based on the right-to-use (RTU) purchased, callers can establish 112k BONDing through 768k BONDing calls via this connection.

Direct Network Connections

When the network interface is ISDN-BRI using the TN2185 board, endpoints can be directly connected to the MCU via the TN556 board. BONDing is performed by the endpoint, but the MCU does support ports being aggregated by the endpoint to achieve the higher rates.

The MCU can be connected to IXCs and LECs via ISDN-PRI or DS1 robbed bit. Each video endpoint participating in an MCU conference *must* subscribe to one of the same network services as the MCU. Unlike voice services provided by IXCs, a subscriber to a given service cannot call endpoints connected to a service

provided by another IXC. Even within the same IXC, such as the AT&T Network Services, subscribers of one digital service cannot connect to subscribers of a different service, unless it is provisioned to do so.

However, the MCU can be connected to multiple network services. Therefore, if the MCU is connected to both AT&T and Sprint, for example, then any endpoint that is connected to either network can join an MCU video conference (provided all other criteria are met). Since the video endpoints view the connection to the MCU as a point-to-point call, the MCU accepts a call from an endpoint using the AT&T network and another endpoint using the Sprint network then places them in the same conference.

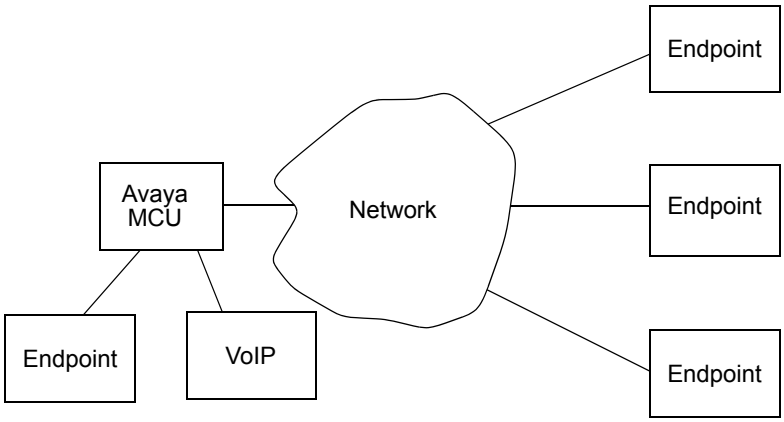


Figure 1-3. Direct Network Connection

Call Routing and Establishment

The MCU allows video conference calls to originate from the MCU and also be received by the MCU. Both incoming and outgoing calls gain access to the network via DS1 (UDS1) trunks. For incoming calls (Meet-Me calls) from the network, the MCU processes the call digits and routes the call based on the designated digits. The MCU selects an MCU port from its available resources and terminates the call on the selected port. The number of available ports is determined by the hardware installed and administration settings.

For outgoing multimedia calls (dial-out) where the Avaya MCU calls the conferees or another Avaya MCU, the MCU pulses the digits over the network. The call is directed through the network and terminates on the conferee's video terminal. Once the network confirms that the call has been answered, the Avaya MCU provides the necessary multimedia ports from the MCU port resource pool. (Actually, the ports needed for the call have been previously allocated when the conference was reserved.) The call is terminated to an extension associated with the dialed-out number.

Call establishment is the procedure used for making an outgoing call to a conferee's endpoint or cascading to another Avaya MCU. Call establishment is triggered by one of the following events:

- Conference status change: When a reserved or dedicated conference becomes active.
- Administration change: When a reservation agent adds a dial-out conferee or changes an existing dial-out conferee's destination number.
- Retry: When a second attempt is made to connect the dialed-out number.

After any of the above events occurs, a dial-out call is placed. Once the call is answered, the Avaya MCU connects the call to the allocated MCU ports.

The MCU offers 440 extensions to provide flexibility for assigning network numbers.

These extensions are administered to many types of data channels, to the maintenance phone, and to MCU-extensions.

Network numbers are assigned to the MCU as Meet-Me numbers. The MCU maps each Meet-Me number to one of the 440 extensions assigned to the MCU. Meet-Me numbers are mapped to MCU extensions via digit deletion/insertion or Automatic Alternate Routing (AAR) tables. When a Meet-Me number is received by the MCU, it is mapped to an extension, which selects an available port for the call. If the video call is over two B-channels (112k or 128k), the MCU actually receives two incoming network calls for the same Meet-Me number. Both calls are routed to the same port.

Similarly, a BONDed 336k call occupies six B-channels, and the MCU receives six incoming network calls for the same Meet-Me number. On the other hand, a 384k

(H0) call also occupies six B-channels, but the MCU receives just one incoming network call for this type of call. The MCU also receives just one incoming network call for a 768k call, which occupies 12 B-channels.

Conferees are unaware of the corresponding MCU extensions; they join a multipoint conference by dialing in on the assigned Meet-Me number or receive a call from the MCU.

Digits are sent to the MCU per network provisioning or per tandem PBX provisioning. The MCU also has AAR digit manipulation functionality. Digit manipulation can be done in the network, within the serving PBX, on the MCU trunk group, or in the MCU call routing tables.

Pre-Installation Procedures

2

Overview

This chapter discusses the procedures to follow before installing the MCU and its components.

NOTE:
The main MCU cabinet is referred to as the Multimedia Server Module (MSM). The supplementary MAP/40P processor cabinet that serves as the T.120 module is referred to as the Expansion Services Module (ESM).

Basic Steps and Required Tools

The following table lists the basic installation steps and the tools and test equipment required to perform MSM installation.

Table 2-1. Tools and Test Equipment Needed for MSM Installation

Installation Step	Tool or Equipment	Recommended Type
Unpack the MSM	Tin Snips Utility Knife Adjustable Wrench	 6 or 8 inch
Position the MSM	Chalk Line Ruler Bubble Level	 30 inch
Install the MSM (includes procedures for earthquake protection mounting)	Electric Drill Masonry Bit Drill Bit (for computer floors) Drift Punch Adjustable Wrench Ratchet Sockets Nut Driver Screwdriver Allen Wrench	Impact Type 1/2 inch 5/8 inch Length to reach concrete floor 6 to 8 inch 1/2 inch 5/16, 1/2 and 3/4 inch 1/4 inch 8 inch, flat blade AC: 1/8 inch DC: 3/16 inch (supplied)
Check commercial power Connect ground and power	Digital Multimeter	KS-20599
Install administration devices		
Power up the MSM		
Interconnect the MSM elements		
Install auxiliary equipment		
Wire the system		
Contact your Technical Center		

To assemble and disassemble the ESM hardware, the following tools are required:

- Medium screwdriver with flat blade
- No. 2 Phillips Screwdriver
- Small pair of needle-nose pliers
- Small pair of wire cutters

- A sharp pointed instrument, such as a pen

  CAUTION:
  Do not use a lead pencil point. The graphite can damage the circuit card, causing problems such as electrical shorts

- Antistatic grounded wrist strap
- Antistatic grounded work mat
- Standard electronic test equipment, such as a digital multi-meter, is recommended

Environmental Checklist

Review the following sections to cover all environmental requirements.

ESM Arrangement

The ESM is currently available in a desk-side arrangement.

The desk-side unit is a tower configuration. The unit sits in a vertical position on a small support base. You must attach the support base to the unit. See the following figure. Also, see Chapter 3 for details on how to attach the base. Position the unit with approximately a 6-inch clearance on all sides of the equipment to provide for adequate air intake and exhaust. The Universal Power Supply (UPS) should sit on the floor alongside the tower unit.

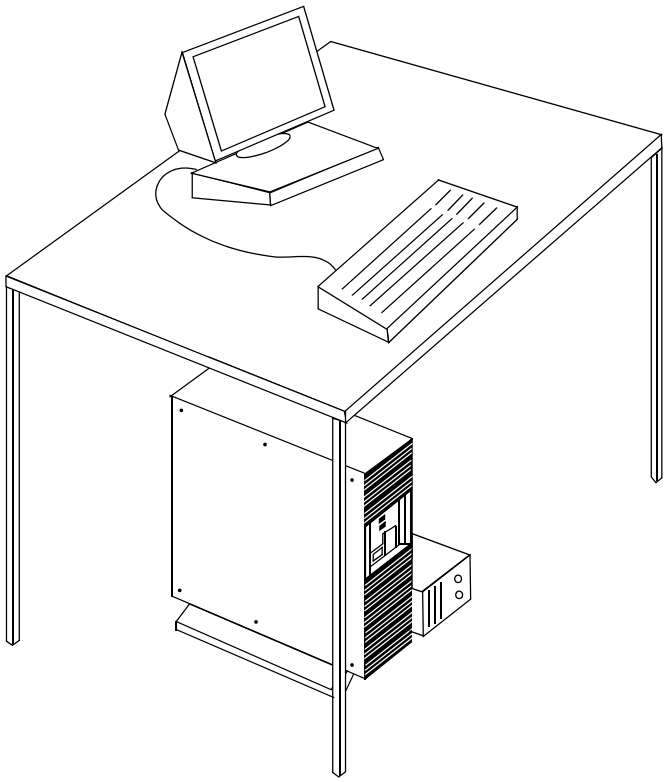


Figure 2-1. Desk-Side ESM with UPS

Floor Plans

The MSM includes two different cabinet profiles.

One profile includes one or more cabinets that hold a single carrier. This physical design allows for modular growth, one cabinet at a time. The first cabinet in this profile is the Expansion Services Carrier Cabinet (ESCC). This cabinet provides the MCU's complex and some port capacity. A maximum of three additional Single-Carrier Cabinets (SCC) cabinets can be added to the ESCC to provide more conferencing port capacity.

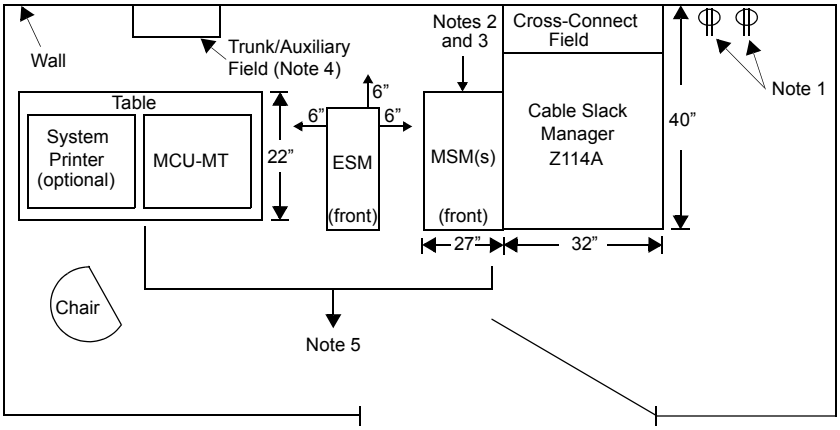
The second profile includes a Multi-Carrier Cabinet (MCC). This cabinet is used in a large-end system, and it includes five carrier shelves. This cabinet is intended for system that require growth for a large port capacity.

The MSM and MCU-MT should always be positioned within 50 feet of one another. Although floor plans depend on the size of the equipment room, be sure to keep the MSM clear of all objects (such as shelves, windows, and pictures) and allow for future space requirements needed for capacity upgrades. For example,

the 24-port MCU requires two SCCs. If a customer is anticipating adding ports in the future, allow vertical space for the second SCC required to expand from 20 to 24 ports.

Typical Layouts

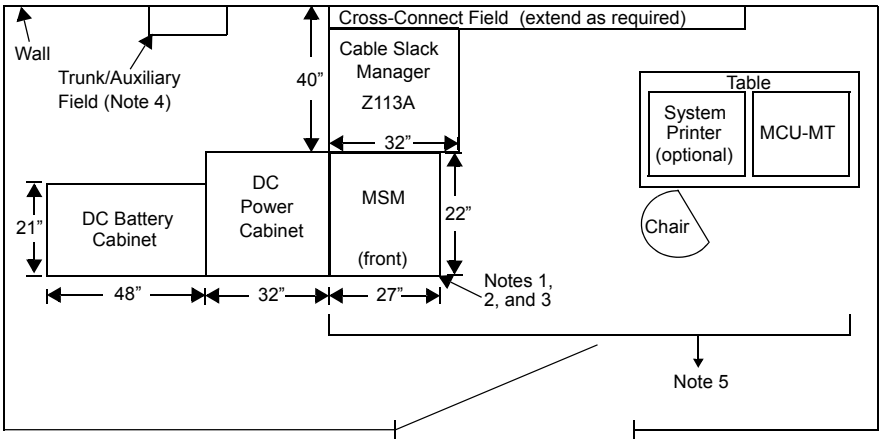
The figures in this section provide typical floor plans for various MCU systems.



NOTES:

1. AC receptacles must be separately fused and not under control of a wall switch. Receptacles must not be shared with other equipment, and should be located outside the cross-connect field area.
2. System must be grounded by one of the approved methods.
3. Earthquake protection may be required.
4. The trunk/auxiliary field may be located within the cross-connect field.
5. MCU-MT, MSM, and ESM must be within 50 feet of one another.

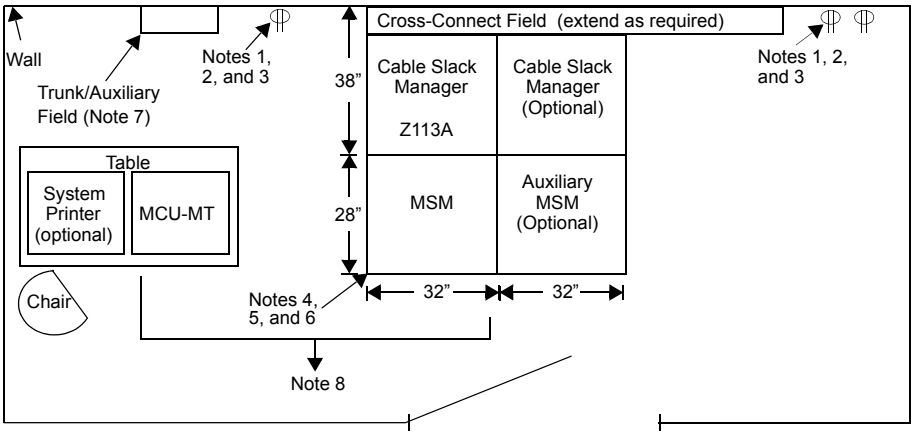
Figure 2-2. Typical Floor Plan for AC-Powered MCU with Single-Carrier MSM and an ESM Configuration



NOTES:

1. Allow at least 36 inches of space in front of MSM to let door swing open.
2. System must be grounded by one of the approved methods.
3. Earthquake protection may be required.
4. The trunk/auxiliary field may be located within the cross-connect field.
5. MCU-MT and MSM must be within 50 feet of one another.

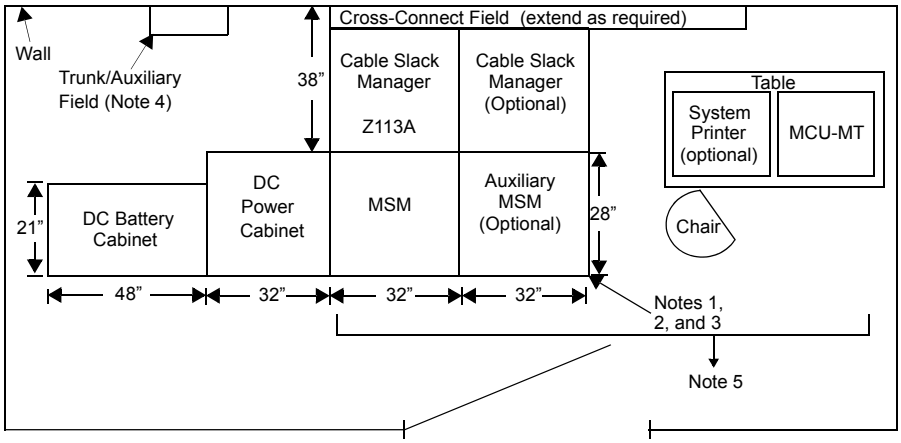
Figure 2-3. Typical Floor Plan for DC-Powered MCU with Single-Carrier MSM



NOTES:

1. AC receptacles must be separately fused and not under control of a wall switch. Receptacles must not be shared with other equipment, and should be located outside the cross-connect field area.
2. An MSM cabinet requires a special 120 volt, 60 Hz, 50 amp AC receptacle (NEMA 5-50R receptacle or equivalent) or 250 volt, 60 Hz, 30 amp AC receptacles (NEMA L14-30R receptacle or equivalent).
3. Auxiliary MSMs require a special 120 volt, 60 Hz, 20 amp AC receptacle (NEMA 5-20R receptacle or equivalent).
4. Allow at least 36 inches of space in front of MSM to let door swing open.
5. System must be grounded by one of the approved methods.
6. Earthquake protection may be required.
7. The trunk/auxiliary field may be located within the cross-connect field.
8. MCU-MT and MSM must be within 50 feet of one another.

Figure 2-4. Typical Floor Plan for AC-Powered MCU with Multicarrier MSM



NOTES:

1. Allow at least 36 inches of space in front of MSM to let door swing open.
2. System must be grounded by one of the approved methods.
3. Earthquake protection may be required.
4. The trunk/auxiliary field may be located within the cross-connect field.
5. MCU-MT and MSM must be within 50 feet of one another.

Figure 2-5. Typical Floor Plan for DC-Powered MCU with Multicarrier MSM

The following requirements pertain to any MCU floor plan:

- The floor must have a commercial floor loading code of at least 50 pounds per square foot.
- AC receptacles must be separately fused and not under control of a wall switch, shared with other equipment or located inside the cross-connect field.
- The MCU must be grounded by one of the approved methods.
- Earthquake protection may be required by law (see the following figure). Areas designated with a 0 have a low susceptibility; higher numbers mean a greater susceptibility. Four is the highest number for the United States; three is the highest number for Canada.
- The trunk and auxiliary fields may be located within the cross-connect field.

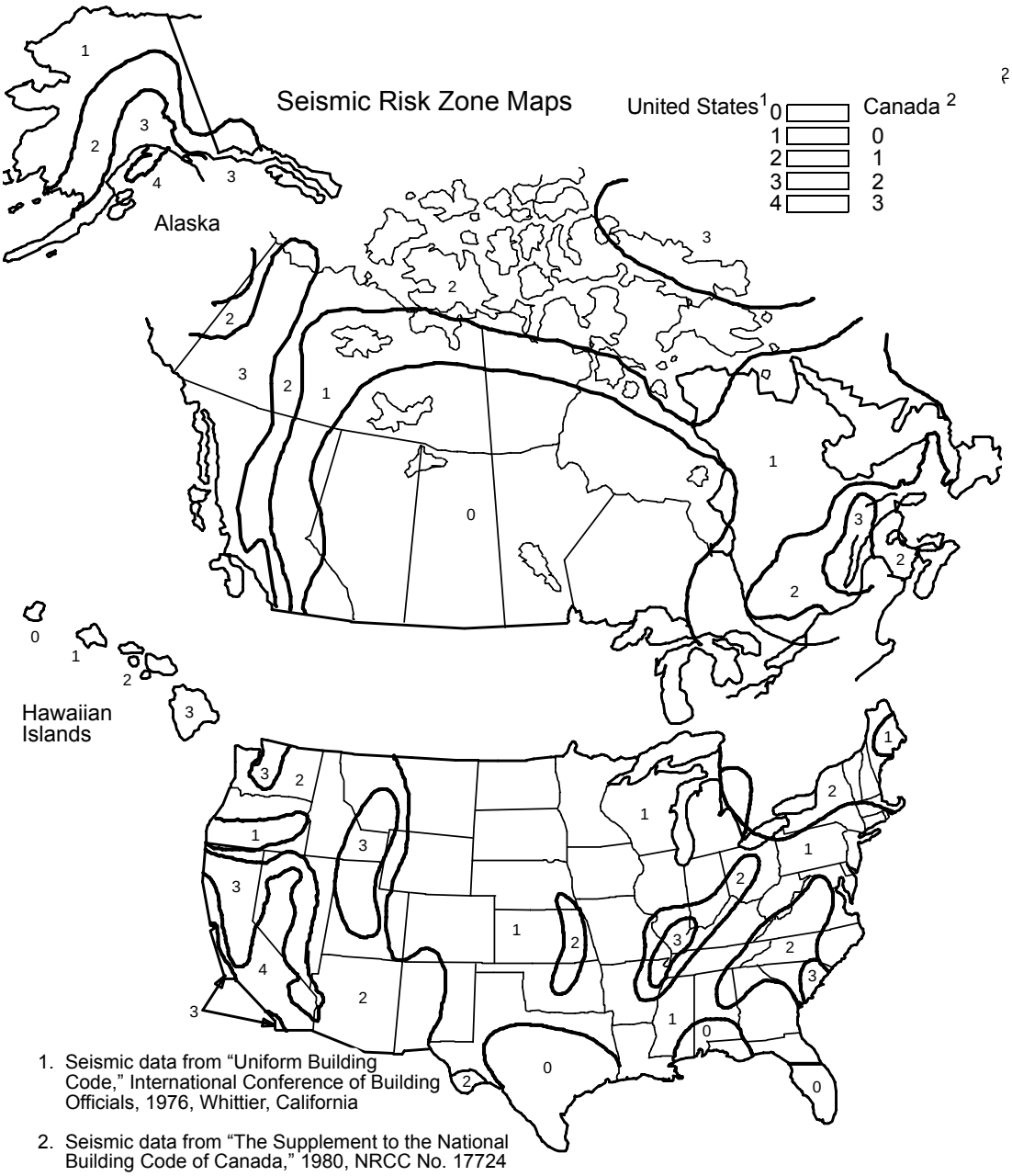


Figure 2-6. North American Continent Earthquake Environment

Floor Area and Space

Floor area requirements in the equipment room vary depending on the type of MSM. Refer to the appropriate section.

Requirements for ESCCs and SCCs

The ESCC and SCC are 27 inches (69 cm) wide and 22 inches (56 cm) deep. A single ESCC/SCC is about 20 inches (51 cm) high, a two-cabinet system is 39 inches (99 cm) high, and a three-cabinet system is 58 inches (1.5 m) high. The cable slack manager requires 38 inches between the ESCC/SCC and wall. The system cabinets and the cable slack manager occupy about eight square feet (.74 square m) of floor space. Allow at least 36 inches in front of the ESCC/SCC for door removal.

Requirements for MCC

The MCC is 32 inches (81 cm) wide and 28 inches (71 cm) deep. The cabinet is 70 inches (1.8 m) high. The cable slack manager requires 38 inches between the MCC and wall. Each MCC (including the door opening) and cable slack manager occupy about 22 square feet (2 square m) of floor area. Allow at least 36 inches in front of the MCC for door removal.

Requirements for ESM

The ESM is 17.7 inches high, 7.0 inches wide (13 inches wide with the base), and 21 inches deep. The ESM weighs approximately 45 pounds. Position the unit with approximately a 6-inch clearance on all sides of the equipment to provide for adequate air intake and exhaust. Install the ESM in an area that provides protection from excessive sunlight, heat, cold, chemicals, static electricity, magnetic fields, vibration, dust, and grime.

The following table lists the approximate weight and size of the primary ESM hardware components. Note that the weight listed for the ESM includes the basic chassis, hard disk, floppy disk, streaming tape drive, and five circuit cards: central processing unit, video controller, hard disk controller, MSM interface card, and Remote Maintenance Board.

Table 2-2. ESM Space Requirements

EQUIPMENT	WEIGHT (LBS.)	HEIGHT (inches)	WIDTH (inches)	DEPTH (inches)
ESM	45	17.7	7.0 (12.6 With Base)	21
Monitor	15	13.5	13	14.5
Keyboard	5	2.5	19	8
400VA, 115v UPS	20	7.0	4.5	15.25
250VA, 230v UPS	11	6	3.4	10.1

Requirements for Terminals

The 715GBCS-2 terminals used as the MCU Management Terminal (MCU-MT) and MCU Scheduling Terminal (MCU-ST) require approximately 3.2 square feet of desk space.

Temperature and Humidity

MSM

The MSM should be installed in a well ventilated area. Temperatures should range between 40 and 120 degrees Fahrenheit (4 to 49 degrees Celsius). Relative humidity should range as follows:

- From 40 degrees Fahrenheit up to 84 degrees Fahrenheit (29 degrees Celsius), between 10 to 95 percent
- From 85 degrees Fahrenheit up to 120 degrees Fahrenheit (49 degrees Celsius), between 10 to 34 percent

Environments beyond these limits may reduce system life and impede operation.

NOTE:
For altitudes above 5,000 feet, reduce the maximum short-term temperature by 1 degree Fahrenheit for each 1,000 feet of elevation above 5,000 feet.

For example, at 10,000 feet, the maximum short-term temperature is 115 degrees Fahrenheit (46 degrees Celsius).

The MSM can operate at the maximum short-term operational limits for a period not to exceed 72 consecutive hours or for more than 15 days in a year.

ESM

Place the ESM in an area where the following environmental requirements are maintained.

Table 2-3. ESM Temperature and Humidity Considerations

OPERATING STATE	TEMPERATURE	HUMIDITY
Operating	+10 ° to +38 ° C	**********
Non-Operating	-40 °to +60 ° C	5% to 92% non-condensing
Continuous Operating	**********	20% to 55% non-condensing
Short Term Operating (72 consecutive hours)	**********	20% to 80% non-condensing

CAUTION:
The ESM has a narrower operating temperature range than the basic MSM cabinet and thus may need to be located in a different room than the MSM.

Air Purity

Do not install the MSM in an area where the air contains excessive dust, lint, carbon particles, paper fiber or metallic contaminates, or corrosive gases (such as sulfur or chlorine).

Lighting

For the MSM, lighting should be sufficient for administration and maintenance personnel to perform tasks. The recommended light intensity level is 50 to 70 footcandles to comply with the standards set by the Occupational Safety and Health Act (OSHA).

For the ESM, lighting should be sufficient for maintenance personnel to perform tasks on the ESM hardware or from the ESM-MT. The recommended light intensity level is 50 to 70 footcandles to comply with the standards set by the Occupational Safety and Health Act (OSHA).

Noise

In most cases, electrical noise is introduced into the MCU through trunk and station cables, or both. However, electromagnetic fields near the MCU may also cause noise in the system. Therefore, the MCU and cable runs should not be placed in areas where a high electromagnetic field strength exists.

Radio transmitters (AM or FM), television stations, induction heaters, motors (with commutators) of 0.25 horsepower (187 watts) or greater, and similar equipment can cause interference. Motors without commutators and field strengths below 1.0 volt are unlikely to cause interference. These fields can be measured with a tunable meter, such as the Electro-Metrics Division Model R-70. To measure fields strengths greater than 1.0 volt, use a broadband meter, such as the HOLADAY HI3001 meter or the Instruments for Industry, Inc., Model EFS-1.

To estimate the field strength caused by radio transmitters, divide the square root of the emitted power of kilowatts by the distance from the antenna in kilometers. This yields the approximate field strength in volts per meter and is relatively accurate for distances greater than half a wavelength (150 meters for a frequency of 1000 kHz).

Additional Considerations

Noise and heat generated by the MSM should also be considered when selecting its location. The ESCC-MSM or SCC-MSM produces 48 dBA of acoustic noise at a distance of five feet. When the door is open, there is an additional 1 dBA of noise.

The noise produced by an MCC-MSM system with a 5-carrier cabinet at a distance of five feet (1.5m) is 51, 53, and 56 dBA at a low, medium, and high fan speed, respectively.

The following table shows the average and maximum power consumption and also the heat dissipation for the MSM. For each power consumption figure, the maximum system conference capacity is assumed. The MCU MSM has an average power consumption of 710 watts and a maximum power consumption of 730 watts. The average heat dissipation for an MCU MSM is 2420 BTUs per hour.

Electrical Requirements Checklist

Review the figures and checklist below to cover all electrical requirements for the MCU. This section includes considerations for power, grounding, lightning protection, sneak current protection, standby power, and wiring requirements.

MSM

Power Requirements

Each ESCC/SCC requires a separate power outlet. These outlets must not be shared with other equipment, must not be under switch control, and should be located outside the cross-connect field. Any available power source can be used as long as the phase or leg provides 120 volt AC at the required drain.

AC-Powered ESCC/SCC

This cabinet uses the 1217A power supply. This is a power factor-corrected, 50/60-Hz, autoranging (90-264 VAC) input, multi-output power supply providing regulated DC output and switch-selectable 20/25-Hz AC Ringer output voltages. The 1217A mounts in the power supply slot of the carrier. A power cord with a 3-prong plug on one end connects the supply to a dedicated AC power source.

NOTE:
This cabinet is available domestically (in the US and Canada) and internationally.

AC-Powered MCC

This cabinet uses a 631DB power supply. This power supply accepts 120 VAC 60 Hz and produces -48 VDC at 8 A and -5 VDC at 6 A, distributed on the carrier backplanes. The -48 VDC also supplies power to the cabinet fans. If the AC input power fails, the unit converts 144 VDC from the optional batteries in the AC power distribution unit to at -48 VDC at 8 A and -5 VDC at 6 A. A circuit in the optional battery charger detects the highest equivalent AC or DC input voltage and switches to the correct input voltage.

NOTE:
This cabinet is available only domestically (in the US and Canada); it is not available internationally.

DC-Powered ESCC/SCC

NOTE:
DC-power distribution is not required whenever the MCU is within 30 ft. of the power unit.

This cabinet uses a 676C power supply. A -48 VDC source supplies power to the DC power supply at up to 25 A. The 676C provides multiple +5 VDC, -5 VDC, -48 VDC, and +12 VDC output. The AC ringing voltage output value and frequency depend on the country of use. The power supply has circuit breakers and Electromagnetic Interference (EMI) filtering. The +12 volts DC used to program the FLASH ROM is generated by a +5v DC to +12v DC converter on the NetPacket circuit pack (TN794).

NOTE:
This cabinet is available only domestically (in the US and Canada); it is not available internationally.

DC-Powered MCC

A DC-powered MCC uses a 649A power supply. The 649A converts a -48 VDC input into outputs of -48 VDC at 10 A, +5 VDC, and -5 VDC at 6 A, which it distributes to circuit pack slots in the carriers. Only one 649A converter is required per carrier except for SN carriers. SN carriers require 2 converters, one on each end. The 649A allows an increase in the number of terminals supported per carrier.

NOTE:
This cabinet is available only domestically (in the US and Canada); it is not available internationally.

A DC-powered MSM has the following input power requirements:

Table 2-4. Input Power Requirements for a DC-Powered MSM (SCC and MCC)

Parameter	Requirements
Static Voltage	-48V DC nominal, -42.5V DC minimum, -52.5V DC maximum (measured at input to MCU).
Dynamic Voltage	Transient change in voltage (+/- 5% of steady state voltage); allowed transient duration up to 200 ms.
AC Ripple Voltage	Maximum wideband AC ripple 450 mvpp in the 3 kHz to 20 mHz band.
Low Voltage Disconnect	Automatic disconnect occurs when input voltage becomes less than -42.5V DC (control provided with battery plant).
Overvoltage Protection	Input voltage must not exceed -52.5V DC.
Voltage Drop	Maximum drop must not exceed 0.5V DC one way on feeder cable between the power board and the MCU. Feeders must be UL-approved and CSA-certified. Feeder gauge must be no smaller than 6 AWG and no larger than 1/0 gauge. Recommended -48V DC feeder cable (Royal Electrol #4905 or equivalent). 1-AWG is required for distances up to 50 feet. Cable resistance must be equal to or less than 0.1290 ohms per 1,000 feet.
Current Draw	The battery plant rectifiers must be capable of providing current for the MCU, including current required for system holdover and charging the batteries. In addition, this may include DC current required for an inverter providing AC power to peripheral equipment (if installed), and for future growth. The -48V DC supplied by the battery plant to the system cabinet will be maintained between -42.5 and -52.5V DC at all times, ensuring proper operation and prevention of damage to hardware.
Circuit Breaker	A UL-listed and CSA-certified circuit breaker must be provided at the battery plant power board for each system cabinet feeder. Recommended circuit breakers are 75 ampere Rpds UPL1-1-REC2-52-753 or Heinemann AM1-B2-A-75-2.

Table 2-4. Input Power Requirements for a DC-Powered MSM (SCC and MCC) (Continued)

Parameter	Requirements
Redundancy	Redundancy of the battery chargers and rectifiers should be considered. It would also provide the additional current necessary to recharge the batteries after being fully discharged.
Electrical Noise	Voice band noise from the battery plant to the system must be less than 32 dBmC.
Grounding	A single point ground must be maintained. A ground conductor must be installed from the isolated ground discharge bar to the closest approved ground via the shortest route required by the NEC/REC. The gauge must be no smaller than the largest conductor in the system and larger than 6 AWG. The ground discharge bar must not be electrically connected to the chassis of the battery plant chargers, power board, or inverter. All output power must be isolated from input power.
Lightning Protection	There must be adequate lightning protection in the battery plant to ensure that the MCU will not be damaged.

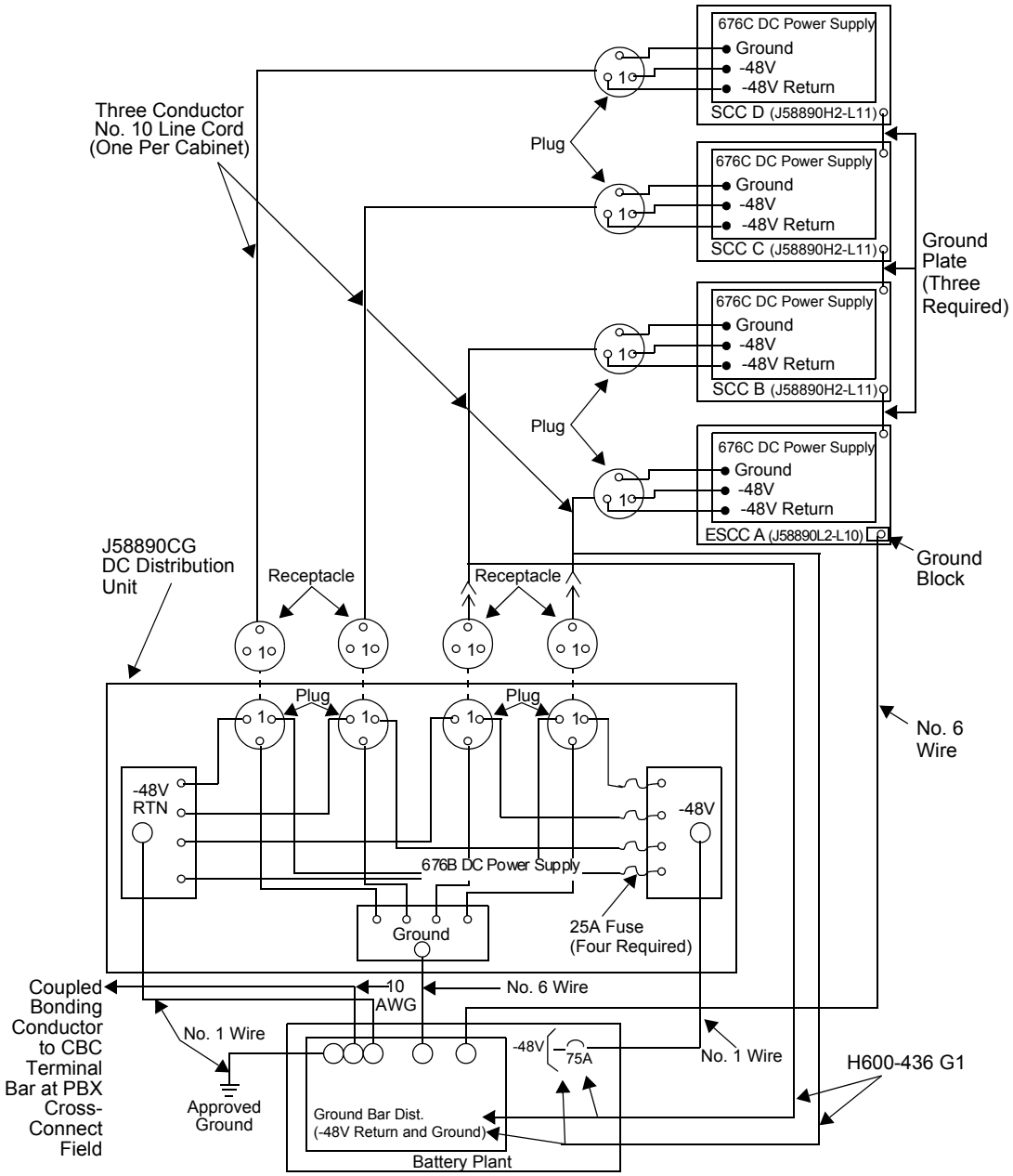


Figure 2-7. Typical ESCC/SCC DC Power and Grounding Layout (MSM)

NOTE:
DC power distribution is not required if the MCU is within 30 ft. of the power unit.

Heat Dissipation

The following table provides the typical heat dissipation of SCC-MSMs.

Table 2-5. Typical Heat Dissipation of SCC-MSMs

BTUs Per Hour	Gram-Calories Per Hour	Watts
1700 (one SCC-MSM including terminals)	438	499
5700 (SCC-MSM stack including terminals)	1436	1672

The following table provides the typical heat dissipation of fully loaded (five carriers) MCC-MSMs.

Table 2-6. Typical Heat Dissipation of MCC-MSMs

BTUs Per Hour	Gram-Calories Per Hour	Watts
6687.52 (excluding terminals)	1638.24	1960
11600.8 (including terminals)	2919.92	3400

Grounding

An approved ground for the MSM in the equipment room is essential. Here are a number of suggestions for an approved ground:

- **Grounding Building Steel:** The metal frame of the building effectively grounded by one of the following items: acceptable metallic water pipe, concrete-encased ground, or a ground ring.
- **Acceptable Water Pipe:** A metal underground water pipe (at least 1/2 inch in diameter) in direct contact with earth for at least 10 feet. The pipe must be electrically continuous or made electrically continuous by bonding insulated joints, plastic pipe, or plastic meters, to the point where the protector ground wire is connected. A metallic underground water pipe must be supplemented by the metal frame of the building, a concrete-encased ground or a ground ring. If these grounds are not available, the water pipe ground can be supplemented as follows:

  NOTE:
  All approved grounds must be bonded to form a single grounding electrode system as required in Section 250-81 of the National Electrical Code.

- Metal underground gas piping system is an electrically continuous system that is uninterrupted with insulating sections or joints and without an outer nonconductive coating.
- Other local metal underground systems or structures including local underground structures such as tanks and piping systems.
- Rod and pipe electrodes of a 5/8 inch (solid rod) or 3/4 inch (conduit or pipe) electrode, driven to a minimum depth of eight feet.
- Plate electrodes exposed to a minimum of two square feet of metallic surface to the exterior soil.

- **Concrete-Encased Ground:** An electrode encased by at least two inches of concrete and located within and near the bottom of a concrete foundation or footing in direct contact with the earth. The electrode must be at least 20 feet of one or more steel reinforcing bars or rods, not less than 1/2 inch in diameter, or at least 20 feet of bare, solid copper wire not smaller than 4 AWG.
- **Ground Ring:** A buried ground that encircles a building or structure at a depth of at least 2 1/2 feet below the earth's surface. The ring must consist of at least 20 feet of bare copper conductor no smaller than 2 AWG.

Approved floor grounds are grounds on the floors of high-rise buildings suitable for connection to the ground terminal in the riser closet and to the MCU single-point ground terminal. These grounds can be any one of the following:

- Building steel
- Grounding conductor for the secondary side of the power transformer feeding the floor
- Metallic water pipes
- Power feed metallic conduit supplying panel boards on the floor
- A grounding point specifically provided in the building for the purpose

Lightning Protection

A coupled bonding conductor is tie-wrapped to all trunks. The coupled bonding conductor can be any one of the following:

- 10-AWG ground wire
- Continuous cable sheath
- Six unused pairs of wire

The coupled bonding conductor connects the MSM single-point ground block and runs all the way to the approved ground located nearest the telephone company-owned protector block at the building entrance.

Sneak Current Protection

Sneak fuses protect the building wiring and circuit packs from “foreign potential” by providing a current interruption capability. Sneak fuse panels, when provided, are installed on the MCU side of the network interface. All incoming and outgoing trunks and off-premises station lines pass through the sneak fuses. Sneak current protection is required for installation in Canada. The sneak fuses must be CSA certified.

Standby Power

The following provides battery reserve, uninterrupted power supply, and battery backup information.

- Battery Reserve:
  - **ESCCs/SCCs**: During commercial power failure, the ESCC/SCC power supplies provide a 250-ms power holdover to allow the MCU to remain in service. If power is restored within 250 ms, there is no interruption of service. A battery reserve is automatically activated if commercial AC power fails.

    The battery, located inside the MSM on the top of the carrier, allows the power supply to provide a two-minute battery reserve holdover to the control circuit packs and fans during power failure beyond 250 ms. All port circuit packs are out of service during this time.

    When commercial power is restored within two minutes, the MCU reinitializes the memory stored in the processor circuit pack. All port circuit packs remain out of service during the approximately 25 seconds required to restore the system. When commercial power is restored after two minutes, the MCU also reinitializes. This time, however, the reinitialization takes longer (approximately 10 minutes), and the port circuit packs remain out of service for the duration.

    If additional holdover power is necessary, an alternate, independent source of on-premises power is required to maintain the MCU for a limited time. An external, commercial UPS or battery backup arrangement can be used as an alternate source of power during a commercial power failure.
  - **MCCs**. MCCs have an internal battery system that supplies holdover power to the whole cabinet for a specific amount of time. Generally, the internal battery system supplies power to the cabinet for 10 seconds. Power is also supplied to the port carriers.

    An AC power interruption to the MCU that lasts fewer than 10 seconds is not noticed by the customer. After 10 seconds, the system powers down the port carriers in the MCU, but the entire control carrier continues to be powered for 10 minutes. The circuit packs in the port carriers are “removed” by the software and, as a result, all connections are dropped.

Connections and call processing are preserved on the control carrier for the entire holdover period. After 10 minutes, the control carriers are powered down and the connections are dropped. The 10 minute interval does not exhaust a fully charged battery. The system is designed to sustain multiple AC service interruptions before the battery has time to recharge fully. After power is restored, the batteries are recharged by a circuit that monitors current and time. If the battery takes longer than 30 hours to recharge, a minor alarm is sent to INADS. This alarm indicates that the battery should be replaced or that the charging circuit should be repaired.

The 397 Battery Charger Circuit immediately detects the loss of AC power. Once AC power loss is detected, an AC power alarm is generated. Included with the AC power fail alarm are several other alarms associated with the loss of power. Several maintenance objects cause a major alarm to be reported (processor interface links, external DS1 timing) but, in general, no specific power-related major or minor alarm results. If the switch is accessed during the 10 minute interval, an AC power warning alarm appears in the active alarm as “resolved.”

If AC power is restored during the 10 second interval, no service interruption results. If AC power is restored between 10 seconds and 10 minutes, service to the port carriers is restored after the software “reinserts” the circuit packs. This can take up to one minute. Links that have their connectivity through the control carriers remain up unless they rely on hardware that is powered externally (for example, channel service units for DS1 facilities). If the CSU is not connected to a power reserve system, the DS1 facility is dropped.

If AC power is restored after 10 minutes (or, if the battery does not have sufficient capacity, in less than 10 minutes), the MCU must reload all software and translation data. The MCU must also “reinsert” all circuit packs. These processes can take several minutes, depending on the size of the system. All links are re-established according to their initialization requirements.

As an option, the internal battery may be omitted on MCC-MSMs that are ordered with UPS. If the battery is omitted, and if the AC from the UPS fails, the system does not report an alarm.

Critical services or services that take a long time to restore (for example, digital announcement circuit packs) should be placed in control carriers, where they can be held up the longest. If AC power interruptions of longer than 10 minutes are frequent, and if the customer's service requirements warrant, consideration should be given to equipping the system with either an external UPS system or an external DC power system.

- Uninterruptible Power Supply (optional): If long-term holdover is required, an external UPS can be provided as an alternate source of power during a commercial power failure. Any UPS that meets the requirements given in the following table can be used with the MCU.

  An ESCC/SCC carrier has the following UPS power requirements:

  — volt-ampere rating: 1200

  — frequency Hertz: 60 +/- 5%

  — power factor: 0.6

  — maximum cut-in time: 200 ms

  Larger UPS' are available for MCCs, and their power rating varies according to the number of populated carriers and the system configuration.

- Battery Back-Up: A battery supply and an inverter can be used to provide standby power for up to eight hours after a commercial power failure. When standby power is provided, the following items must be taken into consideration:

  - Size and weight of batteries
  - Size and weight of inverter
  - Heat dissipation
  - Air flow and circulation
  - Equipment receiving power

  The standby power system contains the following:

  - Inverter
  - Batteries
  - Battery stand

  The MSM requires a 120-volt AC input provided by the inverter. The size of the inverter is determined by the MCU configuration and the additional equipment to be provided with power in the event of a commercial power failure.

  The size of the battery supply required depends on the length of time power is to be provided and the particular power demands of the system.

House Wiring

House wiring includes all on-premises wiring on the customer side of the cross-connect field, which can be either 66-type or 110-type hardware. Wiring is distributed from the cross-connect field by 25-pair cables. The 25-pair cables are connected either directly to terminal wall jacks using adapters or to satellite locations.

Satellite locations are used when already present or when required by the length of the wiring runs. The 25-pair cables can be divided into either 3-pair or 4-pair wiring groups (4-pair groups are recommended). From the satellite locations, 4-pair, D-inside cables connect the satellite locations to information outlets (modular wall jacks).

ESM

Power Requirements

The AC-powered ESM CPU requires an AC power circuit capable of providing up to 8A at 115v or 4A at 230v. However, the typical power consumption of the ESM CPU is approximately 60 watts. The maximum power consumption of an ESM is 80 watts. The monitor requires 2A at 115v or 1A at 230v. It is best if the monitor is not plugged into the auxiliary outlet on the ESM CPU due to the limited current capacity of the outlet. Also, to extend the holdover time when an Uninterruptible Power Supply (UPS) is used, the best results are obtained if the monitor is not plugged into the UPS.

Because the ESM components can change, be sure to check the specifications (figures) printed near the power connectors on the ESM CPU and then monitor these specifications for changes.

Uninterrupted Power Supply (UPS)

Since the ESM software runs with a UNIX operating system, it is strongly recommended that the ESM always have some level of battery backup. A 400VA UPS is available for AC inputs in the 120V range and a 250VA UPS for AC inputs in the 230V range.

The following are the typical holdover times for a fully charged UPS with both the ESM processor and the ESM monitor being powered through the UPS.

NOTE:
For the best results, the monitor should not be powered via the UPS.

Table 2-7. UPS Holdover Time

UPS Style	Approximate Holdover Time
400VA, 115v	12 minutes
250 VA, 230v	7.5 minutes

WARNING:
Interruption of the ESM input power without first performing a proper UNIX shutdown sequence can cause file corruption which could render the ESM inoperational and require one to re-install all ESM system software again.

The normal specifications for the 400 VA / 115 volt and 250 VA / 230 volt Avaya UPS' are provided in the following table.

Table 2-8. Avaya 400 VA, 115v and 250 VA, 230v UPS Specifications

	115V Model	230V Model
Input Voltage Range	90—100 to 132 Vac (may be adjusted with option switches)	180—200 to 265 Vac (may be adjusted with option switches)
Input Power Factor	0.6 minimum	
Frequency Range	50/60 Hz + or - 3 Hz (may be adjusted with dip switches)	
Surge Protection	UL 1449 approved IEEE 587	IEC 801-5
Output Wave Form on Battery	Step-sine wave; RMS values equivalent to utility	
Output Voltage on Battery	115 Vac + or - 5%	230 Vac + or - 5%
Audible Noise	40 dBA @ 1 meter	
Input Cord	Detachable 2.5-meter Schuko 10A cord	
Outlets	Model 250: 5-15R (2) Model 400: 5-15R (3)	Model 250: IEC 320 (2) Model 400: IEC 320 (3)
Batteries	12 Vdc, 7 Ah maintenance-free rechargeable lead acid; user-replaceable	
Battery Run Time (Full Load)	Model 250: 10 minutes; Model 400: 5 minutes	
Operating Environment	Temperature: 10° C to 40° C (50° F to 104° F) Humidity: 5% to 95% (noncondensing)	
Agency Approvals	Safety: UL 1778 CAN/CSA-C22.2 No. 107.1-M91 EMC: FCC Part 15 Class B	Safety: EN 50091-1, EN 60950 CE: TUV Certified EMC: En 55022 Class B

Installing the MCU and Components

3

Overview

This chapter discusses installing the MCU and its components, including the various cabinet types.

Installing the Single-Carrier MSM

The Single-Carrier MSM (SCC-MSM) is shipped in a polyethylene bag and packed in a cardboard container. It is fastened to a wood and styrofoam pallet with two carriage bolts. The cardboard container is strapped to the pallet with a metal band.

⚠ DANGER:
The SCC-MSM weighs approximately 130 pounds when fully loaded and requires two handlers.

Unpacking and Inspecting

1. Check the status of the SHOCKWATCH and/or TILTWATCH indicators on the cardboard container. The SHOCKWATCH and TILTWATCH indicators are normally white. If the container has been jarred or tilted beyond specifications, the indicators will be red, indicating potential damage. Report any damage per local instructions.
2. Remove the SCC-MSM from the cardboard container.
3. Remove all cardboard, tape, and plastic.
4. Open and remove the front door and rear screw-on panels from the SCC-MSM.

5. Remove all packing material from inside cabinet.
6. Inspect the SCC-MSM for damage caused during shipping. Report any damage per local instructions.
7. Check all circuit packs to be sure they are fully seated in the proper slots. Report any discrepancies between circuit pack type or quantity and the purchased configuration.

Carrier Installation Sequence

For a SCC-MSM or ESCC-MSM configuration, install the ESCC-MSM in position “A.” If the SCC-MSM carriers are required, install them in positions “B,” “C,” and “D.”

Positioning the MSM

1. Place the ESCC in position at the designated location.
2. Be sure the AC power receptacle is within 10 feet of the ESCC/SCC. If earthquake protection is required, skip to "Adding Earthquake Protection" on page 3-2.
3. If earthquake protection is not required, install hole plugs (provided with the cabinet) in the holes previously occupied by the two carriage bolts at the bottom rear of the ESCC/SCC. Skip to "Connecting Battery Leads" on page 3-9.

Adding Earthquake Protection

The following sections discuss how to add earthquake protection based on the floor type. The following figure shows the earthquake environment for North America.

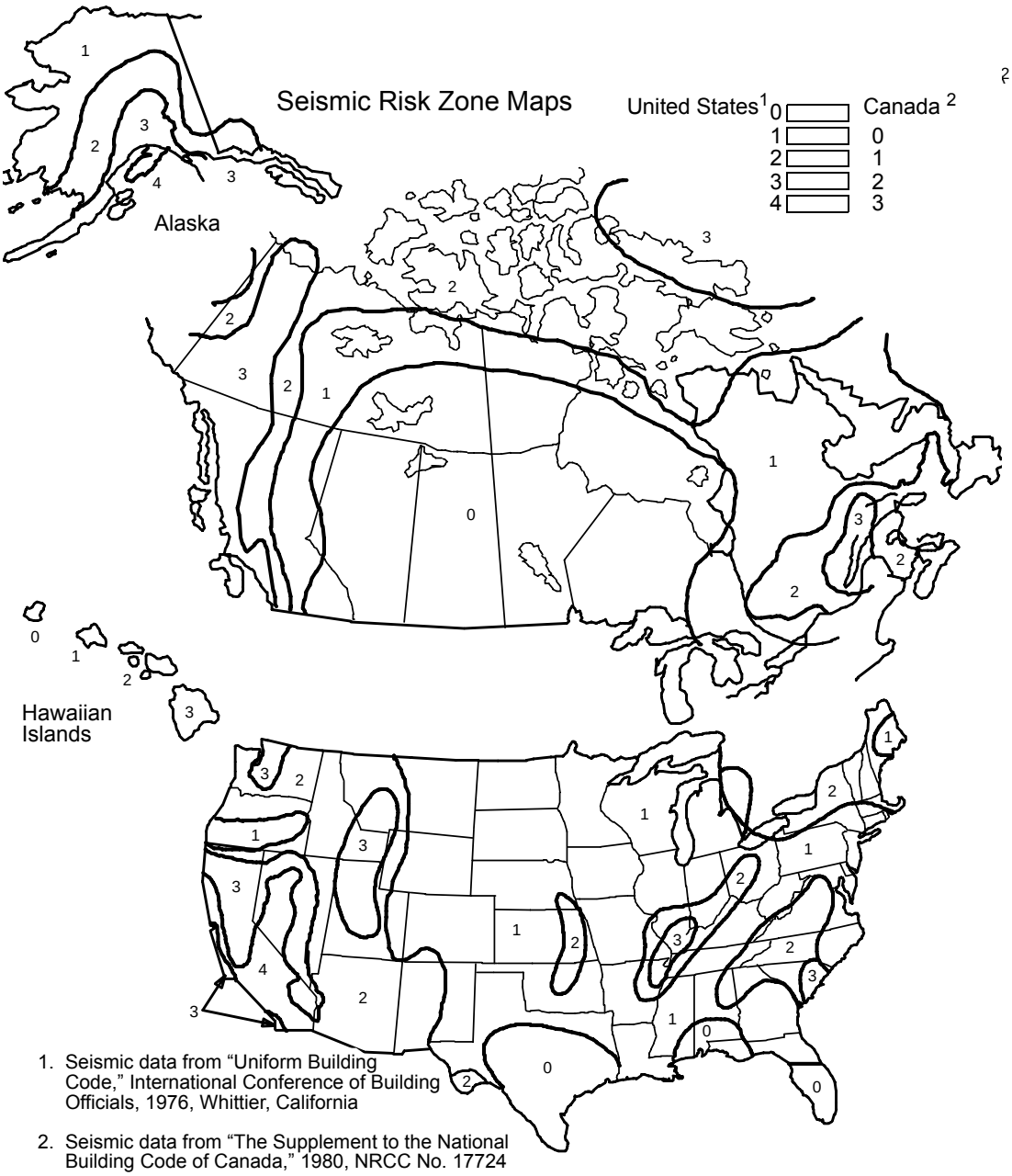


Figure 3-1. North American Continent Earthquake Environment

NOTE:
Instructions for adding the earthquake front plate and earthquake ground plate are given at the appropriate point in the installation sequence.

Procedure for a Concrete Floor

To provide earthquake protection for a concrete floor, do the following:

1. Place the front mounting angle at the location selected for the front of the SCC in cabinet position “A.”
2. Using the angle as the template, mark the location of the mounting bolts.
3. Drill two holes 1/2 inch in diameter and 1-1/2 inches deep at the spot marked in step 2.
4. Insert the concrete anchors.
5. Mount the front mounting angle to the floor using the 3/8-16 x 1.25 bolt with a nylon insulating washer.
6. Move the ESCC back into place.
7. Attach the ESCC to the angle with two No. 12-24 x 1/2 inch thread-forming screws.
8. Insert a pencil or marker through the holes previously occupied by the carriage bolts in the bottom rear of the ESCC and mark the floor directly beneath each hole.
9. Remove the screws installed in step 5 and move the ESCC out of the way.
10. Drill two holes 1/2 inch in diameter and 1-1/2 inches deep at the spot marked in step 8.

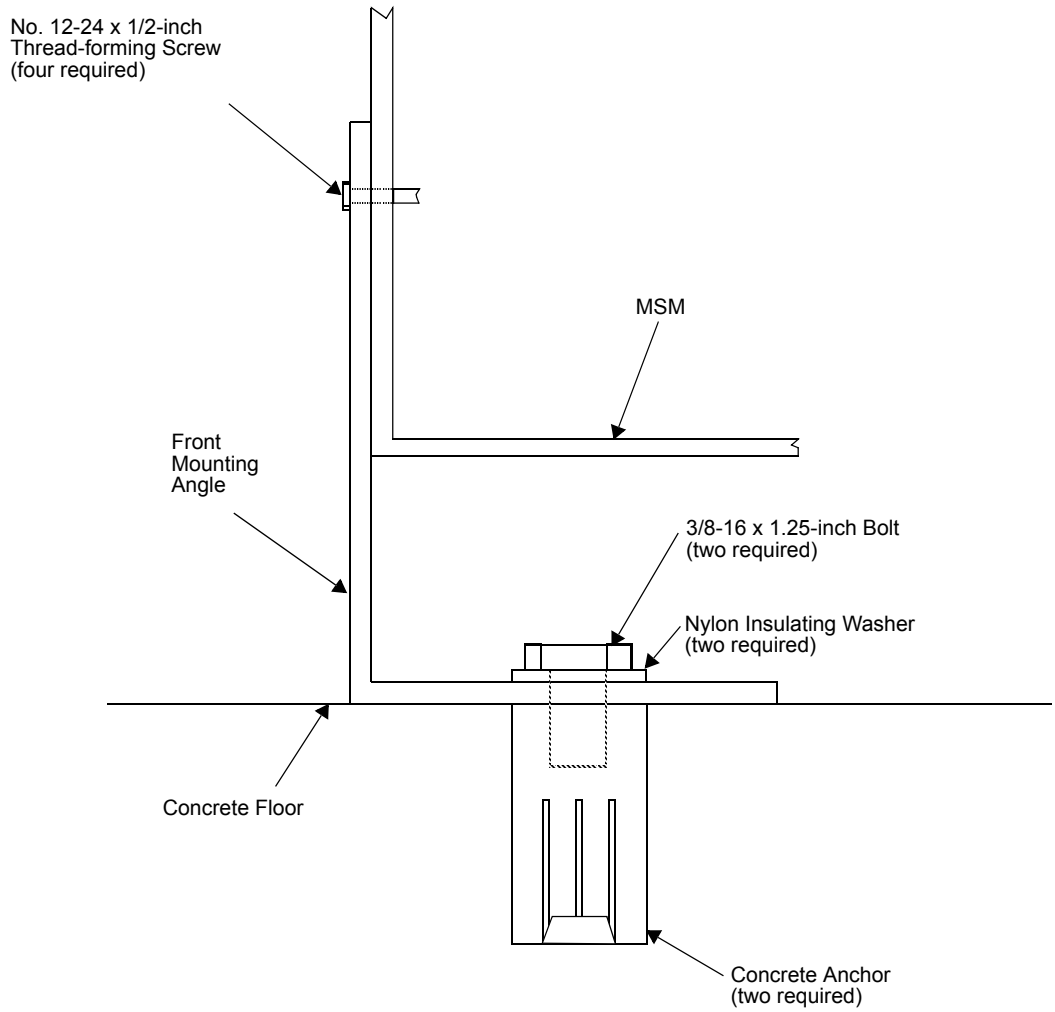
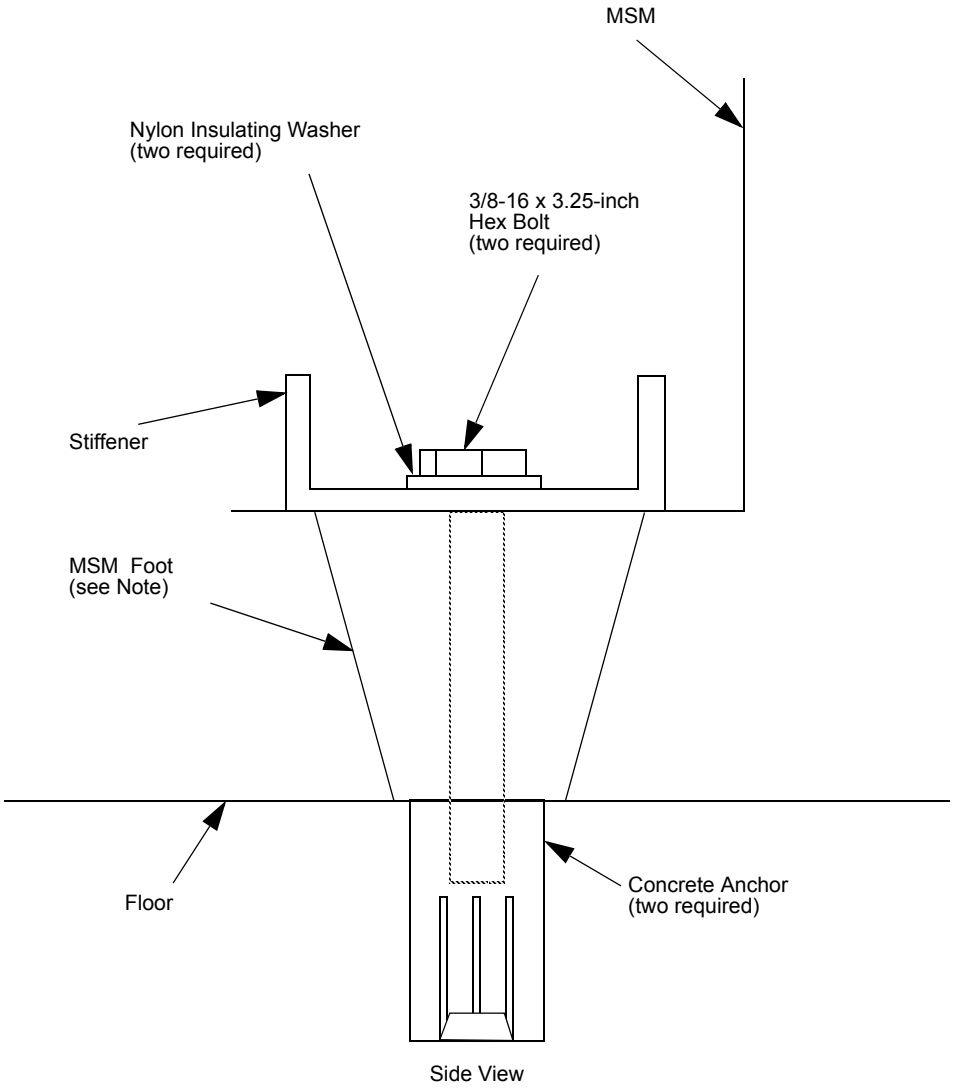


Figure 3-2. Front Mounting Angle— Concrete Floor

11. Move the SCC back into place.
12. Attach the SCC to the front mounting angle using four No. 12-24 x 1/2 inch thread-forming screws.
13. In the rear of the SCC, lay the stiffener on the bottom of the SCC, aligning the stiffener with the holes in the bottom of the SCC.
14. Fasten the SCC to the floor using the 3/8-16 x 3.25 hex bolt and nylon insulating washer.



NOTE: Bolt runs behind cabinet foot, not through it.

Figure 3-3. MSM Earthquake Mounting—Concrete Floor

Procedure for a Raised Computer Floor

If earthquake protection is required on a raised computer floor over a concrete subfloor, do the following:

1. Mark the locations where the four holes should be drilled to bolt the ESCC to the floor.
2. See CAUTION. Drill four holes 5/8-inch in diameter through the floor panels marked in step 1.

   CAUTION:
   Take care while drilling the holes through the raised floor that the drill bit does not penetrate any cables beneath the raised floor that would cause damage to the cable or injury to the installer.

3. Insert a long punch through the holes drilled in step 2 and mark the concrete floor beneath the raised floor.
4. Remove the raised floor panel(s) in which the holes were drilled in step 2.
5. Using the supplied anchor bits, drill a hole at each of the locations marked in step 3. Stop drilling when the mark on the side of the bit reaches the floor level.
6. Insert a plug into the hole.
7. Drill the anchor into the hole until the mark on the bit reaches floor level again. Snap the top of the anchor bit off. Repeat for the other holes.
8. Replace the floor panel(s) removed in step 4.
9. Fasten the MSM to the floor (see the next figure).

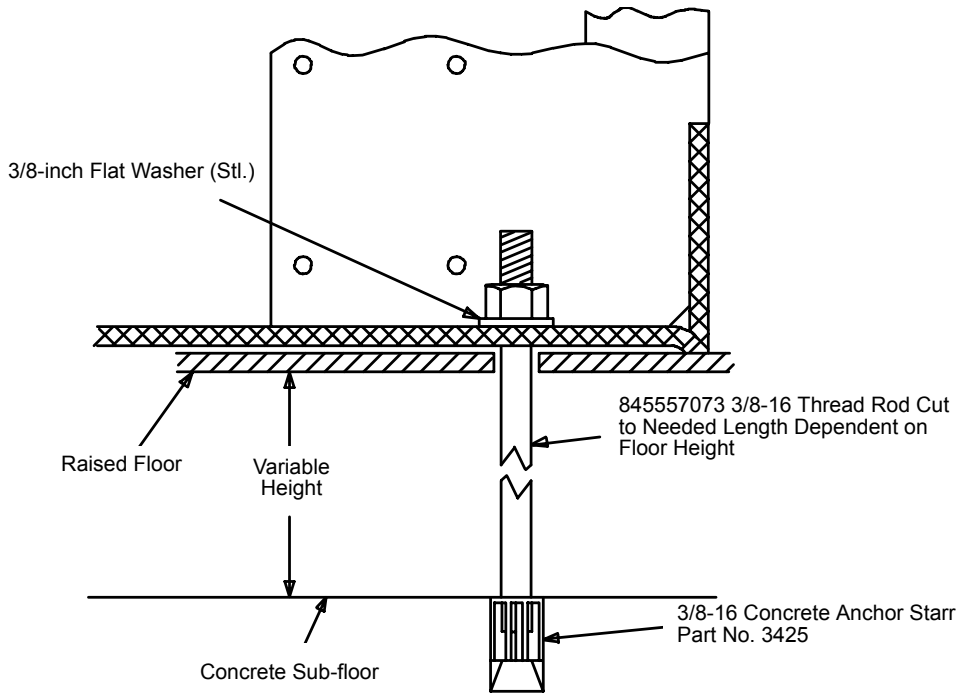


Figure 3-4. Earthquake Mounting—Computer Raised Floor

Checking Circuit Pack Configuration

CAUTION:
Be sure you are wearing wrist straps before you complete the following steps.

1. Verify that all circuit packs are fully seated in proper slots according to the Customer Service Document (CSD) and Port Assignment Worksheet.
2. Report any discrepancies in circuit pack type or quantity.\

Connecting Battery Leads

NOTE:
This procedure is only for AC-powered MCUs. If a 2-cabinet, DC-powered MCU is being installed, skip to "Installing Additional SCCs" on page 3-10. For a one-carrier SCC installation, skip to "Connecting DC Power to Single-Carrier MSMs" on page 3-22.

To confirm that an MCU is AC-powered, look at the front tab on the power supply (the hinge on the circuit board). The number “1217A” identifies the power supply as AC.

The battery is located inside the cabinet on the top of the carrier. The ESCC in position “A” is shipped with the battery lead disconnected to prevent the battery from discharging. Use the following steps to connect the battery:

1. Ensure that the circuit breaker is in the OFF position.
2. Remove the front panel. The battery lead is to the left of the battery. (You may need to reach inside to get to it.)
3. Connect the battery lead and push it back into the ESCC.
4. If additional SCCs are not being installed, skip to "Connecting AC Power to Single-Carrier MSMs" on page 3-17.

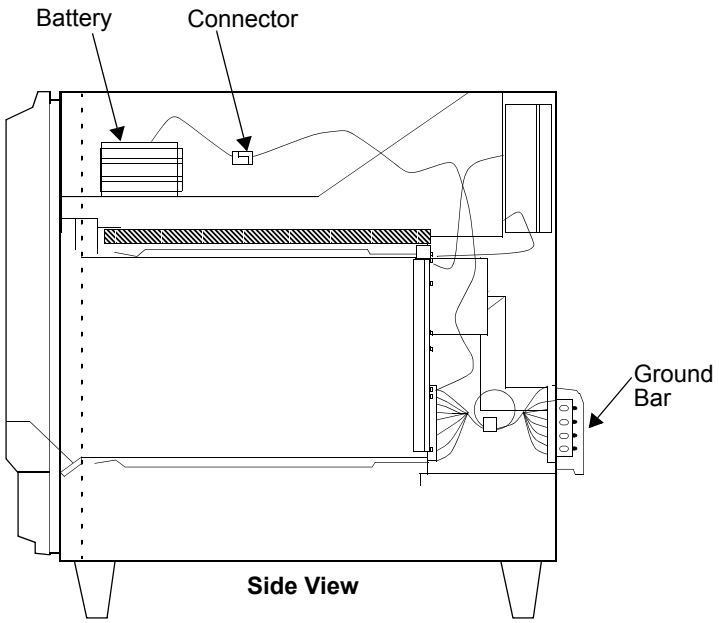


Figure 3-5. Battery Location

Installing Additional SCCs

NOTE:
This procedure is only for installing a second SCC. If you are performing a single ESCC installation, skip to "Connecting AC Power to Single-Carrier MSMs" on page 3-17 or "Connecting DC Power to Single-Carrier MSMs" on page 3-22, as appropriate.

1. Stack SCCs “B,” “C,” and “D” on top of ESCC “A.” (The SCCs are labeled appropriately on the front and back on the left side of the SCC carrier labels.)

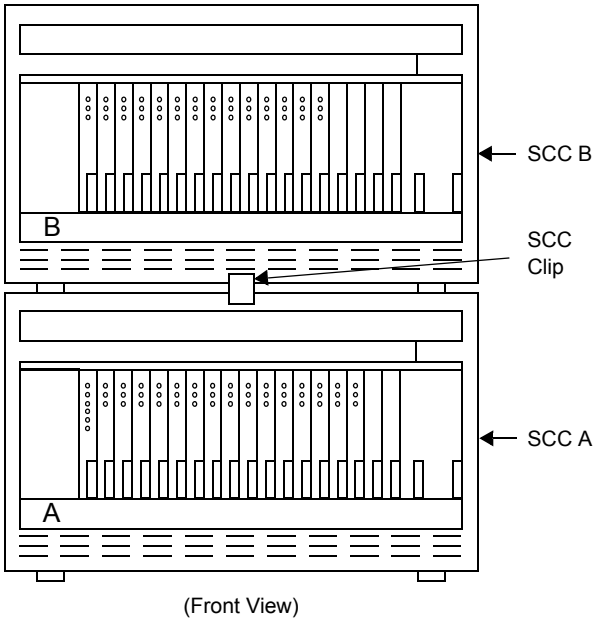


Figure 3-6. Installing Additional SCCs

2. Remove the TDM Bus terminator in slot 22 of ESCC-A backplane and move it to slot 17 of the top SCC.
3. Connect TDM Bus cables as shown in the next figure. The TDM Bus cable is located behind the lower panel.
4. On the backplane of SCCs B, C, and D, to the right of slot 00, six pins are marked for the SCC address plug connections. Verify that the address plug for each SCC is in the right place, as shown in the next figure.

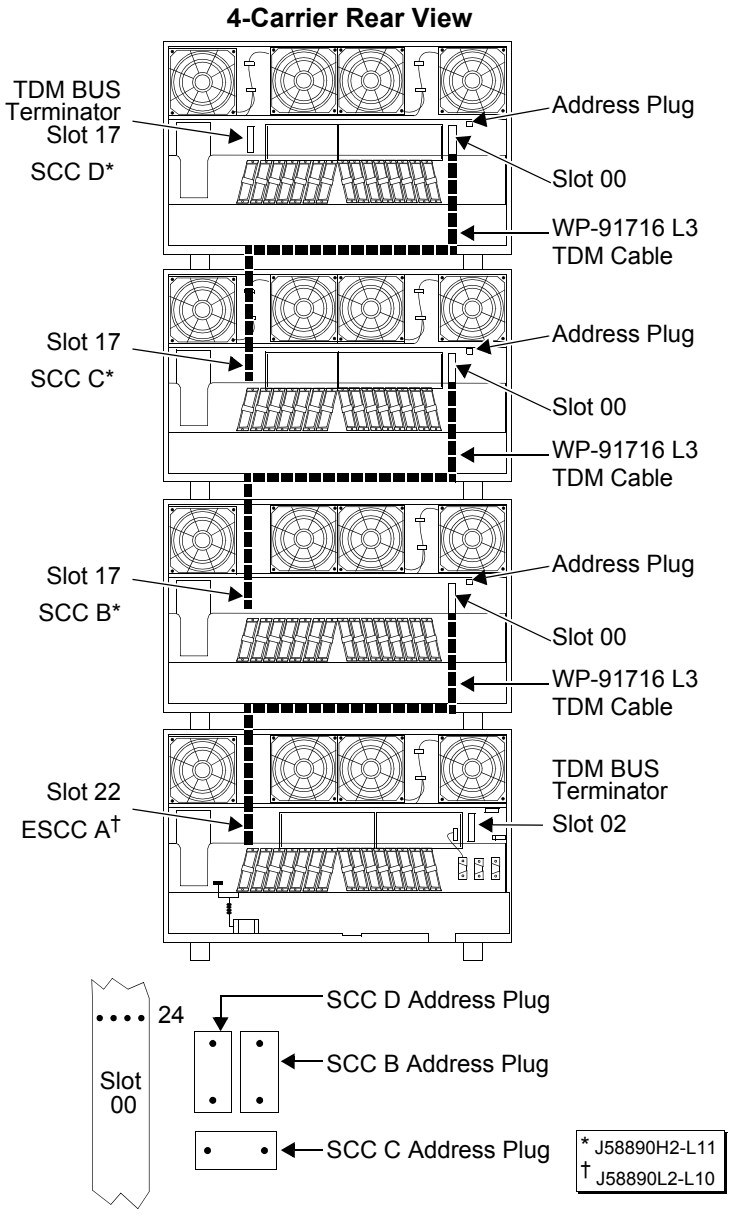


Figure 3-7. TDM Bus Connections for the Single-Carrier MSM

Installing Ground Plates

NOTE:
This procedure is only for MCUs with two or more SCCs.

A ground plate is required between each pair of SCCs for ground protection and stabilization.

1. At the rear of the SCCs, replace the upper and lower panels (leave the screws loose). Refer to Figure 3-7 on page 3-12.
2. On SCC B, place the top of the ground plate over the bottom of the lower rear panel so the four No. 8-32 x 3/8 inch screws at the bottom of the lower rear panel go through the four ground plate keyhole slots.
3. Slide the ground plate down over the top of the upper rear SCC panel of SCC A so the four No. 8-32 x 3/8 inch screws that attach the upper rear panel go through the four lower ground plate slots.
4. Ensure that the exposed portion of the TDM Bus cable between the SCCs does not get pinched.
5. Tighten the screws. If earthquake protection is required, skip to "Installing Earthquake Plates" on page 3-14.

Installing Cable Clamps

Two cable clamps are required for MCUs.

1. At the rear of the SCCs, on each ground plate, install two cable clamps using the screws provided.
2. These clamps hold the external connection cables.

Installing Cabinet Clips

1. At the front of the SCCs, install a cabinet clip between the SCCs. Refer back to Figure 3-6 on page 3-11.
2. Start joining the cabinets by inserting one end of a clip into one cabinet and the other end of a clip into an adjoining cabinet. Continue this process until all the cabinets are joined.

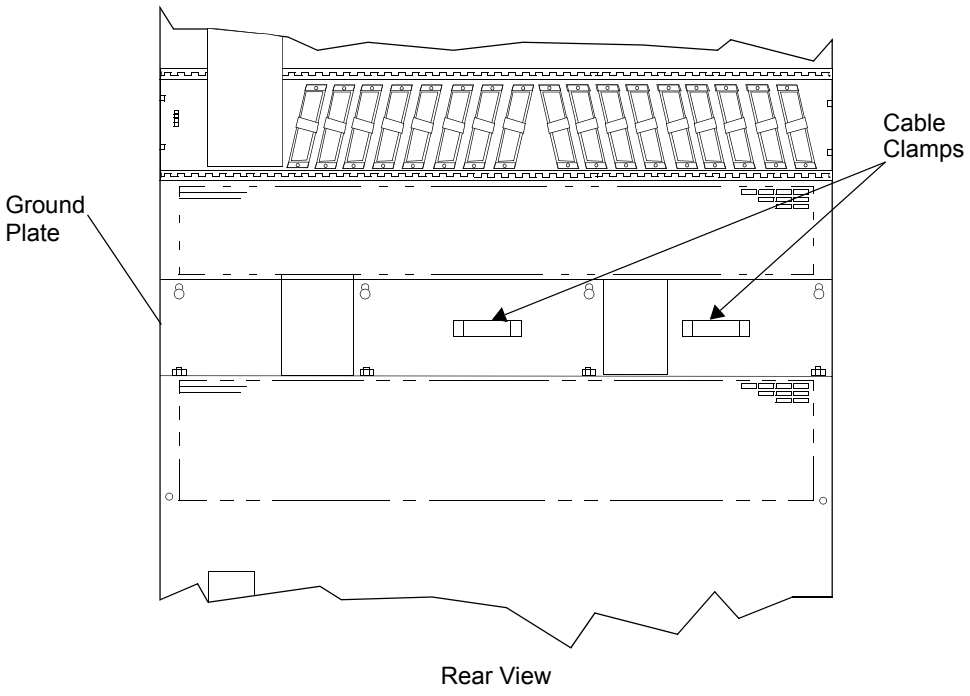


Figure 3-8. Ground Plate and Cable Clamp Locations

Installing Earthquake Plates

NOTE:
This procedure is only for MCUs with two or more SCC cabinets and earthquake protection.

The ground plate provides the ground connection and stabilization between SCCs A and B. The earthquake front plate replaces the cabinet clip.

1. At the front of the SCCs, line up the holes in the top of the earthquake front plate with the holes at the bottom of SCC B and insert the four No. 8-32 x 3/8 inch screws. Do not tighten them yet.
2. At the front of the cabinets, line up the holes in the bottom of the earthquake front plate with the holes at the top of ESCC A and insert the four No. 12-24 x 1/2 inch thread-forming screws.
3. Tighten the earthquake plate screws.

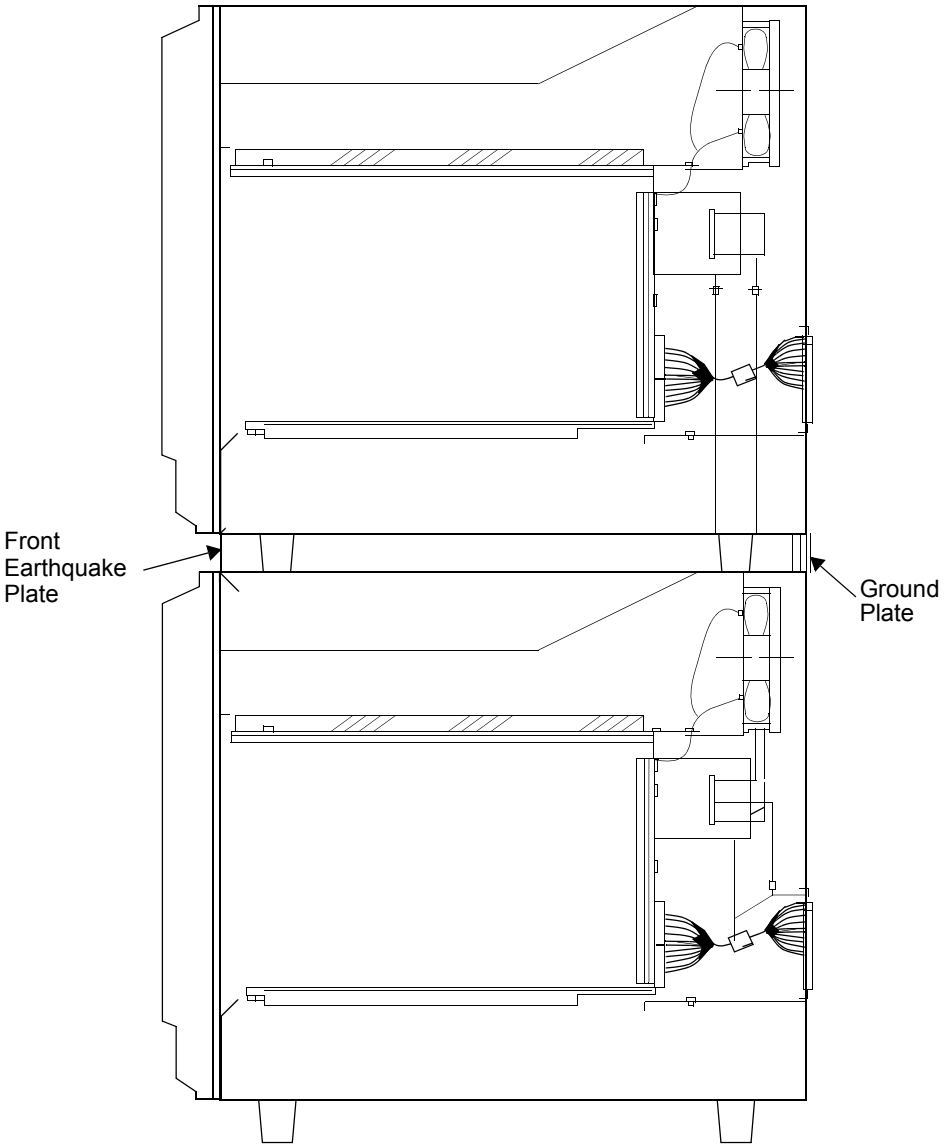


Figure 3-9. Ground Plate and Earthquake Front Plate

Installing Grounds for the Coupled Bonding Conductor

A Coupled Bonding Conductor (CBC) must be tie-wrapped to all trunk cables. The CBC connects the cabinet single-point ground block to the approved ground located nearest the telephone company-owned protector block at the building entrance facility (see the following figure).

NOTE:
The CBC is a conductor that is connected to ground and run adjacent to the pairs in an inside wiring cable. The mutual coupling between the bonding conductor and the cable pairs reduces potential differences in terminating equipment. The conductor consists of a 10-AWG wire that is tie-wrapped to the inside wiring cable.

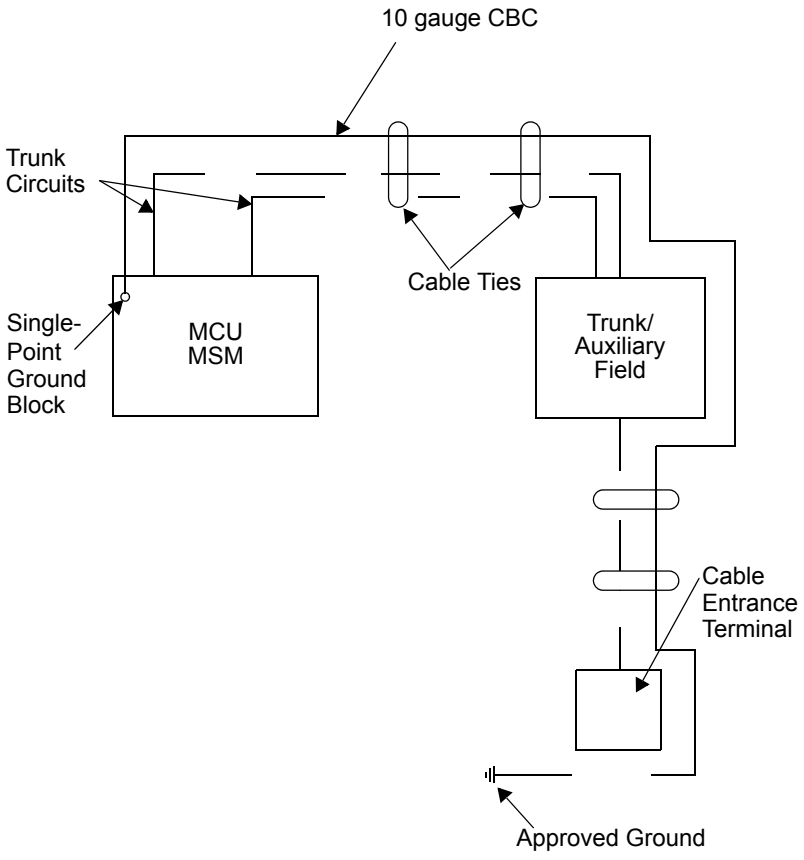


Figure 3-10. Installing the Coupled Bonding Conductor

Approved Grounds

An approved ground is the closest acceptable medium for grounding the building entrance protector, entrance cable shield, or single-point ground of MCU equipment. If more than one type of approved ground is available on the premises, the grounds must be bonded together as required in Section 250-81 of the National Electrical Code. See Chapter 2, “Grounding” for a list of approved grounds.

DANGER:

If the approved ground or approved floor ground can only be accessed inside a dedicated power equipment room, then only a licensed electrician should make the connections to the ground.

Connecting AC Power to Single-Carrier MSMs

NOTE:
For DC-powered MCUs, skip to "Connecting DC Power to Single-Carrier MSMs" on page 3-22.

To confirm that an MCU is AC-powered, look at the front tab on the power supply (the hinge on the circuit board). The number “1271A” identifies the power supply as AC. The AC power is either 120v, 60 cycle or 240v, 50 cycle.

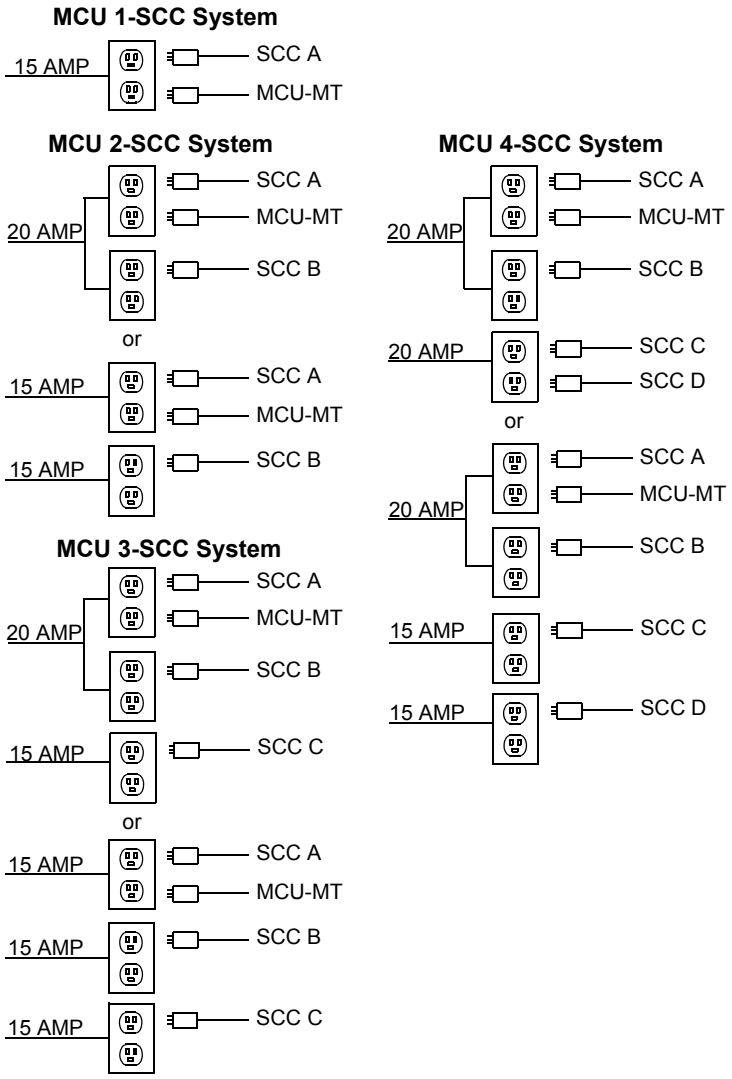


Figure 3-11. Typical AC Power Receptacle Requirements for SCC Systems

Grounding

Grounding is relatively simple for the AC-powered MCU; a single ground wire is connected from the MSM to an approved ground. Grounding must comply with the general rules contained in Article 250 of the National Electrical Code, NFPA 70. The MCU requires a properly grounded 3-prong AC power receptacle for safe operation.

CAUTION:

Do not cut or remove the third ground prong from the Avaya power cord. Do not use 2-wire extension cords or adapters, as this defeats the safety feature of the equipment. If the customer only has a 2-prong receptacle, have it replaced with a properly grounded 3-prong one by a qualified electrician.

Checking 120 Volt AC Power

1. Before beginning equipment installation, use an outlet tester or voltmeter to check the AC receptacle for the presence of ground.
2. Before powering up, check the AC power.

DANGER:

High voltage present.

a. Using a digital voltmeter (VM), set the AC voltage range scale to greater than 250 volts AC.

b. Measure voltage between the hot side and the neutral side of the receptacle.

c. Verify that the voltage measured from Phase to Neutral is 110 to 125 volts AC. Correct any power problem before proceeding.

d. Measure voltage between the phase side of the receptacle and receptacle ground.

e. Verify that the voltage between the phase side of the receptacle and the receptacle ground reads between 110 and 125 volts AC. Correct any power problem before proceeding.

f. Measure voltage from Neutral to Ground.

g. Verify that the meter reads less than 1 volt AC. Correct any grounding problem before proceeding.

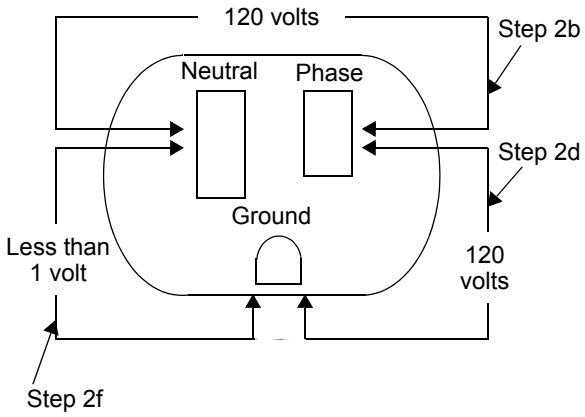


Figure 3-12. Three-Prong 120 Volt AC Receptacle

Connecting AC Power to the ESCC/SCC

Each ESCC/SCC has its own power supply, and the circuit breaker is located on the rear of each power supply.

1. Verify that the circuit breakers are in the OFF position.
2. At the lower left rear of cabinet A, connect a 6-AWG ground wire to the MSM ground bar. Use a screwdriver to loosen and tighten the bolts that secure the ground wire to the ground bar.

   NOTE:
   All approved grounds must be bonded together to form a single grounding electrode system.

3. Run the 6-AWG ground wire to an approved ground. The approved ground must be identified with an Avaya ground tag (FORM 15657NR or equivalent).
4. Connect a 10-AWG wire to the MSM ground bar. This ground wire (coupled bonding conductor) will later be tie-wrapped to the trunk cables and terminated at the coupled-bonding conductor-terminal bar at the MCU's cross connect field.
5. Connect the SCC AC line cords first to the SCCs and then to the AC power receptacle.

   NOTE:
   An external, commercial Uninterruptible Power Supply (UPS) or a battery backup arrangement may be used. Standby power is

engineered to customer needs depending on the MCU size and configuration.

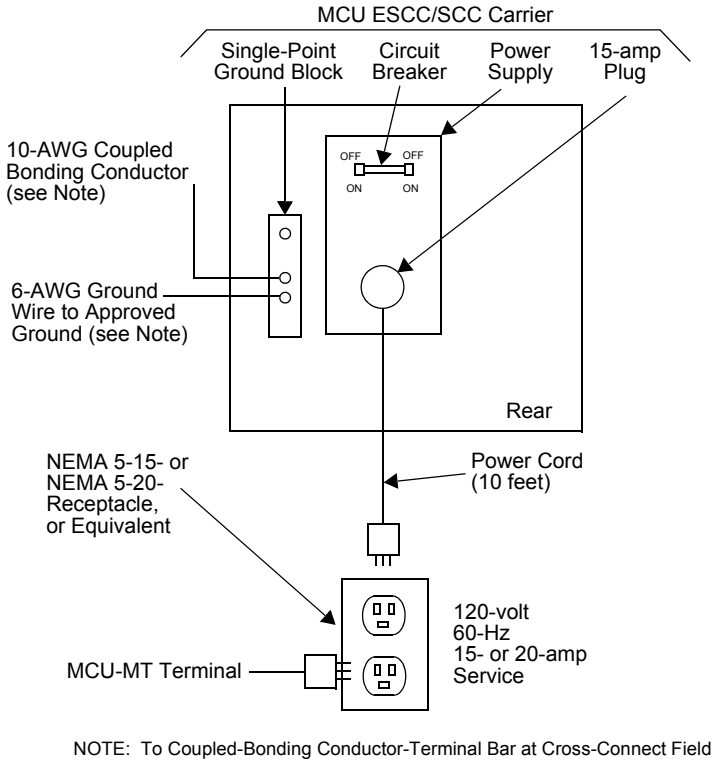


Figure 3-13. Typical Grounding and Power Arrangement

Connecting DC Power to Single-Carrier MSMs

First, verify the label near the circuit breaker on the power supply toward the rear of each MSM corresponds to the local voltage type.

DANGER:

*If the label is different than the voltage type at the site, notify your Avaya representative immediately for a replacement power supply. Do **not**, under any circumstances, connect an incorrect power supply to DC power.*

DC Power Connections

A 30 Foot (9 meter) cable connects to each MSM. A special connector on one end of the cable is plugged into the cabinet power connector. The cable must be cut to length and terminated inside the J58890R DC Power MSM.

Each rectifier assembly can supply up to 50 Amps of DC current. A minimum of two rectifiers are installed in each DC Power MSM to supply a total of 100 Amps. A third rectifier assembly can be installed and is used as a backup (N+1). Each Single-Carrier MSM can pull up to 15 Amps. Up to three DC Power MSMs can be stacked to supply power to Single-Carrier MSM stacks.

Figure 3-14 shows a typical power and ground layout for a DC-powered system without a J58890CG DC Power Distribution Unit. The J58890CG is required if the distance between the DC Power MSM(s) is greater than 30 feet (9 m). Figure 3-15 shows a typical power and ground layout for a DC-powered system containing a DC power distribution unit.

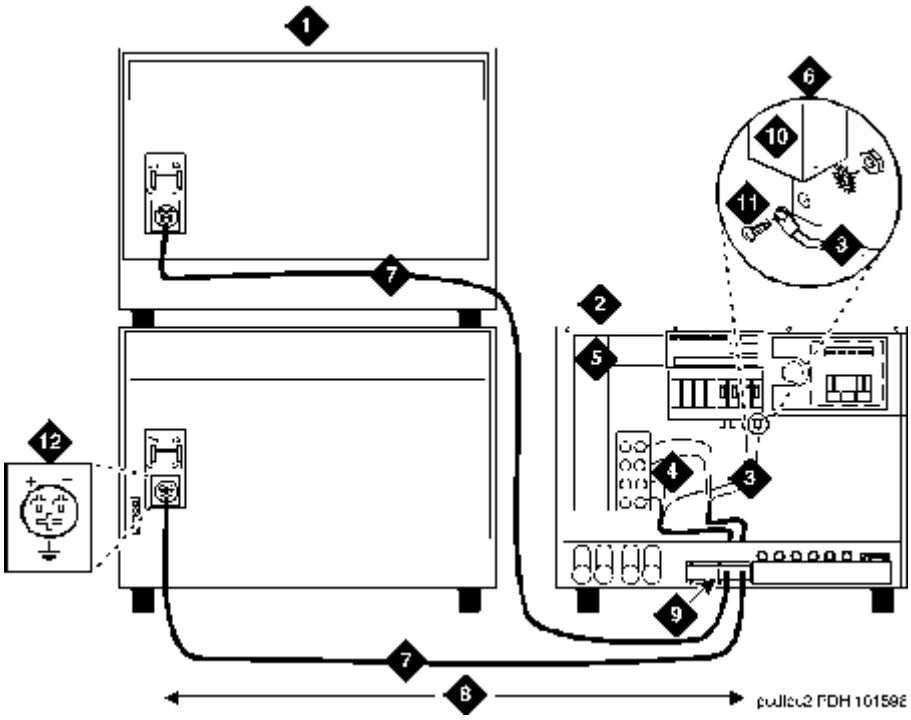


Figure Notes

1. System MSM Stack
2. DC Power MSM
3. White Wires
4. Green Ground Wires and Black Wires Connect to the -48 VDC Return Bus
5. -48 VDC Bus
6. Connect White Wires to Circuit Breakers
7. DC Power Cable (H600-436, G1) to Power Connector on Each MSM. Cut to Length and Crimp a Ring Terminal Onto Each Wire
8. 30 Feet (9 m) Maximum
9. Route Cables Through Sliding Door
10. Circuit Breaker
11. Supplied #10-32 Screw, #10 Star Washer, and #10-32 Hex Nut
12. Inset Showing DC Power Connector (Male)

Figure 3-14. Typical DC Power Connections

DC Power Connections with DC Distribution Unit

A 10 foot (3 meter) power cord is equipped with the appropriate connectors. In the configuration shown in Figure 3-15, each cabinet stack has a DC Power Distribution Unit associated with it.

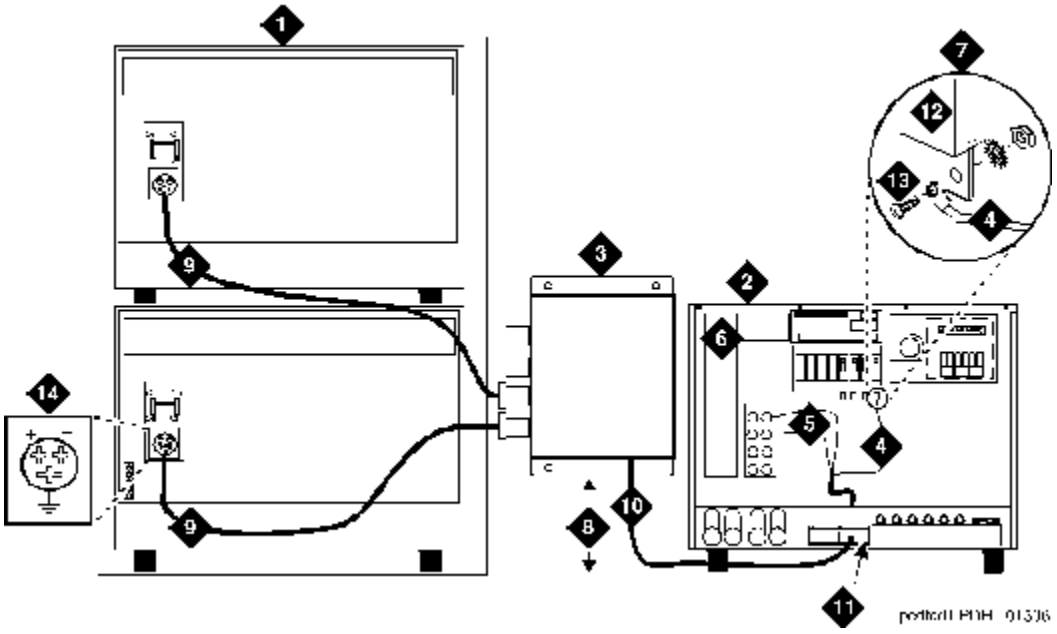


Figure Notes

1. System MSM Stack
2. DC Power MSM
3. DC Power Distribution Unit (Position to the Right of the MSM Stack)
4. White Wire (Connect to Circuit Breaker). See Inset.
5. Green Ground Wire and Black Wire Connect to the -48 VDC Return Bus
6. -48 VDC Bus
7. Inset
8. 12 Inches (30.5 cm) From Floor to DC Power Distribution Unit
9. DC Power Cable to Power Connector on Each MSM
10. DC Power Distribution Unit Power Cord (Route to Rear of DC Power MSM)
11. Route Power Cord Through Sliding Door
12. Circuit Breaker
13. Supplied #10-32 Screw, #10 Star Washer, and #10-32 Hex Nut
14. Inset Showing DC Power Connector (Male)

Figure 3-15. Connections Using DC Power Distribution Unit

Installing the Multicarrier MSM

The MCU MCC-MSM is shipped in a polyethylene bag packed in a cardboard container. The MCC-MSM is fastened to a wood/styrofoam pallet by four carriage bolts. The cardboard container is strapped to the pallet by two metal bands.

The cardboard container is strapped to the pallet with a metal band.

DANGER:
The MCC-MSM may weigh as much as 800 pounds and be top-heavy. Use extreme caution.

Unpacking and Inspecting

1. Check the status of the SHOCKWATCH and/or TILTWATCH indicators on the cardboard container. These indicators are usually white. If the container has been jarred or tilted beyond specifications, the indicator will be red, indicating potential damage. Report any indication of damage per local instructions.
2. See DANGER. Cut and remove bands.

DANGER:
Take care to avoid injury while cutting and removing bands.

3. Determine which cabinet contains the ramp and open it first.
   The carton containing the ramp will have a “ramp enclosed label’’ on it.
4. See CAUTION. Cut the tape holding the container together.

CAUTION:
Deep knife penetration may damage the MCC.

5. Remove all cardboard, tape, and plastic from the MCC.
6. To open the MCC doors, use a screwdriver to turn the screws clockwise. The screws are located on the front and rear doors to release the door latches (see the following figures).
7. Lift off the front and rear doors (do not remove the screws from the door hinges).

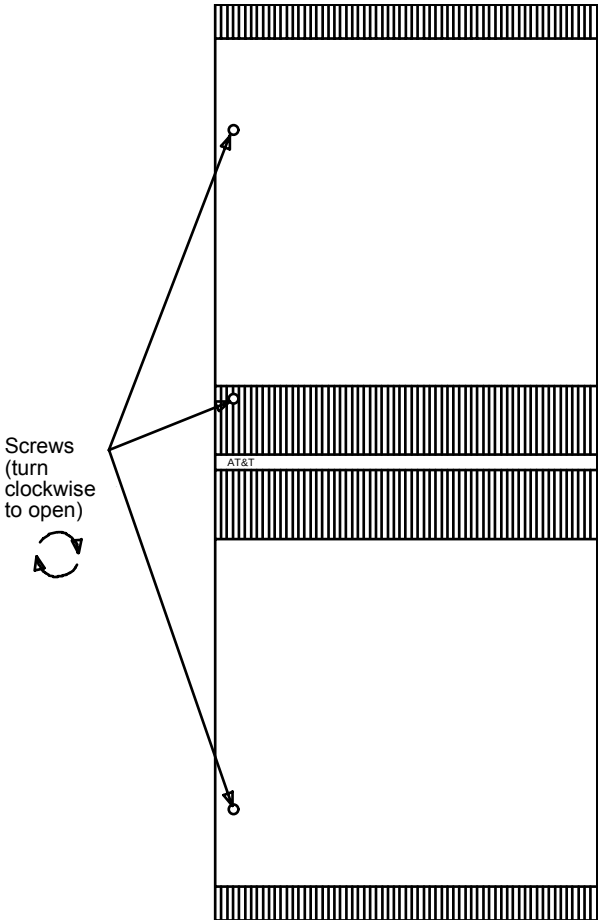


Figure 3-16. Location of MCC Door Latches (Front)

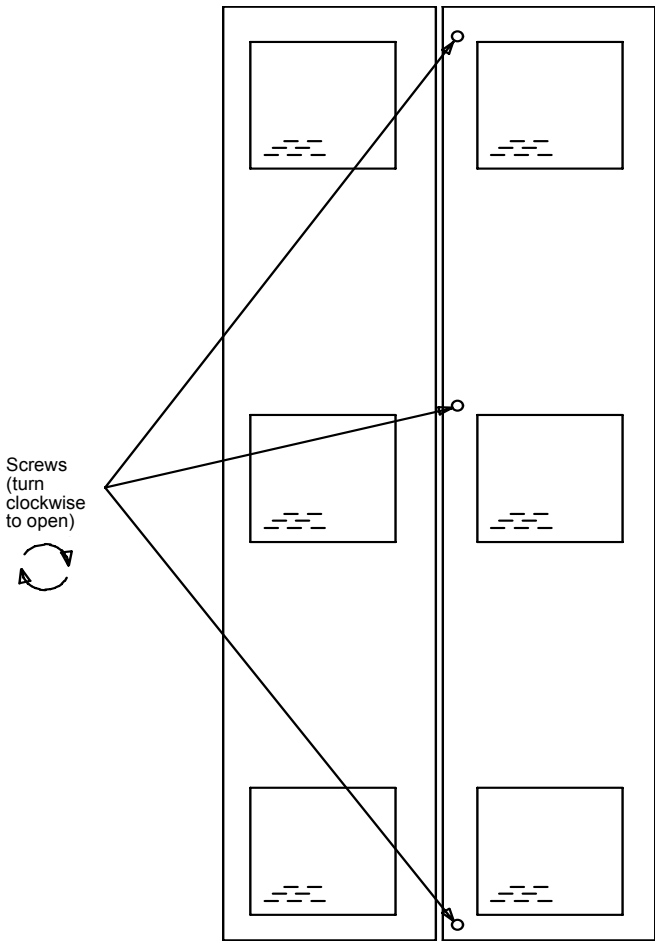


Figure 3-17. Location of MCC Door Latches (Rear)

8. Remove all packing material from inside the MCC.
9. Inspect the MCC for any damage caused during shipping. Report any damages per local instructions.
10. Use an adjustable wrench to remove the carriage bolt nuts located at each bottom corner of the MCC.
11. Drive the carriage bolts downward until they clear the MCC.
12. Remove the ramp from the side of the MCC carton.
13. Remove the power cord stored under or inside the MCC of AC-powered systems, and lay it over the top of the MCC.

14. Remove the supporting block of wood by raising the rear corner of the MSM using a pry bar (if necessary). Repeat for the other rear corner of the MSM.
15. Screw the MSM stabilizing bolts all the way up to provide clearance between the MSM and the pallet when the MSM is rolled down the ramp.
16. Place the ramp as shown in Figure 3-17 on page 3-27. Bolt it into position using the bolts provided in the plastic bag attached to the ramp.
17. Hold both sides of the rear of the MSM. (It is recommended that another technician assist in moving the MSM.)
18. Roll the MSM off the ramp and onto the floor.

Connecting the Carriers in Multicarrier MSMs via TDM/LAN Bus Cabling

TDM/LAN extension cables (WP-91716) connect the carriers in each multicarrier MSM. These cables are flat ribbon-type cables that go to the connectors labeled “TDM/LAN” on each carrier backplane. The cable is 15 ft. long across the five carriers within an MSM. The cable (WP-91716 L7) connected across the fans between the carrier in position A and the carrier in position D is longer than the other cables (WP-91716 L6).

Each end of the TDM/LAN bus in a cabinet is terminated on a carrier backplane by a TDM/LAN terminator (ZAHF4) installed in a TDM/LAN connector. If a carrier is not in place (for example, if a port carrier is not in position E), the terminator is installed in the previous carrier (for example, the port carrier in position D).

The following figure provides a rear view of the TDM/LAN bus cabling for a fully loaded multicarrier MSM configuration.

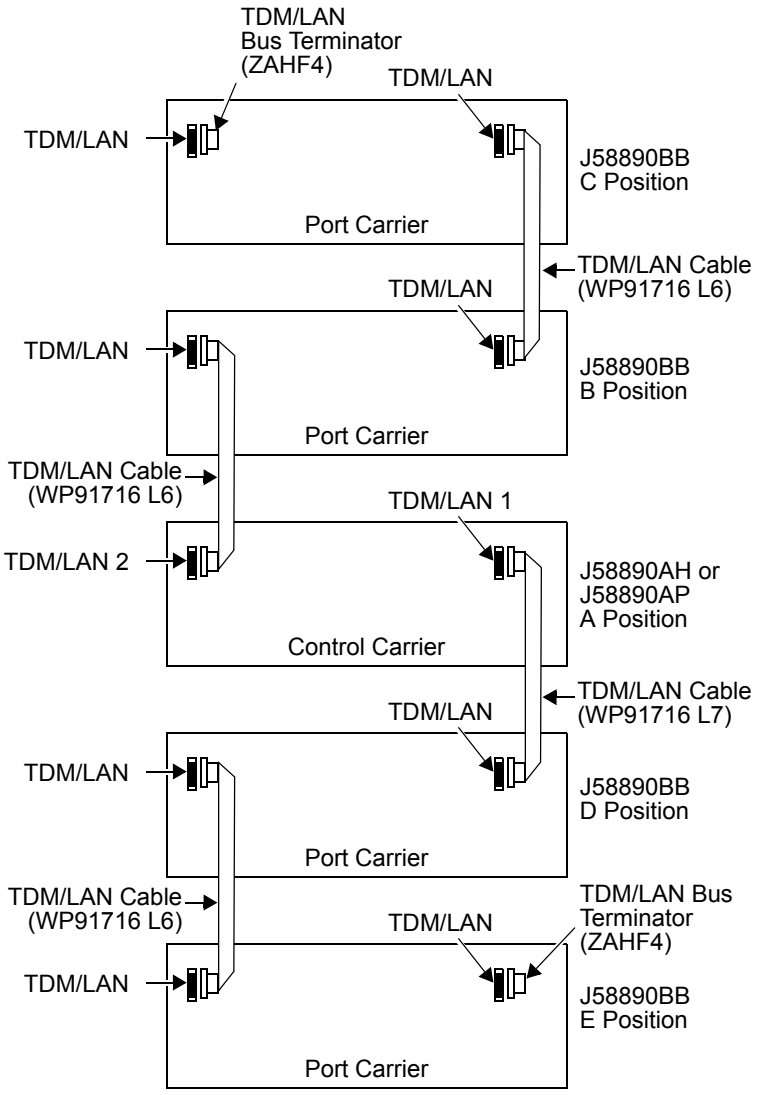


Figure 3-18. TDM/LAN Bus Cabling — Rear View of a Fully Loaded Multicarrier MSM Configuration

Positioning the MSM

Roll the MSM into position at the designated location. See Caution.

CAUTION:
If your system is supplied with cable ductwork, the MSMs must be spaced on 32-inch centers (+-1/8 in). The MSMs must also be level and square with respect to one another. These precautions are advised to prevent problems with ductwork installation. If your system is supplied with slack managers, the MSMs must be placed far enough from the connection field to lay down the (32-inch) slack managers and to provide a little extra room for the cables to access the managers.

NOTE:
Check location of the AC power receptacle. The receptacle must be on a separately fused circuit that is not controlled by a wall switch. It must be located within 10 feet of where the power cord leaves the base of the MSM and should be located outside the cross-connect field area.

Adding Earthquake Protection (If Provided)

1. If earthquake protection is required on a concrete floor:
    a. Insert a pencil or marker through the holes previously occupied by the carriage bolts (front and rear) in the bottom of the MCC, and mark the floor directly beneath each hole.
    b. Roll the MCC out of the way and drill four 1/2-inch diameter holes (about 1-1/2 inches deep) at the spots marked in the previous step.
    c. Insert anchors in the holes.
    d. Roll the MCC back into place, and align the MCC holes over the holes in the floor.
    e. Repeat this procedure from the beginning for each MCC being installed.
    f. When all MCCs are in place, adjust their leveling legs until the MCCs are level. See Caution.

CAUTION:
If your system is supplied with cable ductwork, the MCCs must be level from front to rear and from side to side. They must be square with respect to one another to within + or -1/8 in.

    g. Secure the MCC(s) to the floor with a 3/8-16 X 4.5-inch bolt and flat washer.

2. If earthquake protection is required on a raised computer floor over a concrete sub-floor:
    a. Insert a pencil or marker through the holes previously occupied by the carriage bolts (front and rear) in the bottom of the MCC(s), and mark the floor directly beneath each hole.
    b. See CAUTION. Drill four holes 5/8 inch in diameter through the floor panels marked in step a.

CAUTION:
Take care while drilling the holes through the raised floor that the drill bit does not penetrate any cables beneath the raised floor that would cause damage to the cable or injury to the installer.

    c. Insert a long punch through the hole drilled in step b and mark the concrete floor beneath the raised floor.
    d. Remove the raised floor panel(s) in which the holes were drilled in step b.
    e. Drill four holes 1/2 inch in diameter and 1-1/2 inches deep at the spot marked in step c.
    f. Insert the anchors in the holes.
    g. Replace the floor panel(s) removed in step d.
    h. Repeat this procedure from the beginning for each MCC being installed.
    i. When all MCCs are in place, adjust their leveling legs until the MCCs are level. See Caution.

CAUTION:
If your system is supplied with cable ductwork, the MSMs must be level from front to rear and from side to side. They must be square with respect to one another to within + or -1/8 in.

    j. Fasten the MSM to the floor.

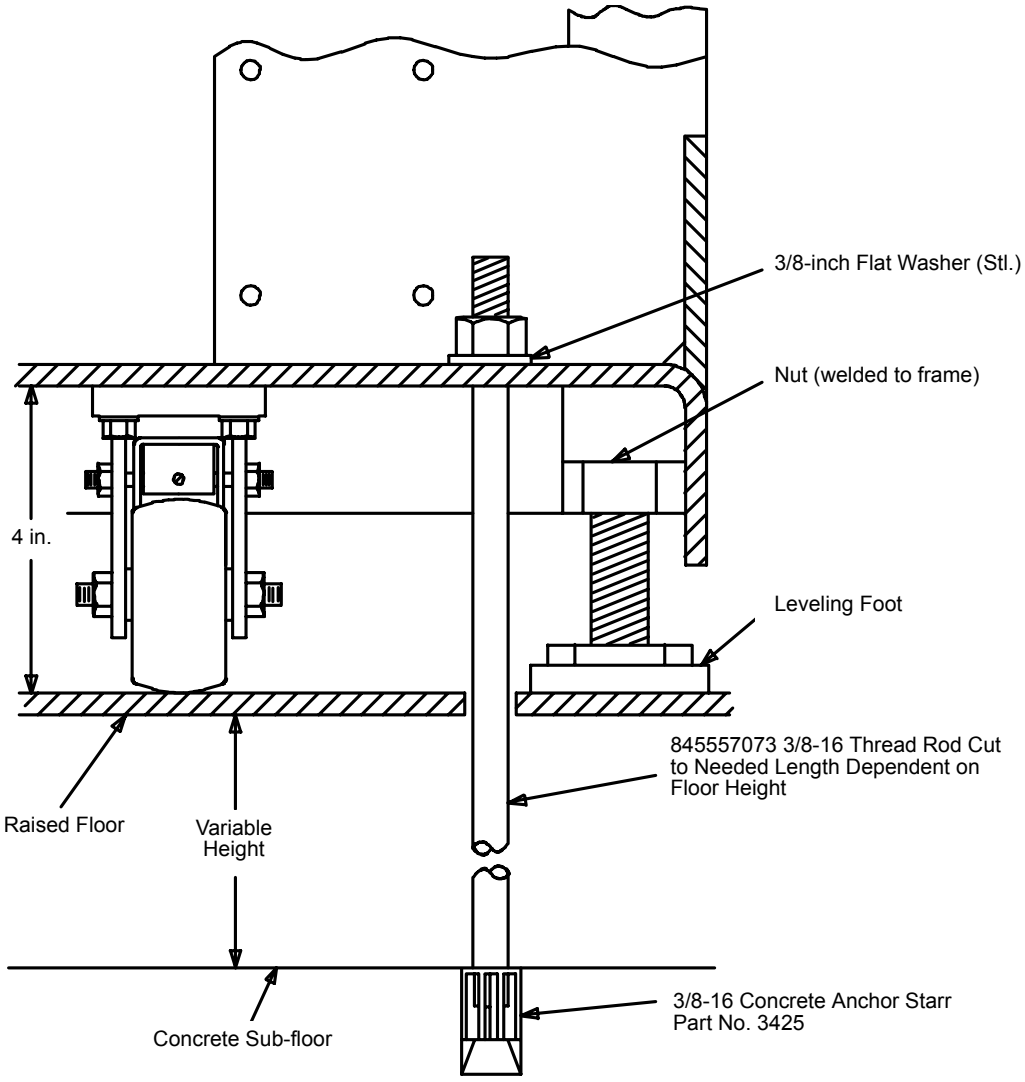


Figure 3-19. Earthquake Mounting—Computer Raised Floor

Completing Cabinet Installation (Earthquake Protection not Provided)

1. Repeat the appropriate procedures from the previous sections for each MCC being installed.
2. When all MCCs are in place, adjust their leveling legs until the MCCs are level. See Caution.

CAUTION:
If your system is supplied with cable ductwork, the MCCs must be level from front to rear and from side to side. They must be square with respect to one another to within + or -1/8 in.

3. Adjust and lock the cabinet stabilizing bolts to keep the MCC from moving.
4. At the bottom of the MCC, install hole plugs (provided with the MCC) in the holes previously occupied by the four carriage bolts.

Connecting AC Power to Multicarrier MSMs

The following procedures apply to AC-powered MCC-MSMs for MCUs.

The following figure shows a typical AC power and grounding layout. The switch may be powered by a 120 volt, a 220 volt, a 208 volt, or a 240 volt AC source, depending on which is required for the particular installation. The power circuit must be dedicated to the switch. It must not be shared with other equipment, and it **must not be** controlled by a wall switch. The AC receptacle should not be located under the cross-connect field. (The coupled bonding connector shown in the illustration is described later in this chapter.)

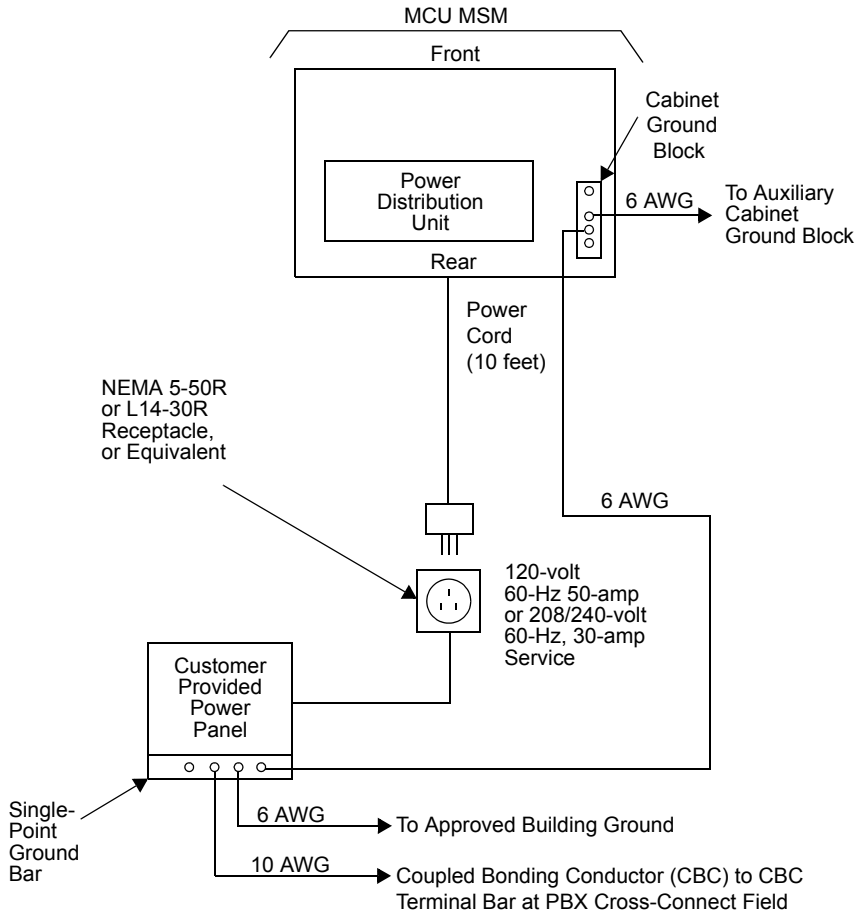


Figure 3-20. Typical AC Power and Grounding Arrangement for a MCC-MSM

It is necessary to note the difference between 208 volt and the other kinds of AC power. The most common power arrangements currently in use are single-phase 3-wire and three-phase 4-wire systems. Both arrangements are illustrated in the following figures. On a three-phase 4-wire Wye system, 208 volt can be obtained from any two phases of the three-phase system. Either method is satisfactory as long as 208 volt three-phase or 220 to 240 volt single-phase 50 to 60 Hz AC, centered around a neutral connection, is furnished at the correct amperage capacity and meets the national and local electrical codes.

The type of power required by a MCC-MSM is given on its rear door. The type of power required by a SCC-MSM is also given on its rear cover.

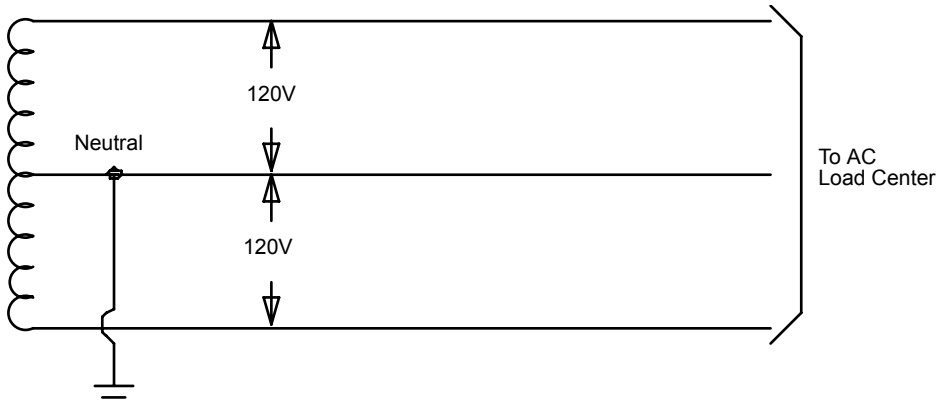


Figure 3-21. Single-Phase 3-Wire (220 to 240 VAC) System

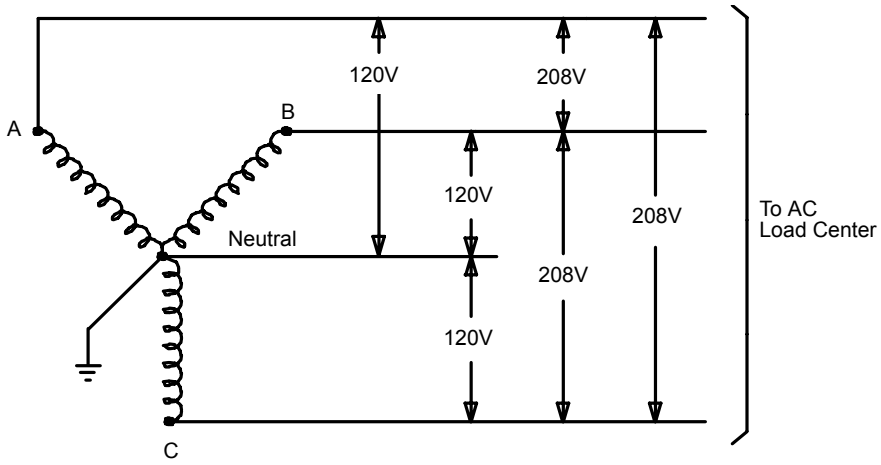


Figure 3-22. Three-Phase 4-Wire Wye 208 VAC System

Connecting to 50Hz Power through a Customer-Provided Transformer

International 50 Hz commercial power is often supplied without a centered neutral connection. In situations like this, the power must be transformed to work with the MCU. Use a transformer with a single-phase tapped primary and a center-tapped secondary to provide compatible power. The following illustration shows an example of a properly wired transformer.

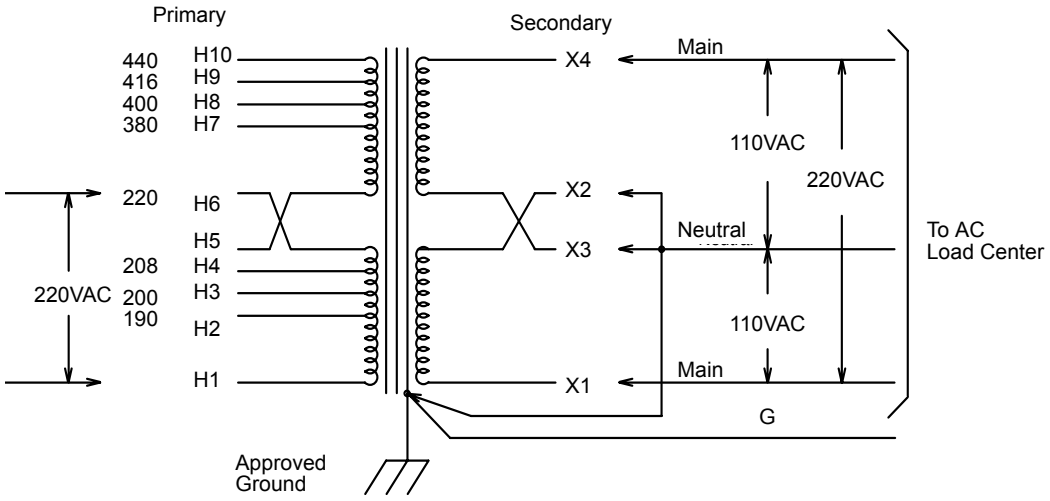


Figure 3-23. Typical Center-Tapped Isolation Transformer

Transformers of several capacities are available. The size of the transformer specified for your system depends on the current requirements of the system. The following table shows a selection of transformers available for use with MCC-MSM

systems. (The **Square-D** part number 3S67F transformer, a 3KVA model, is adequate to power one typical MSM.)

Table 3-1. International 50Hz Transformers

Capacity	Square-D Part No.
3.0 KVA	3S67F
5.0 KVA	5S67F
7.5 KVA	7S67F
10.0 KVA	10S67F
15.0 KVA	15S67H
25.0 KVA	25S67H

Connecting Grounding

CAUTION:
Grounding of the system shall comply with the general rules for grounding contained in Article 250 of the National Electrical Code, NFPA 70.

Grounding is relatively simple for an AC-powered switch. Basically, the cabinets are connected to each other. Then, a single ground wire is connected from the MSM to the single-point ground terminal (SPGT) bar at the AC load center (or optional AC protector cabinet). The SPGT bar is connected to your approved ground by 6-AWG wire.

Coupled Bonding Conductor

This conductor is connected to the single-point ground-terminal bar and run adjacent to pairs in an associated cable. The mutual coupling between the bonding conductor and the pairs reduces potential differences in terminating equipment. The conductor consists of a 10-AWG wire that is tie-wrapped to the inside wiring cable and terminated at the coupled-bonding conductor-terminal bar at the PBX cross-connect field.

DANGER:
If the approved ground or approved floor ground can be accessed only inside a dedicated power equipment room, connections to this ground should be made by a licensed electrician.

All approved grounds must be bonded together to form a single grounding electrode system.

To connect ground, do the following.

1. At lower right rear of the MSM, connect a 6-AWG ground wire to the MSM ground bar (Figure 3-20 on page 3-34). See the accompanying note.

   NOTE:
   An 1/8-inch allen wrench is required to loosen and tighten the bolts securing the ground wire to the ground bar.

2. Run the ground wire to the single-point ground-terminal bar at the AC load center (shown as “power panel” in Figure 3-20 on page 3-34).
3. Run the ground wire to the MSM, and connect it to the MSM ground bar (Figure 3-21 on page 3-35).
4. At the AC load center, connect a 10-AWG wire single-point ground-terminal bar. This ground wire (coupled bonding conductor) will later be tie-wrapped to the trunk cables and connected to the coupled bonding conductor ground bar at the cross-connect field and finally terminated at the customer-provided load center (Figure 3-21 on page 3-35).

Check Commercial Power and Connect AC Power

Before powering up system, check the AC power using a KS-20599 digital voltmeter (DVM) (or equivalent).

1. Set the DVM to the 250 volt range.
2. Carefully measure the voltage between the hot and the neutral side of the receptacle (see Figure 3-24). The neutral wire is white, the hot wire black.

DANGER:
High voltage present.

3. Verify the meter reads 106 to 128 VAC. If not have a qualified electrician correct the problem.
4. Measure the voltage between the neutral and the ground side of the receptacle. The ground wire is green.
5. Verify the meter reads 0 VAC. If not, have a qualified electrician correct the problem.
6. Set all cabinet power modules OFF. plug the AC power cable into the receptacle.

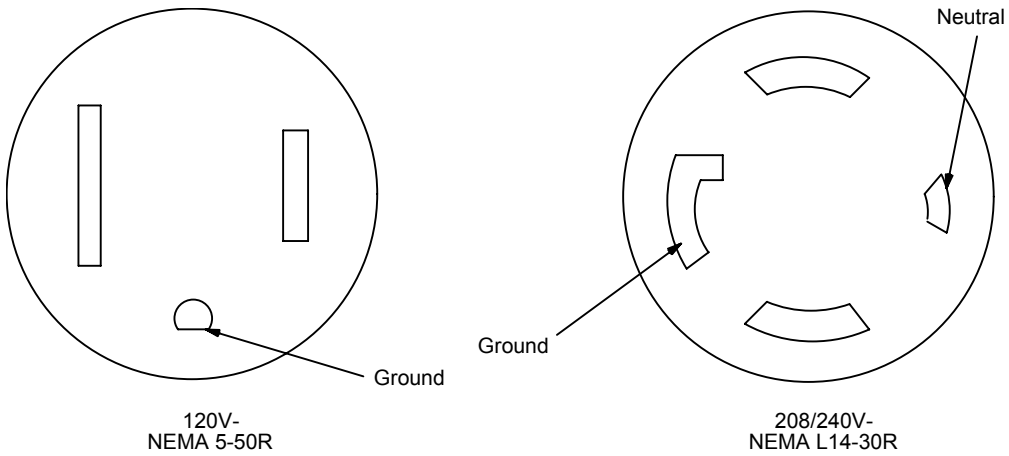


Figure 3-24. AC Receptacle

Connecting Battery Leads (J58890CH-1)

Figure 3-25 shows a typical optional small battery holdover assembly. These assemblies may ship with the battery leads disconnected to prevent the batteries from discharging.

1. Plug the battery connector into the -48 VDC Batteries connector on the rear of the J58890CH-1 Power Distribution Unit.

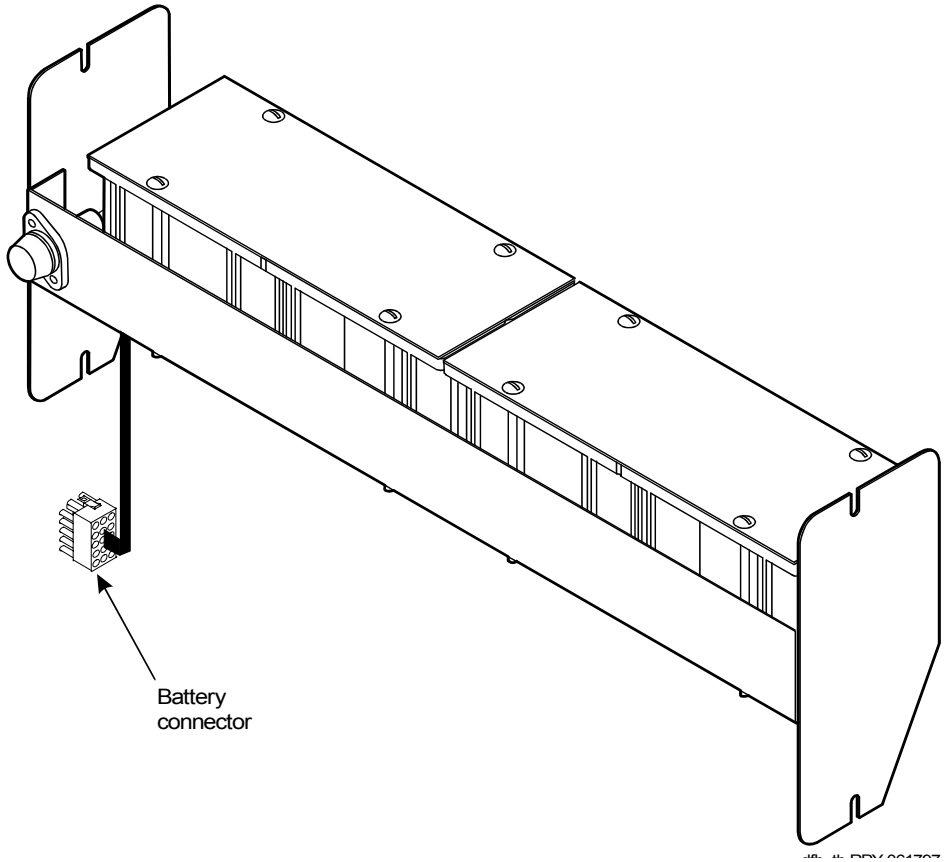


Figure 3-25. Typical Small Battery Assembly

CAUTION:

Power is present in the cabinet even if the AC power cable is unplugged. Turn off the main circuit breaker on the front of the power distribution unit when procedures require ALL power to be removed from the MSM.

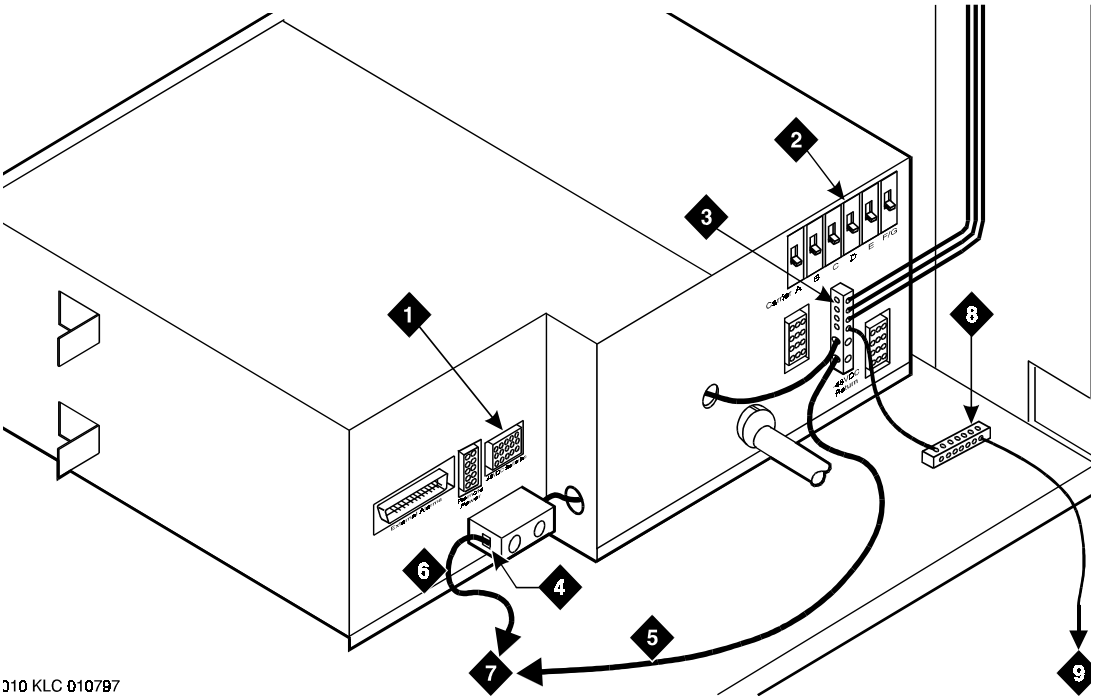


Figure Notes

1. Connect small battery holdover cable (or temperature sensor cable from large battery cabinet) to J20
2. Carrier Circuit Breakers
3. Ground Terminal Block
4. Connect large battery holdover cable here
5. -48 VDC Return - 1/0 AWG (50 mm^2) cable
6. -48 VDC - 1/0 AWG (50 mm^2) cable
7. 1/0 AWG (50 mm^2) 50 feet (15.2 m) cable to large battery cabinet. For cables greater than 50 feet (15.2 m), contact your Avaya representative.
8. Ground Terminal Block
9. To AC load center or approved single-point ground block

Figure 3-26. Power Distribution Unit (J58890CH)

2. Be sure the main power to the power distribution unit is OFF.
3. At the power distribution unit, set all carrier circuit breakers OFF.

Small Battery Holdover

1. Connect the small battery holdover cable to J20. See Figure 3-26.

Connecting Shorting Cable to J58890CE-2

CAUTION:
For MSM with a battery charger, read the caution label on the 397C battery charger before disconnecting batteries.

Some cabinets contain a J58890CE-2 AC Power Distribution Unit without an optional battery charger. Install the shorting cable only when a battery charger is *not* installed.

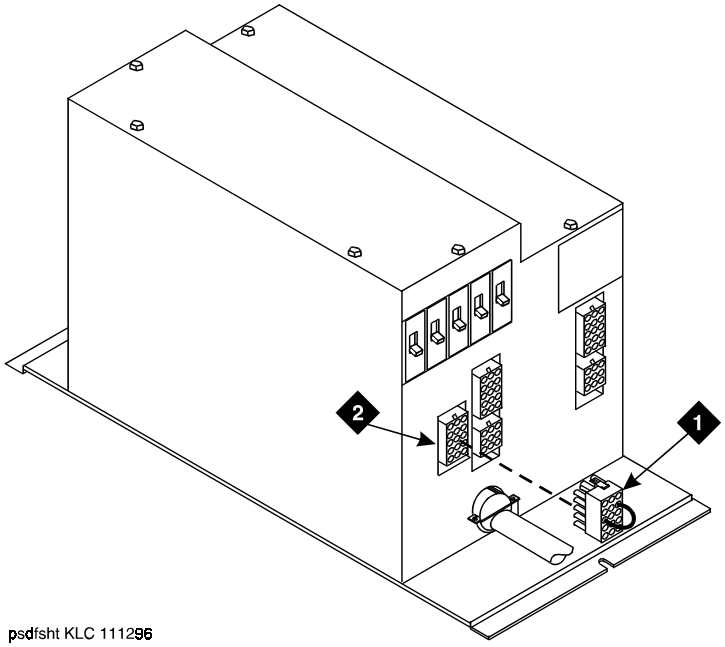


Figure Notes

1. Shorting Cable (H600-442-G1) (If Battery Charger is Not Installed)
2. J11

Figure 3-27. Shorting Cable Installation

1. Set the circuit breakers on the power distribution unit OFF. See Figure 3-27.
2. At the rear of the MSM, insert the shorting cable (H600-442-G1) into J11. The cable is keyed so it can fit only one way.

Connecting AC Power

The main circuit breaker on a MCC-MSM is located on the front of the AC/DC power distribution unit (Figure 3-24 on page 3-39).

1. Verify that the circuit breakers are in the **OFF** position.
2. Connect cabinet AC line cords to AC power receptacles (Figure 3-24 on page 3-39).

Connecting DC Power to Multicarrier MSMs

Refer to the “-48VDC Input Power Requirements” table in the “Connecting DC Power to Single-Carrier MSMs” section earlier in this chapter for the input parameters required for MCC-MSMs powered by a -48VDC battery plant.

The following illustration shows a typical power and grounding layout for a DC-powered MCC-MSM. The size of the wire required for the -48 volt DC and -48 volt return must be engineered to ensure the -**48 volt DC supplied by the battery plant to the MSMs will be maintained between -42.5 and -52.5 volt DC at all times** to ensure proper operation and to prevent hardware damage.

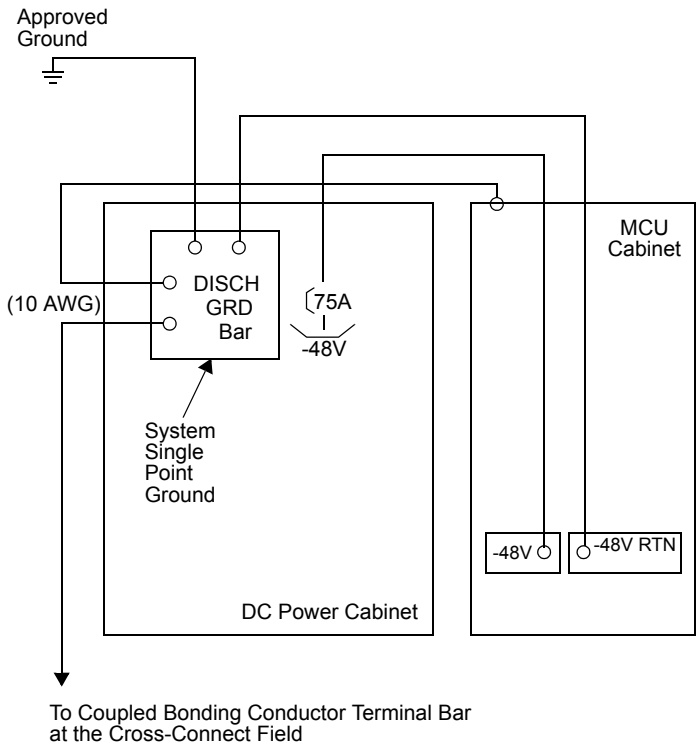


Figure 3-28. Power and Grounding Arrangement for DC-Powered MCC-MSM

Connecting Grounding

CAUTION:
Grounding of the system shall comply with the general rules for grounding contained in Article 250 of the National Electrical Code, NFPA 70.

The grounding scheme for the DC-powered switch is more complex than that of an AC-powered switch.

Coupled Bonding Conductor

This conductor is connected to the single-point ground-terminal bar and run adjacent to pairs in an associated cable. The mutual coupling between the bonding conductor and the pairs reduces potential differences in terminating equipment. The conductor consists of a 10-AWG wire that is tie-wrapped to the inside wiring cable and terminated at the coupled-bonding conductor-terminal bar at the PBX cross-connect field.

Connecting DC Battery and Power Cabinet Frame Grounds

1. Measure and cut a piece of 6-AWG wire (Comcode 846110971) long enough to reach between the **GROUND CONNECTION** terminal in the DC battery cabinet and the **DISCH GRD** bar in the DC power cabinet.
2. Crimp the terminal lugs on each end of the wire.

   NOTE:
   Terminal lugs are furnished as part of D-181895, Kit of Parts.

3. At the DC power cabinet, connect wire to the **DISCH GRD** bar.
4. Route the wire through one of the holes in the side of the cabinets and terminate it on the **GROUND CONNECTION** terminal in the DC battery cabinet.

Connecting Power Plant Ground

1. At the DC power cabinet, connect a 1-AWG ground wire to the **DISCH GRD** bar.
2. Route the ground wire out of the cabinet and terminate it on the approved ground, as shown in the following figure. The approved ground must be identified with an Avaya-supplied grounding tag (FORM 15657NR or equivalent).

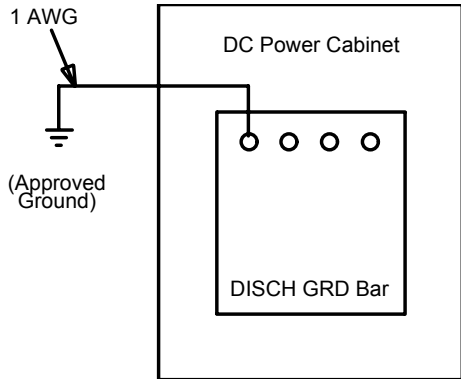


Figure 3-29. Power Plant Grounding

Connecting AC Power to a DC Power Cabinet

1. Have an electrician connect AC power leads to the rectifiers in the DC power cabinet. Each rectifier should have its own branch circuit. Terminate leads on the **AC INPUT** terminal block of each rectifier.
2. Ensure that the associated circuit breakers at the AC power panel are in the **OFF** position.

Connecting System Cabinet Ground Wires

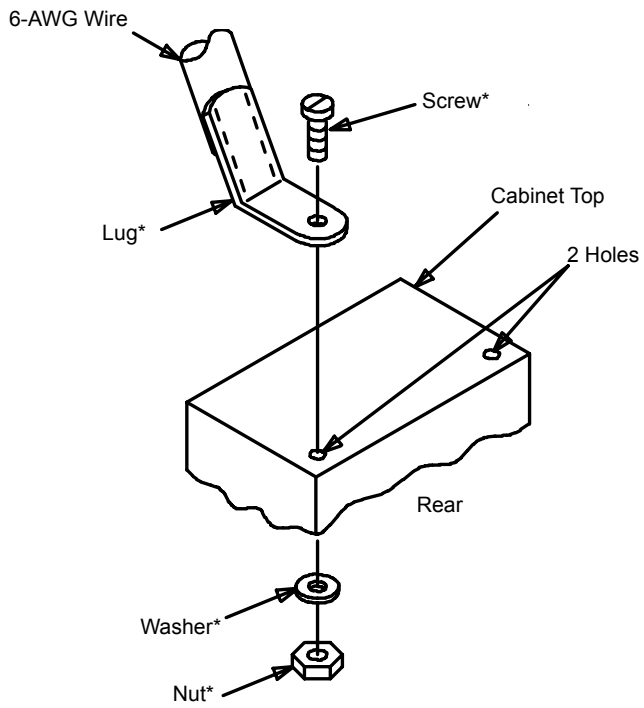
There are two approved methods of grounding the system cabinets. Either method is sufficient. The element common to both methods is that the cabinets that make up the system are wired in a series from the most distant cabinet to the DC power cabinet. You can either wire the tops of the cabinets together or wire the cabinet's ground blocks together. Determine which method the system has been engineered for and then follow the appropriate instructions in the following section.

Connecting Top-Mounted Cabinet Grounds

1. Measure and cut a piece of 6-AWG wire long enough to reach from the **DISCH GRD** bar in the DC power cabinet to the top rear corner of the cabinet, as shown in the next two figures.
2. Crimp terminal lugs on each end of the wire.

   NOTE:
   Terminal lugs are furnished as part of D-181895, Kit of Parts.

3. At the DC power cabinet, connect wire to the **DISCH GRD** bar. Route wire out of DC power cabinet and up to the top rear corner of the MSM.
4. On top of the MSM, terminate the 6-AWG ground wire, as shown in the following figure.



* Included in D-181895, Kit of Parts (Comcode 105434559)

Figure 3-30. MSM Frame Ground Connections

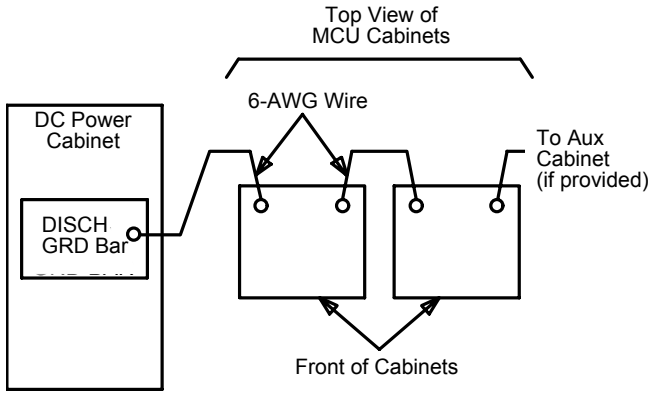


Figure 3-31. Frame Ground Attachment

5. If the switch is equipped with an auxiliary MSM, go to the next step. If it is not, the MSM is grounded and the job is done.
6. Cut a piece of 6-AWG wire long enough to reach between the MSM and the AUX MSM.
7. Crimp terminal lugs on each end of the wire.
8. Connect wire at the top rear corner of the MSM (per the previous figures).
9. Terminate the other end of the wire at the top rear corner of the AUX MSM.

Connecting to the MSM's Ground Blocks

1. At the bottom rear of the MSM (shown in the next figure), use an allen wrench to connect a 6-AWG wire to the MSM ground block.
2. Route the wire out of the MSM and into the DC power cabinet.
3. At the DC power cabinet, terminate the wire on the **DISCH GRD** bar.
4. If the switch is equipped with one or more AUX MSMs, wire from the main MSMs ground block to the first AUX MSMs ground block.
5. Continue to wire serially from ground block to ground block until all of the MSMs are connected through a series of ground blocks to the discharge ground bar at the DC power cabinet.

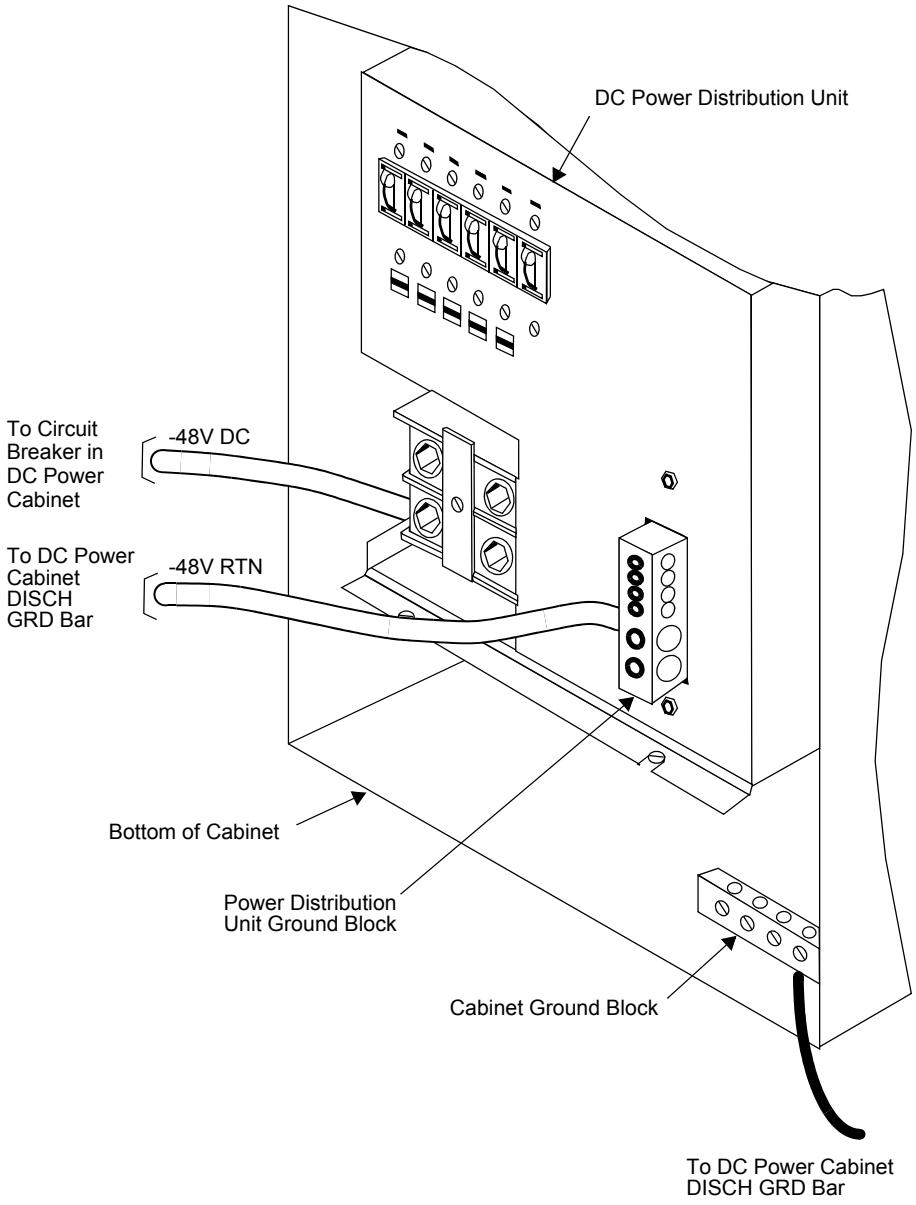


Figure 3-32. Power and Ground Connections for a DC-Powered MCC-MSM

Connecting DC Power to the MSM

NOTE:
Check the DC power plant's documentation to find out if the power plant must be tested before it is connected to your system. If so, perform these tests in the suggested sequence.

The main circuit breaker on a DC-powered MCC-MSM is located on the front of the DC power distribution unit. The circuit breakers on the rear of the DC power distribution unit (CB1 through CB6) control the power to the individual carriers. The following table shows the circuit breaker to carrier relationship.

Table 3-2. Circuit Breaker Definition

Circuit Breaker	Associated Carrier
CB1	Carrier A
CB2	Carrier B
CB3	Carrier C
CB4	Carrier D
CB5	Carrier E
CB6	Filter

Connect power to the MSM as follows:

1. Set the main circuit breaker to OFF.
2. At the MSM:
   a. Using a 3/8-inch allen wrench, connect the -48 volt DC lead as shown in Figure 3-31 on page 3-48.
   b. Using a 3/16-inch allen wrench, connect the -48 volt RTN lead as shown in Figure 3-31 on page 3-48.
3. Route the leads out of the MSM through the mouse hole in the lower rear cover and over to the DC power cabinet.
4. At the DC power cabinet:
   a. Terminate the -48VDC lead on a **DC OUTPUT** circuit breaker.
   b. Terminate the -48V RTN lead on the **DISCH GRD** bar.
5. Repeat the procedure for each MSM.

Installing the ESM

This section discusses ESM installation. Specifically, it discusses how to unpack the ESM, and it provides instructions on how to install the support base. The chapter also includes figures and descriptions of the ESM platform, hardware components, and peripheral devices.

Heeding Warnings

Warnings and cautions appear throughout this book as needed when describing procedures. These notices indicate when the actions you are about to perform can harm you or the equipment unless you follow the procedure steps as listed. (See “Typographical conventions” section in the “About this Book” chapter.)

CAUTION:
Perform a “soft” boot on the UNIX operating system if it is on-line before shutting off power to the system.

WARNING:
Shut the main power switch off only after executing a “soft” system shutdown, and disconnect the power cord before removing the dress cover or access panel and before working within the ESM.

WARNING:
When lifting the ESM chassis, use proper handling practices to prevent back strain or hand injuries.

WARNING:
Do not use the edge of the chassis front bezel of the ESM as a way to lift the unit. The bezel cover comes off easily.

CAUTION:
Observe proper electrostatic discharge precautions when handling computer components. Wear a ground wrist strap against your bare skin and connect to an earth ground.

CAUTION:
The manufacturer) do not accept liability for a damaged unit if the individual equipment is not returned in the original packing materials and carton. The carton has been designed to ensure product warranty and to prevent damage.

Gathering Tools and Test Equipment.

To assemble and disassemble the ESM hardware, the following tools are required:

- Medium screwdriver with flat blade
- No. 2 Phillips Screwdriver
- Small pair of needle-nose pliers
- Small pair of wire cutters
- A sharp pointed instrument, such as a pen

⚠ CAUTION:
Do not use a lead pencil point. The graphite can damage the circuit card, causing problems such as electrical shorts

- Antistatic grounded wrist strap
- Antistatic grounded work mat
- Standard electronic test equipment, such as digital multi-meter, is recommended

Unpacking the MAP/40P

The MAP/40P, keyboard, and monitor are shipped in individual cartons.

⚠ CAUTION:
A boxed, fully-loaded MAP/40P weighs approximately 20 kg (45 lbs).

To unpack the MAP/40P, see Figure 3-33 and complete the following procedure:

1. Set up a work area that includes a work table at least 1- by 1.5-m (3- by 5-ft).
2. Place the MAP/40P carton on the floor.
3. Cut the carton top seam and the left and right end seams. Cut the seams so that you can reuse the carton. See the following “Saving Packing Materials” section.
4. The following items are packed in the top of the MAP/40P box:
   - A plastic packet containing two stabilizing feet (wrapped in paper) and an instruction sheet for installing the stabilizing feet.
   - A 2- to 3-m (6- to 8-ft) power cord (depending on country).
   - Installation and maintenance books (in a cardboard box).

- A plastic packet containing a blank cartridge tape, a diskette with the system configuration and software, a diagnostic diskette, factory information regarding the system, and a yellow BCS return tag.

NOTE:
If you must return a MAP/40P to the manufacturer, complete the yellow BCS return repair tag and attach it to the unit.

Remove all of the items packed on top of the MAP/40P from the box.

5. Remove the top cardboard tray.
6. Locate the back end of the MAP/40P that is resting against the cut-out piece of foam. The foam at this end is easier to press inward than the foam backed by cardboard on the other end.
7. Press in on the foam and lift the end of the MAP/40P.

CAUTION:
An antistatic bag that covers the chassis makes the MAP/40P slippery to handle.

CAUTION:
Do not use the bezel cover as a grip area to move or lift the MAP/40P.

8. Lift the MAP/40P enough to drag it at an angle from the end of the box rather than lifting straight up.
9. Place both of your hands on the sides of the chassis, lift it out of the box, and place it on the work table.

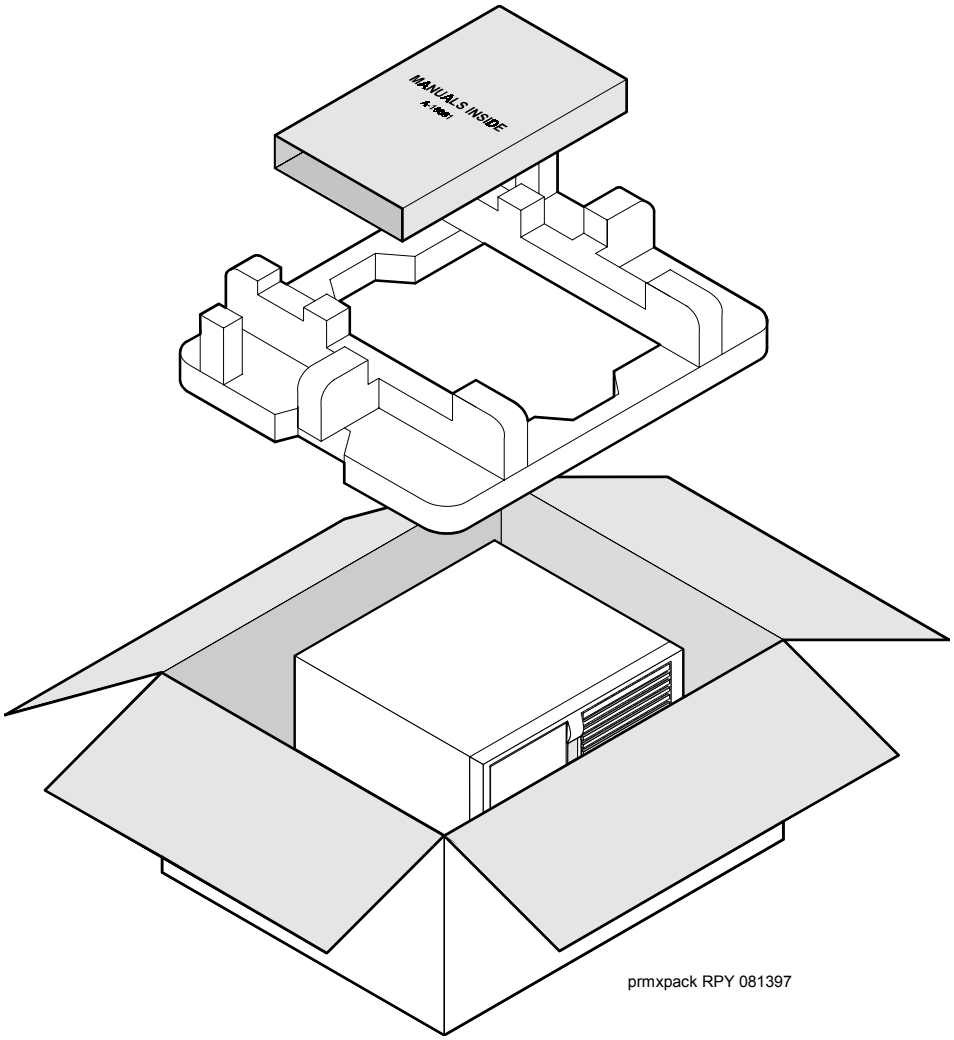


Figure 3-33. Unpacking the MAP/40P

Saving Packing Materials

In case you need to return the MAP/40P to the manufacturer, save the following shipping and packing materials:

- Shipping cartons (MAP/40P, keyboard and monitor)
- Antistatic bags
- Bubble wrap

- Foam inlays

NOTE:
If you ordered multiple MAP/40P units, saving one set of cartons and packing materials should be sufficient.

CAUTION:
The manufacturer does not accept liability for a damaged unit if you do not return it in the original packing materials and carton. The carton has been designed to prevent damage and ensure product warranty.

System Arrangement

The MAP/40P is a desk side unit in a tower configuration (Figure 3-34). It sits vertically on stabilizing feet, which you will install as described in the following "Attaching the Stabilizing Feet" section.

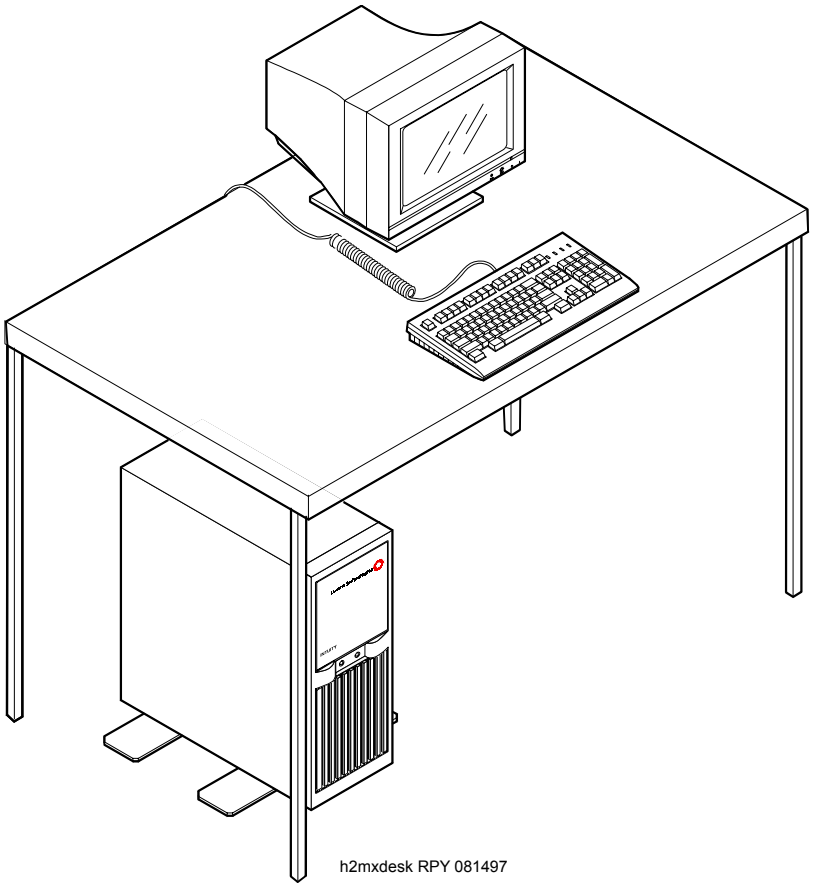


Figure 3-34. MAP/40P Deskside Unit

Attaching the Stabilizing Feet

The manufacturer attaches four screws to the bottom of the MAP/40P to use with the stabilizing feet. See Figure 3-35 for a view of the stabilizing feet.

Complete the following procedures to attach the stabilizing feet:

1. Remove the stabilizing feet from the plastic packet.
2. Remove the paper surrounding the stabilizing feet.
3. Place the MAP/40P bottom up.
4. Turn the stabilizing feet upside down with wings up.
5. Using a No. 2 Phillips head screwdriver, loosen the four mounting screws.
6. Lower the stabilizing feet onto the mounting screws.

7. Rotate the stabilizing feet until they are perpendicular to the MAP/40P.

   NOTE:
   See the manufacturer's instruction sheet included in the plastic packet for more information.

8. Tighten the four mounting screws to secure the feet to the MAP/40P.
9. Grip opposite corners of the chassis and reset the MAP/40P in an upright position.

   NOTE:
   The final position of the MAP/40P must include a front-to-back clearance of at least 16 cm (6 in.) to provide for adequate air intake and exhaust.

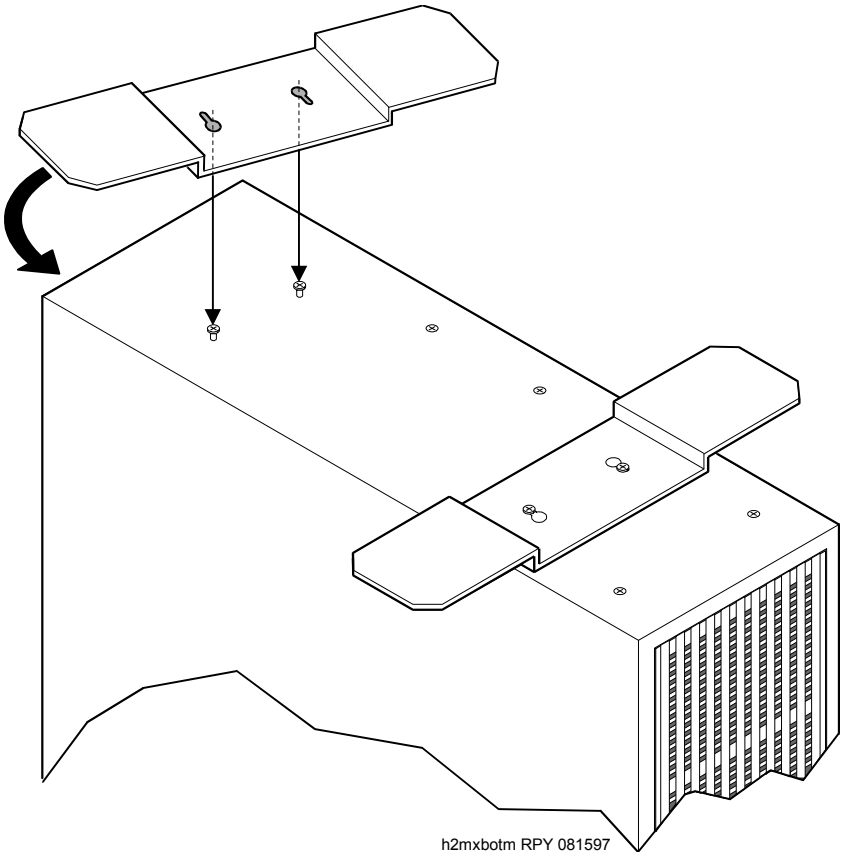


Figure 3-35. Attaching the Stabilizing Feet

Locating Key Components on the MAP/40P

Use the following sections and graphics to locate key components on the MAP/40P.

Three views of the MAP/40P are included:

- Front of the chassis
- Back of the chassis
- Locations of the peripheral drive devices

Front of the Chassis

Figure 3-36 shows the front view of the MAP/40P. The following components are accessible on the front of the MAP/40P:

- Cartridge tape drive
- Diskette drive
- Reset switch
- Power indicator LED
- Disk activity indicator LED
- Power switch

Cartridge Tape Drive

The cartridge tape drive is a peripheral device used to back up and restore files from a tape cartridge.

Diskette Drive

The diskette drive is a peripheral device used to provide storage and random access to the operating system, application software, and speech data.

Reset Switch

The reset switch resets the MAP/40P.

Power Indicator LED

The power indicator LED lights green when the power is on.

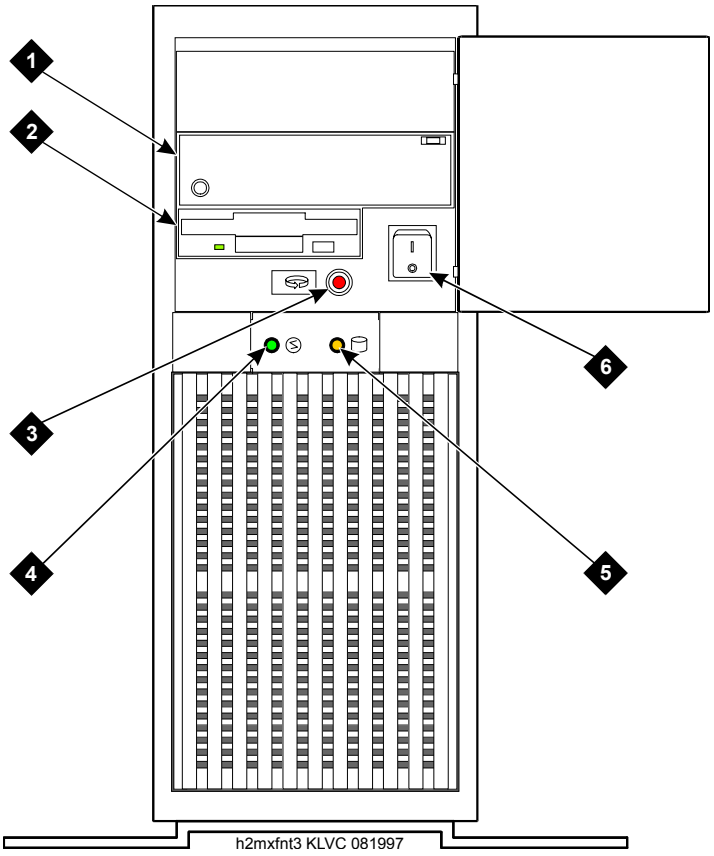
Disk Activity Indicator LED

The disk activity indicator LED lights yellow when the hard disk is active.

Power Switch

The power switch turns the MAP/40P on and off.

Figure 3-36 shows the front view of the MAP/40P.



1. Cartridge tape drive
2. Diskette drive
3. Reset switch
4. Power indicator LED
5. Disk activity indicator LED
6. Power switch

Figure 3-36. Front View of the MAP/40P

Back of the Chassis

These key components are accessible from the back of the MAP/40P chassis:

- AC power inlet receptacle
- AC power supply outlet
- External SCSI connector

- Parallel port
- COM2
- Keyboard connector
- Power supply fan exhaust
- Mouse connector
- Video connector
- COM1

See Figure 3-37 for the locations of these components on the MAP/40P.

AC Power Inlet Receptacle

The AC power inlet receptacle connects the MAP/40P to the AC power source through a 3-prong, 5/10A, 110/230V power cord.

AC Power Supply Outlet

The AC power supply outlet connects the MAP/40P to the monitor using a 2 m (6 ft) monitor power cord.

External SCSI I/O Connector

The external SCSI I/O connector provides an external SCSI connector and an active termination for the SCSI bus. No terminating resistor is shown in Figure 3-37.

Parallel Port

The parallel port communicates with the printer through a 25-pin female plug.

COM2

COM2 is reserved for Avaya remote support.

Keyboard Connector

The keyboard connector connects the keyboard to the MAP/40P through a 6-pin female circular DIN plug.

NOTE:
Do not use the keyboard receptacle for any other purpose than to connect the keyboard.

Power Supply Fan Exhaust

The power supply fan exhaust maintains air flow within the chassis.

Mouse Connector

The mouse connector provides a connection to a serial mouse, although the MAP/40P does not use a mouse.

NOTE:
Do not use the mouse connector for any other purpose.

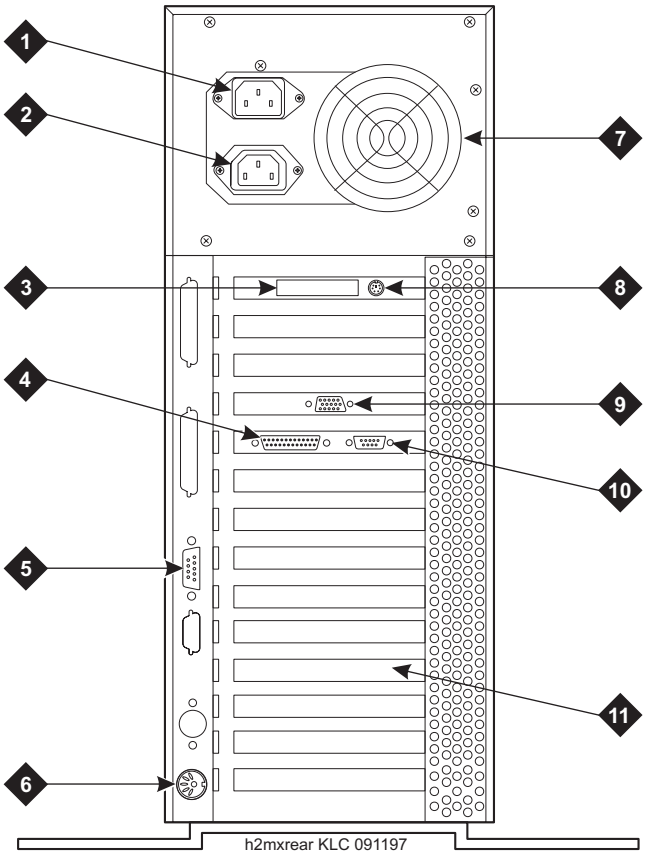
Video Connector

The video connector connects the MAP/40P to the monitor through a 15-pin female D subminiature plug.

COM1

COM1 provides RS-232 connectivity through a 9-pin male D subminiature plug.

Figure 3-37 shows the back view of the MAP/40P.



1. AC power inlet receptacle
2. AC power supply outlet
3. External SCSI I/O connector
4. Parallel port
5. COM2
6. Keyboard connector
7. Power supply fan exhaust
8. Mouse connector
9. Video connector
10. COM1
11. MSM interface card

Figure 3-37. Back View of the MAP/40P

Locations of Peripheral Drive Devices

The MAP/40P contains the following peripheral drive devices:

- Cartridge tape drive
- Diskette drive
- Hard disk drives

See Figure 3-38 for the location of peripheral drive devices.

NOTE:
The specifics of these devices are subject to change.

Cartridge Tape Drive

The cartridge tape drive is a SCSI component used for back-up and restore functions and to load the system.

Diskette Drive

The diskette drive uses 3.5-inch 1.44-Mbyte high-density diskettes. It is used for system configuration and diagnostic testing.

Hard Disk Drives

The following 2-Gbyte SCSI hard disk drives are available in the MAP/40P:

- Hard disk 0
- Hard disk 1

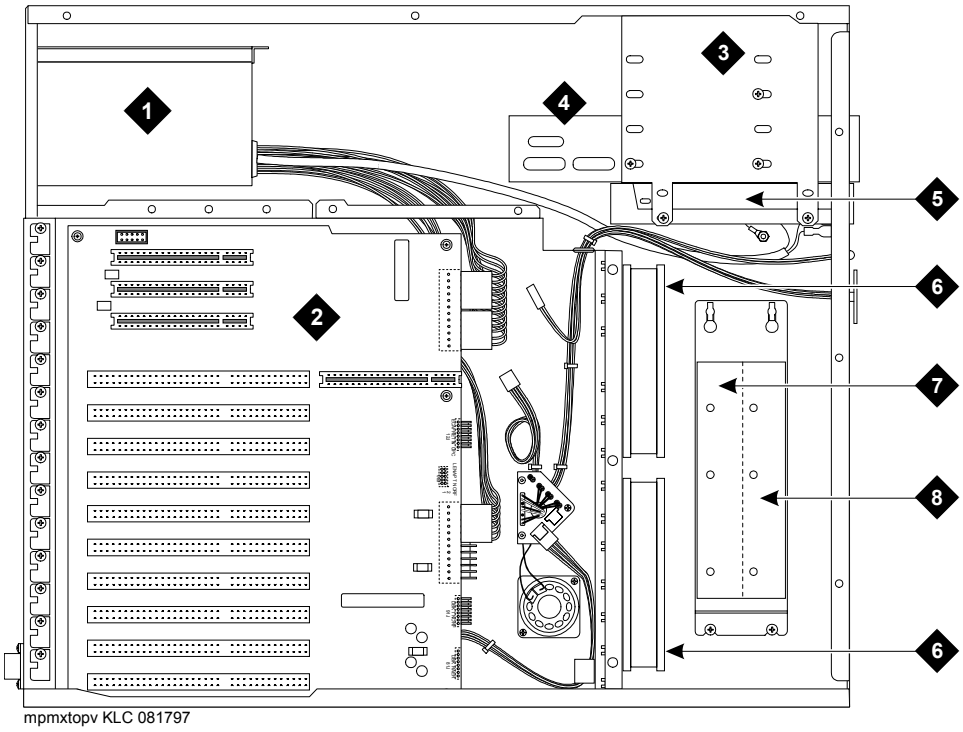
MAP/40P hard disk drives are located between the lower front dress cover and the two circuit card cage fans.

NOTE:
For more information on hard disk drives, see the maintenance book specific to your platform.

Hard Disk 0. Hard disk drive 0 is present in all systems. It is located in the rear slot of the hard disk drive support box, toward the circuit card cage fans. It stores the operating system, application software, and speech data.

Hard Disk 1. Hard disk drive 1 may or may not be present in your system. If it is installed, it is located in the front slot of the hard disk drive support box, toward the lower front dress cover. Hard disk 1 can be used for mirroring.

Figure 3-38 includes a side view of the MAP/40P peripheral drive device locations.



1. Power supply
2. Backplane
3. Empty peripheral bay
4. Cartridge tape drive
5. Diskette drive
6. Circuit card cage fans
7. Hard disk drive 0
8. Hard disk drive 1 (if used)

Figure 3-38. Side View of MAP/40P Including Locations of Peripheral Drive Devices

Chassis Cooling System

Air must circulate inside and around the MAP/40P chassis to prevent components from overheating, which can cause system malfunctions.

There are two ways to maintain proper temperatures within the MAP/40P:

- Interior fans
- Proper clearance around the chassis

Interior Fans

The fans in the MAP/40P help maintain air flow in the unit to prevent components from overheating, which can cause components to malfunction.

The cooling system for the MAP/40P includes three fans:

- Two circuit card cage fans
- Power supply fan

Circuit Card Cage Fans. The circuit card cage fans are located, one on top of the other, behind the hard disk drive(s) of the MAP/40P. Air flows through the circuit card cage fan and exits through vents in the back of the MAP/40P.

Power Supply Fan. The power supply fan is located within the power supply. This fan exhausts air to the rear of the unit.

Proper Clearance Around the Chassis

You must maintain clearance around the chassis so that air can circulate to prevent overheating. The final position of the MAP/40P must include a front-to-back clearance of at least 16 cm (6 in) to provide for adequate air intake and exhaust. You must also leave a minimum of 5 cm (2 in) space along both sides of the chassis.

MSM Hardware Needed for T.120 Support

The following dedicated hardware is needed in the MSM cabinet for interfacing between the ESM and MSM to support T.120 Data Conferencing:

- ESM-MMI, TN787 circuit pack
- ESM-DS1, TN2207 E1 circuit pack, 32CH
- Y-Cable, ED1E434-11,G506
- 356A Adapter, 50-Pin to 8-by-8 Pin Module Plug
- D8W Cable

Installing the ESM-MMI and ESM-DS1 Circuit Packs

The ESM-MMI and ESM-DS1 circuit packs are cabled together using the Y-cable. Therefore, these circuit packs must be physically located in adjoining port slots in the MCU cabinet. If two adjoining slots are not available, rearrange the existing universal port circuit packs to create a pair of available adjoining slots.

Insert the TN787 ESM-MMI circuit packs into one of the two slots. It is recommended that the ESM-MMI circuit pack be installed into the slot to the right of the ESM-DS1 circuit pack to simplify cable management later. Record the location of the ESM-MMI circuit pack (Port Network and Board Number). This information is required later for administering the TN2207 ESM-DS1 circuit pack.

NOTE:
The ESM-MMI circuit pack is labeled simply as a TN787 MMI circuit pack. It is the same as any other MMI circuit pack used for H.221 network

interfacing or BONDing work. The circuit pack takes on the name “ESM-MMI” only from the context of the application in which it is going to be used in the system. When administration of the ESM-DS1 circuit pack is completed properly (for example, defining this pair of circuit packs as dedicated for T.120 support), the TN787 circuit pack automatically reconfigures its on-board firmware to operate in a T.120 mode rather than in an H.221 or BONDing mode. Again, the ESM-MMI circuit pack is physically and electrically identical to and labeled the same as every other MMI circuit pack, and it can be substituted with any other TN787 circuit pack in the system for maintenance reasons.

Before installing the TN2207 ESM-DS1 circuit pack into the system, first verify its on-board jumper/switch configuration to ensure that it is configured as a 32-channel E1 circuit pack and not as a 24-channel DS1 circuit pack. Move the jumper to the 32-channel position, and insert the TN2207 ESM-DS1 circuit pack into the slot directly to the left of the ESM-MMI circuit pack.

NOTE:
Be sure to take proper ESD precautions, including using a grounded wrist strap, when handling the MMI and DS1 circuit packs.

Set the switches on the TN2207 circuit pack to select bit rate and impedance match. See the following table and figure.

Table 3-3. Option Switch Settings On the TN2207

120 Ohms	Twisted pair
75 Ohms	Coaxial requiring 888A adapter
32 Channel	2.048 Mbps
24 Channel	1.544 Mbps

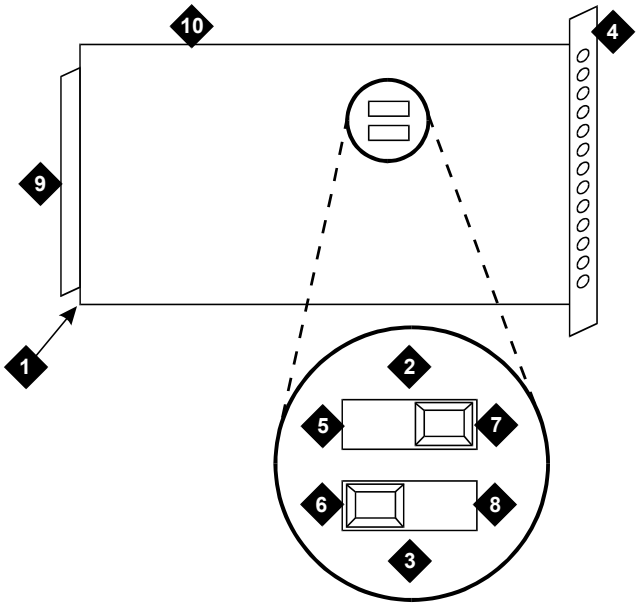


Figure Notes:

1. Backplane Connectors
2. 24/32 Channel Selector
3. 75/120 Ohm Selector
4. Faceplate
5. 32 Channel
6. 120 Ohm (shown selected)
7. 24 Channel (shown selected)
8. 75 Ohm
9. Connector
10. TN2207

Figure 3-39. TN2207 Option Settings

NOTE:
The standard configuration for TN2207 circuit packs shipping from the factory is 24-channel DS1 service with a termination impedance of 120 ohms (24CH/120ohm). Therefore, the 24/32CH jumper/switch must be deliberately moved to the 32CH E1 position before installing the TN2207 circuit pack as an ESM-DS1 circuit pack. If this is not done, the ESM-MSM Link will never establish itself as in-service. The impedance can remain at the factory default setting.

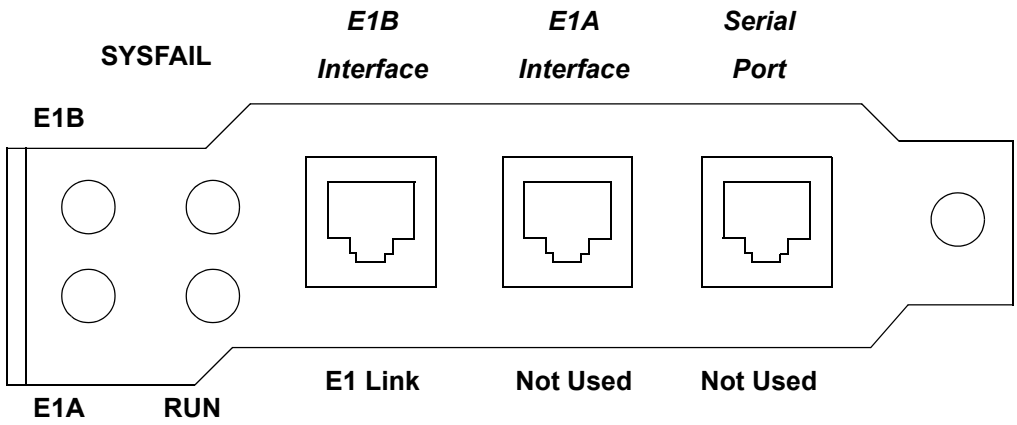


Figure 3-40. Rear Bracket of the MSM Interface Card

Connecting the MSM to the ESM

Use the following figure to connect the MSM to the ESM.

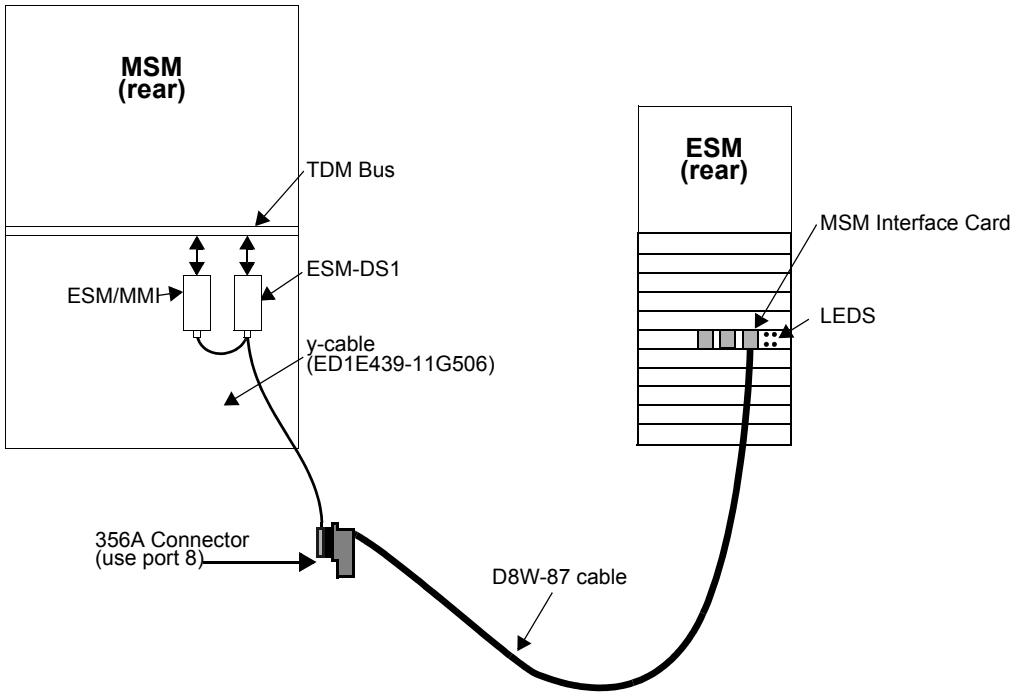


Figure 3-41. Cabling the ESM / MSM Link

Connecting the Monitor

This section describes how to make the connections between the MAP/40P and a monitor.

Required Cabling for Monitor

Two cables connect the monitor to the MAP/40P:

- Video cable connector
- Power cable

Video Cable Connector

The video cable connector has a video input connector at one end. The other end of the cable is permanently attached to the monitor.

Power Cable

The power cable has a male plug at one end and a female plug at the other end.

Connecting Monitor Cables

To connect the monitor cables:

1. Plug the video cable connector from the monitor directly into the video connector located on the back of the MAP/40P. See Figure 3-37 for the location of the video connector.
2. Tighten the thumbscrews on the video cable connector with your fingers or with a small flat-blade screwdriver.
3. Plug the female end of the power cable into the monitor.
4. Plug the male end of the power cable into a grounded outlet.

Connecting the Keyboard

A 6-pin female DIN receptacle is located in the back of the MAP/40P. The mating male plug is provided with the keyboard. Both of the connector assemblies are keyed to provide proper alignment. See Figure 3-37 for the location of the keyboard connector.

NOTE:
Do not use the keyboard receptacle for any other purpose than to connect the keyboard. Do not plug the keyboard into the mouse connector.

Figure 3-42 shows the receptacle and plug.

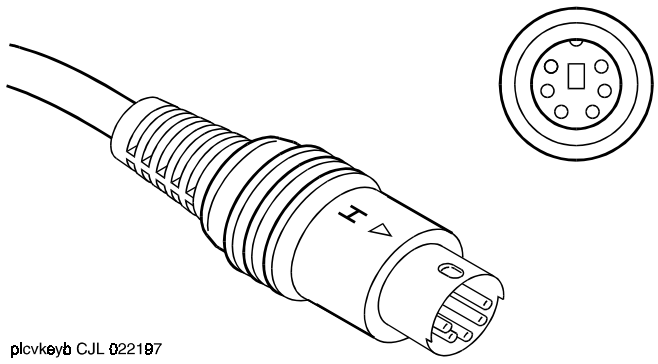


Figure 3-42. Circular DIN 6-Pin Connector for the Keyboard

Connecting the Modem for Remote Access to the ESM

The ESM can be reached remotely via either the COM2 port on the ESM or the Remote Maintenance Board (RMB).

NOTE:
Newer MCU systems (starting with Release 5.0) are made available *without* the RMB and therefore use the COM2 port for remote access. This is true even in the US.

Connection Via COM2 Port

The following sections discuss how to add and administer a modem on the COM2 port of the ESM.

UNIX Port Monitor Configuration

This step is required to configure the ttymon port monitor deamon, to monitor the COM2 port, and to spawn the required service on the port.

1. Log in as root.
2. Invoke sysadm by typing **sysadm.** The Sysadm Menu appears.

   NOTE:
   Ensure that this is in your path.

3. From the Sysadm Menu, select “ports” and press ENTER.
4. In the resulting form, select “port_monitors” and press ENTER.
5. Select “add.”
6. Populate the resulting form as follows:
   - *port monitor tag*: **ttymon3**
   - *port monitor type*: **ttymon**
   - *Command to start the port monitor*: **/usr/lib/saf/ttymon**
   - *start port monitor immediately*: **Yes**
   - *Start state*: **ENABLED**
   - *Restart Count*: **0**
7. Submit the form by selecting F3.
8. From the second menu, select “port_services.”
9. Select “add.”
10. Select “add to many.”
11. Select “ttymon.”

12. Populate form-6 as follows:
    - *Service tag*: **tty01**
    - *Identification and authentication scheme*: **login**
    - *service invocation identity*: (leave blank)
    - *port/service state*: **enabled**.
    - *utmp entry to be created for this service*: **Yes**
    - *Version Number*: (leave the default value)
13. Submit the form by selecting F3.
14. Populate the resulting form as follows:
    - *Name of TTY device*: **/dev/tty01h**
    - *ttylabel*: **9600**
    - *Service command*: **/usr/bin/shserv**
    - *tty line options*:
        - *hangup*: **Yes**
        - *Connect-on-carrier*: **No**
        - *Bidirectional*: **No**
        - *Wait-read:* **No** (count “blank”)
    - *Timeout*: **0**
    - *Prompt message*: **login**
    - *Modules to be pushed*: **ldterm**
15. Leave the rest of the form and submit it.
16. For “quick_terminal,” select “add” and populate as follows:
    - *Port Number*: **/dev/tty01h**
    - *speed*: **9600**
17. For “tty_settings,” select “add” and populate as follows:
    - *Ttylabel*: **ttymon3**
    - *Enable autobaud*: **Yes**
    - *Baud Rate*: (leave blank)
    - *Nextlabel*: **auto**.
18. Leave the default values for the initial line settings and final line settings.
19. Save the form by selecting F3.
20. Shut down and restart the machine.

Configuring the 3820 Modem Via a Terminal

Use the following procedure to configure the 3820 via a terminal rather than on the control panel of the modem.

1. Connect a terminal to the 3820 modem.
2. See the documentation provided with the terminal and make sure that the terminal is acting as a DTE.
3. Set the terminal line to eight bits, no parity, and one stop bit.
4. Set the baud rate of the terminal line to the required modem speed.

   For example, for the 3820 modem attached to the remote maintenance port, set the terminal line to a baud rate of 9600.
5. Enter **AT** on the terminal.

   If the modem returns “OK,” it is ready to accept AT commands from the terminal. If the modem does not return OK, check the connection and the terminal setup.
6. Enter the following AT command:

   AT&TF3L0&D2&S1\N0\Q3S41=<*dial line rate*>*S2=128&W0*

   where <*dial line rate*> is one of the following values:

   3=9600

   5=4800

   6=2400

   7=1200 (V.22)

   8=1200 (212A)

   20=19200

   For example, to set the 3820 modem for COM2 use where the baud rate is 9600, enter **3** as the <*dial line rate*> as shown below:

   AT&TF3L0&D2&S1\N0\Q3S41=3S2=128&W0

   The modem should return “OK.”

Connecting the UPS

Connect the UPS as follows:

1. Check the labels on the UPS to verify that the UPS input voltage (115v or 230v) is appropriate for your site.
2. Check the bank of option switches to verify Switch 1 is set correctly for your site (60hz or 50hz). The remaining option switches can be left in their default (off) position.

3. Place the UPS on its feet in a well-ventilated area away from any heat sources or sunlight. The UPS should be within seven feet of the UPS so that the UPS alarm cable can reach the RMB board in the ESM (where used).
4. For 230v units, plug the appropriate end of the UPS power supply cord into the input connector located on the UPS rear panel. For 115v units, the power supply cord is already built into the UPS.
5. For 115v installations where the RMB board is used, connect the UPS alarm cable from the DB-9 UPS communications port to the UPS port on the RMB board in the ESM.
6. Plug the UPS power supply cord into a grounded, 3-wire AC receptacle.

   NOTE:
   Do not use a ground plug adapter with the power supply cord. If you cannot completely insert the power supply cord plug into the outlet, contact your electrician for a replacement.

7. Turn on the UPS by pressing the ON/OFF button. The UPS performs a self-test, and it verifies the utility line voltage and frequency. The alarm beeps (to indicate a successful test) and the indicator illuminates. Turn the UPS off.

   NOTE:
   The UPS is shipped with a fully-charged battery. However, the UPS may lose some battery charge during shipping and storage. You may use the UPS immediately after unpacking; however, it may not provide its full rated backup time during a power failure. The unit needs to operate for 24 hours before full backup battery time can be expected.

8. Verify that the ESM is set to operate on the correct voltage (115v or 230v). Check the label on the back of the ESM for instructions on how to change, if necessary, the input voltage setting.
9. Plug the ESM power cord into the UPS.

Powering Up the ESM

The ESM can operate on either international or domestic power, either of which is switch-selectable. The ESM may be AC-powered or DC-powered. The manufacturer labels the platform to indicate which intake voltage (either 115 VAC or 220 VAC) the ESM has been set to accommodate. Check the label.

If it is necessary to change the input voltage or verify the setting, check the rocker switch on the back of the ESM. This switch is located in the upper-left corner between the power outlet and the inlet receptacles.

To power up an ESM used *with a UPS*, do the following:

1. Turn on the UPS.
2. Turn on the power switch to the monitor. An indicator light should come on.
3. Turn on the power to the ESM by using the power switch on the front panel of the ESM.

To power up an ESM *for which a UPS is not being used with an AC-powered system*, do the following:

1. Provide a dedicated source of commercial power for the ESM
2. Verify that the ESM is set to operate on the correct voltage (115v or 230v). Check the label on the back of the ESM for instructions on how to change the input voltage setting, if necessary.
3. Plug the UPS power supply cord into a grounded, 3-wire AC receptacle.

NOTE:
Do not use a ground plug adapter with the power supply cord. If you cannot completely insert the power supply cord into the outlet, contact your electrician for a replacement.

Connecting the System to the AC Power Supply

The ESM can operate on the full range of global AC power sources. An AC Input Voltage Selection Switch is located on the rear of the unit. This allows the ESM to operate at the traditional 120 Volt AC and 230 Volt AC levels. The recommended ranges of operation are 90V to 135V and 189V to 270V, respectively. The manufacturer labels the ESM PC rear chassis to indicate which intake voltage (115 VAC or 230 VAC) the ESM is set to accommodate.

CAUTION:
Check the position of the Voltage Select Switch before applying AC Input power to the ESM.

If it is necessary to change the intake voltage or verify the setting, check the rocker switch on the back of the AC-powered ESM. This switch is located in the upper-left corner of the rear plate of the ESM between the power outlet and the power receptacles.

Provide a dedicated line to the ESM. Use the following procedure to ensure that the system is connected properly to the power outlet and is receiving power.

1. Plug one end of the ESM power cord into the AC on the rear of the unit.
2. Place the monitors switch in the ON position.
3. Turn on the power switch in the front of the ESM.

   The green lamp labeled POWER ON on the front of the unit should light. Resident diagnostics should be initiated on the monitor.

4. A green amber lamp should light on the front bottom, screen base area of the monitor.
5. If the monitor lamp does not light, or if diagnostics are not initiated on the monitor screen, recheck the power connections.

Loading ESM Software

Refer to the instructions in the MCU Maintenance document for the latest software installation instructions whenever you are performing an ESM software upgrade on a system that is already installed. New installations arrive from the factory with the ESM software already loaded and tested.

ESM Software Requirements

To install or upgrade system software on the ESM successfully, the following components are required:

- ESM Boot Diskettes 1, 2, and 3
- ESM System Cartridge Tape

ESM Shutdown Procedures

At any time during an ESM software installation, you may be instructed to perform a shutdown of the system. Execute the following sequence of UNIX commands directly to complete a proper shutdown of the UNIX operating system and to kill all running ESM Application software processes.

1. Log in as “inads.”
2. Enter **ESMSHUT**. This will take from 10 to 30 seconds.
3. Even though it says to wait for the system to shut down and display “Press CTRL_ALT_DEL to Reboot.” Do not press “(CTRL_ALT_DELETE).”
4. To turn off (if desired) the ESM at this time, power off the machine at the ON/OFF switch at the front of the unit.

NOTE:
It is recommended that the “Reset” button on the front of the ESM not be used.

WARNING:
Interruption of the ESM input power without first performing a proper UNIX shutdown sequence can cause file corruption. This can render the ESM in-operational and require reinstalling all ESM system software.

Post-Installation Cleanup

If the unit needs cleaning after installation, use the procedures in the following sections.

Cleaning the Chassis Exterior

Disconnect the power source before cleaning. Follow the proper shutdown procedures as outlined in the “Routine Maintenance Procedures” section (to be supplied). Use a mild detergent on a damp cloth to clean the chassis. If you use a spray cleaner, also use a cloth. Dampen the cloth with the cleaner and wipe the chassis surface. Using a spray directly could seep into the chassis and cause damage.

Cleaning the Monitor

Local office supply centers sell CRT screen cleaning wipes (wet pads). Use only these wipes to clean the screen. Follow directions provided with the product. Other than the CRT screen, clean the exterior monitor in the same manner as the chassis exterior. Use a mild detergent or a damp cloth. If you use spray cleaner, use a cloth. Dampen the cloth with the cleaner and wipe the surface.

Cleaning the Keyboard

Disconnect the keyboard from the ESM. Use a mild detergent on a damp cloth to clean the chassis. If you use a spray cleaner, use a cloth. Dampen the cloth with the cleaner and wipe the surface. There are also keyboard brushes and vacuums available to remove dirt particles from between and under the key buttons.

Cleaning the Cartridge Tape Drive

To clean the cartridge tape drive, use 3M products DC-6320 or 3M DC 6150 cleaning tape cartridges. These are available at your local computer or office supply store. Follow the instructions provided.

Cleaning the Floppy Diskette Drive

If you find that you can no longer read or write when the floppy disk is in use, have the drive replaced. The manufacturer recommends not cleaning the disk heads because they are susceptible to scratching and are easily damaged.

Cleaning the Air Filter

The air filter is located in the front of the chassis in the lower bezel cover, and it is reusable. The air filter should be checked and cleaned on a regular basis. (See the “Routine Maintenance Procedures” section.) To remove the air filter and clean it, use the following procedure.

1. Press down on the center tab at the top of the lower bezel and pull forward to remove the bezel.
2. Remove the air filter.
3. Wash with mild soap and water.
4. Allow the air filter to thoroughly air dry.

   NOTE:
   Do not use heat to dry the filter, and do not place a wet or damp filter into the computer.

5. Place the dry filter into the lower bezel.
6. Insert the bottom tab of the bezel into the exterior chassis bezel.
7. Bring the bezel forward and press the center tab down.
8. Lock into place.

The procedure is now completed.

Installing the Management Terminals

The management terminal must be located within 50 feet (15.2 m) of the system. It may be necessary to reduce the maximum distance limitation if higher gauge wire is used or if the capacitive load on the line is increased.

In general, the terminal must be connected directly to the system with the shortest possible cable. For maintenance purposes, the terminal must be located in the same equipment room as the system or in sight of the system.

NOTE:
The management terminal in Figure 3-44 is shown for illustration purposes only and does not represent a specific terminal type.

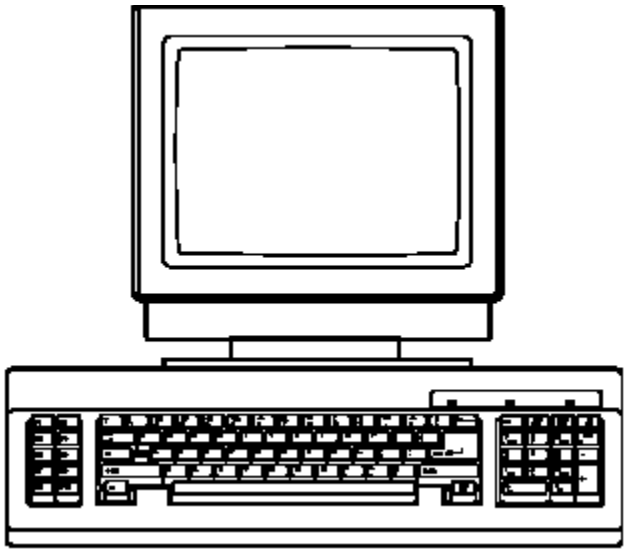


Figure 3-43. Management Terminal and Keyboard

The following types of terminals can be connected to a system:

- 715 BCS
- 2900/715 BCS
- 715 BCS-2

The following notes apply to the installation of the management terminal:

- This chapter emphasizes terminal installation in Release 7 and later systems
- If the terminal connects to a DC-powered system, install a 116A Isolator (comcode 106005242).
- An optional printer may be connected using a locally obtained Electronic Industries Association (EIA) cord.
- See Appendix A, "Option Switch Settings" for printer option switch settings.

Unpack and Inspect

1. Unpack the terminal and inspect for damage. Report all damage according to local requirements.
2. Remove and retain the installation and usage instructions from the carton. These instructions are needed to set up the terminal after it is installed.
3. Set the terminal, keyboard, and all cables onto the equipment room table.

Install a 715 BCS Terminal

1. Plug the keyboard cable into the 6-pin mini-DIN jack on the rear of the terminal. See Callout 2 in Figure 3-45.
2. Plug the supplied 25-pin Data Terminal Equipment (DTE) cable into the P2 port (center connector) on the rear of the terminal.

Install a 715 BCS Terminal (2900/715)

1. Plug the keyboard cable into the 6-pin RJ-11 jack on the left side of the terminal. An adapter cable is available to convert a 6-pin mini DIN jack to an RJ-11 jack to allow a 715 BCS keyboard to be used (comcode 847489895 or 847489903).
2. Plug the supplied 25-pin Data Terminal Equipment (DTE) cable into the P2 port (right side connector). See Callout 4 in Figure 3-45.

Install a 715 BCS-2 Terminal

1. Plug the keyboard cable into the modular keyboard jack on the rear of the terminal. See Callout 5 in Figure 3-45. This is a unique cable and must be connected to the 715 BCS-2 only.
2. Plug the supplied 25-pin Data Terminal Equipment (DTE) cable (H600-426) into the COM1 port (right side connector).

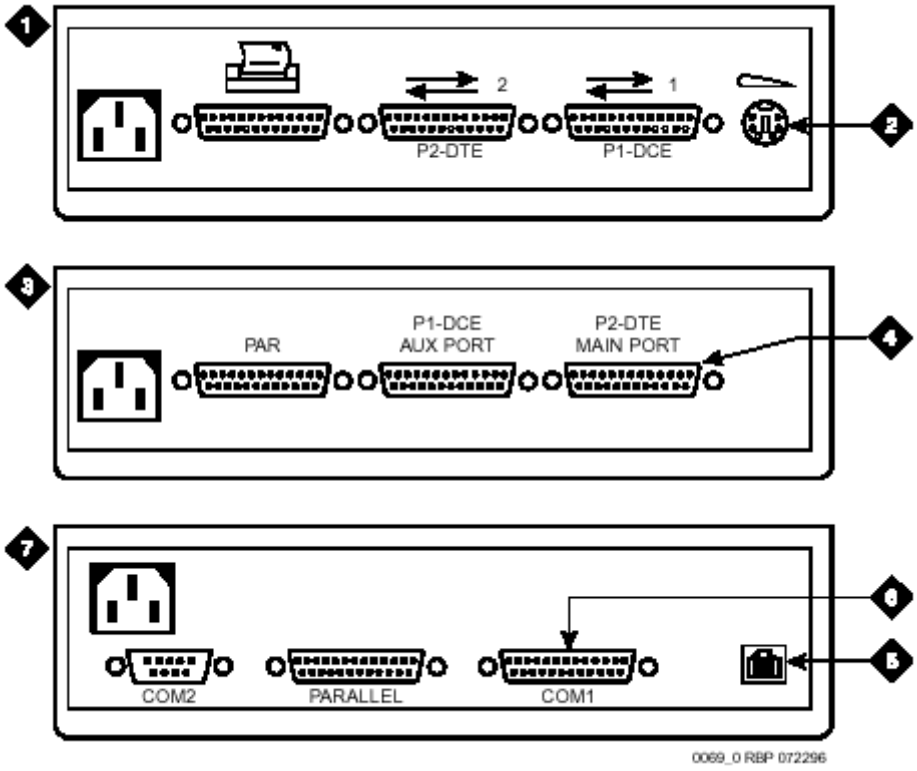


Figure 3-44. Rear Panels on Management Terminals

Figure Notes

1. Rear Panel of 715 BCS Terminal
2. 6-Pin Mini DIN Connector
3. Rear Panel of 2900/715 BCS Terminal
4. P2-DTE Port
5. Modular Keyboard Jack
6. COM 1 Port
7. Rear Panel of 715 BCS-2

Connect to the System (Single Carrier Cabinets)

Single-Carrier Cabinets

To connect the management terminal to a Compact Single-Carrier Cabinet, skip to page 3-8.

NOTE:
If the system is DC-powered, skip to "Connecting DC Power to Single-Carrier MSMs" on page 3-22.

1. Route the 25-pin Data Terminal Equipment (DTE) cable (H600-426) from the terminal to the rear of the Control Cabinet.
2. For a standard reliability system, plug the cable into the **TERM** connector. See Figure 3-45. For a high or critical reliability system, plug the cable into the **DOT** (Duplication Option Terminal) connector.

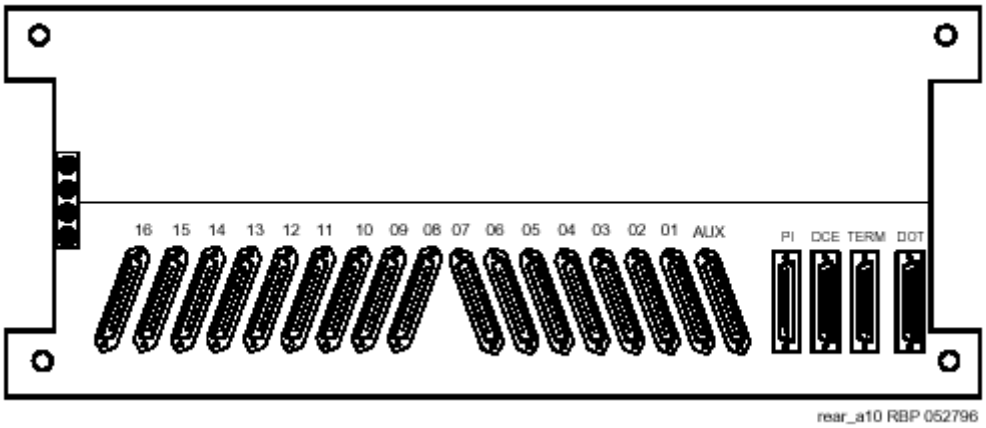


Figure 3-45. Typical Management Terminal Connections

3. Plug the terminal AC power cord into the AC receptacle on the terminal.
4. Plug the opposite end of the power cord into the AC power receptacle.
5. Set the terminal power switch to the **ON** position.

DC-Powered Systems Only

If the terminal is connected to a DC-powered system, a 116A Electronic Industries Association (EIA) Isolator (comcode 106005242) must be installed in series with the 25-pin Data Terminal Equipment (DTE) cable. See Figure 3-47

1. For a standard reliability configuration, plug the 116A isolator into the **Term** connector on the Control Carrier. See figure 3-48.
2. For a high and critical reliability configuration, plug the 116A isolator into the **DOT** (Duplication Option Terminal) connector on the Control Carrier. See figure 3-48.
3. Plug the 25-pin Data Terminal Equipment (DTE) cable (H600-426) from the terminal into the end of the 116A isolator.
4. Plug the terminal AC power cord into the AC receptacle on the terminal.
5. Plug the opposite end of the power cord into the AC power receptacle.

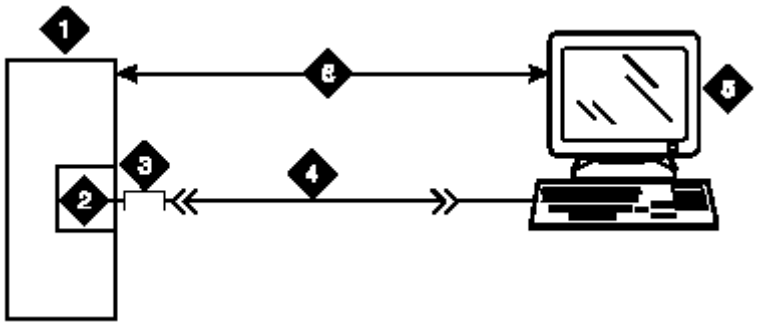


Figure 3-46. Direct Connections to Management Terminal

Figure Notes

1. Processor Port Network (PPN)
2. TERM or DOT Connector (As Appropriate)
3. 116A Isolator
4. M25B Cable (50 ft, [15 m] Maximum)
5. Management Terminal 6. 50 ft (15 m) Maximum

Remotely Connect Terminal

Typical remote connections are shown in Figure 3-48.

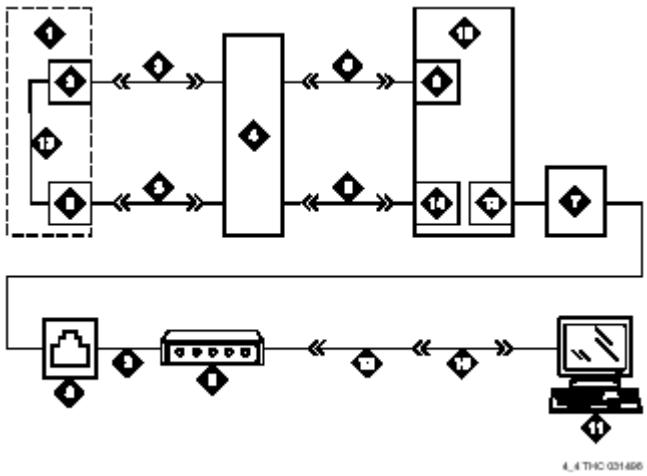


Figure 3-47. Typical Connections to Remote Devices

Figure Notes

1. External Modem Pool
2. 7400A Data Module
3. Line Cord
4. Main Distribution Frame (MDF)
5. B25A Cable (Male to Female)
6. TN754 Digital Line 4-Wire Circuit Pac k
7. Public Switched Telephone Network
8. 103A or Modular Wall Jack
9. Modem
10. A DB9 to DB25 Converter (ED3-1-70, G115) May Be Required on a Personal Computer (PC)
11. Remote Management Terminal or Other Remote Device (Call Detail Recording Utility, CAS+, Property Management System, Basic Call Management System, System Journal Printers, Cost Allocator)
12. M25A Cable

13. Can Be Any of the Following Trunk Circuit Packs: TN747, TN753, TN760, TN767, TN2464, TN2147, TN465, and so forth.
14. Can Be Any Analog Line Circuit Pack
15. Single-Carrier Cabinet System

Compact Single-Carrier Cabinets

To continue the installation:

1. Plug the terminal AC power cord into the AC receptacle on the terminal.
2. Plug the opposite end of the power cord into the AC power receptacle.
3. Set the terminal power switch to the **ON** position.

Set Up Management Terminal

Each management terminal requires a different setup procedure. Refer to the installation and usage instructions packed with the management terminal.

Connect to the System (Multicarrier Cabinets)

1. Route the 25-pin DTE cable from the terminal to the rear of the system.
2. Connect the cable to the TERM connector.
3. Plug the AC power cord into the AC receptacle on the terminal. Plug the opposite end of the power cord to the AC receptacle located at the bottom rear of the cabinet, or into the selected AC receptacle.
4. Set the terminal power switch ON.
5. For a DC-powered system, install an EIA 116A Isolator (comcode 106005242) in series between the DTE cable and the TERM or Terminal Active connector.

Remotely Connect Terminal

A management terminal can be installed at some distance from the system. Typical remote connections are shown in Figure 3-47.

1. Use Z3A2 Asynchronous Data Units (ADUs) and M25A cables on CDRU/CAS+, PMS, SAT PC, BCMS terminal, and Remote SAT.
2. Use Z3A1 ADUs and M25B cables on System/Journal printers.
3. A TN556 ISDN BRI circuit pack is used with the 7500 Data Module.mote Location

Set Up Management Terminal

Each management terminal requires a different setup procedure. Refer to the installation and usage instructions packed with the management terminal.

Install Management Applications

The PC-based Management Applications are installed according to the complete installation instructions provided in Management Applications Operations, 585-229-202.

Installing the MCU-ST or System Printer

NOTE:
If the customer purchased the optional Avaya Conference Reservation and Control System (CRCS), it is a plug replacement for the MCU-ST. CRCS allows the reservation agent to use a PC to schedule and reserve conferences on the MCU in advance of the conference date. It replaces the MCU-ST for conference scheduling and 24-hour reservations. See the CRCS Installation document for installation instructions.

The MCU-ST, also known as the remote manager terminal, is primarily used for scheduling conferences but can also be used to perform administration and maintenance functions if needed. The optional system printer is used for printing alarm and system reports.

The MCU-ST and the system printer may be located some distance from the MCU. If the distance between the MCU and the MCU-ST or system printer is greater than 50 feet, it is considered a remote connection. Also, any terminal that is not connected to the DTE connector on the back of the MSM in position “A” is considered a remote connection. A 8400B, 7400B, or 7400A data module (all of which are optional) and an M25B cable are used to connect either the MCU-ST or the system printer to the MCU.

The following table provide requirements concerning each of the data modules.

Table 3-4. Data Module Requirements

Data Module	Circuit Pack	Distance Limit (24 Gauge Wire)	Distance Limit (26 Gauge Wire)
8400B (ALL)	TN2224	3500 ft, 1066 meters	2800 ft, 853 meters
7400B (USA, CA)	TN754	5000 ft, 1524 meters	4000 ft, 1219 meters
7400A (international)			

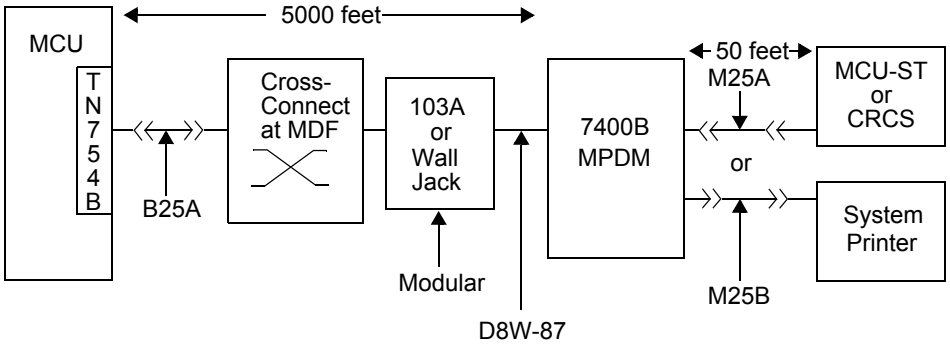


Figure 3-48. Typical Remote Connection for MCU-ST, Avaya CRCS, or System Printer

8400B Data Module

The following figure shows the 8400B data module.

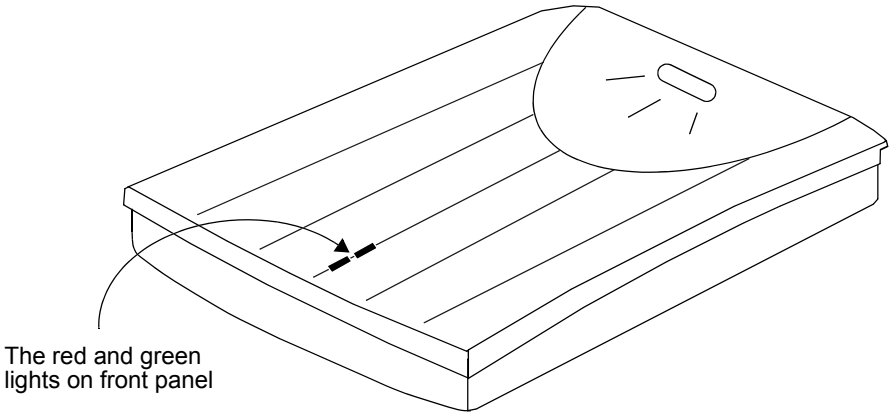


Figure 3-49. 8400B Data Module

Like the 7400B data module, the 8400B data module is a full-duplex asynchronous, data module that provides for simultaneous voice-data communications at the desktop over standard twisted pair wiring. However, it has been designed explicitly to work, in the linked mode, with 2-wire DCP circuits; that is, this data module is a data service link between a DTE device, a 2-wire voice terminal such as the 8400-Series voice terminals, and the MCU.

At the desk, the 8400B data module provides asynchronous communication speeds ranging from 0.3 to 19.2 kbps. The 8400B data module's ability to emulate a Hayes compatible modem interface makes it compatible with many standard PC communications packages that use Hayes Command sets. In addition, the 8400B data module provides a voice dial capability that allows you to initiate voice calls from a PC using industry standard "auto-dialer" PC communications packages.

The 8400B data module can be used as a DCE for host access services, PC, or terminal (DTE) connectivity. The PC or other terminal device is connected to the 8400B data module using a standard EIA-232-D cable and, if needed, the supplied M9/F25 Adapter. This adapter allows connection from a 9-pin jack to a 25-pin jack. A DCP interface (using a D8W-type modular telephone cord) is used to connect the 8400B data module to the MCU.

The 8400B data module provides simultaneous data and voice service. The 8400B works with all DCP voice terminals that support 2-wire operations to provide simultaneous data and voice service.

The voice dial feature allows you to dial a voice call without touching the telephone. Depending on your communications package, you may also store telephone numbers on a PC and recall them for dialing, log phone calls for easy billing, and take notes for later reference during a telephone conversation. In addition, the 8400B data module can be used to automatically turn on the speakerphone of the voice terminal when a voice call is dialed from your terminal device.

The following figure shows a standard configuration in the United States.

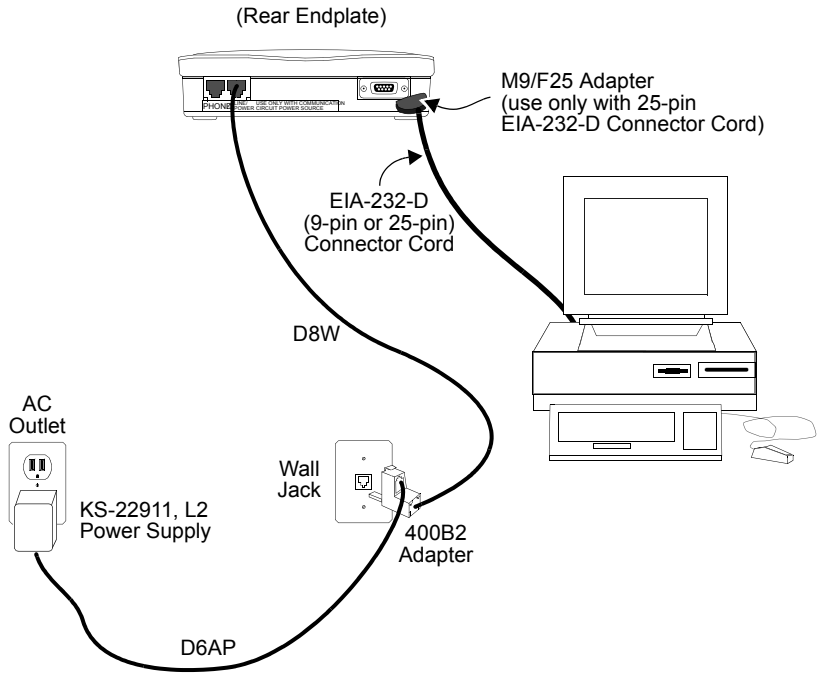


Figure 3-50. Typical 8400B Data Module Configuration in the US

MCU-ST Installation

Install the MCU-ST as follows:

1. Unpack the MCU-ST and inspect for damage.
2. Connect the MAIN COM1 or P2 (DTE) of the MCU-ST to the 7400B data module with an M25B (EIA) cord or equivalent. The 7400B data module is connected with a D8W-87 cable to the wall jack.

   NOTE:
   Refer to the *715GBCS-2 Terminal User's Guide and Service Manual*, 555-230-876, for information on initial setup and power.

3. On the MCU side, connect the B25A cable to the TN754B Digital Line circuit pack.
4. On the MCU-ST, connect the keyboard cord to the KBD jack on the rear of the terminal.

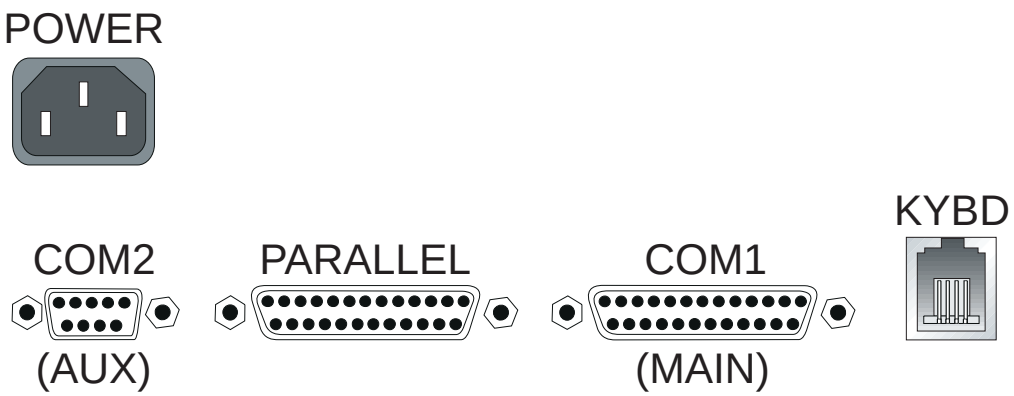


Figure 3-51. MCU-ST Back Panel Connectors

5. Plug in the AC power and turn on the terminal (power switch is at the rear of the terminal).
6. Press TAB until the Keyboard folder tab is highlighted.
7. Press the grey down-arrow and stop on Key Remapping.
8. Press ENTER.
9. Press ENTER/CHG HOST (located at the far right on the keyboard).
10. Press ESC (located at the top left on the keyboard).
11. Type “SB.”
12. Press the grey down-arrow and stop on Save/Exit.
13. Press ENTER.
14. Press CTRL and F1.

Lead Designations for Connections

The following table provides lead designations for terminating the maintenance alarm terminal on the TN754 circuit pack. It also includes the lead designations for terminating 25-pair cables on the TN767 or TN2207 circuit pack. The battery and ground leads for connecting the INADS line or an external alarm are shown for the TN790 Aux Jack circuit pack.

Table 3-5. Lead Designations

110 Pin	Color	ISDN-BRI Line TN556	ISDN-BRI Line 2-Wire TN2198	Analog Line (16) TN746 TN791	Digital Line TN754	Digital Line 2-Wire 24 Ports TN2224B TN2214B	DS1 (UDS1) Tie Trunk TN767 (TN2207)	Aux Jack TN790
01	W-BL	PXR1	T1	T1		T1		Major
02	BL-W	PXT1	R1	R1		R1		Major
03	W-O	TXT1	T2	T2	TXT1	T2		Minor
04	O-W	TXR1	R2	R2	TXR1	R2		Minor
05	W-G	PXR2	T3	T3	PXT1	T3		
06	G-W	PXT2	R3	R3	PXR1	R3		
07	W-BR	TXT2	T4	T4		T4		
08	BR-W	TXR2	R4	R4		R4		
09	W-S	PXR3	T5		TXT2	T5		
10	S-W	PXT3	R5		TXR2	R5		
11	R-BL	TXT3	T6		PXT2	T6		
12	BL-R	TXR3	R6		PXR2	R6		
13	R-O	PXR4	T7			T7		
14	O-R	PXT4	R7			R7		
15	R-G	TXT4	T8		TXT3	T8		
16	G-R	TXR4	R8		TXR3	R8		
17	R-BR	PXR5	T9	T5	PXT3	T9		
18	BR-R	PXT5	R9	R5	PXR3	R9		
19	R-S	TXT5	T10	T6		T10		
20	S-R	TXR5	R10	R6		R10		
21	BK-BL	PXR6	T11	T7	TXT4	T11		E. GND
22	BL-BK	PXT6	R11	R7	TXR4	R11		M. -48
23	BK-O	TXT6	T12	T8	PXT4	T12		E. GND

Table 3-5. Lead Designations (Continued)

110 Pin	Color	ISDN-BRI Line TN556	ISDN-BRI Line 2-Wire TN2198	Analog Line (16) TN746 TN791	Digital Line TN754	Digital Line 2-Wire 24 Ports TN2224B TN2214B	DS1 (UDS1) Tie Trunk TN767 (TN2207)	Aux Jack TN790
24	O-BK	TXR6	R12	R8	PXR4	R12		R. -48
25	BK-G	PXR7		T9		T13		G. GND
26	G-BK	PXT7		R9		R13		- -48
27	BK-BR	TXT7		T10	TXT5	T14		X. GND
28	BR-BK	TXR7		R10	TXR5	R14		T. -48
29	BK-S	PXR8		T11	PXT5	T15		R. GND
30	S-BK	PXT8		R11	PXR5	R15		P. -48
31	Y-BL	TXT8		T12		T16		O. GND
32	BL-Y	TXR8		R12		R16		W. -48
33	Y-O	PXR9			TXT6	T17		E. GND
34	O-Y	PXT9			TXR6	R17		R. -48
35	Y-G	TXT9			PXT6	T18		
36	G-Y	TXR9			PXR6	R18		
37	Y-BR	PXR10				T19		A. GRD
38	BR-Y	PXT10				R19		C. -48
39	Y-S	TXT10			TXT7	T20		C. GND
40	S-Y	TXR10			TXR7	R20		P. -48
41	V-BL	PXR11		T13	PXT7	T21		W. GND
42	BL-V	PXT11		R13	PXR7	R21		R. -48
43	V-O	TXT11		T14		T22	L1*	
44	O-V	TXR11		R14		R22	L1	
45	V-G	PXR12		T15	TXT8	T23	L0	EXT.
46	G-V	PXT12		R15	TXR8	R23	L0*	ALARM
47	V-BR	TXT12		T16	PXT8	T24	LBACK2	
48	BR-V	TXR12		R16	PXR8	R24	LBACK1	
49	V-S							T (INADS)
50	S-V							R (INADS)

* Denotes the ring side or high side of a pair.

The following table shows the pinouts for the TN2303 Series 3 Interface.

Table 3-6. TN2303 Series 3 Pin Connections

TN2303 Series 3			
Function	**Amphenol Pin**	**Backplane Pin**	**RJ45 Pin**
RX+	44	308	3
RX-	19	208	6
TX+	43	307	1
TX-	18	207	2
GND	45	309	7
GND	20	209	8
GND	42	306	5
GND	17	206	4

The following table shows the pinouts for the TN2185 ISDN-BRI 4-wire S Interface.

Table 3-7. TN2185 ISDN-BRI — 4-Wire S Interface Pinout

Port	Signal	Cross-Connect Pin	Color	Amphenol Pin	Backplane Pin
1	TXT.1	1	W-BL	26	102
	TXR.1	2	BL-W	01	002
	PXT.1	3	W-O	27	103
	PXR.1	4	O-W	02	003
2	TXT.2	5	W-G	28	104
	TXR.2	6	G-W	03	004
	PXT.2	7	W-BR	29	105
	PXR.2	8	BR-W	04	005
3	TXT.3	9	W-SL	30	106
	TXR.3	10	SL-W	05	006
	PXT.3	11	R-BL	31	107

Table 3-7. TN2185 ISDN-BRI — 4-Wire S Interface Pinout (Continued)

Port	Signal	Cross-Connect Pin	Color	Amphenol Pin	Backplane Pin
	PXR.3	12	BL-R	06	007
4	TXT.4	13	R-O	32	108
	TXR.4	14	O-R	07	008
	PXT.4	15	R-G	33	109
	PXR.4	16	G-R	08	009
5	TXT.5	17	R-BR	34	110
	TXR.5	18	BR-R	09	010
	PXT.5	19	R-SL	35	111
	PXR.5	20	SL-R	10	011
6	TXT.6	21	BK-BL	36	112
	TXR.6	22	BL-BK	11	012
	PXT.6	23	BK-O	37	113
	PXR.6	24	O-BK	12	013
7	TXT.7	25	BK-G	38	302
	TXR.7	26	G-BK	13	202
	PXT.7	27	BK-BR	39	303
	PXR.7	28	BR-BK	14	203
8	TXT.8	29	BK-SL	40	304
	TXR.8	30	SL-BK	15	204
	PXT.8	31	Y-BL	41	305
	PXR.8	32	BL-Y	16	205

Three-Pair and Four-Pair Modularity

Figure 3-52 shows 3-pair and 4-pair modularity from the port circuit pack to the voice or data terminal.

Most terminals connect to an information outlet (modular jack) installed at the work location. Make the connections as shown in Figure 3-52.

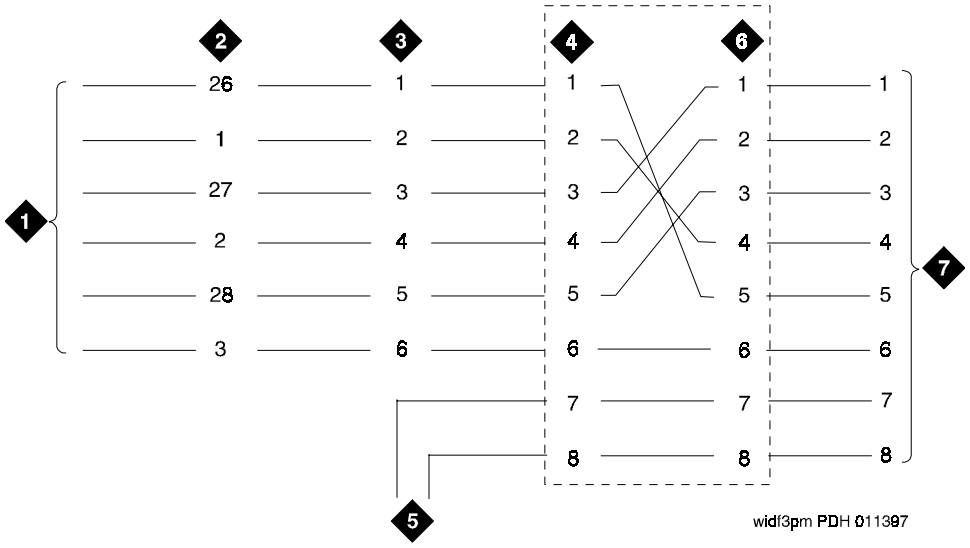


Figure Notes

1. Port Circuit Pack
2. System MSM Connector Pins (3-Pair Modularity)
3. Main Distribution Frame (MDF) Pins (3-Pair Modularity)
4. Input to Information Outlet (4-Pair Modularity)
5. Adjunct Power
6. Output From Information Outlet (4-Pair Modularity)
7. Voice or Data Terminal Pins

Figure 3-52. 3-Pair and 4-Pair Modularity

The following table provides the data module line jack pinouts.

Table 3-8. Data Module Line Jack Pinouts

Mounting Cord Pin	RJ45C Terminals	Lead Designation	Description
1	3	TXT	TN754 4-wire Out T
2	4	TXR	TN754 4-wire Out R
3	5	PXT	TN754 4-wire In T
4	1	T	TN2224 2-wire T
5	2	R	TN2224 2-wire R
6	6	PXR	TN754 4-wire In R
7	7	P1-	Power via 400B2 for 8400B
8	8	P2+	Power via 400B2 for 8400B

Installing and Using Data Modules

This section discusses various topics concerning setting up and using data modules.

Setting the 8400B Data Module for CRCS or the MCU-ST

Follow the instructions below to set the 8400B data module before connecting it to the CRCS or MCU-ST.

1. Connect a dumb terminal to the 8400B data module using a DSF cable (25-pin RS232 cable).
2. Enter the following commands:
   a. Enter **at** and the screen displays `OK`.

      NOTE:
      If `OK` is not displayed, press RETURN, then enter **at&s0&c0**.

   b. Enter **at&v** to view the options. Look at the top line of the active profile.
   c. Enter **at&c1&d2&s1&s0=1&w0&w1&y0s24=001**.

3. These settings produce the following results:

   &c1 sets the data carrier detect (DCD) circuit to operate according to the EIA standard.

   &d2 sets the data module to go on hook when an on-to-off transition is detected on the data terminal ready (DTR) input, disconnecting the call.

   &s1 sets the data module to respond to the data set ready (DSR) signal.

   &s0=1 turns on the automatic answer feature and causes the data module to answer on the first ring.

   &w0 causes the current configuration to be stored in data profile storage location 0.

   &w1 causes the current configuration to be stored in data profile storage location 1.

   &y0 selects the configuration stored in data profile storage location 0 to become the current configuration every time the data module is powered on.

   s24=001 indicates that no telephone is connected.

4. Remove power from the 8400B data module for 5 seconds
5. Reconnect power to the 8400B data module. The red LED comes on steady.
6. Type **at** and press Enter. The **OK** prompt appears. Type **atdt** and the dial hunt group number for the network control channels. Press Enter. the login prompt appears.
7. When the login for the MCU displays, enter the login and password assigned by the technical center during installation to verify that you have a working ST or CRCS to MCU link.

DTE/DCE Hardware Setup (7400 Data Module)

Under the top access panel of the data module is a small circuit board inserted in a card-edge connector. The orientation of this circuit board, referred to as the Electronic Industries Association (EIA) Connector Board, determines whether the data module is configured for a Data Communications Equipment (DCE) or Data Terminal Equipment (DTE) operation. Always verify that the EIA Connector Board is oriented correctly for your application prior to installation.

To determine the current orientation of the EIA Connector Board, and to reposition it, if necessary, do the following:

1. Disconnect the power cord, the line cord, and the EIA-232-D cable from the data module.

2. Refer to the following figure. Remove the top access panel of the data module:
    a. Apply a gentle lifting pressure at the rear edge of the access panel, and insert the tip of a ballpoint pen or other suitable device into each of the two tab-lock holes in the rear panel to release the locking tabs.
    b. Lift and remove the access panel.

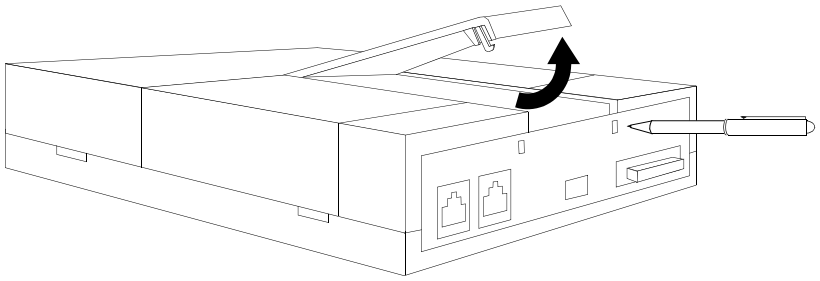


Figure 3-53. Removing the Top Access Panel

3. Turn the data module so that you are looking at it from the front.
4. Look down into the access opening of the data module. Then locate the large silver arrow pointing toward the back of the unit; the arrow points to the EIA Connector Board.
5. Look at the board from the front of the data module. Note that “DCE” is etched into the upper left corner of the board. This indicates that the board is oriented for a DCE operation. See the following figure.

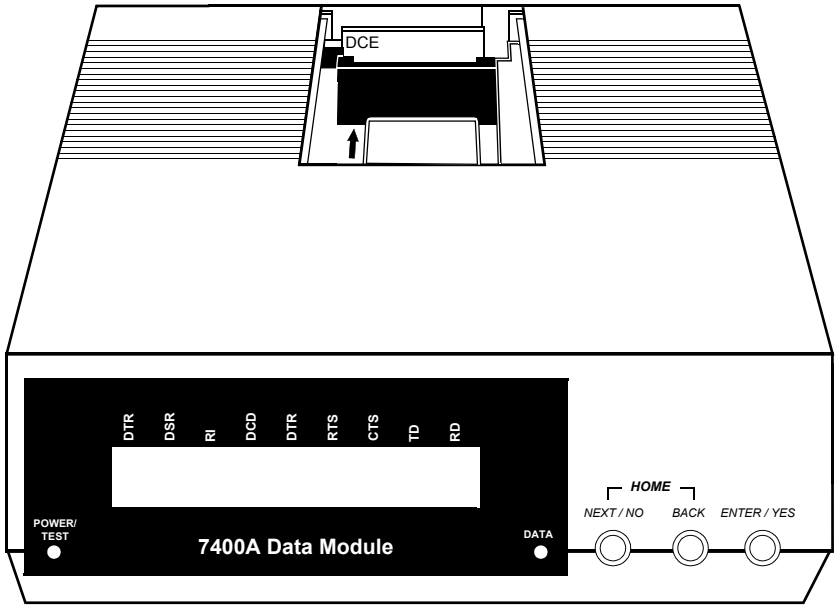


Figure 3-54. EIA Connector Board Shown in DCE Position

Using the Front Panel (7400 Data Module)

The following sections discuss using buttons and menus.

Buttons

The following list identifies the buttons on the module and explains their use.

- **NEXT/NO** is used to scroll forward through the menu and/or reject the function displayed. By keeping this button depressed, you can quickly scroll through menu items.
- **BACK** is used to scroll backward through the menu. By keeping this button depressed, you can quickly scroll back through menu items.
- **NEXT/NO** and **BACK** pressed simultaneously returns the user automatically to the “Home” screen from many menus. However, do not press these two keys simultaneously while changing option values. If this done, the system queries if you want to save the changes you have made, and it does not return you to the “Home” screen.
- **ENTER/YES** is used to set an option or execute the function displayed.

Main Menu

The main menu has several levels of options and suboptions.

- Press **NEXT/NO** to scroll through the entire first level to view each available option.
- Scroll to the desired main menu option, and select it by pressing **ENTER/YES**. You are now one level deeper within the options; accordingly, select the desired suboption from those available.
- Press **NEXT/NO** and **BACK** simultaneously at any time to return to the "Home" display automatically.

DCE Operations—Terminal Device Applications (7400 Data Module)

To set the 7400A Data Module using the AT command interface, do the following:

1. From the **HOME** screen, press **NEXT/NO** until the system prompts with **SET INTERFACE?**.
2. Press **ENTER/YES**. The system prompts with **INT = AT COMM?** or **INT --> AT COMM?**.
3. Press **ENTER/YES**.
4. The system displays **INT = AT COMMAND**.

The 7400A Data Module then performs a self-test.

Options and Settings for DCE AT Command Interface

The following table provides the options and settings for the DCE AT command interface. For each option, value "on" is the default.

Table 3-9. Options and Settings for DCE AT Command Interface

Set Option Displays	Possible Values
Set 300 speed	on, off
Set 1200 speed	on, off
Set 2400 speed	on, off
Set 4800 speed	on, off
Set 9600 speed	on, off
Set 19200 speed	on, off

Setting the 7400A Data Module for CRCS

Complete the following instructions to set the 7400A data module before connecting it to CRCS.

1. Open the cover on the 7400A data module and confirm that the data module is optioned for DCE mode. (There is a card in the data module that should read “DCE” when it is viewed from the front side.)
2. Complete the following settings on the data module:
   a. Set the interface for the AT command by pressing the NEXT/NO button until the 7400A prompts with the “SET INTERFACE?” message.
   b. Press the ENTER/YES button. The 7400A prompts with the “INT = AT COMM” or “INT---> AT COMM?” message.
   c. Press the ENTER/YES button. The 7400A displays the “INT = AT COMMAND” message, and it will perform a self test.
   d. Press the NEXT/NO button. The 7400A prompts with the “Set Options?” message.
   e. Press the ENTER/YES button.
   f. Use the ENTER/YES and NEXT/NO buttons to make the following baud settings:
      - 300 = off
      - 1200 = off
      - 2400 = off
      - 4800 = off
      - 9600 = on
      - 19200 = off
3. Ensure that you are using a model WP-90110 L7 power supply that provides an input of 117V, 60Hz, and 20W and outputs of +5V, 1.5A; +12V, -10A; and -12V, -10A.
4. Ensure that the indicators on the data module read as follows:

DTR	DSR	RI	DCD	RTS	CTS	TD	RD
high	high	-----	high	high	high	-----	-----
1	3	5	7	9	11	13	15

Also, ensure that the power LED is on.

Setting the 7400B Data Module for the MCU-ST

Follow the instructions below to set the 7400B data module before connecting it to the MCU-ST.

1. Connect a dumb terminal to the 7400B data module using a DSF cable (25-pin RS232 cable).
2. Enter the following commands:
   a. Enter **at** and the screen displays OK.

      NOTE:
      If OK is not displayed, press RETURN, then enter **at&s0&c0**.

   b. Enter **at&v** to view the options. Look at the top line of the active profile.
   c. Enter **at&c1&d2&s1&s0=1&w0&w1&y0**.
3. These settings produce the following results:

   &c1 sets the data carrier detect (DCD) circuit to operate according to the EIA standard.

   &d2 sets the data module to go on hook when an on-to-off transition is detected on the data terminal ready (DTR) input, disconnecting the call.

   &s1 sets the data module to respond to the data set ready (DSR) signal.

   &s0=1 turns on the automatic answer feature and causes the data module to answer on the first ring.

   &w0 causes the current configuration to be stored in data profile storage location 0.

   &w1 causes the current configuration to be stored in data profile storage location 1.

   &y0 selects the configuration stored in data profile storage location 0 to become the current configuration every time the data module is powered on.

Setting the 7400B Data Module for the System Printer

Follow the instructions below to set the 7400B data module before connecting it to the system printer.

1. Connect a dumb terminal to the 7400B data module using a DSF cable (25-pin RS232 cable).
2. Enter the following commands:

a. Enter **at** and the screen displays OK.

NOTE:
If OK is not displayed, press RETURN then enter **at&s0&c0**.

b. Enter **at&v** to view the options. Look at the top line of the active profile.

c. Enter **at&f&c1&d2e0q1s0=1&w0&y0**.

3. These settings produce the following results:

&f resets the options to the factory defaults.

&c1 sets the data carrier detect (DCD) circuit to operate according to the EIA standard.

&d2 sets the data module to go on hook when an on-to-off transition is detected on the data terminal ready (DTR) input, disconnecting the call.

e0 turns off the echo.

q1 turns off the result codes, which would be the normal response of the data module when it receives commands.

s0=1 turns on the automatic answer feature and causes the data module to answer on the first ring.

&w0 causes the current configuration to be stored in data profile storage location 0.

&y0 selects the configuration stored in data profile storage location 0 to become the current configuration every time the data module is powered on.

Installing the System Printer

1. Unpack the system printer and inspect for damage.
2. Connect the MAIN PORT or P2 (DTE) of the system printer to the 7400B data module with an M25B (EIA) cord or equivalent. The 7400B data module is connected with a D8W-87 cable to the wall jack.
3. On the MCU side, connect the B25A cable to the TN754B Digital Line circuit pack.

Installing the INADS Interface

The INADS trunk is a two-way, rotary dial, loop start trunk that connects to the TN790 Processor circuit pack through the INADS terminals at the trunk/auxiliary cross-connect field. The INADS trunk is used only for the INADS connection.

1. Determine the INADS trunk appearance at the green trunk/auxiliary cross-connect field.

2. Label terminals for INADS trunk appearance (IN).
3. Install jumpers between INADS trunk appearance (IN) and INADS terminals.

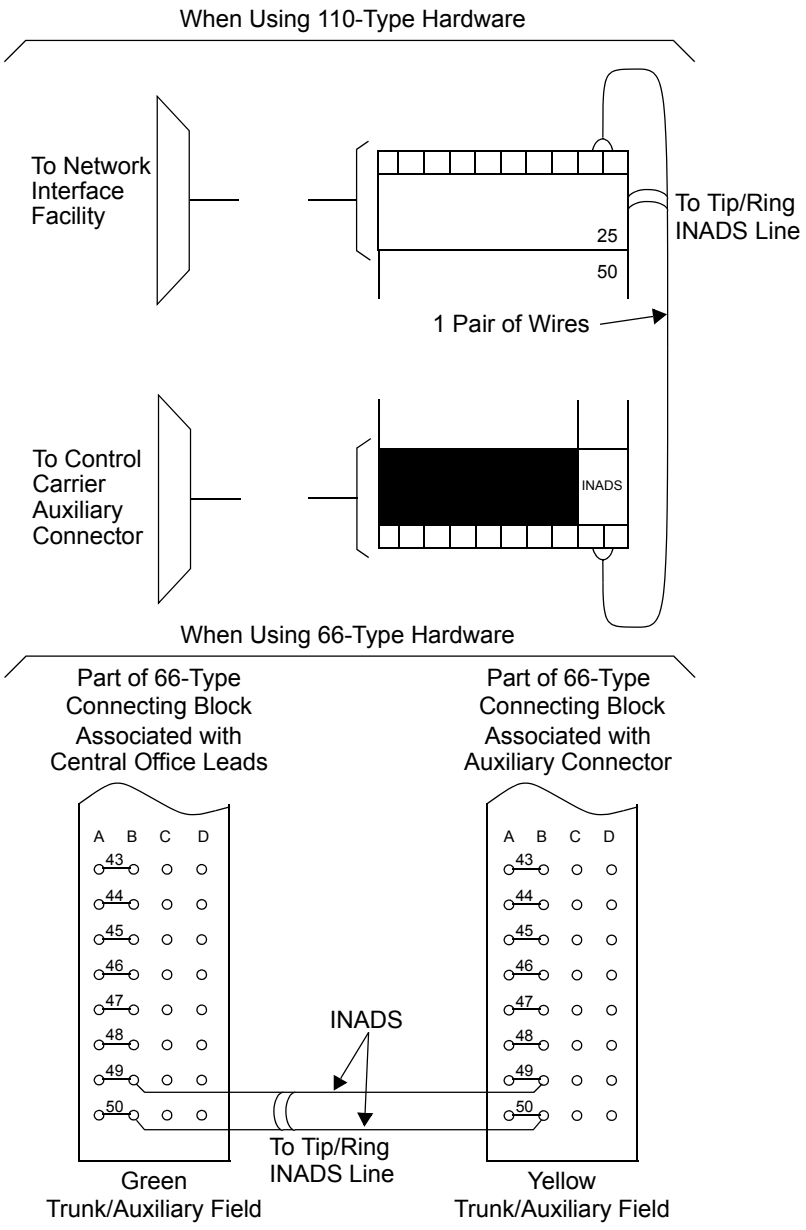


Figure 3-55. Connections at Trunk/Auxiliary Field for INADS Trunk

Cabling for DS1 or UDS1 Tie Trunks

DS1 or UDS1 tie trunks provide digital data service between an MSM and a PBX or between the MCU and a data network using T1 or E1 carrier facilities through a Channel Service Unit (CSU). The TN767E DS1 (TN2207 UDS1) tie trunk circuit pack provides connection capability to the DS1 (USD1) facility for 24 independent trunks. The following table shows the lead designations for the DS1 (UDS1) circuit pack.

NOTE:
For details on installing trunk cables, see Chapter 4, *"Connecting to the Network."*

The H600307 connector cable (comcode 104307376) is used to connect the DS1 (UDS1) tie trunk to a PBX or to a CSU. This cable is a 50-foot shielded cable equipped with a 50-pin male connector on each end.

NOTE:
Connector pins 2 and 3 have wires with a clear sleeve attached.

NOTE:
In the United Kingdom, an 888A adapter is required to link the 25-pair cable to the coaxial cable leading to the network.

Table 3-10. DS1 Interface Cable H600-307 (and C6C)

50-Pin			15-Pin		
Pin	**Color**	**Designation**	**Pin**	**Color**	**Designation**
02	W-BL				
03	BL-W				
47	W-G	LI (High)	11	W-G	LI (High)
22	G-W	LI	03	G-W	LI
48	W-BR	LO	09	W-BR	LO
23	BR-W	LO (High)	01	BR	LO (High)
49	W-SL	LOOP2	06	W-SL	LOOP2
24	SL-W	LOOP1	05	SL-W	LOOP1

All other pins empty.

The following figure shows a typical DS1-MMI cable configuration.

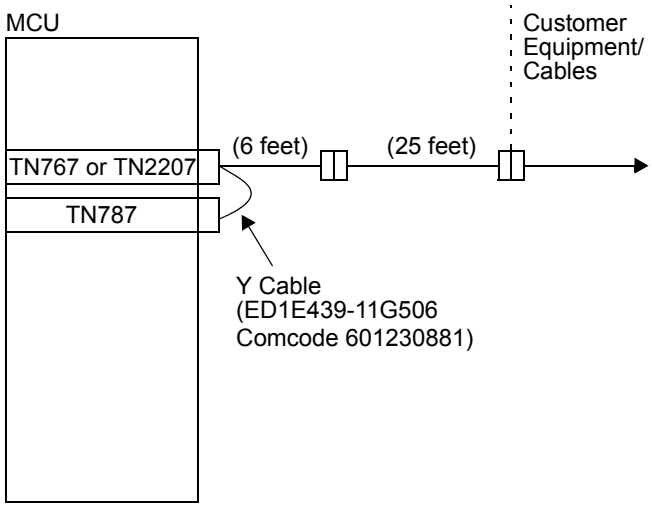


Figure 3-56. Typical DS1-MMI Cable Configuration

Installing TN2236 Data Interface Cables

This section describes the cables that support the V.35/RS449/EIA-530 data interfaces supported by the TN2236 Data Interface circuit pack. These cables are used to connect external V.35/RS449/EIA-530 interfaces.

Cable Description

Cables designed for the V.35/RS449/EIA-530 interfaces used twisted and shielded pairs of 24 AWG wires to minimize radiation. All the cables are 25 ft long. The maximum distance between the Avaya MCU and the V.35/RS449/EIA-530 endpoint is currently 50 ft. For distances greater than 50 ft, digital loop extenders must be used. All extension cables must be of Plenum quality.

The V.35/RS449/EIA-530 cables can connect to DTE or DCE equipment. Generally, a male connector at the end of each cable presents DTE, while a female connector presents DCE.

Cable Summary and Typical Application

The following table contains a summary of all the TN2236 cables:

Table 3-11. Summary of TN2236 Cables

Cable	Gender	Drawing Number	Comcode
DI-MMI-Y	NA	H600-478 G1	601838444
V.35	DTE	H600-479 G1	601838451
V.35	DCE	H600-479 G2	601838469
RS449	DTE	H600-480 G1	601838477
RS449	DB37 F-F gender changer to make DCE	NA	407709716
EIA-530	DTE	H600-481 G1	601838485
EIA-530	DB25 F-F gender changer to make DCE	NA	407709724
RS366 DCE Y	DCE	H600-494 G1	601875982

The protocol cables are 50-pin Amphenol at the system end and protocol-specific at the customer end. The user may connect equipment or extension cables at this point.

NOTE:
The RS449 DCE and the EIA-530 DCE are provided by using the DTE versions with gender changes. This cannot be done for the V.35 interface.

The following figure shows a typical cable application with two types of connections.

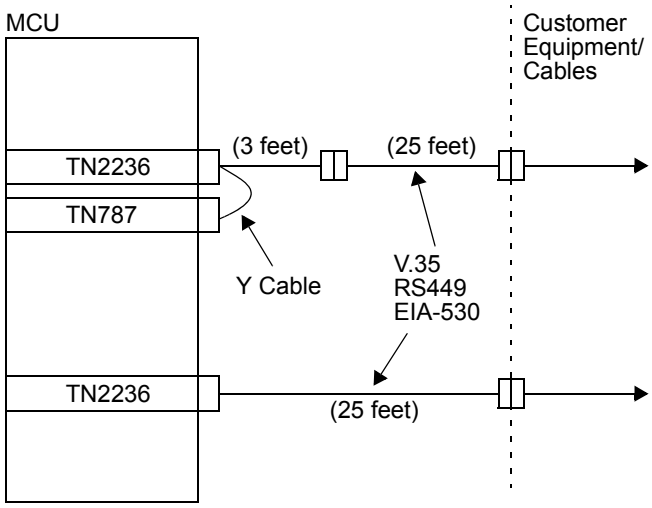


Figure 3-57. Typical Data Interface Cable Configurations

For one connection, the TN2236 DI circuit pack is cabled to the TN787 MMI circuit pack. This is done with a separate Y-cable with three 50-pin Amphenol connectors. For the other connection, a cable is connected directly to the TN2236 circuit pack.

The following two figures show scenarios involving the RS366 DCE-Y cable, which is required to support customer equipment dialing into the MCU.

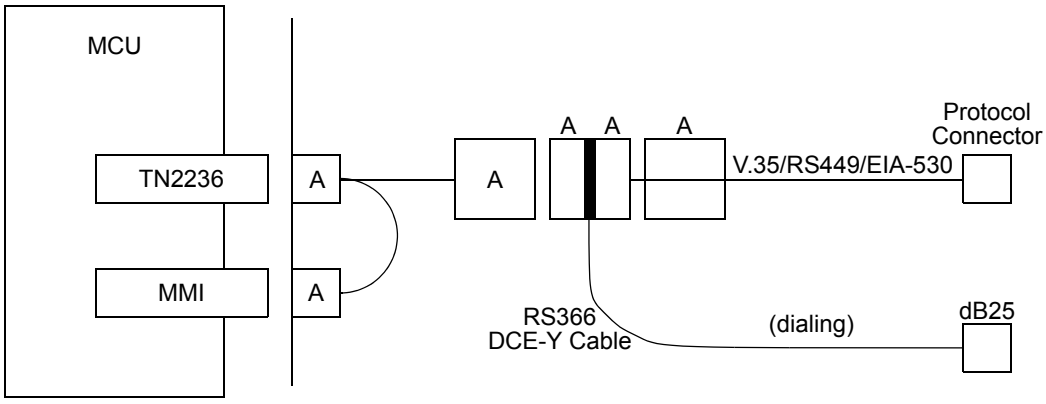


Figure 3-58. Data Interface Cable Configuration Including the RS366 DCE-Y Cable (Scenario 1)

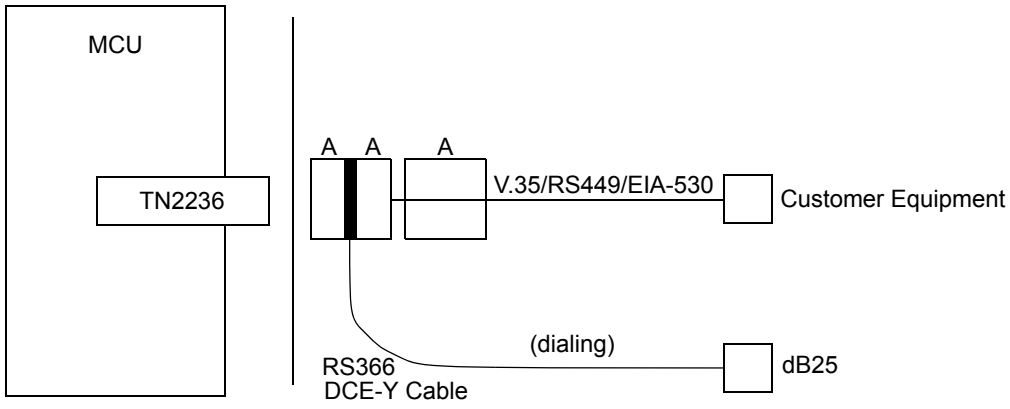


Figure 3-59. Data Interface Cable Configuration Including the RS366 DCE-Y Cable (Scenario 2)

Pin Connections for Rates Exceeding 672k

The following table provides the pin connections of the cable for the MMI and DI circuit packs. This cable is connected to the connector panel at the back side of the MCU. The L1 Amphneol connector is connected to the V.35, RS449, and EIA-530 Interface cables (discussed later)

Table 3-12. DI-MMI-Y Cable Pin Connections

MMI Amphenol	DI Amphenol	LI Amphenol	Signal Name
35 10	49 24		trsync ~trsync
37 12	37 12		trclk ~trclk
34 09	48 23		tdata ~tdata
33 08	36 11		rdata ~rdata
38 13	47 22		~ds1here ~pahere
	35 10	35 10	term_tim_a term_tim_a
	46 21	46 21	snd_tim_a snd_tim_b
	34 09	34 09	rec_tim_a rec_tim_b
	45 20	45 20	tr_data_a tr_data_b
	33 08	33 08	rec_data_a rec_data_b
	44 19	44 19	los_a los_b
	32 07	32 07	rr_a rr_b
	43 18	43 18	dte_rdy_a dte_rdy_b
	31 06	31 06	dce_rdy_a dce_rdy_b
	42	42	moatgrd
	17	17	ring_ind
	30 05	30 05	cts_a cts_b
	41 16	41 16	r_t_s_a r_t_s_b

Table 3-12. DI-MMI-Y Cable Pin Connections (Continued)

MMI Amphenol	DI Amphenol	LI Amphenol	Signal Name
	29 04	29 04	moatgrd sp_nb8_rx
	40 15	40 15	dlo_nb4_rx dsc_nb2_rx
	28 03	28 03	pwi_nb1_rx pnd_crq_rx
	39 14	39 14	acr_dpr_rx moatgrd
	27 02	27 02	nb8_sp_tx nb4_dlo_tx
	38 13	38 13	nb2_dsc_tx nb1_pwi_tx
	26 01	26 01	crq_pnd_tx dpr_acr_tx
50 25	50 25	50 25	

DI-MMI-Y Cable (H600-478 G1)

The DI-MMI-Y cable uses the connections indicated in the previous table. All TN2236 circuit packs that support transfer rates in the range of 672k to 1920k are cabled to a TN787 MMI circuit pack via this cable. If a DI circuit pack is cabled to an MMI circuit pack, the system reserves the appropriate number of resources to ensure that the administered DI capacity can be used. Excess MMI capacity may be used by any other DS1 or DI circuit pack. Therefore, the cable shown in this section is not used whenever the transfer rate is less than 672k.

Whenever the DI-MMI-Y cable is used on the system, the L1 connector end is connected to the TN2236 DI Male Amphenol connector shown in the following sections, depending on the interface type. The TN2236 DI Amphenol is labeled “DI,” the TN787MMI Amphenol is labeled “MMI,” and the L1 connector Amphenol is labeled “LI Conn.”

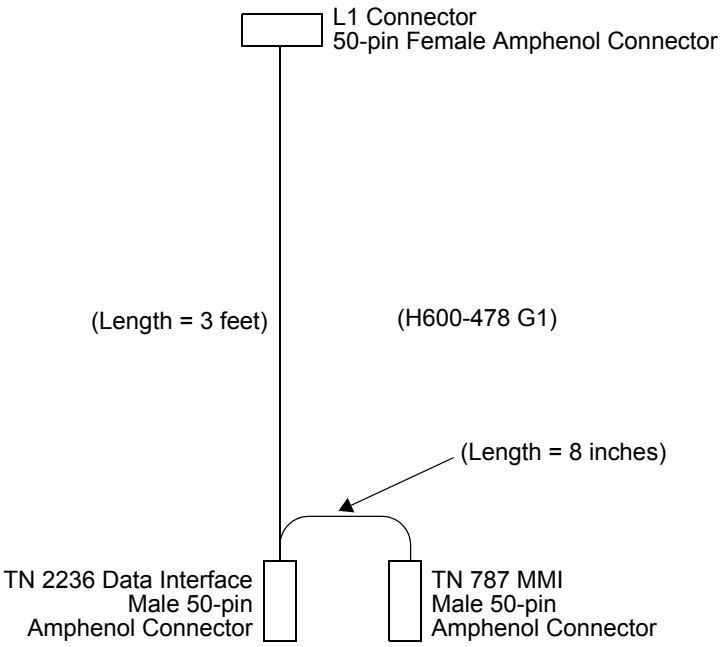


Figure 3-60. DI-MMI-Y Cable

RS366 DCE-Y Cable (H600-494 G1)

The RS366 DCE-Y cable is required to support customer equipment dialing into the MCU. The cable appears as follows:

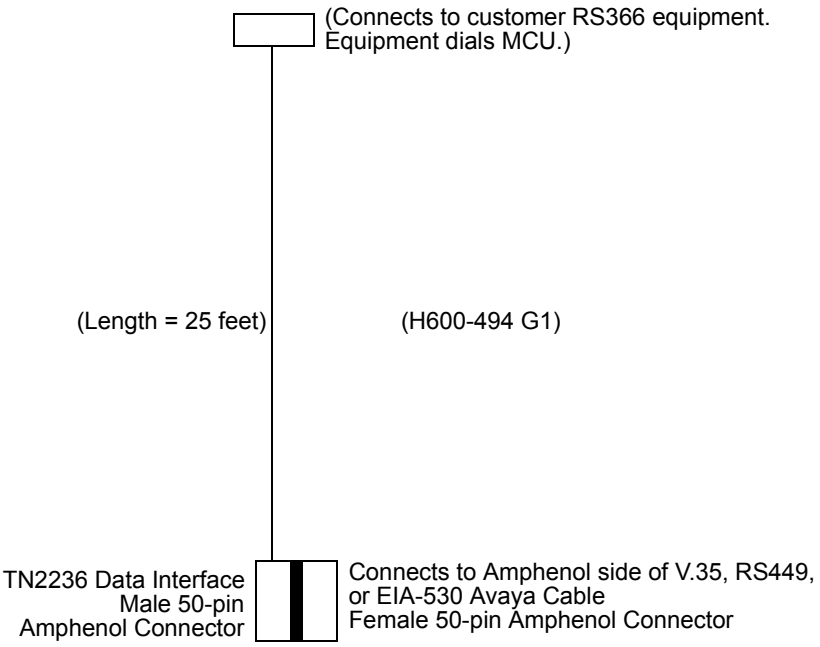


Figure 3-61. RS366 DCE-Y Cable

Pin Connections for the RS366 DCE-Y Cable

The following table indicates pin connections for the RS366 DCE-Y Cable.

Table 3-13. RS366 DCE-Y Cable Pin Connections

DCE -db25 f	Amphenol m	Amphenol f	Signal Name
	49 24	49 24	trsync ~trsync
	37 12	37 12	trclk ~trclk
	48 23	48 23	tdata ~tdata
	36 11	36 11	rdata ~rdata
	47 22	47 22	~ds1here ~pahere
	35 10	35 10	term_tim_a term_tim_a

Table 3-13. RS366 DCE-Y Cable Pin Connections (Continued)

DCE -db25 f	Amphenol m	Amphenol f	Signal Name
	46 21	46 21	snd_tim_a snd_tim_b
	34 09	34 09	rec_tim_a rec_tim_b
	45 20	45 20	tr_data_a tr_data_b
	33 08	33 08	rec_data_a rec_data_b
	44 19	44 19	los_a los_b
	32 07	32 07	rr_a rr_b
	43 18	43 18	dte_rdy_a dte_rdy_b
	31 06	31 06	dce_rdy_a dce_rdy_b
	42	42	moatgrd
	17	17	ring_ind
	30 05	30 05	cts_a cts_b
	41 16	41 16	r_t_s_a r_t_s_b
7 17	29 04	29 04	moatgrd sp_nb8_rx
16 15	40 15	40 15	dlo_nb4_rx dsc_nb2_rx
14 4	28 03	28 03	pwi_nb1_rx pnd_crq_rx
2 7	39 14	39 14	acr_dpr_rx moatgrd
--- 22	27 02	27 02	nb8_sp_tx nb4_dlo_tx

Table 3-13. RS366 DCE-Y Cable Pin Connections (Continued)

DCE -db25 f	Amphenol m	Amphenol f	Signal Name
13 6	38 13	38 13	nb2_dsc_tx nb1_pwi_tx
5 3	26 01	26 01	crq_pnd_tx dpr_acr_tx
1 1	50 25	50 25	gnd gnd

Cable Connections for All Transfer Rates

The tables in the following sections shows the pin connections for V.35, RS-449, and EIA-530 for both DTE and DCE types to the Data Interface circuit pack. The cable for each interface is a straight cable from Amphenol to the V.35, RS-449, or EIA-530 connection. For V.35 DTE and DCE cables, the resistors identified in the table in the next section are inside the cable connector.

V.35 Interface Cable

The V.35 Interface Cable appears as follows:

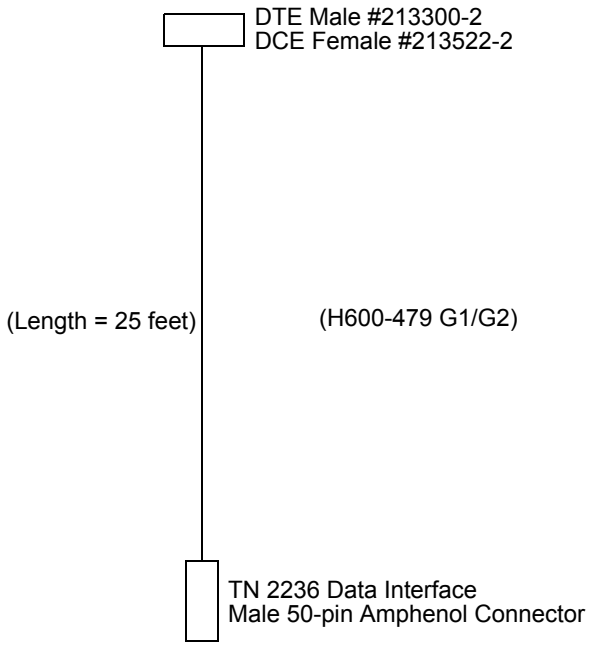


Figure 3-62. V.35 Interface Cable

The cable is available in two versions. The DCE V.35 version provides female 34-pin connections, and the DTE V.35 version provides male 34-pin connections. DTE-to-DCE conversions are done with the help of a 150 ohm resistor that is embedded within the cable. The maximum distance between the Avaya MCU and the V.35 endpoint is 50 ft when using the extension cable. This means that a 25 ft extension cable is added to the 25 ft Avaya cable.

The following table shows the pin connections for the V.35 cable and the TN2236 Interface circuit pack (Amphenol):

Table 3-14. V.35 Cable—TN2236 DI Amphenol Connections

V.35 Cable		TN2236 Amphenol	Signal Name
DTE	DCE		
U W*	U W	35 10	term_tim_a term_tim_a
Y AA	Y AA#	46 21	snd_tim_a snd_tim_b
V X	V X#	34 09	rec_tim_a rec_tim_b
P S*	P S	45 20	tr_data_a tr_data_b
R T	R T#	33 08	rec_data_a rec_data_b
- -	- -	44 19	los_a los_b
F -	F -	32 07	rr_a rr_b
H -	H -	43 18	dte_rdy_a dte_rdy_b
E -	E -	31 06	dce_rdy_a dce_rdy_b
B*	B#	42	moatgrd
J	J	17	ring_ind
D -	D -	30 05	cts_a cts_b
C -	C -	41 16	r_t_s_a r_t_s_b
A A	A A	50 25	

* Requires 150 ohm resistors connecting pin W (10) to pin B (42), and pin S (20) to pin B (42)

RS449 Interface Cable

The RS449 Interface Cable appears as follows:

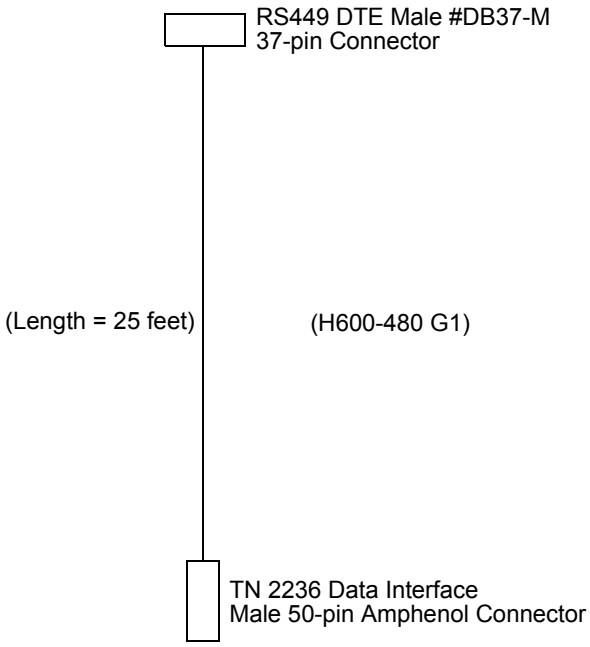


Figure 3-63. RS449 Interface Cable

Only the DTE version of this cable is available. For DCE versions, a female to female gender changer can be used to convert a male connection to a female connection. The maximum distance using the extension cable between the MCU and the RS449 endpoint is 50 ft. This means that a 25 ft extension cable is added to the 25 ft Avaya cable.

The following table shows the pin connections for the RS449 cable and the TN2236 Interface circuit pack (Amphenol):

Table 3-15. RS449 Cable—TN2236 DI Amphenol Connections

RS449 Cable		TN2236 Amphenol	Signal Name
DTE	DCE		
17 35	17 35	35 10	term_tim_a term_tim_a
5 23	5 23	46 21	snd_tim_a snd_tim_b
8 26	8 26	34 09	rec_tim_a rec_tim_b
4 22	4 22	45 20	tr_data_a tr_data_b
6 24	6 24	33 08	rec_data_a rec_data_b
3 21	- -	44 19	los_a los_b
13 31	13 31	32 07	rr_a rr_b
12 30	12 30	43 18	dte_rdy_a dte_rdy_b
11 29	11 29	31 06	dce_rdy_a dce_rdy_b
19	19	42	moatgrd
15	15	17	ring_ind
9 27	9 27	30 05	cts_a cts_b
7 25	7 25	41 16	r_t_s_a r_t_s_b
1 1	1 1	50 25	

EIA-530 Interface Cable

The EIA-530 Interface Cable appears as follows:

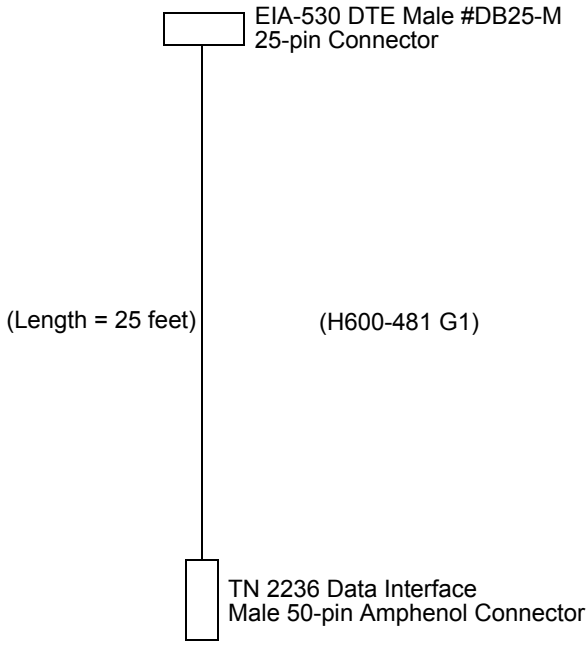


Figure 3-64. EIA-530 Cable

Only the DTE version of this cable is available. To convert a DTE interface to a DCE interface, a female-to-female gender changer is used. The maximum distance between the MCU and the EIA-530 endpoint is 50 ft. This means that a 25 ft extension cable is added to the 25 ft Avaya cable.

The following table shows the pin connections for the EIA-530 cable and the TN2236 Interface circuit pack (Amphenol):

Table 3-16. EIA-530 Cable—TN2236 DI Amphenol Connections

EIA-530 Cable		TN2236 Amphenol	Signal Name
DTE	DCE		
24 11	24 11	35 10	term_tim_a term_tim_a
15 12	15 12	46 21	snd_tim_a snd_tim_b
17 9	17 9	34 09	rec_tim_a rec_tim_b
2 14	2 14	45 20	tr_data_a tr_data_b
3 16	3 16	33 08	rec_data_a rec_data_b
- -	- -	44 19	los_a los_b
8 10	8 10	32 07	rr_a rr_b
20 23	20 23	43 18	dte_rdy_a dte_rdy_b
6 22	6 22	31 06	dce_rdy_a dce_rdy_b
7	7	42	moatgrd
-	-	17	ring_ind
5 13	5 13	30 05	cts_a cts_b
4 19	4 19	41 16	r_t_s_a r_t_s_b
1 1	1 1	50 25	

Applications and Interactions

The following devices interact with the V.35, RS-449, and EIA-530 interfaces:

- H.320 endpoints that use Group Systems that connect directly to the MCU via a DCE V.35, RS449, or EIA-530 Interface
- Devices such as encryptions devices, IMUXs running proprietary protocols, and satellite modems that connect directly to the MCU via a DTE V.35, RS449, or EIA-530 Interface
- V.35, RS449, and EIA-530 connections

The following figures show typical V.35, RS449, and EIA-530 connections to the Avaya MCU.

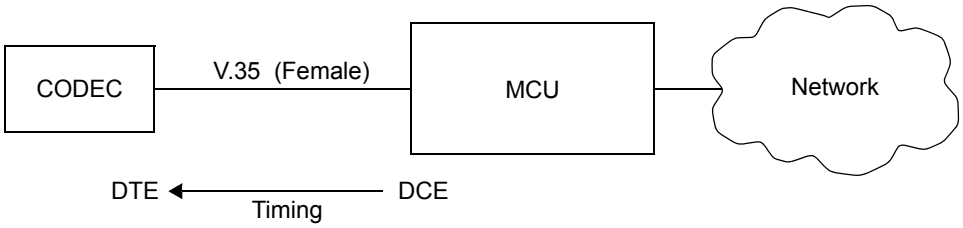


Figure 3-65. V.35 Codec Directly Connected to the MCU

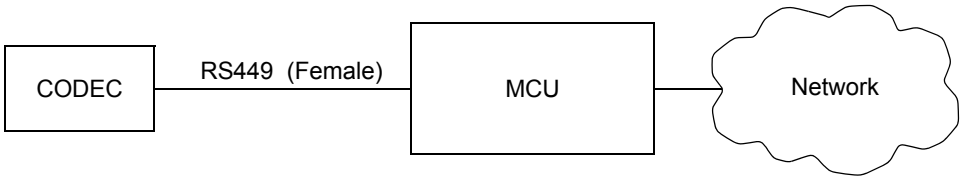


Figure 3-66. RS449 Codec Directly Connected to the MCU

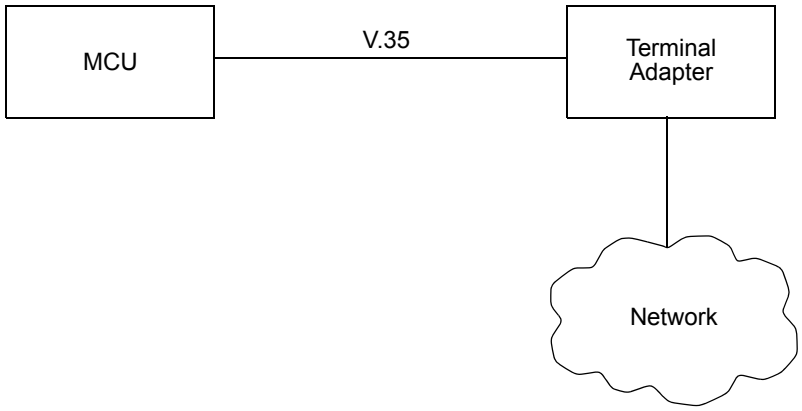


Figure 3-67. Inverse Multiplexor (Terminal Adapter) Connected to the MCU

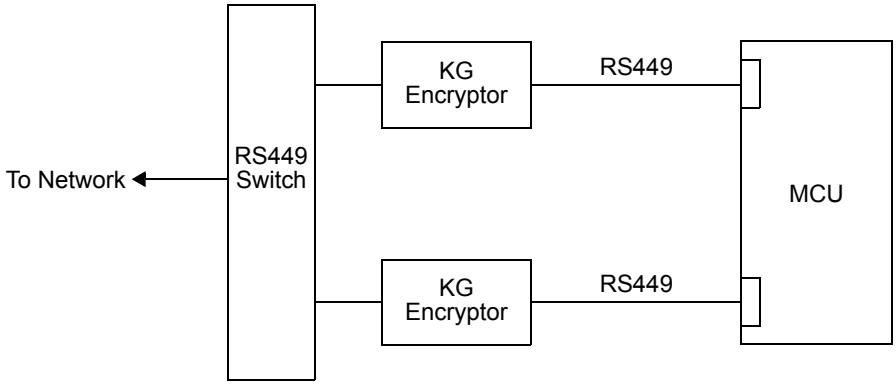


Figure 3-68. KG Encryption Device Connected to the MCU

Connecting to the Network

4

Overview

This section describes the wiring and connections required for the MCU. It identifies the cross-connect fields, lists the hardware equipment room requirements, and provides procedures for installing cables.

Hardware Equipment Room

In the equipment room, 66- or 110-type hardware is used for the cross-connect field. A cross-connect field contains a trunk/auxiliary field and a distribution field (port, auxiliary, and maintenance alarm terminals).

Trunk/Auxiliary Field

The trunk/auxiliary field contains three distinct cross-connect areas (Avaya SYSTIMAX® standards):

- Green field: This field terminates the network interface leads from the CO and provides the terminals to cross-connect the CO leads to the purple or yellow fields as required. A single row of the 66-type connecting block or 110-type terminal block can terminate 24 one-pair, 8 three-pair, or 12 two-pair trunks.
- Purple field: This field terminates the trunk circuits from the MCU with WP-90929, List 1 and List 3 (110-type terminal block) or WP-90929, List 2 or List 4 (66-type connecting block) concentrator cables. Also, 25-pair cables can be used to terminal trunk circuits from the MCU with each trunk circuit pack connecting to one 25-pair row of the 66-type connecting

block/110-type terminal block. Each 66-type connecting block or 110-type terminal block row can terminate 24 one-pair, 8 three-pair, or 12 two-pair trunks.

- Yellow field: This field provides cross-connection terminals for the INADS trunk lead from the MCU. One 25-foot cable is required for the INADS connection.

Distribution Field

The distribution field contains the following cross-connect area:

- Purple field (port field): This area terminates the 25-pair cables from the MCU for the maintenance alarm terminals. Each line circuit pack connects to one 66-type connecting block or to one 25-pair row of the 110-type terminal block. One 25-pair cable is required for each line circuit pack.

Table 4-1. Distribution Field-110A-Type Terminal Blocks

3-Pair Port Field (Purple)	4-Pair Station Field (Blue)	3-Pair Station Field (Blue or White)
110AC1-300STM/6	110AB1-100FT	110AC1-100FT
110AC1-300STF/6	110AB1-300FT	110AC1-300FT
		110AC1-300STM/6
		110AC1-300STF/6

66-Type Hardware

The following figure shows a typical cross-connect field using 66-type hardware. It is possible that only a few 66-type connecting blocks will be required in the trunk/auxiliary field for the green and yellow fields. For this reason, if 157B connecting blocks mounted on a purple 183-type of 166-type backboard is used as the trunk/auxiliary field, then some of the extra connecting blocks in the purple field can be used as the green and yellow fields to avoid ordering extra backboards and connecting blocks.

When this is done, the green and yellow fields should be clearly identified to avoid confusion. When white backboards are required for cross-connections with a satellite closet, they must be ordered from an outside vendor. If a blue backboard is used for these cross-connections, the part of the blue field that is functionally used as the white field should be clearly identified.

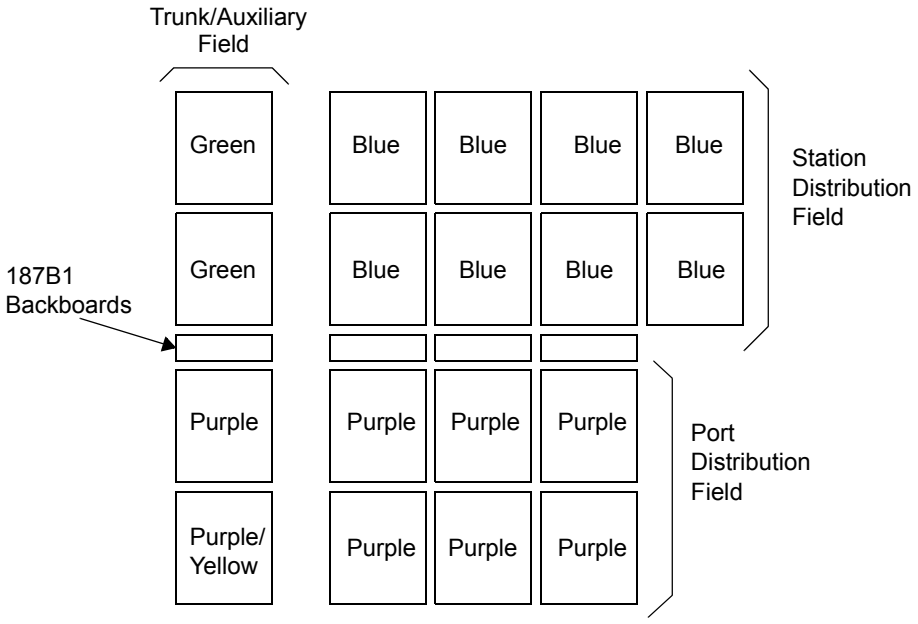


Figure 4-1. Typical Cross-Connect Field Arrangement Using 66-Type Hardware

The 66-type connecting blocks can be mounted directly onto the wall without using colored backboards. If this is the case, all the cross-connect field functional colors should be identified on the wall.

Cross-Connect Field Using 110-Type Hardware

The cross-connect field is located directly behind the MSM. The following figure shows a typical cross-connect field installation using 110A-type terminal blocks.

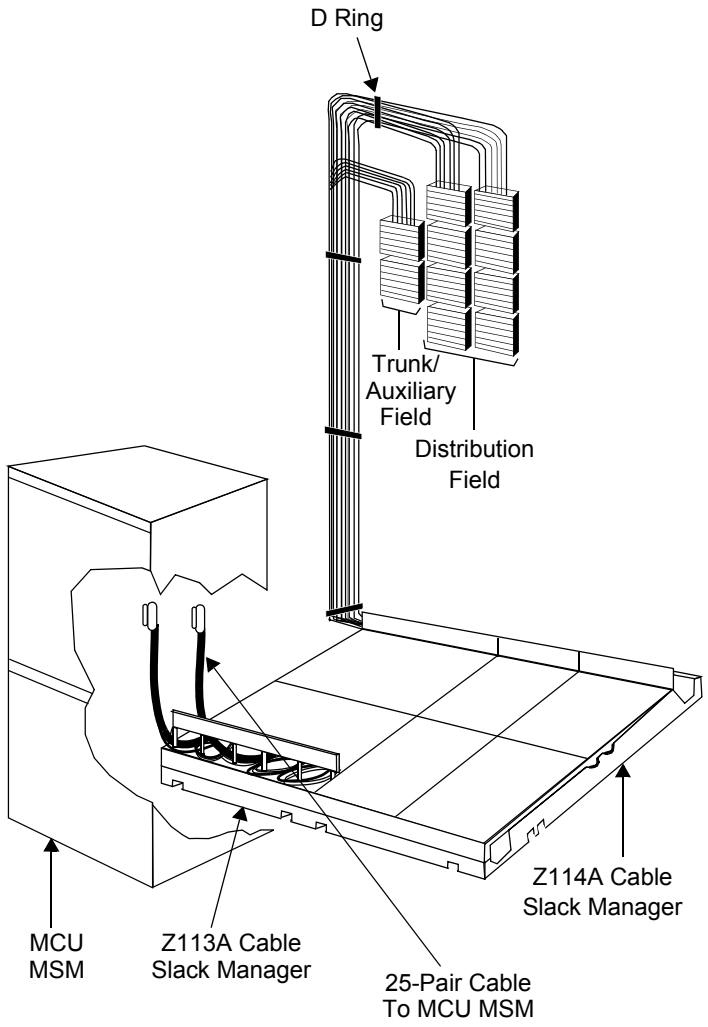


Figure 4-2. Typical Cross-Connect Field Installation Using 110A-Type Hardware

Cross-Connect Field Using 66-Type Hardware

The following figure shows a typical cross-connect field installation using 66-type hardware.

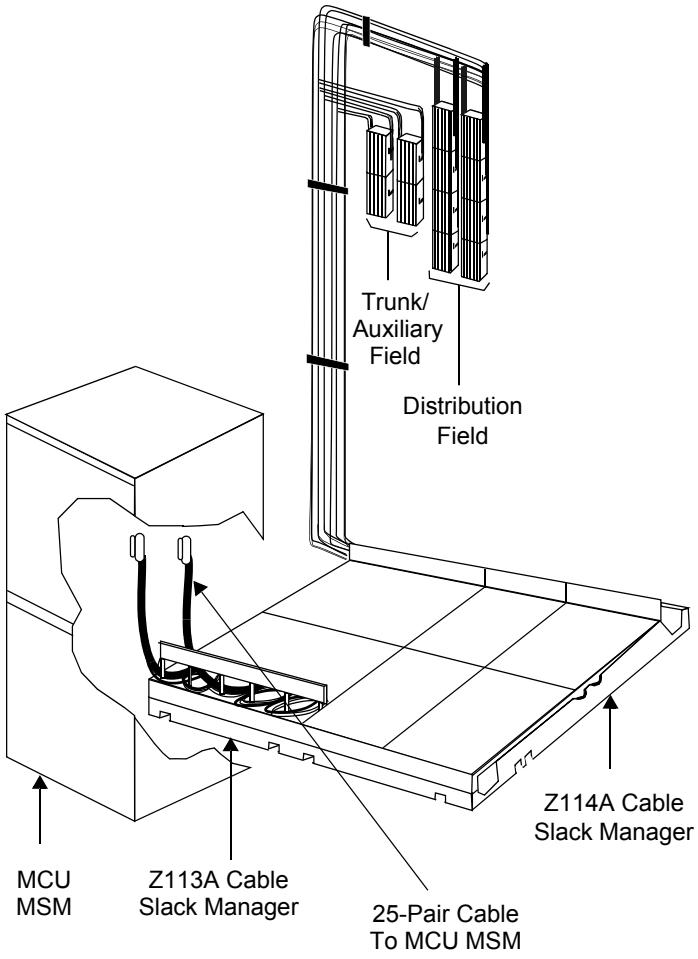


Figure 4-3. Typical Cross-Connect Field Installation Using 66-Type Hardware

Equipment Requirements

Review the following requirements for connecting the MCU to the network.

Wall Space for 110-Type Hardware

The trunk/auxiliary field and the distribution field are mounted on the same wall. Each 110P-type terminal block is 8 1/2 inches wide. Vertical patch cord troughs are 5 5/16 inches wide and horizontal patch cord troughs are 23 inches wide.

Each 110-A type terminal block is 10 13/16 inches wide; however, no horizontal patch cord troughs are used and the blocks are shorter than 110P-type terminal

blocks. This allows the 110A-type terminal blocks to be stacked. Therefore, the 110A-type hardware requires less space than the 110P-type hardware on a per-station basis.

Wall Space for 66-Type Hardware

The trunk/auxiliary field and the distribution field are mounted on the same wall. If the 66-type connecting blocks are mounted directly on a wall, the space requirements of a 183-type backboard should be used to determine the required wall space for the connecting blocks.

This method allows enough wall space between the connecting blocks for jumper wires and cable connections. The 183A-type backboard mounts four 66-type connecting blocks and is 8 1/2 inches wide and 20 inches tall. The 183B-type backboard mounts eight 66-type connecting blocks, and is 17 inches wide and 20 inches tall.

Installing Equipment Room Hardware

The procedures for installing hardware assume a system technician is performing the installation alone. If possible, locate the cross-connect field directly behind the MCU cabinet.

Wall Mounting 110A-Type Terminal Blocks

The 110A-type hardware can be stacked in almost any arrangement at any height or location on the wall. One arrangement is shown in the following figure. The distance between the mounting screw holes on the terminal blocks is 10-13/16 inches. If a vertical patch cord trough is used, the distance between the mounting screws is 5-5/16 inches.

Wall Mounting 66-Type Connecting Blocks

The first column of 66-type connecting blocks should be aligned with the left side of the MSM. This arrangement allows for orderly growth toward the right side of the cross-connect field.

The connectorized 66-type connecting blocks are factory wired for cable routing from the top so the cable connector aligns with the connector on the connecting block. If cable routing from the bottom is desired, then the connector on the connecting block must be removed and rotated 180 degrees. Then the connector must be relocated in the previously unoccupied hole since the connecting block leads are not long enough to reach the hole where the connector was previously mounted. The Velcro® cable retainer must also be relocated.

To install the cross-connect field, use the following procedure:

1. Draw a level horizontal line on the wall 12 inches above the floor.
2. Place the bottom of the first backboard/connecting block on the line and align it vertically with the left side of the MSM. Mark the mounting holes.
3. Remove the backboard and connecting block and drill holes in the wall for 3/4 inch No. 12 wood screws.
4. Move the backboard and connecting block into place and fasten it to the wall with 3/4 inch No. 12 wood screws.
5. The next backboard and connecting block is mounted to the right or above the one previously installed, depending on the space requirement. Repeat steps 2 through 4 until each backboard or connecting block is installed.

NOTE:
The 66-type connecting blocks should not be installed more than 78 1/2 inches above the floor.

Labeling the Cross-Connect Field

The following figure shows the graphic symbols used (instead of words) on labels for the MCU, cross-connections, information outlets, and cables. The labels are color-coded to identify system wiring as follows:

- Green: Leads to the Central Office (CO)
- Purple: Leads to MCU ports
- Yellow: Leads to the INADS connection

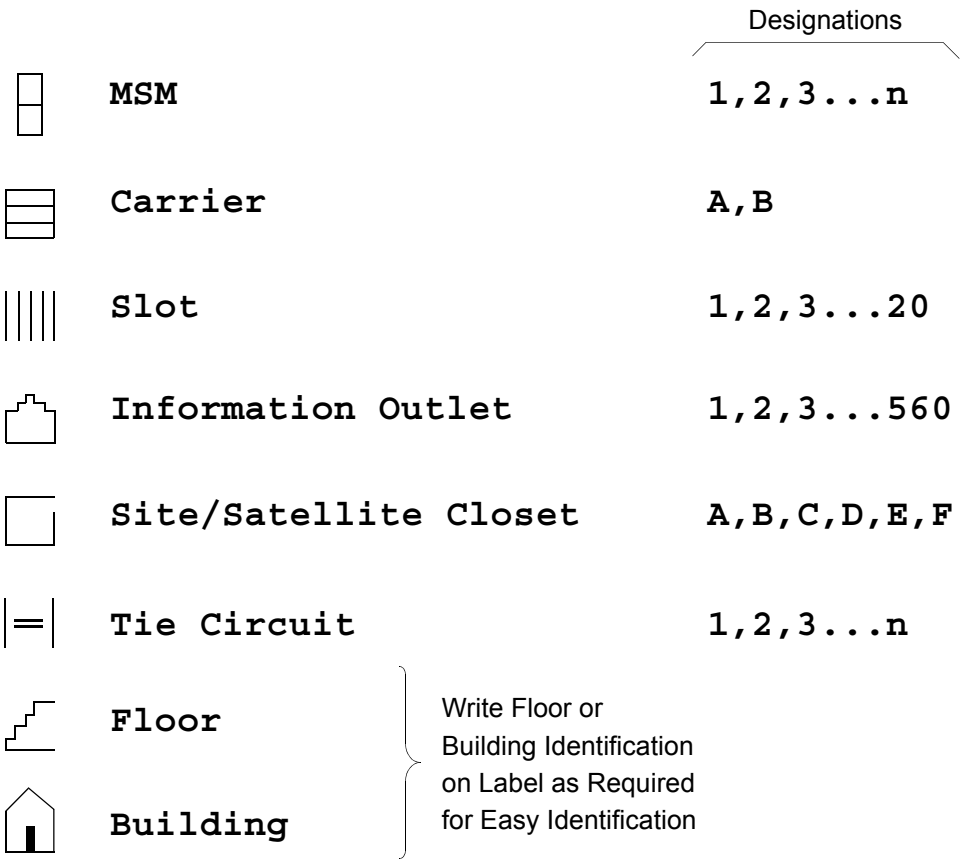


Figure 4-4. Label Graphic Symbols and Designation Nomenclature

Installing Cables

The purple port label shown in the following figure is installed with both ends of the 25-pair cables that connect to the trunk/auxiliary field and/or the distribution field.

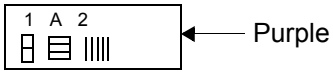
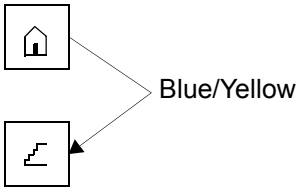
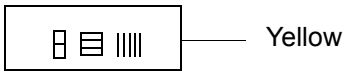
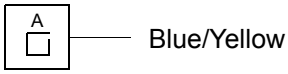
Label Name	Range	Sample Label
Port Cable	1A1-1A10, 1B1-1B20, 1C1-1C20, 1D1-1D20, 1E1-1E20	
Building	Field Identified	
Floor	Field Identified	
Auxiliary Cable	Field Identified	
Site or Satellite	A-F and/or Field Identified	

Figure 4-5. Equipment Room Cabling Labels

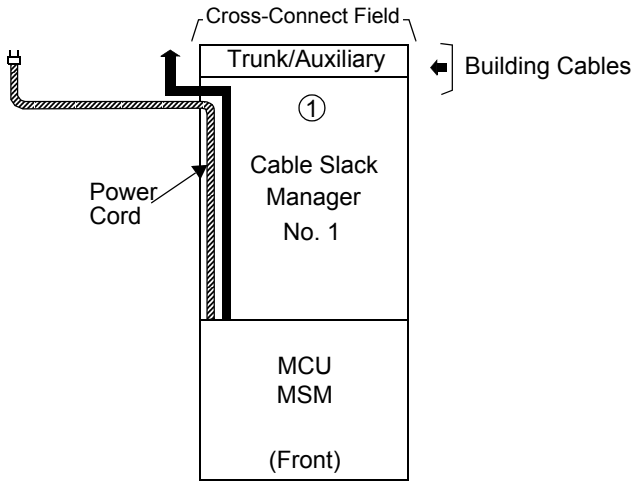
The blue/yellow label is for 25-pair cables that connect to site/satellite closets.

Table 4-2. Cable/Connector/Building Label Ordering Information

Description	Quantity Per Code	Comcode
201A Labels	34 sheets	103969994

Guidelines for Routing Cables

The following two figures show typical cable routing from the MSM to the top and bottom of the cross-connect field, respectively.

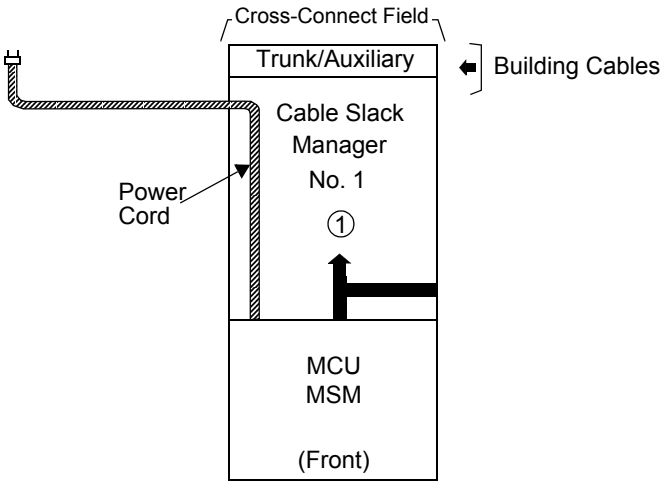


① Cables Run from MSM to Trunk/Auxiliary

Figure 4-6. Cable Routing from MSM to Cross-Connect Field (using top)

The following guidelines should be followed when routing cables from the MSM to the cross-connect field.

- When cable routing is to the top or bottom of the cross-connect field, each port cable is connected at the MSM and then routed along the front trough of the cable slack manager to the connecting/terminal block where the cable is to be terminated.



① Cables Run from MSM to Trunk/Auxiliary Field

Figure 4-7. Cable Routing from MSM to Cross-Connect Field (using bottom)

- Enough slack must be left at the MSM end of the cable to allow for proper dressing of the cables.
- Route the cable from the MSM to the wall. Place the cable beside one of the rows of columns in the cable slack manager (see NOTE).

  NOTE:
  Retainers mounted on columns keep the cable from protruding above the top of the base of the cable slack manager.

- Determine the length of the cable required to reach from the cable slack manager to the assigned connecting/terminal block.
- The cable must be supported on the wall using D rings.
- Cable slack is stored by coiling the cable around the columns in the cable slack manager. The first run should always go across the full length of the five columns in the cable slack manager.
- Connect the cable to the assigned connecting/terminal block.

Installing Control Carrier Outputs Cable

The control carrier AUXILIARY connector outputs support the INADS trunk connection. There is one connector on the back of the control carrier that is labeled *AUX*. A 25-pair cable connects this control carrier AUXILIARY connector to a 66-type connecting block or 110-type terminal block in the yellow field of the trunk/auxiliary field.

110-Type Hardware

Place the appropriate AUXILIARY connector label on the assigned 110-type terminal block row. On the control carrier cable, place a yellow auxiliary label on the connectors at each end of the cable. Write the letters AUX on each label.

66-Type Hardware

Write the lead designations for the AUXILIARY connector on the 66-type connecting block. If cable labels are used, place a yellow auxiliary label on the connectors at each end of the cable. Write the letters AUX on the connectors at each end of the cable.

Connecting the Control Carrier Outputs Cable

Plug the connector cable in the AUXILIARY connector on the rear of the control carrier. Route the connector cable through the cable slack manager to the assigned 66-type connecting block or 110-type terminal block in the yellow field of the trunk/auxiliary field.

Use this procedure to install the cables:

1. For 110-type hardware (see step 2 for 66-type hardware), connect patch cords or jumper wires from the terminal block in the green field to the associated terminal block in the purple field.
2. For 66-type hardware, install bridging clips on the 66-type connecting blocks as required.

   NOTE:
   The left half of the 66-type connecting block is designated as part of the green field and the right half is designated as part of the purple field.

3. Connect the single-fingered end of the concentrator cables to the 110-type terminal block or 157B connecting block connectors associated with the purple row.

4. At the rear of the MSM, connect the other end (2/3 fingered end) of the concentrator cables to the appropriate carrier slots. Equipped carrier slots are identified on the CSO. Mark the nomenclature strips above the carrier to identify the equipped slots.
5. Label connectors on each end of the cables that connect to the MSM.
6. Dress cables down the sides of the MSM and store the excess cable slack in the cable slack manager as described previously.

Installing Grounds for the Coupled Bonding Conductor

A Coupled Bonding Conductor (CBC) must be tie-wrapped to all trunk cables. The CBC connects the cabinet single-point ground block to the approved ground located nearest the telephone company-owned protector block at the building entrance facility (see the following figure).

NOTE:
The CBC is a conductor that is connected to ground and run adjacent to the pairs in an inside wiring cable. The mutual coupling between the bonding conductor and the cable pairs reduces potential differences in terminating equipment. The conductor consists of a 10-AWG wire that is tie-wrapped to the inside wiring cable.

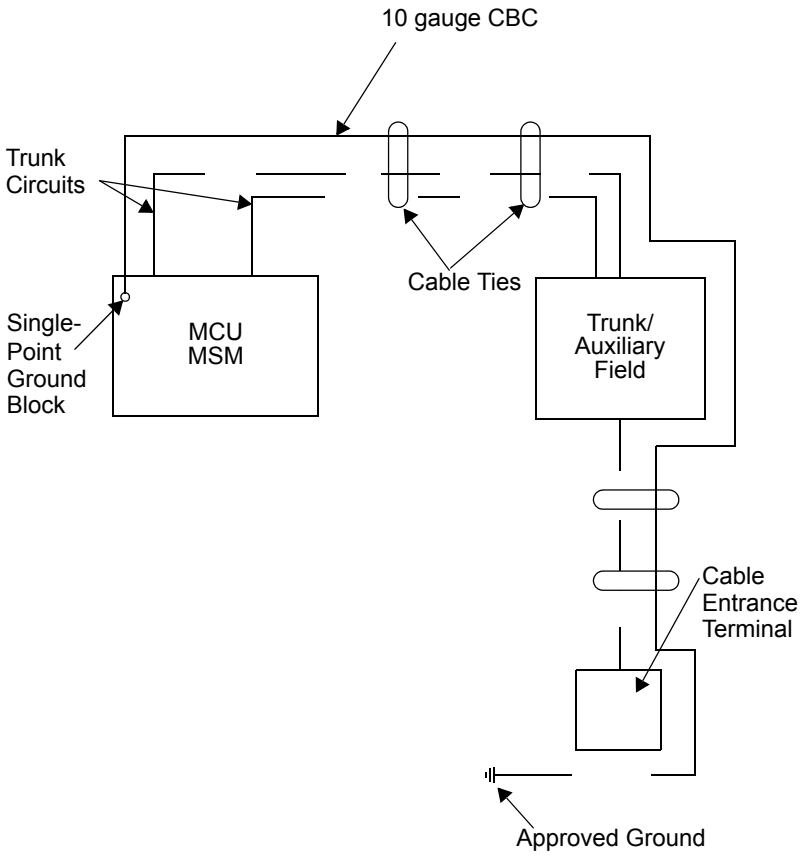


Figure 4-8. Installing the Coupled Bonding Conductor

Approved Grounds

An approved ground is the closest acceptable medium for grounding the building entrance protector, entrance cable shield, or single-point ground of MCU equipment. If more than one type of approved ground is available on the premises, the grounds must be bonded together as required in Section 250-81 of the National Electrical Code. See Chapter 2, “Grounding” for a list of approved grounds.

DANGER:

If the approved ground or approved floor ground can only be accessed inside a dedicated power equipment room, then only a licensed electrician should make the connections to the ground.

Installing DS1 or UDS1 Trunks

The following figures show the connections between the MCU to a PBX and between the MCU and a CSU for a direct network connection. In this example, the DS1 circuit pack is used. For information on installing a CSU, see the documentation provided with the unit.

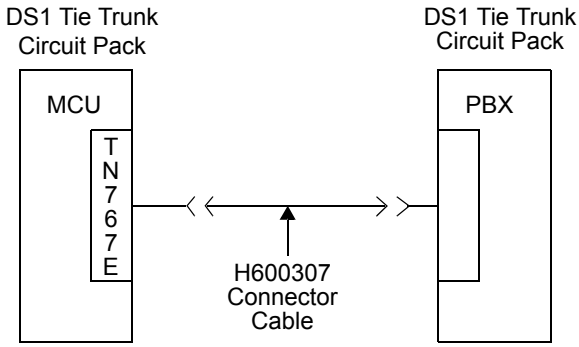


Figure 4-9. Connections for DS1 Trunks Between the MCU and PBX

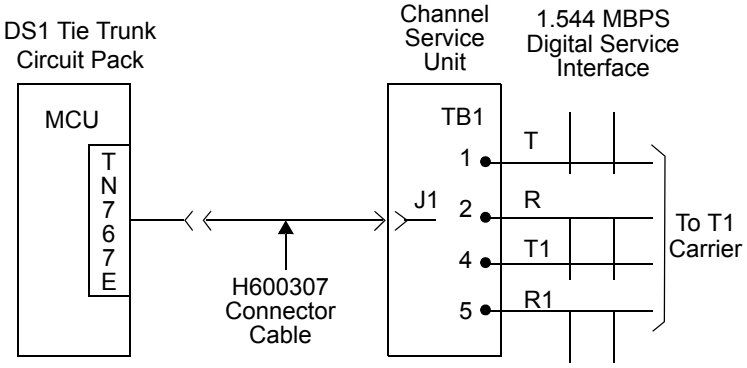


Figure 4-10. Connections for DS1 Trunks Between the MCU and CSU

Activating the MCU

5

Overview

This chapter contains instructions for activating the MCU. Be sure to complete the instructions in the order they are provided.

CAUTION:
To prevent damage from static electricity, always wear an EMC wrist strap (comcode 900 698 226) when handling circuit packs.

WARNING:
White-labeled control circuit packs must not be re-seated without powering down first.

Powering Up SCCs

If your system contains one or more SCCs, have the on-site technician start powering up as follows:

1. Verify that the slide on the memory card, shipped with the MCU, is not in the write-protect position as shown in Figure 5-1.
2. Insert the memory card into the TN794 NetPacket circuit pack in the direction indicated by the arrow on the label.

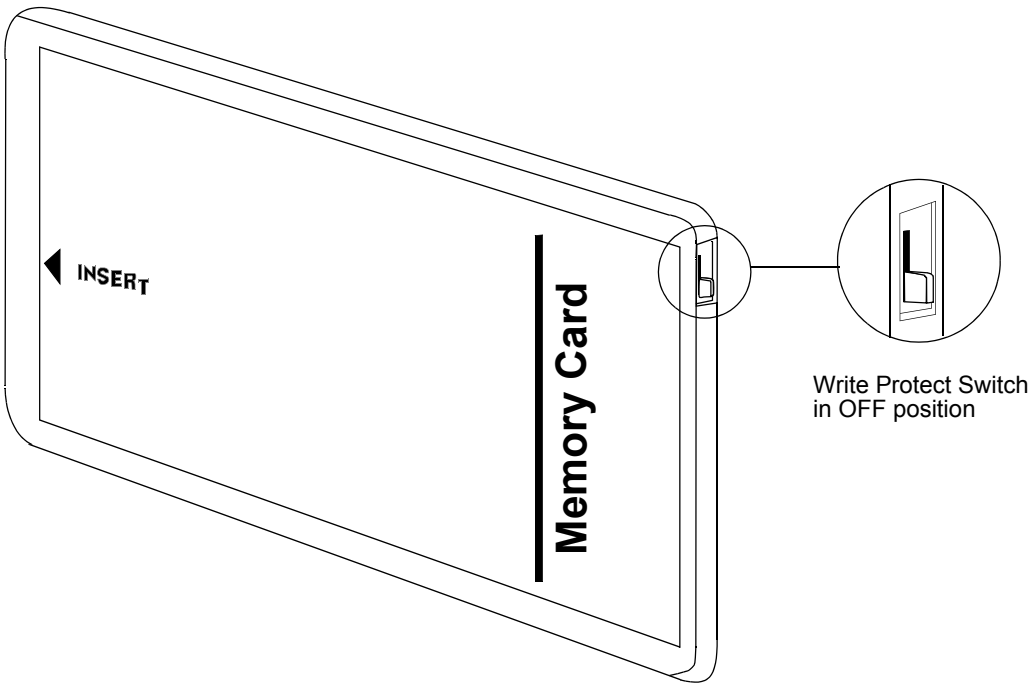


Figure 5-1. Memory Card

Procedure For an AC-Powered System

To power up AC-Powered SCCs, complete the following steps:

1. Set the associated circuit breakers on the AC power panel to ON.
2. At the rear of each cabinet, set the circuit breakers to ON.

   This starts the system initialization and test. Some red lights may be on but will be turned off by other procedures in this chapter.
3. After several minutes, check the MCU-MT to verify that all tests pass.

   NOTE:
   If any of the terminal messages indicate a test has failed, or if the `"spe down mode"` message is displayed, refer to the MCU Maintenance document or call your Avaya representative to clear the trouble.
4. About two minutes after `"REBOOT PERFORMED"` is displayed, verify that the screen displays: `Login:`

Procedure For a DC-Powered System

To power up DC-powered SCCs, complete the following steps:

1. At the DC battery cabinet (if installed), set the circuit breaker to ON.
2. At the DC power cabinet, set the circuit breakers on the associated rectifiers to ON.
3. At the rear of each power distribution unit (if installed), set the circuit breaker to ON.

   This starts the system initialization and test. Some red lights may be on, but they will be turned off by other procedures in this chapter.

Powering Up the MCC

If your system contains an MCC, have the on-site technician power up as follows:

1. Verify that the slide on the memory card, shipped with the MCU, is not in the write-protect position as shown in Figure 5-1.
2. Insert the memory card into the TN794 NetPacket Control circuit pack in the direction indicated by the arrow on the label.
3. Verify that all cabinet power modules are OFF.
4. Plug the MSM power cable into the appropriate receptacle. For DC-powered systems, go to step 6.
5. For AC-powered systems, ensure that the associated circuit breakers at the AC power panel are in the ON position.
6. At the DC battery cabinet, set the circuit breaker to ON.
7. At the DC power cabinet, set the circuit breaker on associated rectifiers to ON.
8. In each MSM, in front of the power distribution unit, set the MAIN circuit breaker to ON.
9. In each MSM, at the rear of the power distribution unit, set each of the circuit breakers to ON.

NOTE:
This action starts the system initialization test. All red LEDs on the circuit packs go on, then off. Some LEDs will remain on until translations are completed (for example, the DS1 circuit pack).

10. After several minutes, check the MCU Management Terminal (MCU-MT) to verify that all tests pass.

    NOTE:
    If any message indicates a test failed or the message, "`spe down mode`" is displayed, refer to the MCU Maintenance document to clear the problem.

11. About two minutes after "`RESET 4 (REBOOT) PERFORMED`" is displayed, verify the screen displays: `Login:`

CAUTION:
To prevent damage from static electricity, always wear an EMC wrist strap (comcode 900 698 226) when handling circuit packs.

WARNING:
White-labeled control circuit packs must not be reseated without powering down first.

12. If any of the red LEDs that remain on should be off, refer to the MCU Maintenance document to identify and clear the problem.

    NOTE:
    LEDs for DS1 circuit packs are red until these circuit packs are administered.

    Alarms appear in the Alarm Log (available from the MCU-MT) when power is applied to the MCU before all equipment connecting to port circuit packs is installed. Normally, some alarms are logged when power is applied, but they should be resolved quickly. If no equipment is connected to the port packs, alarms associated with these ports can take up to four hours to come in, but clear automatically after all equipment is installed and operating correctly.

IP Connectivity with DSA

IP connectivity for administering the MCU is offered with a software package known as DEFINITY Site Administration (DSA). To install DSA, insert the CD to load the program and then perform the following steps:

1. Start the DSA program.
2. From the **File** menu, select **New—Switch**.
3. Enter a descriptive name for the MCU.
4. Choose **Network Connection**.

5. Enter either the FQDN (fully qualified domain name) or the C-LAN IP address.

NOTE:
For versions of DSA prior to version 1.8, there may be a delay when an IP address is used rather than the FQDN.

6. Enter the port on the MCU for connection.

NOTE:
Port number must be the same as the one administered on the IP Services form.

7. Select your settings to establish timeouts when connecting and sustaining an idle connection. It is best to use the defaults, although can increase the timeout period if you experience trouble connecting before the default timeout.
8. Choose whether you want to log in manually each time or have the program log you in automatically. If you select login automatically, go to step 9.
9. Complete the setup by entering the login id and password.

Logging In to DSA

The on-site technician uses the *craft* or OEM login to log into the MCU. Contact your technical center for the correct response to the ASG challenge on Avaya MCUs while using remote access via INADS port on the TN790B or Network control channels on the NETPKT TN794. OEM logins may differ.

NOTE:
The technician or the VTC must administer the initial IP Services for future IP access. This can be done locally or via an analog line.

Perform the following procedure to log in to the MCU:

1. At the MCU-MT, verify the screen displays: `Login:`
2. Enter **craft or OEM login**.

   Login: craft

   Password: (Using Maintenance Terminal Access, OEM or Avaya technicians)

   Avaya Remote Access MCU Login

   Challenge: 998-9190 Product ID : 1000000000

   Response: xxxxxxx

3. Enter password or response.

   NOTE:
   For security purposes, the password is not displayed as you enter it. The MCU verifies the login and password. If an invalid password or response is entered, the screen displays: `login incorrect.` Try again.

4. Verify the software version.
5. Verify that the screen displays: `Terminal Type (Enter 715, 513, 4410, or 4425): [715]).`
6. Enter your terminal type.
7. The screen should now display: `command:`
8. Enter **change password craft**.
9. From the Password Change form in the *Your Current Password* field, enter the current password you used to log in.
10. In the *New Password For Login Name* field, enter the new password.

    NOTE:
    Valid passwords have four to eleven characters Which contain at least 1 alphabetic and 1 numeric symbol; valid characters include letters, numerals, and !&*?;'^(),.:- (exclamation mark, ampersand, star, question mark, semi colon, apostrophe, up arrow, oval brackets, comma, period, colon, dash). Passwords should be selected on the basis of local procedures and recorded in accordance with those procedures.

11. Reenter the new password in the *New Password (enter again)* field and click SUBMIT.
12. Verify that the screen displays: `command successfully completed` followed by `command:`

Setting the System Clock

The time set on the MCU is critical for reserving conferences. In areas of the country that change to Daylight Savings Time, the system clock must be set to adjust the time forward or back an hour as appropriate. Previous releases of the MCU required Daylight Savings Time adjustments to be made manually but this release performs the change automatically if specified on the Set Date and Time form.

The 24-hour conference scheduling system uses the MCU system clock to know when to begin and end conferences. If the MCU is set for the wrong time, it may restore conference records from backup memory that are incorrectly scheduled. If the optional CRCS is installed, the date and time on the MCU and CRCS must be synchronized. Also, for a conference involving T.120 data, the clock on the ESM must be synchronized with the clock on the MSM via a heartbeat message sent by the MSM to the ESM.

The system clock is affected only when power is interrupted for more than two minutes. The optional Uninterrupted Power Supply (UPS) may be used to protect against power outages to the MCU.

Daylight Savings Rules

Use this screen to enter up to 15 customized Daylight Savings rules. You can specify the day, month, date, time and increment each Daylight Savings rule goes into effect and the day, month, date, and time it stops. Rule 0 makes no adjustment of the system clock for Daylight Savings and cannot be modified.

```
change daylight-savings-rules                          Page 1 of 2

DAYLIGHT SAVINGS RULES
Rule Change Day Month    Date Time     Increment

 0: No Daylight Savings

 1: Start: first Sunday___ on or after April___ 1_ at 02:00 _01:00
     Stop: first Sunday___ on or after October_ 24 at 02:00
 2: Start: first _________ on or after ________ __ at __:__
     Stop: first _________ on or after ________ __ at __:__
 3: Start: first _________ on or after ________ __ at __:__
     Stop: first _________ on or after ________ __ at __:__
 4: Start: first _________ on or after ________ __ at __:__
     Stop: first _________ on or after ________ __ at __:__
 5: Start: first _________ on or after ________ __ at __:__
     Stop: first _________ on or after ________ __ at __:__
 6: Start: first _________ on or after ________ __ at __:__
     Stop: first _________ on or after ________ __ at __:__
 7: Start: first _________ on or after ________ __ at __:__
     Stop: first _________ on or after ________ __ at __:________
```

Figure 5-2. Daylight Savings Rules Form (Page 1)

The form contains the following fields.

- *Rule*

  This display-only field indicates the Daylight Savings rule number.

- *Change Day (Start)*

Enter the day of the week (**Sunday** through **Saturday**) you want the clock to move ahead to begin Daylight Savings Time. For example, in the eastern United States, Daylight Savings Time starts at 02:00 on the first Sunday in the month of April. If this field is blank, the clock will change on the exact date entered in the next 2 fields.

- *Month (Start)*

  Enter the month you want the clock to move ahead to begin Daylight Savings Time.

- *Date (Start)*

  Enter the day of the month (**0** to **31**) you want the clock to move ahead to begin Daylight Savings Time.

- *Time (Start)*

  Enter the hour (**0** to **23**) and minute (**0** to **59**) you want the clock to move ahead to begin Daylight Savings Time.

- *Increment (Start)*

  Enter the hour (**0** to **23**) and minute (**0** to **59**) you want the clock to move ahead to begin Daylight Savings Time and to move back to return to standard time.

- *Change Day (Stop)*

  Enter the day of the week (**Sunday** through **Saturday**) you want the clock to move back to return to standard time. For example, in the eastern United States, Daylight Savings Time ends at 02:00 on the last Sunday in the month of October. If this field is blank, the clock will change on the exact date entered in the next 2 fields.

- *Month (Stop)*

  Enter the month you want the clock to move back to return to standard time.

- *Date (Stop)*

  Enter the day of the month (**0** to **31**) you want the clock to move back to return to standard time.

- *Time (Stop)*

  Enter the hour (**0** to **23**) and minute (**0** to **59**) you want the clock to back to return to standard time.

Set Date and Time Form

The date and time are set using the Set Date and Time Form. To set the date and time, follow these procedures:

NOTE:
Be sure to obtain the accurate time by calling the National Bureau of Standard Time at **202 844-1234**.

1. At the *command:* prompt, enter **set time**.
2. At the *Day of the Week* field, enter the day of the week.
3. At the Month field, enter the current month.
4. In the *Day of the Month* field, enter the current day (1 through 31).
5. In the *Year* field, enter the current year.
6. In the *Hour* field, enter the current hour in military time. (00 is midnight, noon is 12, and 23 is 11 p.m. The p.m. time is hour plus 12.)
7. In the *Minute* field, enter the current minute (0 through 59).

   NOTE:
   Seconds are reset to 00 for the minute selected.

8. In the *Type* field, enter **daylight-savings** if Daylight Savings Time is currently being observed; otherwise enter **standard** for standard time.
9. In the Daylight Savings Rule field, enter the appropriate rule number as defined on the Daylight Savings Rules screen.
10. Press ENTER.
11. When the MT displays: *Command successfully completed* followed by *command*:, enter **display time** to verify the setting.

```
set time                                                    Page   1 of   1
                                DATE AND TIME

       DATE

           Day of the Week: Thursday       Month: May
          Day of the Month: 11              Year: 2000

       TIME

           Hour: 15  Minute: 25    Second: 47   Type: Daylight Savings

                     Daylight Savings Rule: 1

 WARNING: Changing the date or time will impact BCMS, CDR and MEASUREMENTS
```

Figure 5-3. Set Date and Time Form

Saving Translations

The save translation command copies the current system translations onto the memory card located on the NetPacket. Use the following procedure to save translations on the original system memory card and to make a backup memory card (not included):

NOTE:
To order the 10 meg backup memory card (J58890TG1,L15), use comcode 601817430.

1. Be sure the system memory card is inserted in the network control circuit pack.
2. At the `command:` prompt, type **save translation** and press RETURN. Wait several minutes.
3. Check for a **0** in the *Error Code* column; it indicates the save translation was successfully completed.

   NOTE:
   If a number other than **0** appears, the save translation process did not complete. Record the number in the *Error Code* field along with any *Error Message* and notify maintenance support.

4. If the save translation procedure was successful and the customer has a backup memory card, remove the system memory card and insert the backup memory card. Repeat steps 2 and 3, and then swap the memory cards. Place the backup memory card in a safe place.

Testing the Network

Test the connection of each DS1 or UDS1 circuit pack to the network as follows:

1. At the MCU-MT, enter **test ds1** ***location*** **long** where ***location*** is the cabinet and slot address of the DS1 (UDS1) circuit pack (for example, **1a05**).
2. Verify that all board level tests pass. If not, check the network connections.

   NOTE:
   If the board level tests pass but the port level tests either abort or fail, network service is not turned on.

Logging Off

After initializing the MCU, log off the system to prevent unauthorized changes to the data entered and to save the changes that were made.

1. At the MCU-MT, enter **logoff**.
2. The screen displays: `Login:`

Calling INADS

The final step in the on-site installation procedure is to call INADS to report a new system installation and to test the INADS interface as follows:

1. The on-site technician calls INADS to report a new system installation and asks them to call the MCU.
2. INADS displays the System Parameters Maintenance form to confirm the product identification.
3. INADS enters **test inads-link**.
4. INADS terminates the login and disconnects.
5. INADS checks the trouble ticket generated by the test. It should show `"INADS,n,MINOR"` to indicate a minor off-board alarm was reported.
6. INADS calls back and checks the error log to verify there are no problems.
7. INADS displays the Change Password form (see “Changing Passwords” for details) and changes the appropriate passwords.
8. INADS displays the Maintenance-Related System Parameters form (see “Setting System Maintenance Parameters”) to establish customer-supplied alarm thresholds and contact numbers.
9. INADS terminates the login and disconnects.

Setting System Maintenance Parameters

The Maintenance-Related System Parameters form identifies MCU scheduled maintenance parameters and maintenance thresholds. The fields are defined as follows; specific entries must be obtained from the customer.

Use the following procedure under the craft login to change maintenance parameters:

1. At the `command:` prompt, type **change system-parameters maintenance** then press RETURN.
2. Verify that the screen displays the Maintenance-Related System Parameters form.

3. From the *Product Identification* field, use TAB and RETURN to advance to the fields you want to change.

   NOTE:
   An entry must be made in the *Product Identification* field and the *OSS Telephone Number* field.

4. When the form is completed, verify the screen displays: `command successfully completed` followed by `command:`
5. To verify the form, type **display system-parameters maintenance** then press RETURN.

Maintenance-Related System Parameters Form

An example of the Maintenance-Related System Parameters form appears as follows:

```
display system-parameters maintenance                          Page   1 of   4
                  MAINTENANCE-RELATED SYSTEM PARAMETERS

OPERATIONS SUPPORT PARAMETERS
            Product Identification: 1234567890
         First OSS Telephone Number:                    Abbrev Alarm Report? y
        Second OSS Telephone Number:                    Abbrev Alarm Report? n
  Alarm Origination to OSS Numbers: neither
        Cleared Alarm Notification? n                 Suspension Threshold: 5
              Restart Notification? n
           Test Remote Access Port? n
        CPE Alarm Activation Level: none
        Sch Adj Alarm Activation Level: none

     Customer Access to INADS Port? y
       Repeat Dial Interval (mins): 7
SCHEDULED MAINTENANCE
                  Start Time: 01 : 00                 Stop Time: 06 : 00
           Daily Maintenance: daily              Save Translation: daily
```

Figure 5-4. Maintenance-Related System Parameters Form (Page 1)

```
display system-parameters maintenance                          Page   2 of   4
                    MAINTENANCE-RELATED SYSTEM PARAMETERS

MINIMUM MAINTENANCE THRESHOLDS ( Before Notification )
        TTRs: 4        CPTRs: 1        Call Classifier Ports: 0




ISDN MAINTENANCE
   ISDN-PRI Test Call Extension: 68937   ISDN-BRI Service SPID:

DS1 MAINTENANCE
   DS0 Loop-Around Test Call Extension:

SPE OPTIONAL BOARDS
                     Packet Intf1? y     Packet Intf2? y
```

Figure 5-5. Maintenance-Related System Parameters Form (Page 2)

```
display system-parameters maintenance                          Page   3 of   4
                    MAINTENANCE-RELATED SYSTEM PARAMETERS

         Modem Connection: internal
                Data Bits: 8
                   Parity: none
```

Figure 5-6. Maintenance-Related System Parameters Form (Page 3)

```
display system-parameters maintenance                          Page   1 of   4
                  MAINTENANCE-RELATED SYSTEM PARAMETERS

OPERATIONS SUPPORT PARAMETERS
            Product Identification: 1234567890
        First OSS Telephone Number:                    Abbrev Alarm Report? y
       Second OSS Telephone Number:                    Abbrev Alarm Report? n
  Alarm Origination to OSS Numbers: neither
        Cleared Alarm Notification? n                 Suspension Threshold: 5
             Restart Notification? n
           Test Remote Access Port? n
        CPE Alarm Activation Level: none
        Sch Adj Alarm Activation Level: none

     Customer Access to INADS Port? y
       Repeat Dial Interval (mins): 7
SCHEDULED MAINTENANCE
                  Start Time: 01 : 00                  Stop Time: 06 : 00
           Daily Maintenance: daily               Save Translation: daily
```

Figure 5-7. Maintenance-Related System Parameters Form (Page 4)

The fields on the Maintenance-Related System Parameters form are defined in the following paragraphs. Specific entries can be obtained from your technical center and/or the customer.

Page 1: **Operations Support Parameters Area**

- *Product Identification*

  Identifies the MCU to an Operations Support System (OSS), such as INADS or System Network Management Protocol (SNMP). This field must be populated if you want to make changes to this form. The number must start with “1” and contain ten digits.

- *First OSS Telephone Number*

  The first number that the MCU uses for alarm origination. This number can also be used to dial a telephone number when an alarm is raised on the MCU. The number must be obtained from the National Customer Support Center (NCSC) or the Technical Support Center (TSC). Characters # and * are not allowed in the telephone number.

- *Abbrev Alarm Report*

  Enables the Abbreviated Alarm Report feature for the first OSS. Default is **y**.

- *Second OSS Telephone Number*

  The second number that the MCU uses for alarm origination. This number can also be used to dial a telephone number when an alarm is raised on the MCU. The number must be obtained from the National Customer Support Center (NCSC) or the Technical Support Center (TSC). Characters # and * are not allowed in the telephone number.

- *Abbrev Alarm Report*

  Enables the Abbreviated Alarm Report feature for the second OSS. Default is **y**.

- *Alarm Origination to OSS Numbers*

  Indicates one of four options for alarm origination. If this field is set to any value other than **neither** (default), the craft login has a 30-minute inactivity timeout.

  — For value **both**, all major and minor alarms result in an automatic call to both OSS telephone numbers. Both OSS telephone numbers must be administered.

  — For value **first-only**, all major and minor alarms result in an automatic call to the first OSS number only. The switch does not call the second OSS telephone number even if the number is administered. The first OSS telephone number must be administered.

  — For value **neither**, alarm origination does not take place. Warning alarms are not reported to either numbers.

  — For value **second-as-backup**, all major and minor alarms result in an automatic call to the first OSS telephone number. If calling the first OSS telephone number fails four attempts, the switch starts to call the second OSS telephone number as a backup until calling the first OSS telephone number becomes successful. Both OSS telephone numbers must be administered.

- *Cleared Alarm Notification*

  Enables the MCU to originate a call to the alarm receiver and sends an alarm resolution message whenever all previously reported major and minor alarms are resolved. Alarm origination must be activated for *Cleared Alarm Notification* to work. Values include **y** and **n**.

- *Restart Notification?*

  Generates an automatic call to the OSS number if the MCU has a restart. Values include **y** and **n**

- *Test Remote Access Port*

  Indicates whether to test the remote access port on the Processor circuit pack.

- *CPE Alarm Activation Level*

  Indicates the level at which the customer premises equipment (CPE) alarm is activated. If the level is set to **major**, the CPE alarm is activated only on major alarms. If the level is set to **minor**, the CPE alarm is activated for both major and minor alarms. If the level is **warning**, the CPE alarm is activated for all alarms. If the level is set to **none**, the CPE does not activate for any alarm.

- *Sched Adj Alarm Activation Level*

  SCH-ADJ allows the MCU to originate an alarm to the alarm center whenever CRCS fails to communicate with the MCU for a given time period. This halt in communication may occur if the user powers down the CRCS, or if a problem occurs within the CRCS PC. If the user has a CRCS connected to the MCU, the CRCS logs into the MCU once every hour to display the time (this represents an attempt to synchronize the data and time for the MCU and CRCS). Once the CRCS logs into the MCU, the MCU knows that the CRCS is active. If, within the hour, the CRCS does not log into the MCU, an error is logged against SCH-ADJ. If the CRCS does not log into the MCU for three consecutive hours, an alarm is raised.

  Values for this field include **major**, **minor**, **warning**, and **none** (default). Only major or minor alarms automatically notify the alarm center.

- *Customer Access to INADS Port*

  Allows the user to prohibit access to system administration and maintenance interface via the INADS port when using customer login ID's. This field can be activated only by Avaya services via system-parameters maintenance administration. Values include **y** and **n** (default).

Page 1: Scheduled Maintenance Area

- *Start Time*

  Indicates the hour and minute the daily scheduled maintenance actions start. Enter a number from **0** to **23** for hours and **0** through **59** for minutes. The scheduled maintenance actions are: daily maintenance and save translation

- *Stop Time*

  Indicates the hour and minute when scheduled daily maintenance will stop running. If any daily maintenance operations are not completed by this time, the system notes where in the sequence it stopped, and it performs those operations during the next scheduled daily maintenance.

- *Daily Maintenance*

  Displays the status **daily** to indicate the maintenance tests are automatically run each day. This value cannot be changed.

- *Save Translation*

  Indicates if the MCU translation data should be automatically backed up on a specified day of the week (**sunday**, **monday**, etc.) all week (**daily**), or not at all (**no**).

Page 2: **Minimum Thresholds Area**

- *TTRs*

  Shows the minimum number of touch-tone receivers (**1** through **200**) administered in the MCU. If fewer than this number are in service, a warning alarm is raised. Enter value **8** for each TN744 Call Classifier circuit pack in the MCU.

- *CPTRs*

  Shows the minimum number of call progress tone receivers (**1** through **200**) administered in the MCU. If fewer than this number are in service, a warning alarm is raised. Enter value **8** for each TN744 Call Classifier circuit pack in the MCU.

- *Call Classifier Ports*

  Shows the minimum number of call classifiers (**1** through **200**) administered in the MCU. If fewer than this number are in service, a warning alarm is raised. Enter value **8** for each TN744 Call Classifier circuit pack in the MCU.

Page 2: ISDN Maintenance Area

- *ISDN-PRI Test CALL extension*

  Defines the extension number for an ISDN test call. This test allows a far-end ISDN node to test the ISDN-PRI trunks between the far end and the MCU. Enter an unassigned DNIS extension number.

- *ISDN-BRI Service SPID*

  N/A for the MCU. Leave blank.

- *DSO Loop-Around Test Call Extension*

  Indicates the extension used by the network service provider to set up a DSO loop-around connection for testing non-ISDN DS1 trunks.

  This feature is used primarily for testing DSO channels associated with non-ISDN-PRI trunks. The loop-around is activated by dialing the test extension number. Multiple DSO Loop-Around connections can be set up by placing multiple calls to the loop-around extension.

  For more information, see the information about Facility Test Calls in the maintenance document for your system.

Page 3:

- *Modem Connection*

  Indicates the type of modem connection. Values are **internal**, **external**, and **none**. Value cannot be **none** if *Alarm Origination to OSS Numbers* is enabled.

- *Data Bits*

  Enter the number of data bits. Values include **7** and **8**.

- *Parity*

  Display-only field. Value is **none**.

Cable Connectivity

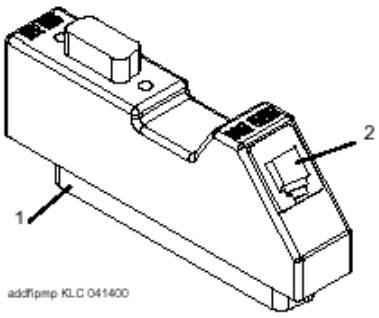
A

Overview

This appendix provides information on cable connectivity.

Media Processor Cable

Figure A-1 shows the cable used for TN2303 Media Processor connectivity.



Adapter (for Series 3 CPs)

1. Amphenol connector to connector corresponding to TN2303 slot
2. To ethernet 10/100BaseT over Category 5 cabling

Figure A-1. TN2303 Media Processor Cable

Connect the Cables

1. Determine into which port slots you are putting the TN799B C-LAN and TN2303 Media Processor circuit packs.
2. From the rear of the cabinet, connect a 259A connector to the backplane connector corresponding to each TN799B slot.
3. Connect one end of each DW8 cable to each 259A connector. Connect the other end(s) to the customer's network.
4. Connect the amphenol connector on the adaptor to the backplane. connector corresponding to each TN2303 slot.

Connect the Ethernet

1. Connect the network cable(s) to the ETHERNET connector on the TN2303 adaptor(s).

NOTE:
You need a Category 5 cable or better for 100 Mb operation.

Miscellaneous ESM Cables

The following figures show the cables used for ESM connectivity.

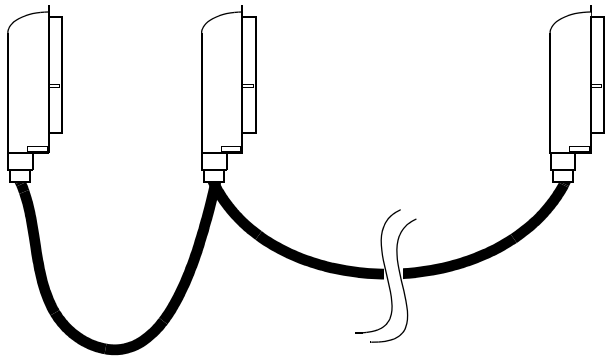


Figure A-2. Y-Cable 25 Feet

The DS1 Y-Cable has a length of 6 ft., while the DI Y-Cable has a length of three ft.

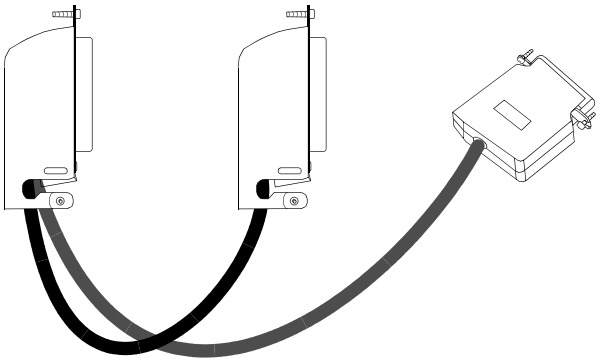


Figure A-3. RS366 DCE-Y Cable

The RS366 DCE Y-Cable is 25 ft.

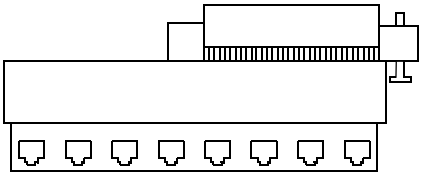


Figure A-4. 356A Conductor

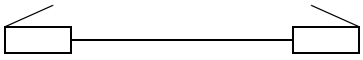


Figure A-5. D8W Cable

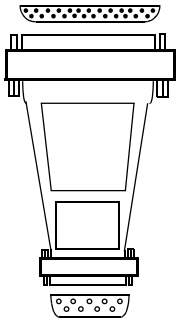


Figure A-6. DB-25 Male to DB-9 Female Adapter

An adapter such as this one may be needed if an external modem is connected to the ESM.

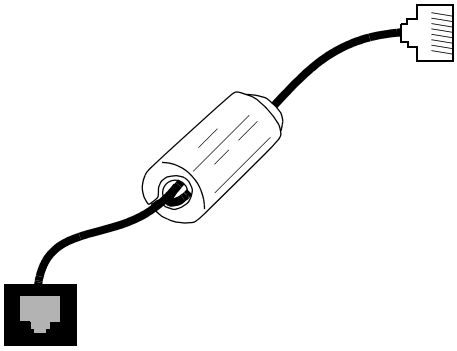


Figure A-7. RMB/EMI Suppression Cable

This cable is placed between the RMB modem jack and an analog telephone line.

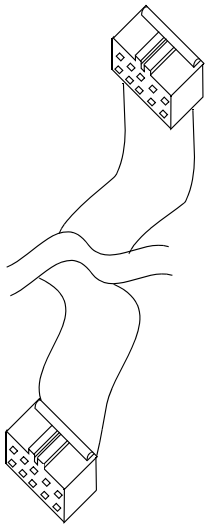


Figure A-8. ESM Internal Reset Cable

This cable is inside the ESM PC and is connected to the RMB board.

ESM/MSM E1 Cabling Pinouts for Cross-Connect Wiring

In certain installations, it may be desirable to connect the ESM/MSM E1 span through a cross connect panel rather than direct D8W cabling from the TN2207 to the MSM Interface Card. When connecting through a cross connect panel, it is necessary to know the wiring pinouts from the MSM Interface Card's E1B

connector and the wiring pinouts of the 50 pin Y-cable connection from the TN2207 board.

Table A-1. MSM Interface Card E1B Pin Assignments (PRI-ISA64)

E1B Pin	Signal Name
1	Receive Ring
2	Receive Ring
3	No Connection
4	Transmit Ring
5	Transmit Tip
6	No Connection
7	No Connection
8	No Connection

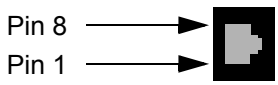


Figure A-9. E1B Connector

C6F Connector Cable (Comcode 104-307-475) 50 foot long shielded cable equipped with a 50 pin male connector on one end and a three inch stub on the other end. This cable is used to connect the TN2207 E1 trunk circuit pack to cross-connect fields requiring hardwire connections.

Table A-2. C6F Connector Cable Lead Identification

Wire Color	Lead Designation	Connector Pin Number
WG	Receive Ring	47
G	Receive Tip	22
W-BR	Transmit Tip	48
BR	Transmit Ring	23
W-S	LBACK2	49
S	LBACK1	24

TN2236 Data Interface Wiring

Following are several illustrations to assist customers and installers at sites equipped with the TN2236 Data Interface circuit packs.

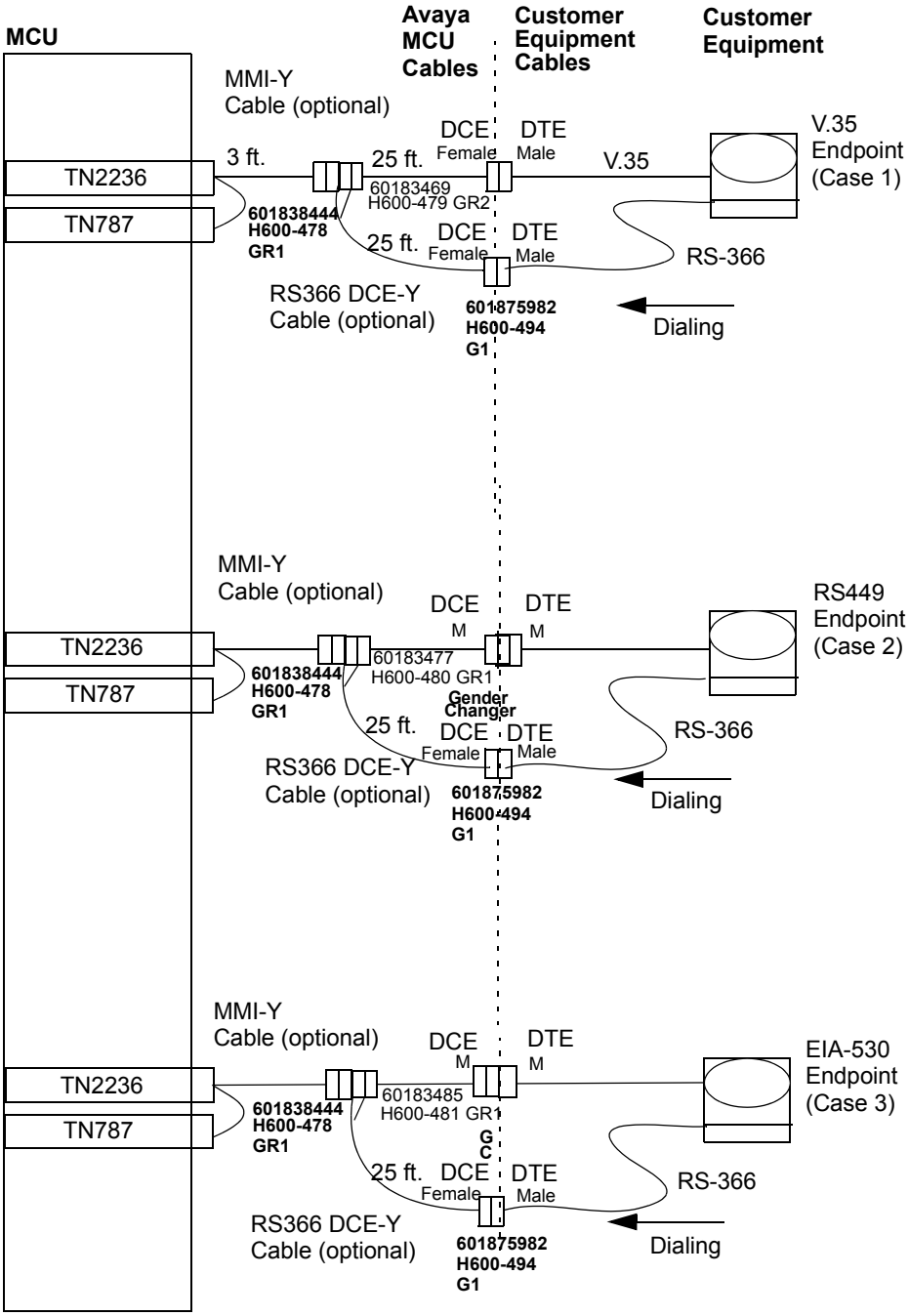


Figure A-10. Installation Example: MCU connected to customer endpoints

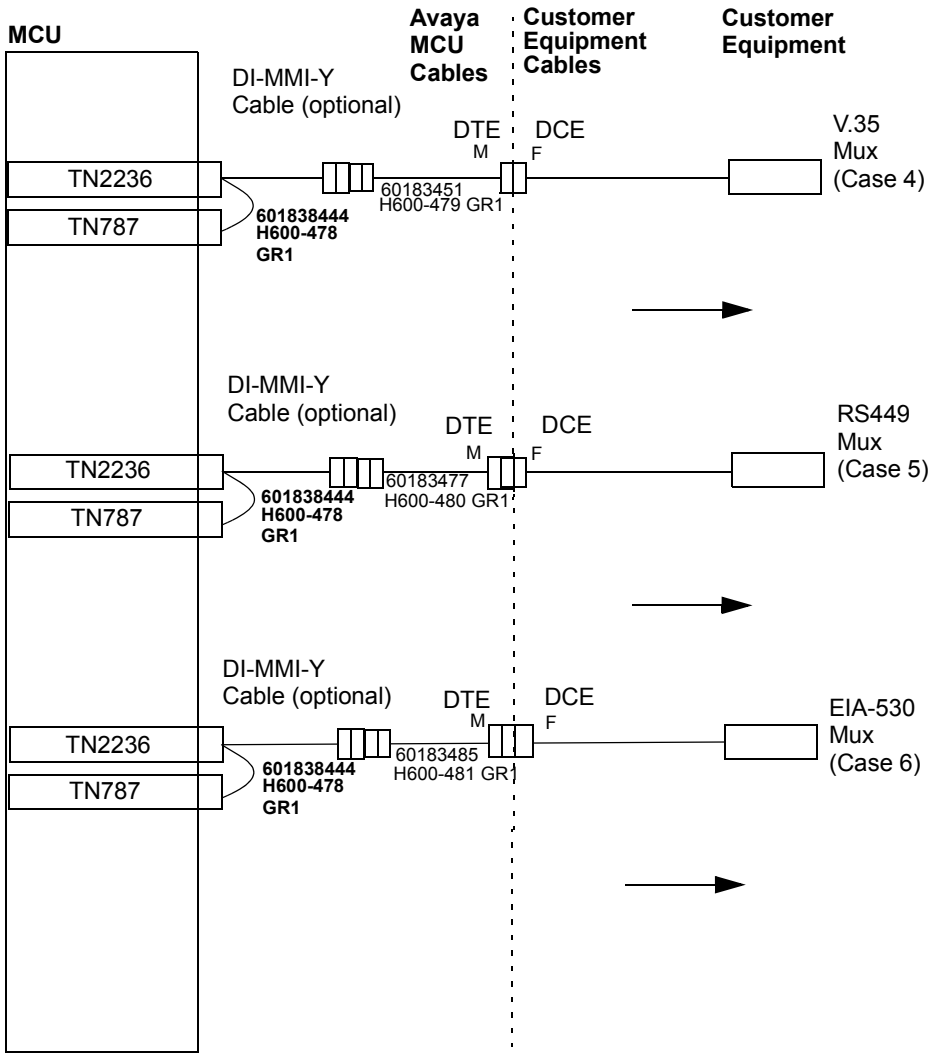


Figure A-11. Installation Examples: MCU connected to MUX

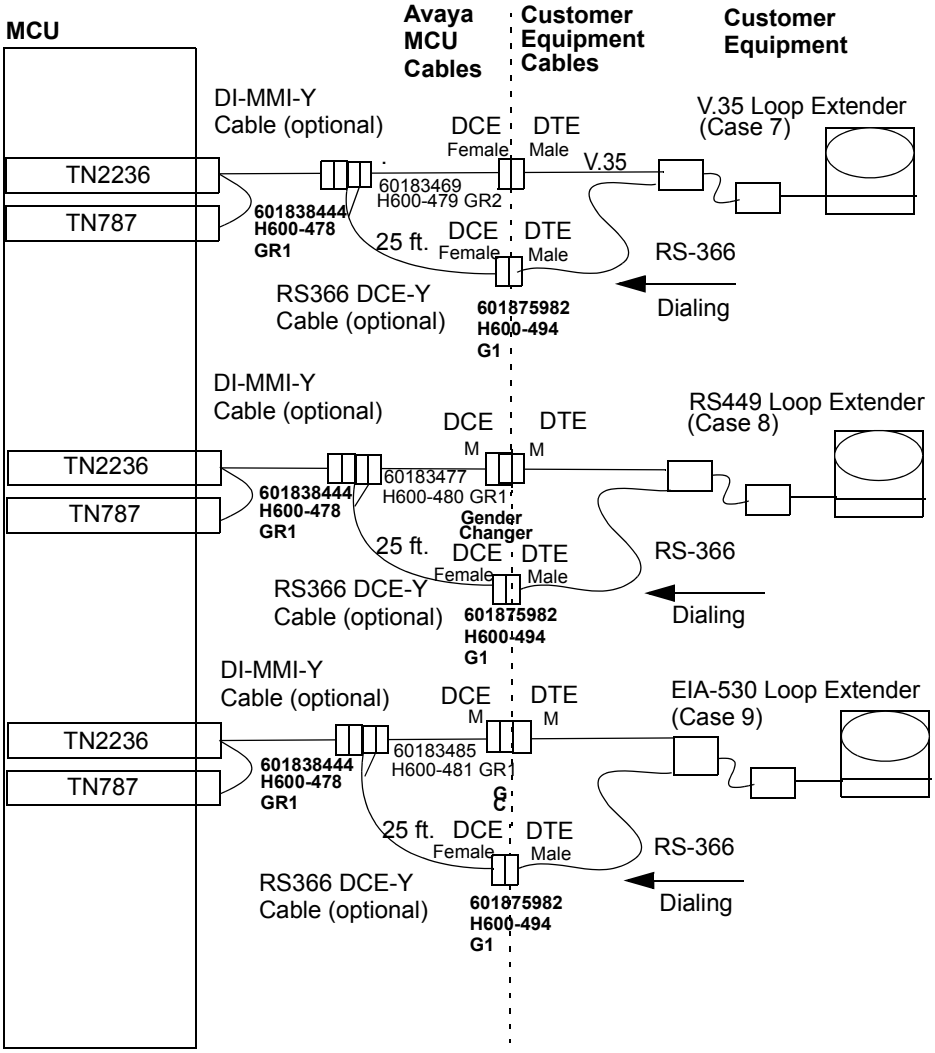


Figure A-12. Installation Examples: MCU connected to loop extenders

The Former Enterprise Networks Group
of Lucent Technologies

MultiPoint Conferencing Unit (MCU)
Release 7.1

Maintenance

555-027-741
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Maintenance Architecture

1

Maintenance Objects

The MCU is partitioned into separate entities called maintenance objects (MOs). Each MO is referred to by an uppercase, mnemonic-like name that serves as an abbreviation for the MO. For example, MMI-PT stands for Multimedia Interface Port; VC-BD stands for Voice Conditioner circuit pack.

Each MO is monitored by the MCU and has its own maintenance strategy. Each MO is normally a separately replaceable unit. Most MOs, such as the DS1 circuit pack (DS1-BD), are individual circuit packs. Some MOs are hardware components that reside on part of a circuit pack. For example, the TDM bus clock (TDM-CLK) and tone generator (TONE-PT) circuits reside on the Tone-Clock circuit pack (TONE-BD). Some MOs, such as synchronization (SYNC), represent processes or a combination of processes and hardware.

Maintenance names are recorded in the error and alarm logs. Individual copies of a given MO are assigned an address that defines the MO's physical location in the MCU. Repair instructions appear alphabetically under Chapter 8, "Maintenance Object Repair Procedures."

Alarm and Error Reporting

During normal operations, software and firmware may detect error conditions relevant to specific MOs. The MCU attempts to fix or circumvent these problems automatically. However, if a hardware component incurs too many errors, an alarm is raised. Typically, an alarm is generated according to the following sequence of events:

1. An error occurs in an MO.
2. The component notifies the maintenance software of the error. An error is detected in one of two ways:
   A. For in-line errors, firmware on the component detects the occurrence of an error during ongoing operations.
   B. For other types of errors, a periodic test or a scheduled test executed by software detects the error. These tests run at regular intervals, and they are administered by the **change system-parameters** command. The technician can also run these tests on demand by using the maintenance commands located under each MO under “Craft-Demanded Tests” in Chapter 8.
3. Software logs the error in the error log, and increments the error counter for that error. Whenever an error counter is active (greater than zero), a maintenance record is maintained for the MO. A routine based on the strategy for maintaining that component is queued and runs when the resources are available.

   NOTE:
   For some error types, the routine executes additional tests called analysis tests on the component. Error counters associated with the tests are incremented or decremented based on the success or failure of these tests. If all tests pass, the maintenance record is retired.

4. In-line error counters are generally not associated with any specific test. These counters are automatically decremented over time at a rate specific to the error type. If the error occurs at a rate lower than the leak rate, the counter for that error gradually decreases. If the error does not recur for a while, the counter drops to zero, and the relevant maintenance record is retired. This process is known as the leaky bucket” mechanism.
5. When a counter exceeds its specific threshold value, an alarm is raised. Most alarms are raised by specific test failures. Each alarm is logged in the alarm log, and it remains active until the problem is resolved. Further testing with no failures, no additional errors over a period of time, or repair actions can resolve an alarm.

The MCU keeps a record of every alarm detected. This record, along with the alarm log and the error log, can be displayed locally at the MCU Management Terminal (MCU-MT) or remotely by your technical center and Initialization and Administration System (INADS) personnel.

An alarm is classified as Major, Minor, or Warning, depending on its affect on system operation. Alarms are also classified as ON-BOARD or OFF-BOARD.

- Major alarms: identify failures that cause a critical degradation of service. These alarms require immediate attention.
- Minor alarms: identify failures that cause some service degradation but do not render a crucial portion of the system inoperable. MINOR alarms require attention, but not immediate attention.
- Warning alarms: identify failures that cause no significant degradation of service or equipment failures external to the MCU. These failures are not reported to INADS.
- On-Board alarms: originate in the circuitry on the alarmed circuit pack.
- Off-Board alarms: originate in a process or component that is external to the circuit pack.

Alarms are discussed further in Chapter 6, "Accessing Alarms and Errors".

Maintenance Testing

The MCU is designed to be easy to maintain and to have minimal down time. Most troubles are reduced to the circuit pack level and can be identified by LEDs on the circuit packs and software reports generated.

The maintenance tests can be divided into three groups:

- Periodic: background tests performed by software maintenance, usually on an hourly basis. These tests are non-destructive and can be run during high traffic periods without interfering with calls.
- Scheduled: background tests performed by software maintenance, usually on a daily basis, are generally more thorough than periodic testing. The tests are considered destructive and are usually run during off-hours so they do not interfere with calls.
- Fixed Interval: background tests performed by software maintenance at regular time intervals (these intervals cannot be administered). These tests run concurrently with periodic maintenance.

Craft-demanded tests are also run when maintenance personnel perform trouble clearing activities. These tests include periodic tests plus other tests that are required only when trouble occurs. Some nonperiodic demand tests may disrupt operation.

Maintenance personnel can use the MCU-MT to initiate the same tests the MCU initiates. Test results are displayed on the screen.

The primary goals of maintenance are to detect, report, and clear troubles as quickly as possible, with a minimum of service disruption. Errors are often detected and corrected before any apparent failure occurs. This goal is supported by maintenance tests, automatic software diagnostic programs, and fault detection hardware.

Multimedia Server Module/Expansion Services Module Link

Basic Structure and Administration

The link between the Multimedia Server Module (MSM) and the Expansion Services Module (ESM) is known as the ESM/MSM Link. In Release 4.0, this link is the TN765 Processor Interface (PI) circuit pack. The ESM is equipped with a MSM Interface Card (**PRI-ISA64**) connected to the MSM via an E1 circuit pack (also known as the TN2207 circuit pack or **ESM-DS1**). This ESM-DS1 service circuit is self-cabled to an Multimedia Interface (MMI) circuit pack (also known as the TN787K circuit pack or **ESM-MMI**) in the MSM cabinet.

Data conferences are administered solely on the MSM. This conference information is transferred to the ESM by the MSM each time the ESM/MSM Link is established or recovers. This ensures that any customer-specific values residing on the MSM are maintained by the MSM along with all other MCU parameters.

ESM/MSM Link administration and maintenance for the ESM component follows the current link administration and maintenance strategy for the MSM component. (Refer to Chapter 10, "T.120 Maintenance From the ESM-MT") However, the ESM/MSM Link is specifically administered to indicate that it is a link to the ESM rather than to the network. If the ESM/MSM Link fails to establish once MSM administration has concluded, an off-board alarm is raised against the **PI-LINK MO** by the MSM. The MSM then attempts to reestablish the ESM/MSM Link periodically, therefore lengthening the time interval between attempts after a certain number of retries fail.

If the ESM/MSM Link fails, each component (that is, the ESM and MSM) first assumes that the other side failed and then attempts to reestablish the link. Since the ESM control channel (D-channel) can fail without the LAPF channels (B-channels) failing, a data conference can continue uninterrupted. While the ESM/MSM Link is down, new data conferences cannot be established, and changes cannot be made to the existing data conference. New endpoints can join the audio and video portions of an existing multimedia conference even though these endpoints cannot join the data portion of the same conference. When the ESM/MSM Link recovers, current data conferencing information that the ESM

should be managing is retransmitted by the MSM. This includes all the necessary configuration, re-synchronization parameters, and B-channel availability.

However, if there is an active data conference, and if the E1 span experiences a problem that causes failure on both the ESM/MSM Link's D-channel and the B-channels associated with each endpoint's data stream, then, once the E1 span returns to good health, the D-channel link reestablishes as described earlier. However, the B-channels are not automatically reallocated for those endpoints. To reestablish the data portion of the voice-video-data conference, each of the endpoints needs to exit the conference and reenter the conference. This could be done on an endpoint-by-endpoint basis (that is, via a drop-and-redial sequence) or at the conference level by terminating and restarting the conference.

The MSM Management Terminal (MSM-MT) may be used to diagnose data conferencing problems originating on either the ESM or the MSM. If the ESM/MSM Link between these two components is established, all status information and error, alarm and reset activity on the ESM are reported to the MSM and can be retrieved via maintenance commands entered from the MSM-MT. While the ESM/MSM Link is down, all such information on the ESM can be retrieved via maintenance commands entered from the ESM Management Terminal (ESM-MT). Refer to Chapter 10 for more details on working from the ESM-MT.

Once the ESM/MSM Link recovers, the ESM retransmits any errors and alarms to the MSM that occurred during this lapse of service.

ESM/MSM Time of Day (TOD) Synchronization Over the Link

Data reflecting ESM errors, ESM alarms, and ESM resets reside in both ESM maintenance logs and MSM maintenance logs. Therefore, the date and time stamps in each of these logs on the two components must be as close as possible for a given event. To ensure this, the ESM synchronizes its internal Time of Day (**TOD**) clock to the values found in a **Heartbeat** message dispatched from the MSM. Therefore, system time defined and stored on the MSM via the MSM **set time** and **save translation** administration commands is recorded by the ESM once synchronization of the ESM and MSM takes place. In other words, the local time established by the UNIX operating system on the ESM at installation time is overwritten once the ESM/MSM Link is established and the **Heartbeat** message sent by the MSM is acknowledged by the ESM.

To ensure that the date and time stamps on these two components remain in close proximity, a **Heartbeat** message is dispatched from the MSM to the ESM every minute once the ESM/MSM Link is established. If, after three attempts, no acknowledgment message is sent by the ESM, a hardware error is logged, and a major alarm is raised against the PI-LINK MO and the ESM MO by the MSM.

At the initial synchronization of clocks, a newly installed ESM provides a local ESM report indicating a log of a **reset level 4** performed at initial ESM system

boot-up. In addition, a date and time stamp reflects the **original TOD** clock from the UNIX operating system before the ESM/MSM Link was established and the synchronization of clocks occurred. These date and time stamps differ from those that appear on the MSM report that reflect the **reset level 4** performed on the ESM occurring at the prevailing MSM system time.

Therefore, it is important to maintain **TOD** synchronization between the two components for the following reason: if the user is viewing ESM error and alarm log information from the ESM Management Terminal when the ESM/MSM Link is down, and if the same user is also examining MSM error and alarm log information for the ESM MO or any other relevant MO in the MSM maintenance logs, events on the ESM and MSM that occurred at approximately the same time can be correlated to link dependencies together for troubleshooting purposes.

ESM/MSM Communication Over the Link

The ESM transmits an **ESM Ready** message over the ESM/MSM Link to the MSM to confirm link establishment. If the ESM fails to handshake, and if no such acknowledgment message is received by the MSM within seven minutes, a hardware error is logged, and a major alarm is raised against the ESM MO by the MSM. The PI-LINK MO is defined by the MSM to log hardware errors and raise alarms for faults detected on the ESM/MSM Link by the MSM.

The MSM transmits a **Heartbeat** message over the ESM/MSM Link to the ESM every minute. For each message dispatched, the ESM sends an acknowledgment message to the MSM to confirm receipt of the message. If there is no acknowledgment after three consecutive **Heartbeat** message attempts, a hardware error is logged, and the MSM raises a major alarm against the PI-LINK MO and the ESM MO.

All such deficiencies are uncovered by checking the error log and the alarm log from the MSM-MT for the ESM MO and the PI-LINK MO. Each error type and auxiliary data value presented in the output identifies a unique hardware or software subcomponent (for example, D-channel or server process) and type of failure detected (for example, B-channel number) on the ESM or the MSM.

For each alarm message dispatched from the ESM, the MSM sends an acknowledgment message to the ESM to corroborate receipt of the message. If no acknowledgment is received, the ESM retransmits any unconfirmed set alarm or clear alarm messages.

All active alarms recorded against the ESM that are being tracked by the MSM are resolved automatically whenever the ESM/MSM Link is disabled via the Change Communication Link form. Such alarms also remain unchanged whenever an ESM/MSM Link failure occurs. While the ESM/MSM Link is down, errors and alarms logged on the ESM can be retrieved via maintenance commands entered from the ESM-MT. When the ESM/MSM Link recovers, the ESM retransmits any errors and alarms to the MSM that occurred during this lapse of service.

Hardware Configuration and Power

2

Circuit Packs and Equipment

As much as possible, the MCU hardware is maintained as a group of independent units called MOs. Each MO is normally a separately replaceable unit. MOs include circuit packs, power units, fans, maintenance alarm terminals, lines, and trunks. The **list configuration all** command can be entered to determine the circuit pack/port configuration.

The following table identifies the replaceable MCU circuit packs and equipment.

Table 2-1. Replaceable MCU Circuit Packs and Equipment

Name	Code
Cabinet (Control)	J58890L-1,L7
Cabinet (Port)	J58890H-1/L8
Call Classifier Circuit Pack	TN744*
C-LAN	TN799
Current Limiter	928LS
Data Interface (DI)	TN2236B
Dial-out Accelerator	TN744D
Digital Line	TN754B
Digital Line (24-port, 2-wire DCP)	TN2224
Digital Line	TN2214
DS1	TN767E
Media Processor	TN2303
ISDN-BRI	TN556B
ISDN-BRI (4-wire, S/t-TE Interface)	TN2185
ISDN-BRI (2-wire, U-interface)	TN2198
Maintenance/Test Circuit Pack	TN771D
Multimedia Interface (MMI) Circuit Pack	TN787K
NetPkt Interface	TN794
Power Unit (AC) [SCC-MSM]	WP-91153
Power Unit (DC) [SCC-MSM]	676B
Power Unit (AC) [MCC-MSM]	631DA, 631DB
Power Unit (DC) [MCC-MSM]	644A, 645B
Processor	TN790B
TDM/LAN Bus Terminator	ZAHF4
Tone-Clock	TN768, TN780
Tone-Clock (Tone Detector and Call Classifier)	TN2182B
Tone Detector	TN420C, TN748D
TDM/LAN Cable Assembly	WP91716/L3
UDS1	TN2207
Video Processor Plus	TN2237
Voice Conditioner	TN788B

*Threshold for TN744 level alarming should be administered.

Cabinet Configurations

MSM

The basic MCU cabinet is referred to as the Multimedia Server Module (MSM). The Control Carrier provides the control complex for the MCU as well as slots for port circuit packs. The MSM houses the main hardware of the system. A fully equipped MSM contains the following:

- Control Carrier: houses power units, system logic, control circuit packs, and port circuit packs.
- Port Carrier: houses power units and up to 18 port circuit packs.
- Power Distribution Unit:

  [SCC-MSM] In a system with Alternating Current (AC) power, provides several Direct Current (DC) outputs, a ringing voltage generator, and a battery charging voltage. The DC outputs are distributed on the cabinet backplane to the slots for the circuit packs. The power supply has a circuit breaker and EMI filtering. In a system with DC power, provides several DC outputs and a ringing voltage generator. The DC outputs are distributed on the cabinet backplane to the slots for the circuit packs. The power supply has circuit breakers and EMI filtering.

  [MCC-MSM] In a system with AC power, provides a ringing voltage generator, an Electro-Magnetic Interference (EMI) filter, and an AC power relay. In a system with DC power, provides a ringing voltage generator, an EMI filter, and a DC power relay.
- Wiring Harness and Time-Division Multiplexing (TDM) Local Area Network (LAN) Cables.

ESM

The supplementary cabinet required for T.120 data transmissions within the MCU conference is referred to as the Expansion Services Module (ESM). The ESM is actually a Pentium™ processing unit, and it serves as a data bridge for implementing the T.120 Data Conferencing feature. One ESM can be connected to the MSM cabinet via Primary Rate Interface (PRI). Control is provided by the MCU Switch Processing Element (SPE). The ESM cabinet contains the following circuit packs, all of which are linked by the ISA bus.

- MSM-Interface (ESM-HDLC) card
- 486 or Pentium Processor circuit pack
- VGA card
- SCSI controller

Power Controls

MSM

Two basic powering options are available with the MSM: Alternating Current (AC) and Direct Current (DC). Both the SCC-MSM and the MCC-MSM may be powered by -48 volts DC from a battery-type power plant (this requires DC-to-DC conversion power units). Both cabinet types can also be powered by 120 volts, 60 cycles. Internationally, both cabinets can use various power configurations. The MCC-MSM and its associated power supply can be powered by 120/208 volts AC either directly or from a Universal Power Supply (UPS) system.

The control cabinet in an AC-powered MSM has an internal battery that provides short-term holdover protection against short power interruptions. This method is known as the Nominal Power Holdover Strategy. The battery is connected so that it automatically provides power if the AC service fails.

The SCC-MSM has a two-minute battery dropout (holdover), while the MCC-MSM has a 10-minute battery dropout (holdover). (See the “Cabinet Power” section.)

The time and extent of the dropout is 1/4 of a second for the entire cabinet, and two minutes for the control carrier. If the dropout is shorter than 1/4 second for the entire cabinet, no conferences are dropped. If the dropout is longer than 1/4 second but shorter than two minutes, all conferences are dropped. If the holdover is longer than two minutes, the system reloads.

ESM

The ESM is available with an AC power supply (110/230 VAC). The AC power supply maintains 325 watts of nominal power with all outputs simultaneously at full load. A receptacle is provided at the rear of the ESM to supply power for the monitor. Other power options include the Avaya AT250 UPS (international) and the Avaya AT400 UPS (domestic).

Cabinet Power

SCC-MSM

There is no internal AC wiring or distribution and no software interaction with the power system in the SCC-MSM. The power supplies themselves take about 1/4 second for the voltages to drop below limits. The control cabinet is the only cabinet that has an internal battery reserve. A port cabinet has the 1/4 second power supply decay delay, after which all connections and links associated with the cabinet are dropped.

The control cabinet has a battery that furnishes power to the processor memory complex for a minimum of only two minutes if the battery is fully charged. This battery is recharged after power is restored, but the charging process is not monitored by the MCU. The cabinet is not able to detect AC power loss, and it notices only a DC power output failure as the power supply output decays.

The memory contents are preserved, and the processor continues operating during the two-minute period. However, the Tone-Clock circuit pack is not held over and, as a result, no connections are possible. The battery does not supply the voltages necessary for the internal modem circuit of the Processor circuit pack. As a result, no call is originated to the Initialization and Administration System (INADS), and the MCU cannot answer any calls. Thus, the MCU cannot report any internal or external alarms during this period. After two minutes (or, depending on the condition of the battery, under two minutes), the processor and memory are lost and the system is totally inactive.

If power is restored in less than 1/4 of a second, no conferences are dropped. If power is restored between 1/4 of a second and two minutes, all conferences are dropped, and memory is maintained. However, since the tone-clock is lost, the MCU undergoes a reset once the AC restoral process clears all calls and the alarm log (in which errors are retained).

The MCU keeps a record of the restart in the error log, but it might not detect a power error if the outage is between 1/4 of a second and one minute. The loss of the clock is logged, though. After one minute, the power error is logged. If the outage exceeds the battery holdover interval, the error logs and alarm logs are lost (since they cannot be saved on the memory card).

Depending on the size of the MCU, it can take up to one minute to restore service to the ports. After a power outage of two minutes following the restoral of AC power, the MCU reinitializes from the translations on the memory card. It takes about five minutes to restore service. Again, if the MCU is subjected to frequent power outages or has critical service needs, an external UPS or DC power system should be considered.

MCC-MSM

The MCC-MSM has an internal battery system that supplies holdover power to the whole cabinet for a specific amount of time. Generally, the internal battery system supplies power to the cabinet for 10 seconds. Power is also supplied to the port carriers.

An AC power interruption to the MCU that lasts fewer than 10 seconds is not noticed by the customer. After 10 seconds, the system powers down the port carriers in the MCU, but the entire control carrier continues to be powered for 10 minutes. The circuit packs in the port carriers are “removed” by the software and, as a result, all connections are dropped.

Connections and call processing are preserved on the control carrier for the entire holdover period. After 10 minutes, the control carriers are powered down and the connections are dropped. The 10 minute interval does not exhaust a fully charged battery. The system is designed to sustain multiple AC service interruptions before the battery has time to recharge fully. After power is restored, the batteries are recharged by a circuit that monitors current and time. If the battery takes longer than 30 hours to recharge, a minor alarm is sent to INADS. This alarm indicates that the battery should be replaced or that the charging circuit should be repaired.

The system immediately detects the loss of AC power. Once AC power loss is detected, an AC power alarm is generated. Included with the AC power fail alarm are several other alarms associated with the loss of power. Several maintenance objects cause a major alarm to be reported (processor interface links, external DS1 timing) but, in general, no specific power-related major or minor alarm results. If the switch is accessed during the 10 minute interval, an AC power warning alarm appears in the active alarm as “resolved.”

If AC power is restored during the 10 second interval, no service interruption results. If AC power is restored between 10 seconds and 10 minutes, service to the port carriers is restored after the software “reinserts” the circuit packs. This can take up to one minute. Links that have their connectivity through the control carriers remain up unless they rely on hardware that is powered externally (for example, channel service units for DS1 facilities). If the CSU is not connected to a power reserve system, the DS1 facility is dropped.

If AC power is restored after 10 minutes (or, if the battery does not have sufficient capacity, in less than 10 minutes), the MCU must reload all software and translation data. The MCU must also “reinsert” all circuit packs. These processes can take several minutes, depending on the size of the system. All links are re-established according to their initialization requirements.

As an option, the internal battery may be omitted on MCC-MSMs that are ordered with UPS. If the battery is omitted, and if the AC from the UPS fails, the system does not report an alarm.

If AC power interruptions of longer than 10 minutes are frequent, and if the customer's service requirements warrant, consideration should be given to equipping the system with either an external UPS system or an external DC power system.

ESM

The Avaya AT250 UPS (international) and the Avaya AT400 UPS (domestic) are available with the ESM. The international version provides 230V, and the domestic version provides 110V. The AT250 is a 250VA (and the AT400 is a 400VA) power supply with a 10-minute battery holdover capability. UPS is standard within the ESM.

Management Terminals

3

Maintenance personnel use the MCU-MT to initiate the same tests that the MCU initiates. Test results are displayed on the MCU-MT screen. The MCU-ST can also be used to perform maintenance functions. The maintenance alarm terminal alerts maintenance personnel to major, minor, and warning alarms on the MCU. The user can use the MCU-MT to use the Bulletin Board feature that is discussed at the end of this chapter.

MCU Management Terminal

The MCU-MT supplied with the MCU is a 715GBCS-2 Business Communications Terminal (BCT).

NOTE:
Complete information for the 715GBCS-2 terminal is provided in the *715GBCS-2 Terminal User's Guide and Service Manual*, 555-230-876.

The MCU-MT is connected to the TN786B Processor circuit pack. Typical tasks that can be performed on the MCU-MT by technicians using maintenance commands include:

- Displaying error and alarm logs
- Testing circuit packs
- Testing system functions
- Busying out and release system equipment
- Resetting the system

Keyboard

The keyboard of the 715GBCS-2 terminal is equipped with cursor keys for obtaining data and editing keys for making changes and corrections. The keyboard is also equipped with transaction keys that perform certain functions with a single keystroke. Some of the types of keys include:

- Cursor keys: cursor keys are used to move the cursor between fields and pages on a screen form. The cursor must be positioned on a field before information can be added or changed in that field.
- Two editing keys: BACKSPACE and CLEAR. BACKSPACE is used to erase the character at the current cursor position. When pressed simultaneously with SHIFT, CLEAR is used to erase all data in a field. The cursor must be positioned in the field before CLEAR is pressed.
- Three transaction keys: CANCEL, ENTER, and HELP. CANCEL is used to erase a form or command. Once the key is pressed, the system returns the command (task request) and asks for a new command. ENTER is used to store data entered on a screen form in the system's memory. HELP is used to display information about the type of data that can be entered into the field associated with the current cursor position. The system displays all the permissible entries for that field. This key can be pressed at the enter command level to obtain a list of all commands.

Finally, the terminal is equipped with various configuration folders to allow you to configure your terminal according to your requirements. Be sure to refer to the 715GBCS-2 document for complete details.

Logging In from the MCU-MT

To log in from the MCU-MT, follow these procedures:

1. From the MCU-MT, verify the screen displays: *Login:*
2. Enter **craft** or **OEM login.**

```
Login: craft

Password: (Using Maintenance Terminal Access, OEM or
Avaya Technicians)

Avaya Remote Access MCU Login


Challenge: 998-9190 Product ID: 1000000000

Response: xxxxxx
```

NOTE:
Customer level logins and craft level logins only require a password and will not get a Challenge requiring a Response.

3. Enter **password** or a **Response** to a Challenge, as appropriate.

   NOTE:
   For security purposes, your password is not displayed as you enter it. The MCU verifies the login and password. If an invalid password or response is entered, the screen displays: *login incorrect*. Try again.

4. Verify the software version.
5. Verify that the screen displays: *Terminal Type (Enter 715, 513, 4410, or 4425): [715]*
6. Choose the default by pressing RETURN.
7. The screen should now display: *Command*.

MCU Scheduling Terminal

The MCU-ST supplied with the MCU is also a 71GBCS-2 terminal. Generally, it is connected remotely to the MCU via a 7400B data module. It is used by the reservation agent primarily for reserving multipoint conferences and checking multipoint conference status. It can also be used to perform system administration tasks, and technicians can use it to perform the same tasks as performed on the MCU-MT.

Keyboard

Refer to the “Keyboard” section for the MCU-MT.

Logging In Remotely from the MCU-ST

You can perform administration and report functions from the remote MCU-ST. To log in to the MCU-ST, follow these procedures:

1. Enter **at**.
2. When the *OK* prompt appears, enter **atdt*code*** where ***code*** is the access code provided when the MCU is installed.
3. From the MCU-MT, verify the screen displays: *Login:*
4. Enter **craft** or **OEM login.**

```
Login: craft

Password: (Using Maintenance Terminal Access, OEM or
Avaya Technicians)

Avaya Remote Access MCU Login


Challenge: 998-9190 Product ID: 1000000000

Response: xxxxxx
```

NOTE:
Customer level logins and craft level logins only require a password and will not get a Challenge requiring a Response.

5. Enter **password** or a **Response** to a Challenge, as appropriate.

   NOTE:
   For security purposes, your password is not displayed as you enter it. The MCU verifies the login and password. If an invalid password or response is entered, the screen displays: *login incorrect.* Try again.

6. Verify the software version.
7. Verify that the screen displays: *Terminal Type (Enter 715, 513, 4410, or 4425): [715]*
8. Choose the default by pressing RETURN.
9. The screen should now display: *Command:*

MCU Bulletin Board

This feature allows the user to leave messages in the system in order to communicate with other system users.

NOTE:
This feature is not intended as a substitute for the existing procedures for escalating problems but only as an aid to the existing process.

Description

The bulletin board service provides an easy interface for the customer and Avaya to leave messages on the system. The bulletin board feature makes it easy for the customer to communicate with Avaya (and vise-versa). For example, when a new load is installed on a customer's MCU, Avaya can leave the customer messages that describe new functionality. This feature also allows Avaya to keep the customer informed on the progress of trouble items. In addition, the feature can be used by the customer to provide additional information concerning problems that have already been escalated.

Accessing the Bulletin Board

Any user with the appropriate permissions can log into the system and have access to the bulletin board. Users who have "Maintain System" or "Administer Features" permissions can enter, change, display, print, or schedule to print a message. Users who have "Display Admin" and "Maintain Data" permission can display the bulletin board. Any user who has "Display" permission can display, print, and schedule to print the contents of the bulletin board.

When logging onto the system, users are notified of any messages on the bulletin board. The notification message indicates the last time the bulletin board was updated, if any "High-Priority" message exists, and if the bulletin board is 80% or more full. If a "High-Priority" message exists, the command prompt changes to the following message:

```
High-Priority Bulletin Board Messages Entered:
```

After the next command is entered, the default command prompt returns to the screen.

User Considerations

Only one user at a time may edit a message on the bulletin board. The user must have the proper permissions to access the bulletin board. The user must maintain the information stored on the bulletin board. It is the user's responsibility to delete old messages. If the bulletin board is full, any new messages overwrite old messages.

System Considerations

The Bulletin Board feature provides up to three pages of text for each message. Each page is limited to 20 lines of text, and each line of text is limited to 40 characters per line. The first 10 lines of text on page 1 is reserved for Avaya Service's High-Priority messages.

System Bulletin Board Commands

The system commands **change bulletin board**, **display bulletin board**, along with existing commands in the user interface are provided for use in the MCU-based Bulletin Board.

Editing a Bulletin Board Message

Use the following procedure.

1. Log into the system with “Maintain System” or “Administer Features” permissions.
2. Enter the command **change bulletin-board**.
3. Follow system prompts.

To display messages on the MCU-based Bulletin Board, the user must do the following:

1. Log into the system with “Maintain System”, “Display Admin”, or “Maint Data” permissions.
2. Enter the command **display bulletin board**.
3. Follow system prompts.

Editing an MCU-Based Bulletin Board Message

A message may contain up to three pages of information. Message lines 1 through 10 on page 1 are reserved for Avaya Services High-Priority messages (the “init” and “inads” logins can edit the first 10 lines on page 1). Pages 2 and 3 allow up to 20 lines of text, and each line of text may be up to 40 characters per line. Each line of text has an associated date field that is populated automatically by the system each time the line is modified. The control keys used to edit existing feature forms must be used to edit a message in the MCU-based Bulletin Board. The following characters are allowed for use in the text field:

Uppercase/Lowercase letters, spaces, numerals, and punctuation and characters.

NOTE:
Tab characters are not allowed. The existing command line interface causes the cursor to move to the next field if a Tab character is entered.

If a user changes any lines that cause two or more consecutive blank lines, then the bulletin board will be automatically reorganized (upon submittal). Two or more blank lines are consolidated into a single blank line. If a blank line is at the top of a form, it is also deleted. This function helps prevent holes in the bulletin board screens as old entries are deleted.

To save a message entered into the bulletin board text field, the user must execute the **save translation** command.

The following screen is an example of bulletin board messages between Avaya and a customer who is having trouble with trunk group translations:

```
display bulletin-board                                    Page  1 of  3

              Messages (* indicates high-priority)      Date

          * Avaya is in the process of                  12/02/95
          * investigating your trunk lockup problem.    12/02/95
          * The Bulletin Board will be updated as       12/02/95
          * information is found.                       12/02/95
          * We have identified the problem.             12/02/95
          * The trunk you added does not provide        12/02/95
          * disconnect supervision, however your trunk  12/02/95
          * group was administered as such.             12/02/95
          * Please call for details.                    12/02/95
          *
            We recently added a new trunk group (14)    12/03/95
            and have had trunk group members locking up. 12/03/95
            We see the error - Thanks for checking.     12/03/95
```

Figure 3-1. Bulletin Board Messages

Initialization and Recovery

4

System Reset

When the MCU is powered on, or when it experiences a catastrophic fault that interrupts its basic functions, it is rebooted. Several less severe resets that allow the MCU to recover from disrupting errors are available to the MCU. Reset commands are used to restart the MCU manually at various levels, depending on the required test activity.

An MCU reset occurs when power is lost and when:

- A reset command is entered.
- Maintenance software that automatically resets the MCU is loaded.

⚠ WARNING:
When the MCU is rebooted or reset at level 2, 3, 4, or 5, all conferences are dropped and must be manually reentered.

The MCU-MT display screen and MCU circuit pack LEDs indicate the progress of the recovery process. LEDs are discussed in Chapter 7, "LED Interpretation".

For each level of reset, a typical display is provided. Note that any hexadecimal numbers shown in parenthesis, such as (8B89), are only examples and are subject to change.

If any diagnostic test fails, the MCU may not function properly and the MCU restart may not proceed. In that case, the MCU goes into SPE-Down mode. In failure cases, the appropriate part (for example, the TN786B Processor circuit pack) should be replaced.

Use and check the results of the **set vector** and **get vector** commands to determine how much time should be added for the recovery levels. Also, if an update file is applied on a reset, add 30 seconds to one minute to the recovery time.

Reset System 1 (Warm Start)

For this restart, stable conferences remain stable. Also, the PACCON circuit pack and the Processor Interface (PI) circuit pack are re-downloaded. Finally, all software is reset.

```
RESET 1 (WARM) PERFORMED
```

Figure 4-1. Reset System 1 (Warm Start) Example

Reset System 2

This recovery takes about 30 seconds during which time all port circuit packs are reset. All conferences are dropped. Conferences may be reconnected (conferees must redial their Meet-Me numbers to rejoin the conference) within 30 seconds.

In this restart, all software is reset. In addition, the TDM bus and all port circuit packs are reset.

INTERNAL REGISTER TEST	PASSED
LOCAL BUS TEST	PASSED
ROM CHECKSUM TEST	PASSED
CONTROL STATUS TEST	PASSED
DCACHE TEST	PASSED
ICACHE TESTR	PASSED
WRITE BUFFER TEST	PASSED
BTO TEST	PASSED
TIMER TEST	PASSED
RESET 2 (COLD_2) PERFORMED	

Figure 4-2. Reset System 2 (Cold Start without Translations Loading) Example

Reset System 3

This recovery takes about 30 seconds to one minute. Translations are reloaded from a memory card. Depending on the translations, reloading can take from five to 30 seconds. Thereafter, all port circuit packs are reset, and all conferences are dropped. Conferences can be reconnected (conferees must redial their Meet-Me numbers to rejoin the conference) after one minute.

In this restart, all software is reset. After the software is reset, all translations are loaded from the memory card. In addition, the TDM Bus and all port circuit packs are reset.

INVOKING EMERGENCY TRANSFER INTERNAL REGISTER TEST	PASSED
LOCAL BUS TEST	PASSED
ROM CHECKSUM TEST	PASSED
CONTROL STATUS TEST	PASSED
DCACHE TEST	PASSED
ICACHE TESTR	PASSED
WRITE BUFFER TEST	PASSED
BTO TEST	PASSED
TIMER TEST	PASSED
RESET 3 (COLD_1) PERFORMED	

Figure 4-3. Reset System 3 (Cold Start with Translations Loading) Example

Reset System 4 (Reboot)

This recovery takes less than two minutes. The processor firmware, known as the LMM, performs a series of diagnostics on the processor memory. This takes about one minute. The boot image is already in the flash Read-Only Memory (ROM). The MCU is rebooted immediately after the LMM performs a series of diagnostics on the processor and memory. Translations are reloaded from the memory card. Depending on the translation, the reloading process takes from five to 30 seconds.

Thereafter, all port circuit packs are reset and all conferences are dropped. Conferees may need to wait up to five minutes before they can rejoin a conference by redialing their Meet-Me numbers.

INVOKING EMERGENCY TRANSFER INTERNAL REGISTER TEST	PASSED
LOCAL BUS TEST	PASSED
ROM CHECKSUM TEST	PASSED
CONTROL STATUS TEST	PASSED
DCACHE TEST	PASSED
ICACHE TESTR	PASSED
WRITE BUFFER TEST	PASSED
BTO TEST	PASSED
TIMER TEST	PASSED
MEM CONFIG TEST	PASSED
MEMORY FUNCTIONAL TEST	PASSED
MEMORY MODULE A STUCK BIT TEST	PASSED
MEMORY MODULE A PARITY TEST	PASSED
MEMORY MODULE A BURST TEST	PASSED
VIRTUAL MEMORY TEST	PASSED
EXCEPTION TEST	PASSED
TIMER TEST	PASSED
MTP TEST	PASSED
SANITY TIMER TEST	PASSED
ADDRESS MATCHER TEST	PASSED
FLASH TEXT CHECKSUM TEST	PASSED
DECOMPRESSING IDATA	in_cnt = xxxxx; out_cnt = xxxxxxx
RAM DATA CHECKSUM TEST	PASSED
RESET 4 (REBOOT) PERFORMED	

Figure 4-4. Reset MCU 4 (MCU Reboot) Example

Reset System 5 (Reboot and Run 24-Hour Tests)

This reboot takes about three minutes. The LMM performs a series of diagnostics on the processor and memory. The boot image is already in the flash ROM memory. The MCU is rebooted immediately after the LMM performs a series of diagnostics on the processor and memory.

Translations are reloaded from the memory card. Depending on the translation, the reloading process takes from five to 30 seconds. Thereafter, all port circuit packs are reset and all conferences are dropped. Conferees may need to wait up to five minutes before they can rejoin a conference by redialing their Meet-Me numbers.

INVOKING EMERGENCY TRANSFER INTERNAL REGISTER TEST	PASSED
LOCAL BUS TEST	PASSED
ROM CHECKSUM TEST	PASSED
CONTROL STATUS TEST	PASSED
DCACHE TEST	PASSED
ICACHE TESTR	PASSED
WRITE BUFFER TEST	PASSED
BTO TEST	PASSED
TIMER TEST	PASSED
MEM CONFIG TEST	PASSED
MEMORY FUNCTIONAL TEST	PASSED
MEMORY MODULE A STUCK BIT TEST	PASSED
MEMORY MODULE A PARITY TEST	PASSED
MEMORY MODULE A BURST TEST	PASSED
MEMORY MODULE A COUPLE TEST	PASSED
VIRTUAL MEMORY TEST	PASSED
EXCEPTION TEST	PASSED
TIMER TEST	PASSED
MTP TEST	PASSED
SANITY TIMER TEST	PASSED
ADDRESS MATCHER TEST	PASSED
FLASH TEXT CHECKSUM TEST	PASSED
DECOMPRESSING IDATA	in_cnt = xxxxx; out_cnt = xxxxxxx
RAM DATA CHECKSUM TEST	PASSED
RESET 5 (EXT REBOOT) PERFORMED	

Figure 4-5. Reset System 5 (Reboot and Run All 24-Hour Tests) Example

Procedure for SPE-Down Mode

Fatal hardware and software problems might cause an MCU to go into SPE-Down mode. In this mode, the MCU does not provide any service. Moreover, while in this mode, the software cannot run.

The maintenance processor on the TN786B Processor circuit pack is responsible for maintenance when the MCU is in this mode. The MCU-MT, which is connected directly to the Processor circuit pack, provides a very limited interface to the MCU. Technicians can display alarms or restart the MCU. Only a subset of control complex alarms can be displayed.

The following figure shows the possible SPE-Down alarm for the MCU.

```
display alarms                                                  page  1


                                ALARM REPORT

Port   Maintenance  On     Alt  Alarm Svc   Ack?  Date           Date
       Name         Board? Name Type  State       Alarmed        Resolved

 1A    SW-CTL       y           MINOR  In    n    12/08/15:25    00/00/00:00
 1A    SW-CTL       y           MINOR  In    n    12/08/15:25    00/00/00:00
 1A    SW-CTL       y           MINOR  In    n    12/08/15:25    00/00/00:00
 1A    SW-CTL       y           MINOR  In    n    12/08/15:25    00/00/00:00
 1A10  DS1-BD       y           MINOR  In    n    12/08/15:25    00/00/00:00
```

Figure 4-6. SPE-Down Mode Example

The first priority after the MCU goes into SPE-Down mode is to restore the MCU to service as soon as possible. To do so, determine the location of the problem. A fatal problem with one circuit pack may affect another circuit pack. This is especially true for the processor and memory circuit packs. All of the following methods should be used to determine where the fault lies:

1. Enter **display alarms.** This command shows where maintenance thinks the problem lies. The alarms are a good indication of why the MCU went down. They should be used with the following two steps:
   A. Observe any red LEDs. A red LED on the circuit pack helps determine where software or processor firmware (LMM) had a problem.

B. Enter **reset**. This causes the MCU to attempt a reset system 4. Observe all the diagnostics on the MCU-MT screen and note if the LMM has a problem with any of the diagnostics.

If you cannot complete these steps or have problems with the maintenance interface, replace the TN786B Processor circuit pack. Otherwise, skip to Step 2.

WARNING:

Powering down or reseating the processor or memory circuit packs causes all memory to be lost (including the initcause log). It will then be difficult to determine the cause of the problem. However, since the primary objective is to restore service, this course of action is appropriate.

2. Depending on the alarm displayed, use the following table to replace the circuit packs specified, one by one, in the order given:

Table 4-1. Order of Circuit Pack Replacement

Alarm	Suggested Replacements
PROC_BD	1. Processor 2. NetPkt Interface
MEM_BUS	1. Processor 2. NetPkt Interface
PROC_MEM	1. Processor
OFFBD_MEM	1. Processor 2. NetPkt Interface
INVALID_ERR	1. Processor 2. NetPkt Interface
MAINT_BD	1. Processor 2. NetPkt Interface
NETCON_ ABSENT	1. NetPkt Interface 2. Processor
NO_CARTRIDGE	1. Memory Card 2. NetPkt Interface 3. Processor

3. After you replace the appropriate circuit packs, enter **reset**.
4. If the diagnostic tests do not pass, repeat the process.

ESM-Related System Technician Commands

Certain craft-demanded commands can be executed from the MSM-MT to monitor or influence the ESM. The **status esm** and **display Alarms/Errors** commands can be used to query information from the ESM. The **reset esm <level>** command can be used to attempt to reset the ESM from the MSM-MT.

Reset ESM Command

The **reset esm** command causes a reset message to be sent to the ESM. It causes the MSM to act as an interface to the ESM. It also causes the link to drop and any resources devoted to that link from being deallocated. The format of the command is:

reset esm <level>

where **<level>** is a value between **1** and **4** that indicates the reset level to be performed by the ESM. Receipt of this command from the MSM via the ESM link causes certain ESM server processes to be restarted.

CAUTION:
*Executing a **reset esm <2>**, **<3>**, or **<4>** command disrupts all existing data portions in a multimedia conference unless precautions are taken. From the MSM-MT, enter the **list conference all** command, and verify from the output presented that there are currently no in-use or active data conferences. In addition, ensure that any reserved data conferences are not scheduled within the next five minutes. If these conditions have been met, an ESM system reboot (**reset 4**) may be initiated.*

The status command line on the MSM displays **command successfully completed** if the reset command was sent to the ESM, or **command failed** if the reset command cannot be sent to the ESM. The latter case occurs if the ESM link is down.

Note that **command successfully completed** does not indicate whether or not the ESM was able to actually perform the requested reset. To check if **reset esm** is successfully completed, the technician must wait at least the maximum time

associated with the level of reset requested before issuing a **display error** command. The following table indicates the appropriate delay for each reset level.

Table 4-2. Reset ESM Command Delays

Command	Maximum Delay (Seconds)
reset ESM 1	15
reset ESM 2	300
reset ESM 3	300
reset ESM 4	300

When examining the output of **display error**, observe **event/error type 513** to determine if a reset 1 successfully completed. Similarly, look for **event/error type 3329** for reset 2, reset 3, or reset 4.

The ESM has error thresholds associated with each reset level. The ESM escalates from one level to the next higher level if the ESM detects conditions that cause repeated resets to be performed. However, for craft-demanded resets either from the ESM or the MSM, there is no escalation to a higher level.

reset esm 1

This system command was devised to control spawning all ESM server processes. The command kills and then respawns several ESM server processes, including the esmlink process. Therefore, a **reset esm 1** causes a temporary interruption in the ESM/MSM Link establishment before returning to an in-service state. This reset procedure completes in a few seconds; this ensures that disruption of service is kept at an absolute minimum so that establishing new data conferences is not impeded and that in-use and active data conferences are not impacted.

reset esm 2

This command performs the same level of ESM reinitialization as a **reset esm 4** command.

reset esm 3

This command performs the same level of ESM reinitialization of the ESM as a **reset esm 4** command.

reset esm 4

The **reset esm 4** command was devised to control first reinitializing the MSM Interface Card and then spawning all ESM server processes. This reset procedure completes in less than five minutes to guarantee that disruption of service is kept at an absolute minimum. During this period, the data portions of all in-use data conferences are terminated, and new data conferences cannot be established. To reestablish, the endpoints must exit the conference completely and reenter the video and audio and data portions of a dial-out multimedia conference. This can be accomplished via the Change Conference form (that is, set the appropriate field first to **file,** then to **dedicated** at the conference level) or on an individual endpoint basis (that is, after the endpoint drops, enable the MCU via a redial).

Routine Maintenance Procedures

5

General-Purpose Maintenance Procedures

The following general-purpose maintenance procedures may be used with other repair strategies to clear MCU-alarmed and user-reported troubles:

- INADS Alarm Origination—Activation/Deactivation
- Maintenance-Related System Parameters Form
- Handling Port Circuit Packs
- Handling Control Circuit Packs
- Powering the Cabinet
- Troubleshooting Control Carrier Power Units
- MCU Backup
- Software Upgrade
- Firmware Download (Circuit Pack Upgrade)
- Preventive Maintenance Procedures
- Other Maintenance Aids
- Troubleshooting Backplane Voltage Problems
- ESM Maintenance

INADS Alarm Origination

Alarm origination suppression enables alarm origination to be stopped while the MCU is being worked on. If alarm origination is suppressed, the MCU still originates a cleared alarm message if the repair activity resolves all previously reported major and minor alarms.

Before performing any of the maintenance procedures (such as replacing a circuit pack or removing power), the alarm origination to INADS should be deactivated. This action prevents INADS from receiving alarms caused by on-site maintenance activity.

NOTE:
No alarms are reported while the remote maintenance port (the INADS port on the TN786B Processor circuit pack) is in use. Thus, any alarms generated during remote maintenance are not reported until the session is terminated. Furthermore, if any alarms are retired before the maintenance session is completed, they are not reported at all.

The alarm origination should be reactivated when the maintenance activity is completed.

Deactivating Alarm Origination

You may deactivate INADS alarm origination whenever you log in as **craft.**

1. Log in as **craft** and enter your password.
2. If the Alarm Origination is currently activated in the Maintenance-Related System Parameters form, the MCU displays the following message:

   Suppress Alarm Origination: [y]

3. The default answer is **yes**, so press ENTER. If you press any other key or combination of keys, the MCU interprets your response as **yes**.

   NOTE:
   The **test inads-link** command works whether or not you have overridden the INADS alarm origination.

Activating Alarm Origination

If after you log in as **craft**, or after issuing a command, no additional craft command is entered for 30 minutes, an automatic timeout and logoff occurs. At that time, all alarms in the MCU previously unreported to INADS are reported.

If you are logged in as **craft** on two separate terminals (the MCU-MT and the MCU-ST), the MCU waits until the second terminal times out or until you log off before reporting such alarms to INADS.

Maintenance-Related System Parameters Form

The Maintenance-Related System Parameters form is used to select various operations support and scheduled maintenance features. Also, the form is another way to activate or deactivate alarm origination.

Deactivating Alarm Origination

1. Enter **change system-parameters maintenance**. The Maintenance-Related System Parameters form is displayed.
2. Change **y** to **n** in the *Cleared Alarm Notification* field.
3. Change **y** to **n** in the *Alarm Origination Activated* field.
4. Change **y** to **n** in the *Remote Test* field.
5. Change *CPE Alarm Activation Level* to **none** and note alarm level (major, minor, warning) for later reinstatement.
6. Press ENTER and verify the screen displays the following message: *command successfully completed.*

Activating Alarm Origination

The Maintenance -Related System Parameters form can be used to activate and deactivate INADS alarm origination when performing repairs. To access the form, enter **change system-parameters maintenance**.

An example of the Maintenance-Related System Parameters form appears as follows:

```
display system-parameters maintenance                          Page   1 of   4
                  MAINTENANCE-RELATED SYSTEM PARAMETERS

OPERATIONS SUPPORT PARAMETERS
           Product Identification: 1234567890
         First OSS Telephone Number:                    Abbrev Alarm Report? y
        Second OSS Telephone Number:                    Abbrev Alarm Report? n
  Alarm Origination to OSS Numbers: neither
        Cleared Alarm Notification? n                 Suspension Threshold: 5
              Restart Notification? n
           Test Remote Access Port? n
        CPE Alarm Activation Level: none
        Sch Adj Alarm Activation Level: none

     Customer Access to INADS Port? y
       Repeat Dial Interval (mins): 7
SCHEDULED MAINTENANCE
                  Start Time: 01 : 00                 Stop Time: 06 : 00
           Daily Maintenance: daily              Save Translation: daily
```

Figure 5-1. Maintenance-Related System Parameters Form (Page 1)

```
display system-parameters maintenance                          Page   2 of   4
                  MAINTENANCE-RELATED SYSTEM PARAMETERS

MINIMUM MAINTENANCE THRESHOLDS ( Before Notification )
        TTRs: 4        CPTRs: 1        Call Classifier Ports: 0




ISDN MAINTENANCE
   ISDN-PRI Test Call Extension: 68937   ISDN-BRI Service SPID:

DS1 MAINTENANCE
   DS0 Loop-Around Test Call Extension:

SPE OPTIONAL BOARDS
                     Packet Intf1? y     Packet Intf2? y
```

Figure 5-2. Maintenance-Related System Parameters Form (Page 2)

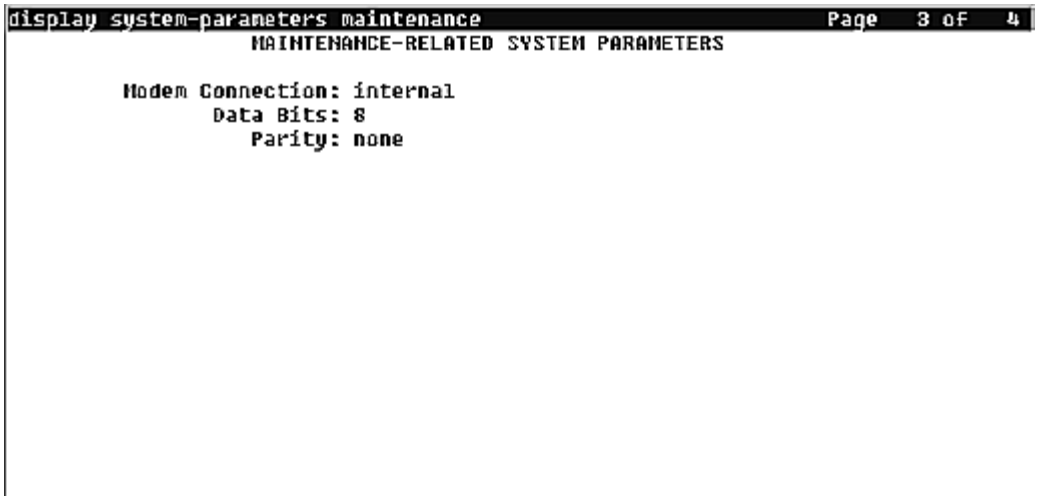


Figure 5-3. Maintenance-Related System Parameters Form (Page 3)

The fields on the Maintenance-Related System Parameters form are defined in the following paragraphs. Specific entries can be obtained from your technical center, technical consultant (if available), and/or the customer.

Page 1: **Operations Support Parameters Area**

- *Product Identification*

  Identifies the MCU to an Operations Support System (OSS), such as INADS or System Network Management Protocol (SNMP). This field must be populated if you want to make changes to this form. The number must start with “1” and contain ten digits.

- *First OSS Telephone Number*

  The first number that the MCU uses for alarm origination. This number can also be used to dial a telephone number when an alarm is raised on the MCU. The number must be obtained from your technical center. Characters # and * are not allowed in the telephone number.

- *Abbrev Alarm Report*

  Enables the Abbreviated Alarm Report feature for the first OSS. Default is **y**.

- *Second OSS Telephone Number*

  The second number that the MCU uses for alarm origination. This number can also be used to dial a telephone number when an alarm is raised on the MCU. The number must be obtained from your technical center. Characters # and * are not allowed in the telephone number.

- *Abbrev Alarm Report*

  Enables the Abbreviated Alarm Report feature for the second OSS. Default is **y**.

- *Alarm Origination to OSS Numbers*

  Indicates one of four options for alarm origination. If this field is set to any value other than **neither** (default), the craft login has a 30-minute inactivity timeout.

  — For value **both**, all major and minor alarms result in an automatic call to both OSS telephone numbers. Both OSS telephone numbers must be administered.

  — For value **first-only**, all major and minor alarms result in an automatic call to the first OSS number only. The switch does not call the second OSS telephone number even if the number is administered. The first OSS telephone number must be administered.

  — For value **neither**, alarm origination does not take place. Warning alarms are not reported to either numbers.

  — For value **second-as-backup**, all major and minor alarms result in an automatic call to the first OSS telephone number. If calling the first OSS telephone number fails four attempts, the switch starts to call the second OSS telephone number as a backup until calling the first OSS telephone number becomes successful. Both OSS telephone numbers must be administered.

- *Cleared Alarm Notification*

  Enables the MCU to originate a call to the alarm receiver and sends an alarm resolution message whenever all previously reported major and minor alarms are resolved. Alarm origination must be activated for *Cleared Alarm Notification* to work. Values include **y** and **n**.

- *Suspension Threshold*

  Some problems cause alarms to be generated and resolved repeatedly. To detect these problems, the switch suspends Cleared Alarm Notification when it has reported the specified number of Cleared Alarm notifications in a 24 hour period. A suspended Cleared Alarm Notification reactivates with a successfully completed “logoff” command, a system reset, or when the threshold is changed. This field is irrelevant if *Cleared Alarm Notification* or *Alarm Origination* are disabled. (1-15)

- *Restart Notification?*

  Generates an automatic call to the OSS number if the MCU has a restart. Values include **y** and **n**

- *Test Remote Access Port*

  Indicates whether to test the remote access port on the Processor circuit pack.

- *CPE Alarm Activation Level*

  Indicates the level at which the customer premises equipment (CPE) alarm is activated. If the level is set to **major**, the CPE alarm is activated only on major alarms. If the level is set to **minor**, the CPE alarm is activated for both major and minor alarms. If the level is **warning**, the CPE alarm is activated for all alarms. If the level is set to **none**, the CPE does not activate for any alarm.

- *Sched Adj Alarm Activation Level*

  SCH-ADJ allows the MCU to originate an alarm to the alarm center whenever CRCS fails to communicate with the MCU for a given time period. This halt in communication may occur if the user powers down the CRCS, or if a problem occurs within the CRCS PC. If the user has a CRCS connected to the MCU, the CRCS logs into the MCU once every hour to display the time (this represents an attempt to synchronize the data and time for the MCU and CRCS). Once the CRCS logs into the MCU, the MCU knows that the CRCS is active. If, within the hour, the CRCS does not log into the MCU, an error is logged against SCH-ADJ. If the CRCS does not log into the MCU for three consecutive hours, an alarm is raised.

  Values for this field include **major**, **minor**, **warning**, and **none** (default). Only major or minor alarms automatically notify the alarm center.

- *Customer Access to INADS Port*

  Allows the user to prohibit access to system administration and maintenance interface via the INADS port when using customer login ID's. This field can be activated only by Avaya services via system-parameters maintenance administration. Values include **y** and **n** (default).

- *Repeat Dial Interval (MMS)*

  Number of minutes that the system must wait before attempting another call origination to an OSS. Lack of a far-end acknowledgment triggers the timer.

Page 1: Scheduled Maintenance Area

- *Start Time*

  Indicates the hour and minute the daily scheduled maintenance actions start. Enter a number from **0** to **23** for hours and **0** through **59** for minutes. The scheduled maintenance actions are: daily maintenance and save translation

- *Stop Time*

  Indicates the hour and minute when scheduled daily maintenance will stop running. If any daily maintenance operations are not completed by this time, the system notes where in the sequence it stopped, and it performs those operations during the next scheduled daily maintenance.

- *Daily Maintenance*

  Displays the status **daily** to indicate the maintenance tests are automatically run each day. This value cannot be changed.

- *Save Translation*

  Indicates if the MCU translation data should be automatically backed up on a specified day of the week (**sunday**, **monday**, etc.) all week (**daily**), or not at all (**no**).

Page 2: **Minimum Thresholds Area**

- *TTRs*

  Shows the minimum number of touch-tone receivers (**1** through **200**) administered in the MCU. If fewer than this number are in service, a warning alarm is raised. Enter value **8** for each TN744 Call Classifier circuit pack in the MCU.

- *CPTRs*

  Shows the minimum number of call progress tone receivers (**1** through **200**) administered in the MCU. If fewer than this number are in service, a warning alarm is raised. Enter value **8** for each TN744 Call Classifier circuit pack in the MCU.

- *Call Classifier Ports*

  Shows the minimum number of call classifiers (**1** through **200**) administered in the MCU. If fewer than this number are in service, a warning alarm is raised. Enter value **8** for each TN744 Call Classifier circuit pack in the MCU.

Page 2: ISDN Maintenance Area

- *ISDN-PRI Test CALL extension*

  Defines the extension number for an ISDN test call. This test allows a far-end ISDN node to test the ISDN-PRI trunks between the far end and the MCU. Enter an unassigned DNIS extension number.

- *ISDN-BRI Service SPID*

  N/A for the MCU. Leave blank.

- *DSO Loop-Around Test Call Extension*

  Indicates the extension used by the network service provider to set up a DSO loop-around connection for testing non-ISDN DS1 trunks.

  This feature is used primarily for testing DSO channels associated with non-ISDN-PRI trunks. The loop-around is activated by dialing the test extension number. Multiple DSO Loop-Around connections can be set up by placing multiple calls to the loop-around extension.

Page 2: SPE OPTIONAL BOARDS Area

- *Packet Intfl1*

  Identifies the presence of Packet Interface 1 (always set to **y** for MCU)

- *Packet Intfl2*

  Identifies the presence of Packet Interface 2 (always set to **y** for MCU)

Page 3:

- *Modem Connection*

  Indicates the type of modem connection. Values are **internal**, **external** or **none**. Value cannot be **none** if *Alarm Origination to OSS Numbers* is enabled.

- *Data Bits*

  The number of data bits, either **7** or **8**.

- *Parity*

  Display-only field. Value is **none**.

For more information, see the information about Facility Test Calls in the Maintenance document for your system.

Changing Settings on the Maintenance-Related System Parameters Form

To change the settings on the Maintenance-Related System Parameters form, perform the following procedure:

1. Log in on the MCU-MT and verify that the screen displays: `enter command`.
2. Enter **change system-parameters maintenance**. The Maintenance-Related System Parameters form is displayed.
3. Enter the appropriate information in the fields. Use TAB to advance the cursor to the next field. An entry must be made in the *Product Identification* field if there are any changes to the form.
4. When all the fields are completed, press ENTER to submit the form.

5. Verify that the following message appears on the screen: `command successfully completed`.
6. Enter **display system-parameters maintenance** to verify the field entries. The Maintenance-Related System Parameters form is displayed showing the data entered in the preceding steps.

Handling Port Circuit Packs

WARNING:
Electronic discharge can destroy or severely damage integrated circuits or circuit packs. Always wear the electrostatic discharge (ESD) wrist grounding strap when handling circuit packs.

Common Port Circuit Packs

When any of the common port circuit packs (except the TN754C Digital Line circuit pack) are physically removed from the backplane, no alarm is logged for about 11 minutes (heavily loaded systems may take several minutes longer). When a circuit pack that has been removed is alarmed, this alarm type is minor and is classified as an on-board alarm. The time delay permits maintenance activity to be performed without triggering an additional alarm. An alarm is logged only against a common port circuit pack on which ports have been administered.

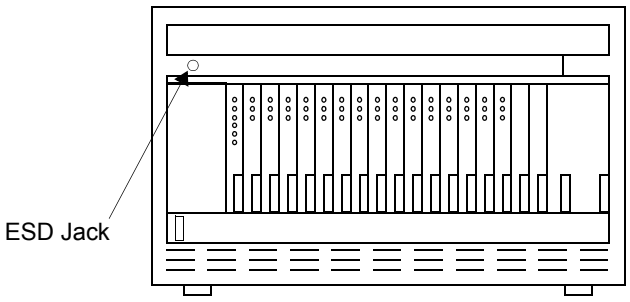


Figure 5-4. ESD Wrist Strap Grounding Locations

The following procedures are for unseating, reseating, replacing, and installing new port circuit packs. They are common to all maintenance activities involving port circuit packs.

Unseating and Reseating Port Circuit Packs

CAUTION:
Any time a circuit pack is unseated, service is interrupted if the amber (busy) LED is lighted.

WARNING:
In general, do not reseat circuit packs unless you are instructed to do so.

Each circuit pack has a latch pin and a locking lever on the lower part of its front panel. To unseat and reseat the circuit pack:

1. Slide the latch pin upward to unlock the locking lever.
2. Pull down on the locking lever until the pack is disconnected from its socket.
3. Pull the circuit pack just enough to break contact with the backplane connector but do not remove it from the cabinet.

To reseat a circuit pack:

1. Push the unseated circuit pack back into the backplane connector.
2. Lift the locking lever until the pin engages.

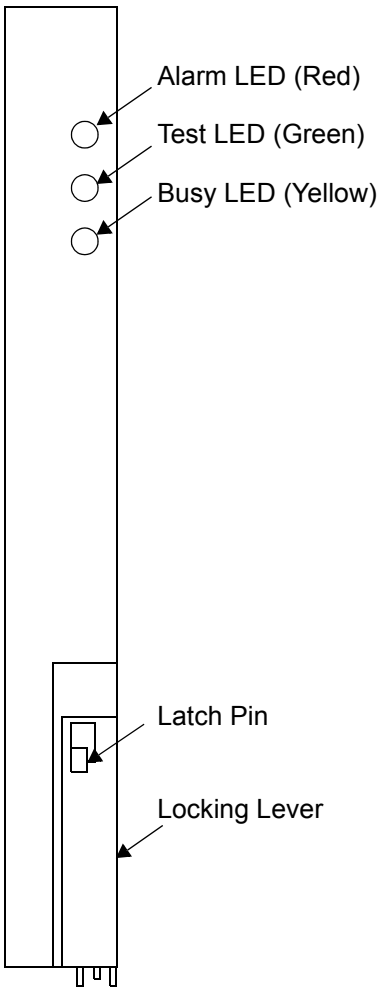


Figure 5-5. Typical TN-Coded Circuit Pack

Replacing Port Circuit Packs

WARNING:
Replacing a port circuit pack temporarily clears any associated alarms; however, if the trouble remains, the alarm recurs.

To replace port circuit packs:

1. Unseat the circuit pack.
2. Slide the circuit pack out of the slot.
3. See the following section, “Installing a New Port Circuit Pack.”

NOTE:
If a new port circuit pack does not correct the problem, reinstall the original port circuit pack.

Installing a New Port Circuit Pack

To install a new port circuit pack or to return the original one to service:

1. Carefully insert the new port circuit pack and push it all the way into its mounting slot.
2. Lift the locking lever until the latch pin engages.
3. Verify that the circuit pack LED indications are correct. See Chapter 7, "LED Interpretation"for details.

NOTE:
Wideband requires a TN767E DS1 circuit pack.

Handling Control Circuit Packs

WARNING:
In general, it is not recommended that you reseat circuit packs unless you are instructed to do so.

Unseating and Reseating Control Circuit Packs

Each circuit pack has a latch pin and a locking lever on the lower part of its front panel. To unseat a control circuit pack:

1. Remove power as described in the following section, "Powering the Cabinet" on page 5-17.
2. Slide the latch pin upward to unlock the locking lever.
3. Pull down on the locking lever until the circuit pack is disconnected from its socket.
4. Pull the circuit pack just enough to break contact with the backplane connector, but do not remove it from the cabinet.

To reseat a control circuit pack:

1. Push the unseated circuit pack back into the backplane connector.
2. Lift the locking lever until the pin engages.
3. Restore power as described in the following section, “Powering the Cabinet.”

Replacing a Control Circuit Pack

Before replacing a circuit pack, unseat and reseat it to ensure the trouble is not being caused by a bad connection with the backplane.

NOTE:
When replacing a TN786B Processor circuit pack, make sure it has the current version of the MCU software.

1. Remove power as described in the following section, "Powering the Cabinet" on page 5-17.
2. Unseat the control circuit pack.
3. Slide the control circuit pack out of the slot.
4. Replace the control circuit pack as described under the following section, "Installing a New NetPkt Interface Circuit Pack" on page 5-15.

Installing a New NetPkt Interface Circuit Pack

To install a new NetPkt Interface circuit pack or to return the original to service:

1. Carefully insert the circuit pack and push it all the way into its mounting slot.
2. Lift the locking lever until the latch pin engages.
3. Restore power as described under “Powering the Cabinet.”
4. Verify that the LED indications on the circuit pack are correct. See Chapter 7, "LED Interpretation" for details.
5. Test the reseated or replaced control circuit pack by issuing the appropriate craft commands after power has been restored.

Network Control Circuit Pack

The MCU uses the TN794 NetPkt Interface circuit pack. This circuit pack holds a memory card which must be removed before this circuit pack can be handled (that is, unseated, reseated, replaced, or installed).

WARNING:
Any new TN794 NetPkt Interface circuit pack must have the correct date and time manually set and verified.

Removing the Memory Card

1. Check that the “*card in use*” LED is not on.

CAUTION:
Do not remove this card if the LED is on; data stored on the card could be destroyed.

2. Carefully pull the memory card from the memory card slot.

Inserting the Memory Card

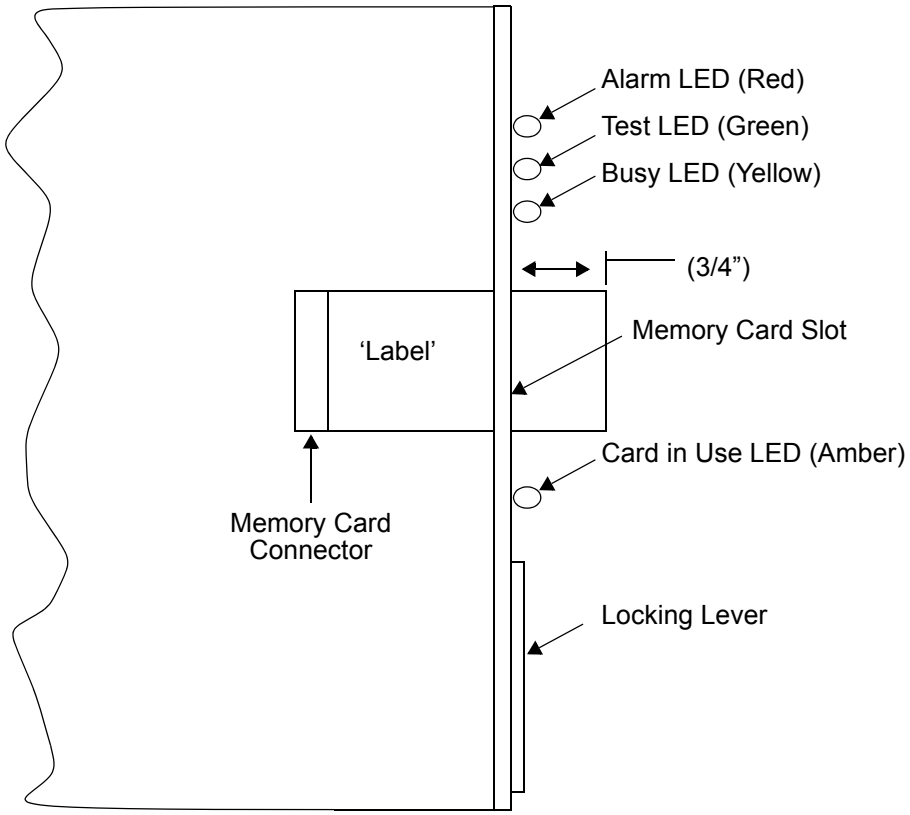


Figure 5-6. Inserting a Memory Card

1. Hold the memory card in front of you so the card’s label is facing to your left.
2. With the memory card in this position, insert the shorter edge of the card into the mounting slot in the TN794 NetPkt Interface circuit pack.
3. Gently push the card forward until you feel some resistance at the opposite edge of the card.
4. When the card is fully inserted, about 3/4 inch of the card should still appear outside the memory card slot.
5. Confirm that as you are facing the circuit pack, the memory card label is facing to your left. If it is not, remove the card and start again.
6. Test the memory card by entering **test card-mem** (see CARD-MEM in Chapter 8, "Maintenance Object Repair Procedures").

Powering the Cabinet

These procedures apply to cabinets with either an AC or DC power source.

Removing Power from the Cabinet

1. Check to be sure the memory card is in the TN794 NetPkt Interface circuit pack.
2. Enter **save translation**.
3. Turn off the power in each carrier individually. The On/Off switch is located at the back of the carrier behind the power unit.

Restoring Power to the Cabinet

To restore power to the cabinet:

1. Turn on the power in each carrier individually. The On/Off switch is located at the back of the carrier behind the power unit.
2. Make sure that the memory card is properly inserted into the memory slot of the TN794 NetPkt Interface circuit pack.
3. When the rebooting process begins, the translations are loaded from the memory card in about three minutes.
4. When the MCU power is restored, the following display appears:

```
TN786 FLMM
INVOKING EMERGENCY TRANSFER
ROM CHECKSUM TEST (=22C4)                PASSED
SOFT INT TEST                            PASSED
NMI TEST                                 PASSED
READ_WRITE MEMORY                        PASSED
MEMORY BOARD 1 PARITY BIT TEST           PASSED
MEMORY FUNCTIONAL TEST                   PASSED
FLASH TEXT CHECKSUM (=BB04)


RESET 4 (REBOOT) PERFORMED
```

Figure 5-7. Power Restart Display Example

5. Reset the time by entering **set time.** (Use **display time** to verify the setting.)

Troubleshooting Control Carrier Power Units

WARNING:
Electrostatic discharge can destroy or severely damage integrated circuits or circuit packs. Always wear the ESD wrist grounding strap when handling circuit packs. Connect the wrist strap to one of the metal tabs located on the lower left or right side of one of the carriers.

1. Check to be sure the memory card is in the TN794 NetPkt Interface circuit pack.
2. As a backup, create a written record of all reserved conferences. Enter **list conference** and **list mcu-extensions** and record the related data.
3. Enter **save translation**.
4. Unplug the power unit.
5. Move the locking slide on the suspect power unit to the extreme left position, and unlatch the locking lever.
6. Unseat the power unit.
7. Unseat all the control circuit packs.
8. Reseat the power unit.
9. Plug in the power unit. Check the yellow LED on the power unit as shown in the following table.

Table 5-1. Power Unit LED Interpretation

If the Yellow LED is...	When...	Then...
ON	all circuit packs are unseated	circuit packs can be presumed to be healthy.
OFF	all circuit packs are unseated	replace the power supply.
ON	a specific circuit pack is unseated	reseat the same circuit pack. If the LED goes off, the circuit pack is defective.

10. Refer to Chapter 8, "Maintenance Object Repair Procedures" for instructions on replacing the various types of power units.

MCU Backup

MCU translations can be restored by using the data on the memory card. The procedure is described in the following section.

Save Translation

To ensure that the memory card contains the most recent copy of the translation data, the MCU can be set to automatically save translation data onto the memory card every 24 hours.

NOTE:
Automatic daily backup of the system translation data is controlled by an entry on the Maintenance-Related System Parameters form that is defaulted to **daily** (which means the MCU automatically saves translations every 24 hours).

If many translation data changes are made, save them by entering **save translation.** This action saves the new changes on the memory card without waiting for the next automatic backup. If the translation data changes frequently, translations should be saved more frequently to ensure that the most up-to-date information is kept.

NOTE:
If possible, perform the save translation operation after business hours to avoid delays. Do not issue the **save translation** command during alarm conditions.

Keep in mind that the **save translation** command (which includes saving translations as part of scheduled maintenance), blocks all maintenance commands except some **list**, **display**, **monitor**, and **status** commands. The **status card-mem** command is also blocked during the save translation operation. This is because the MCU blocks the execution of any commands that change the translation, access a memory card, or trigger a maintenance action.

Memory Card Backup

The backup system for the MCU is saved on a formatted memory card. In case of a power failure, the system translations can be restored using the backup memory card.

Only one memory card is provided per MCU. It is recommended that additional memory cards be purchased and formatted to serve as backup or replacements. Memory cards should be alternated periodically.

It is also recommended that backup copies of the translation data be made weekly, or after many changes have been made. This minimizes the loss of recent translation data changes if the memory card becomes damaged.

1. Remove the memory card from the TN794 NetPkt Interface circuit pack.
2. Insert the backup memory card into the NetPkt Interface circuit pack.
3. Log on and enter **save translation.**

   NOTE:
   If an error code appears, refer to the next section on "Memory Card Errors" on page 5-21.

4. Remove the backup memory card from the slot in which it is installed.
5. Insert the original memory card in the slot.
6. Label the backup memory card with the date and time it was made.

Memory Card Errors

Memory card errors usually occur because either the card is faulty or the Network Control circuit pack is defective. See Table 5-2 for the appropriate actions.

Table 5-2. Error Codes and Actions

Error Message	Description	Action
Cannot access file storage area	The wrong memory card may be installed.	If the correct memory card is installed, test it. If it passes, escalate the problem.
Cannot turn on 12-volt power supply	Fault may be with the NetPkt Interface circuit pack.	Test the 12-volt power supply by entering **test card-mem**. If the test fails, replace the NetPkt Interface circuit pack.
Invalid directory on Card-Mem	Memory card needs refreshing.	Run **test card-mem** to be sure the card passes the test.
Card-Mem is unusable	Defective memory card.	Replace the memory card.
Could not write to Card-Mem	Something may be wrong with the memory card.	Run **test card-mem** to be sure the card passes the test.
Cannot access mass storage system now; try again	Storage system is in use.	Repeat the test later.
Request is incompatible with currently running operations	Storage system is in use.	Repeat the test later.
Card-Mem is not inserted in the system	Memory card is not in the NetPkt Interface circuit pack.	Insert the memory card.
Cannot access file; wrong type of Card-Mem is inserted	The correct memory card for the desired operation is not installed.	Load the correct memory card.
File size exceeded	No more file space.	Escalate the problem.
Upgrade Memory Card inserted	The System Upgrade Memory card may have been accidentally inserted.	Insert the 10-Mb memory card.

Table 5-2. Error Codes and Actions — *Continued*

Error Message	Description	Action
Card-Mem is write-protected	The tab on the top side of the memory card is incorrectly set.	Move the tab to the correct position.
Command has been aborted; please try later	The command has been preempted.	Try again later.
Saved copy of translations is unusable	The copy of the translations on the memory card is faulty.	Reenter the **save translation** command.

```
save translation

                    SAVE TRANSLATION

Processor      Command Completion Status      Error Code

SPE_A                    Success                    0

Command successfully completed
enter command:
```

Figure 5-8. Save Translation Screen

Software Upgrade

The software upgrade feature permits the MCU to upgrade its software version to include new features and to fix software problems. Performing an upgrade on an MCU requires a level 4 reboot and, therefore, causes a service disruption.

The following procedure explains how to install upgraded software in an existing MCU Release 7.0 to a release 7.1 or MCU Release 7.1 to newer 7.1 software. This procedure takes 30 minutes, if firmware upgrades also need to be done it may take two or more hours during which time service will be disrupted. This procedure cannot be implemented remotely.

1. Verify that you have received the necessary hardware, firmware and software, including the following:
   - 20 MB generic card containing the MCU software (orange label)
   - 10 MB firmware download card containing the firmware for the TN2237C, TN787K, TN2236B and TN2303 circuit packs. (white label)
2. If the MCU has a CRCS adjunct, logout and exit from the CRCS. The CRCS release must also be upgraded to match the MCU Release 7.1
3. If the CRCS has Web Pak, on the WEB Server, have the customer access the Control Panel, Services and stop Connection Manager.
4. If the MCU has an ESM adjunct, follow the shutdown procedures for the ESM as found in MCU Maintenance Manuals under, Routine Maintenance, ESM Maintenance, Shutting Down the UNIX Operating System.
5. Login at the MCU Maintenance Terminal (MT).
6. Issue command: **change system-parameters maintenance**, set the Alarm Origination to OSS Numbers to *neither.*
7. Issue these commands and make sure all pages complete without an “error encountered can’t complete request” or “error translation corruption” displayed on the terminal status line.
   - **list trunk-group**
   - **list mcu-extension**
   - **list hunt-group**
   - **list data-module**
   - **list ars analysis**
   - **list conference**
   - **list partition-route-table**
8. File any Dedicated or Reserved (inactive, in-use or active) conferences. Get the customer’s permission and note dedicated conferences for reactivation after the upgrade is complete

9. Issue the command: **save translations** and verify it successfully completes.
10. If the customer has a backup 10 MB translation card or older 4 MB translation card formatted for post-R6 translations only (command: **format card-mem translation**), insert this card in the TN794. Issue the command: **save translations** and verify that it successfully completes.
11. Remove the current translation card and insert the 20 MB MCU Release 7.1 software card and issue the command: **status card-mem** to verify the correct software version for the upgrade is present on the flash card.
12. If your MCU supports VoIP, issue the command: **busyout gatekeeper**
13. If you are adding new carriers at this time, proceed with step 14. If you are *not* adding new carriers, issue command: **reset system 4** and proceed to step 19.
14. Issue the command: **logoff**
15. Proceed with logoff: [n] type **y**
16. Power down the system (SCC—A Carrier only, MCC—the whole system) and put on wrist strap
17. Install any new carriers required for this installation and a TN744 Call classifier (Do not add any other new port boards at this time).
18. Power up the system. Observe the MT for errors during the upgrade.
19. After about 5 minutes you will be prompted for the translation card. Replace the 20 MB orange flash card with the Release 7.0 10 MB translation card saved earlier.
20. The system will complete the reboot.
21. Login (ASG is required for init and inads logins)
22. Issue these commands and make sure all pages complete without an “error encountered can’t complete request” or “error translation corruption” displayed on the terminal status line.
    - **list conference**
    - **list trunk-group**
    - **list mcu-extension**
    - **list hunt-group**
    - **list data-module**
    - **list ars analysis**
    - **list aar analysis**
    - **list partition-route-table**
23. Insert any new port circuit packs

24. Insert firmware flash card and perform a "**status card**" to confirm appropriate firmware levels.
25. Print the command: **list configuration all**
26. Using the **upgrade firmware** commands, upgrade any TN2237C (VPP), TN787K (MMI), TN2236B (DI) or TN2303 (MEDIA PROCESSOR) circuit packs that do not meet the vintage level on the firmware upgrade card. Instructions on the firmware upgrade commands are in MCU Maintenance Manual. If upgrading TN2236B DI boards, execute command: **change synchronization** and blank the Primary and Secondary fields if a Circuit Type **DI** is the sync source.
27. Remove your Firmware upgrade card. insert your 10 MB translation flash card.
28. If the Primary and Secondary sync source were blanked because they were DI, retranslate them with the command: **change synchronization**
29. Validate the MCU system sanity with the following commands.
    - **Power up the ESM** (if you have one)
    - **status synchronization**
    - **status signal-group 1 – x**
    - **status trunk-group x**
    - **list video**
    - **list mmi**
    - **status ESM** (if you have one)
    - **status gatekeeper** (if the MCU has VoIP viaTN799B, CLAN and the TN2303 Media Processor)
30. Issue command: **display alarms**. If any alarms exist, resolve them by following normal maintenance procedures.

NOTE:
If a Trans-ID alarm is present, this alarm can only be cleared by the init level login, contact your Technical Center to issue command: *reset trans-id*

31. If you filed any dedicated conferences in paragraph 8, rededicate them now if the customer wishes you to do so.
32. Issue the command: **save translations**.
33. Add any new translations required for this upgrade.
34. Issue command: **change system-parameters maintenance** and set Alarm Origination to OSS Numbers back to its original setting.
35. Issue command: **save translations**.
36. Remove 10 MB translation card and label Release 7.1 and date with today's date.

37. If a backup translation card is available, label Release 7.1 and date, insert this translation card in the TN794 and execute the command: *save translations*. (After this completes, if the backup translation card is a 4MB remove this card and insert the 10 MB translation card save on previously)
38. Upgrade CRCS, verify it can communicate with the MCU. (i.e. Query MCU Parameters)

Firmware Upgrade

The technician can upgrade and/or modify the TN787K, TN2236B, TN2237C and TN2303 circuit packs at the customer location. The commands for doing so are issued from the MCU Maintenance Terminal (MT). Command feedback is returned to this terminal. The craft logins have access to all the commands for firmware upgrade.

The system must remain in service during the circuit pack upgrade. The actual circuit packs that are being upgraded must be idle (that is, they cannot provide service) during the upgrade. Generally, each circuit pack is upgraded within five minutes. The MMI and DI will upgrade within a few minutes. The VPP and Media Processor can take between 7 and 10 minutes.

NOTE:
Since hardware is backward compatible, it is recommended that circuit pack upgrades be performed before system software upgrades.

Determining Upgrade Requirements

Firmware information is stored on a memory card inserted into the Net Packet circuit pack. To display firmware information, use the **status card-mem** command. This command produces the Memory Card Status report. The output from this report helps determine if it is necessary to proceed with the upgrade. (It is possible, for example, that the circuit packs already have the appropriate firmware or that the memory card, but not its label, was changed.) An example of the report appears as follows:

```
status card-mem                                              Page 1 of 1

                              MEMORY CARD STATUS

   Location: 1A                                 Write Protection: off
     Status: inserted                              Capacity (MB): 1 Series 1
System Size: small                          Number of Erase Pulses: 90
                                Translation Storage Space Used (%): 67


    File Name     Data Present                              Date    Time

    tn787h v7          y                                  07/20/98 14:00
    tn2237 v7          y                                  07/22/98 12:00
    tn2236 v5          y                                  08/16/98 01:00
    tn2303 v4          y
```

Figure 5-9. Memory Card Status Report

Upgrading Specific Circuit Packs

If upgrading TN2236B DI boards first "*change synchronization*", record the slot locations and blank the Primary and Secondary fields if a Circuit Type DI is the synchronization source. The technician can upgrade one circuit pack at a time. As an option, the technician can continue to upgrade all of one specific circuit pack type.

To upgrade an individual circuit pack, enter the

upgrade firmware *cp ppss* command,

where ***cp*** is the circuit pack type, including ***data-interface*** (TN2236B), ***mmi*** (TN787K), ***vpp*** (TN2237C) or ***medpro*** (TN2303) ***ppss*** is the circuit pack location (for example, ***upgrade firmware mmi 1a12***).

To upgrade all of one specific circuit pack type, enter the

***upgrade firmware cp* all** command.

These commands are accepted only under the following conditions:

- Memory card is inserted and is a minimum of 10 MB
- Firmware file is on a 10 MB firmware flash card

NOTE:
Each flash device must contain all the necessary code (packages) to populate a given circuit pack completely. For example, if attempting to upgrade a TN787 circuit pack, all the packages for this circuit pack (for example, the boot code, application code, etc.) must be on the flash to populate a circuit pack completely and make it functional. If another type of card is inserted, an error message is returned.

- Specified circuit pack is inserted
- Specified location is valid and contains the specified circuit pack
- Circuit pack intended for an upgrade can support a firmware upgrade

A firmware flash card will contain four firmware packages. A different firmware package is needed for each type of circuit pack to be upgraded.

A firmware package includes several smaller files of firmware code. For the upgrade to be successful, all the firmware files included in a particular firmware

package must be present on the flash card. The following table identifies the three types of firmware packages currently supported by the MCU.

Table 5-3. Firmware Package Contents for Upgradable MCU Circuit Packs

	MCU Circuit Pack Type			
Firmware File No.	**TN2236 Data Interface**	**TN787 Multimedia Interface**	**TN2237 Video Processor Plus**	**TN2303 Media Processor**
1	340 Boot Code	340 Boot Code	340 Boot Code	Audio DSP Main Code
2	340 Application Code	340 Application Code	340 Application Code	Def. PPC Application Code
3	FPGA Code	TSI DSP Code	TSI DSP Code	Audio DSP Boot Code
4		H221 Code	Video DSP Code	Audio/Video FPGA Code
5		ESM Code	TSI FPGA Code	MCU PPC Application Code
6			Multi-Image FPGA Code	MCU TSI FPGA Code
7			Single-Image FPGA Code	MCU TSI DSP Code
8			AVP Code	MCU Video DSP Code
9				PPC Boot Code

The first column in this table indicates the sequence in which the firmware files are downloaded within a firmware package. For example, in the MMI firmware package, the 340 Boot Code is file 1 and is therefore downloaded first. This is followed by the 340 Application Code, which is file 2.

The file number is useful whenever your are troubleshooting any five-digit abort and failure codes returned by the **upgrade firmware** command. The last digit in the error code identifies the package number in which the error was encountered. For example, error code 20003 on an MMI circuit pack indicates that the third firmware file could not be upgraded. The previous table shows that the third firmware file in the MMI firmware package is the TSI code.

Each firmware package and firmware file are also given a unique internal ID. These internal IDs are used by software during the upgrade process to identify what firmware packages and firmware files are stored on the firmware flash card.

The IDs are also used to determine what firmware files are currently running on the targeted circuit pack.

Whenever the user enters the **upgrade firmware** command, the command first verifies that the firmware flash card is formatted correctly. If the card is not formatted correctly, an abort is returned, and the **upgrade firmware** command is terminated. In this case, the **upgrade firmware** command then compares the firmware package and the firmware file's internal software IDs to the flash card's firmware IDs. If any of the firmware IDs do not match, an abort is returned, and the **upgrade firmware** command is terminated. Whenever all of the firmware IDs match, the upgrade process continues.

Once the firmware information stored on the flash card is verified, the suffix and vintage of the firmware package on the flash card are compared to the targeted circuit pack's suffix and vintage. If the suffix and/or vintage on the flash card are less than or equal to that of the targeted circuit pack, the circuit pack does not need to be upgraded; therefore, an abort is returned, and the **upgrade firmware** command is terminated.

If the vintage of the firmware package on the flash card are greater than that of the targeted circuit pack, the circuit pack needs to be upgraded; therefore, the upgrade process continues.

Thereafter, a comparison of each firmware file's version number is made between the flash card and the targeted circuit pack. If the version number of the firmware file on the flash card is less than the version number of the targeted circuit pack's firmware file, an abort is returned, and the **upgrade firmware** command is terminated. If the version numbers are the same, the file does not need to be upgraded and is skipped. If the version number of the flash card's firmware file is greater than that of the circuit pack, the file needs to be upgraded; therefore, the upgrade process continues.

Software then checks for any ports on the targeted circuit pack that are active on a call. If there are any such ports, an abort is returned, and the **upgrade firmware** command is terminated. If no such ports are active, maintenance takes the ports out of service, and a file transfer begins between the flash card and the targeted circuit pack. After each firmware file is downloaded, the circuit pack erases its flash device and then updates it with the new firmware file. After all the files on a circuit pack are upgraded, software resets the circuit pack and brings all the ports back into service.

A firmware package can take from two to seven minutes to download completely to a single circuit pack. The amount of time for an upgrade depends on the type of circuit pack and the number of firmware files that are being upgraded. The **upgrade firmware** command uses the control channel of the TDM bus; therefore, the command could have an impact on system performance. To minimize any such impact, the command should be used only during off hours.

NOTE:
If the **upgrade firmware** command returns a five-digit error code, it is likely that the targeted circuit pack was left with some of its firmware files upgraded and some not upgraded. Each firmware-downloadable circuit pack has two error counters that generate on-board minor alarms if any problems are encountered during the upgrade process. If either alarm is raised, it should be given immediate attention. The following table describes the error log entries for these counters.

Table 5-4. Upgrade Firmware Command Error Log Entries for Upgradable MCU Circuit Packs

Error Type	Aux Data	Alarm Level	On/Off Board	Command to Clear Alarm
3329	any	Minor	On	upgrade firmware
	The circuit pack could not be reset and is still running in its boot code. 1. Physically reseat and reinsert the circuit pack to get it to run in its application code. 2. Retry the **upgrade firmware** command.			
3585	any	Minor	On	upgrade firmware
	An error or failure condition was detected during the upgrade process. 1. Retry the **upgrade firmware** command.			

If the circuit pack is in the busy-out state prior to upgrading, use the appropriate **release** command to make the circuit pack available for upgrading.

Troubleshooting the Upgrade Firmware Command

The firmware upgrade process is complex and therefore can return many different types of errors. The following table describes the abort and failure codes that can be returned by the **upgrade firmware** command. The table also provides the appropriate corrective actions.

Table 5-5. Troubleshooting the Upgrade Firmware Command

Error Code	Test Result	Description / Recommendation
1001	ABORT	One or more ports on the targeted circuit pack are active on a call. Terminate the call and retry the **upgrade** command.
1014	ABORT	This is normal if the test is being done when a circuit pack is not physically in the system or the system is booting up. 1. Verify the circuit pack is physically in the system. 2. Verify that the system is not in the process of booting up. 3. Retry the command at one minute intervals a maximum of 5 times. 4. If the test continues to return to NO BOARD, escalate the problem.
2000X	ABORT or FAIL	A maintenance timer expired while waiting for a response from the circuit pack that is being upgraded. Either a circuit pack failure or software error has occurred. 1. Check the active hardware error log. If error code 3329 is displayed, the circuit pack was not properly reset and is still running in its boot code. Physically reseat and reinsert the circuit pack. Once the circuit pack is reinserted, retry the **upgrade** command. 2. If the **upgrade** command continues to abort or fail, escalate the problem.
2012	ABORT	This is an internal system error that occurs when the system cannot retrieve the targeted circuit pack's board code, suffix, and vintage information. 1. Retry the command. 2. If the **upgrade** command continues to abort, escalate the problem.
2100	ABORT	System resources required for this test are not available. 1. Retry the command. 2. If the **upgrade** command continues to abort, escalate the problem.

Table 5-5. Troubleshooting the Upgrade Firmware Command — *Continued*

Error Code	Test Result	Description / Recommendation
2710	ABORT	The flash card does not contain the firmware needed to perform the upgrade. 1. Issue the **status card-memory** command to find out what firmware packages are stored on the flash card. If the correct firmware package is displayed, there may be a problem with the individual firmware files stored within the firmware package itself, or the flash card may not have been made correctly. Retry the **upgrade firmware** command again. 2. If the **upgrade** command continues to abort, a new firmware card is required. Escalate the problem.
2711	ABORT	The firmware package on the flash card is corrupted. 1. Issue the **status card-memory** command to find out what firmware packages are stored on the flash card. If the correct firmware package is displayed, there may be a problem with the individual firmware files stored within the firmware package itself, or the flash card may not have been made correctly. Retry the **upgrade firmware** command again. 2. If the **upgrade** command continues to abort, a new firmware card is required. Escalate the problem.

Table 5-5. Troubleshooting the Upgrade Firmware Command — *Continued*

Error Code	Test Result	Description / Recommendation
2712X	ABORT	An individual firmware file within a firmware package is an older version than the firmware file on the circuit pack. This can happen when a circuit pack needs to be downgraded to a previous firmware release due to a bug in a newer release. However, if this is the case, the suffix and/or vintage of the firmware package stored on the flash card should be less than that of the circuit packs. 1. Issue the **status card-memory** command to find out the suffix and vintage of the firmware package on the flash card. Issue the **list config board xxxx** command to find out the suffix and vintage of the circuit pack. If the suffix and/or vintage of the package are greater than or equal to that of the circuit packs, escalate the problem. 2. Check the active alarm's hardware error log. If error code 3329 is displayed, the circuit pack was not properly reset and is still running in its boot code. Before proceeding, physically reseat and reinsert the circuit pack. 3. If having an older version of a firmware file on the flash card is intended, use the override option of the **upgrade** command to upgrade the circuit pack. **Warning**: The override option downloads every file within the specified firmware package. 4. If the **upgrade** command continues to abort, escalate the problem.
2716	ABORT	This is an internal system software error indicating that the flash card is busy (contention error). 1. Wait five minutes and retry the command. 2. If the **upgrade** command continues to abort, escalate the problem.

Table 5-5. Troubleshooting the Upgrade Firmware Command — *Continued*

Error Code	Test Result	Description / Recommendation
2717X	ABORT	A firmware package contains several different types of firmware files. Each firmware file that can be downloaded is assigned a unique firmware ID by software and firmware. This abort code is returned by the circuit pack during an upgrade whenever the circuit pack does not recognize the firmware ID of the firmware file being downloaded. 1. Check the active alarm's hardware error log. If error code 3329 is displayed, the circuit pack was not properly reset and is still running in its boot code. Before proceeding, physically reseat and reinsert the circuit pack. When the circuit pack is reset, retry the **upgrade** command. 2. If the **upgrade** command continues to abort, escalate the problem.
2718X	ABORT	The targeted circuit pack aborted the current firmware upgrade command due to an internal circuit pack error. 1. Check the active alarm's hardware error log. If error code 3329 is displayed, the circuit pack was not properly reset and is still running in its boot code. Before proceeding, physically reseat and reinsert the circuit pack. When the circuit pack is reset, retry the **upgrade** command. 2. If the **upgrade** command continues to abort or fail, escalate the problem.
2721X	ABORT	This is an internal system software error indicating that the data packet that was just transferred is larger than 24 bytes. This condition can occur if the targeted circuit pack is not healthy. 1. Check the active alarm's hardware error log. If error code 3329 is displayed, the circuit pack was not properly reset and is still running in its boot code. Before proceeding, physically reseat and reinsert the circuit pack. When the circuit pack is reset, retry the **upgrade** command. Manually release the circuit pack once the upgrade is completed. 2. If the **upgrade** command continues to abort, escalate the problem.

Table 5-5. Troubleshooting the Upgrade Firmware Command — *Continued*

Error Code	Test Result	Description / Recommendation
2722X	ABORT	This is an internal system software error indicating that the system software could not access the firmware file on the flash card. 1. Check the active alarm's hardware error log. If error code 3329 is displayed, the circuit pack was not properly reset and is still running in its boot code. Before proceeding, physically reseat and reinsert the circuit pack. When the circuit pack is reset, retry the **upgrade** command. 2. If the **upgrade** command continues to abort, escalate the problem.
2723X	ABORT	This is internal system software error indicating that software could not transfer the file to the circuit pack after the maximum number of retries. This condition can occur if the targeted circuit is not healthy. 1. Check the active alarm's hardware error log. If error code 3329 is displayed, the circuit pack was not properly reset and is still running in its boot code. Before proceeding, physically reseat and reinsert the circuit pack. When the circuit pack is reset, retry the **upgrade** command. Manually release the circuit pack once the upgrade is completed. 2. If the **upgrade** command continues to abort, escalate the problem.
2724X	ABORT	The user pressed the CANCEL key at the MCU-MT to abort the current firmware upgrade operation. Although this key was pressed, the **upgrade** command continues until the current circuit pack is completed.
2725X	ABORT or FAIL	The checksum calculated by software and the checksum calculated by the firmware are different. 1. Check the active alarm's hardware error log. If error code 3329 is displayed, the circuit pack was not properly reset and is still running in its boot code. Before proceeding, physically reseat and reinsert the circuit pack. When the circuit pack is reset, retry the **upgrade** command. 2. If the **upgrade** command continues to abort, escalate the problem.

Table 5-5. Troubleshooting the Upgrade Firmware Command — *Continued*

Error Code	Test Result	Description / Recommendation
2726X	ABORT	The circuit pack failed to reset. The circuit pack is running in its boot code. 1. Physically reseat and reinsert the circuit pack to get it to run in its application code. Once the circuit pack is reset, retry the **upgrade** command. 2. If the **upgrade** command continues to abort with this code, there may be a problem on the circuit pack. Escalate the problem.
2727X	ABORT	The **upgrade** command is allocated 10 minutes to upgrade each circuit pack. This abort code is returned whenever the **upgrade** command is still active after 10 minutes. If this error occurs, the upgrade is terminated. 1. Check the active alarm's hardware error log. If error code 3329 is displayed, the circuit pack was not properly reset and is still running in its boot code. Before proceeding, physically reseat and reinsert the circuit pack. When the circuit pack is reset, retry the **upgrade** command. 2. If the **upgrade** command continues to abort, escalate the problem.
2728	ABORT	The firmware package on the flash card is older than the firmware package on the circuit pack that is being upgraded. 1. The suffix and/or vintage of the firmware package on the flash card are less than that of the target circuit pack. Use the **status card-mem** and **list config board** commands to compare the two suffixes and/or vintages. 2. If the firmware package on the card is correct, use the override option of the **upgrade** command to download to the circuit pack.
2729	ABORT	The firmware package on the flash card is the same as the firmware package on the circuit pack that is being upgraded. 1. The suffix and/or vintage of the firmware package on the flash card are the same as that of the target circuit pack. Use the **status card-mem** and **list config board** commands to compare the two suffixes and/or vintages. 2. If the firmware package on the card is correct, use the override option of the **upgrade** command to download to the circuit pack.

Table 5-5. Troubleshooting the Upgrade Firmware Command — *Continued*

Error Code	Test Result	Description / Recommendation
2730	ABORT	The target circuit pack does not support the firmware download feature; therefore, a download cannot be made to this circuit pack.
2731	ABORT	The circuit pack's internal firmware version check failed after the upgrade. 1. Retry the **upgrade** command. 2. If the **upgrade** command continues to abort with this code, there may be a problem on the circuit pack. Escalate the problem.
2732	ABORT	The circuit pack that was upgraded could not be updated with the new suffix and/or vintage. 1. Retry the **upgrade** command. 2. If the **upgrade** command continues to abort with this code, there may be a problem on the circuit pack. Escalate the problem.
30000	ABORT	After the upgrade, the circuit pack's suffix and/or vintage did not match the suffix and/or vintage of the firmware stored on the flash card. 1. Retry the **upgrade** command. 2. If the **upgrade** command continues to abort with this code, there may be a problem on the circuit pack. Escalate the problem.
30001-3063X	ABORT or FAIL	The file transfer operation is aborted due to errors detected on the DI, MMI, or VPP circuit packs. A short description of several error codes in the indicated range follows. 3009X:unrecognized package ID 3011X:unrecognized package ID 3019X:package received is too big 3063X:bad starting address

Table 5-5. Troubleshooting the Upgrade Firmware Command — *Continued*

Error Code	Test Result	Description / Recommendation
any	FAIL	The targeted circuit pack was either not upgraded or only partially upgraded. 1. Check the active alarm's hardware error log. If error code 3329 is displayed, the circuit pack was not properly reset and is still running in its boot code. Before proceeding, physically reseat and reinsert the circuit pack. When the circuit pack is reset, retry the **upgrade** command. 2. Retry the command at one minute intervals a maximum of five times. 3. If the **upgrade** command continues to abort, escalate the problem.
-	PASS	The targeted circuit pack has been successfully upgraded with the new version of firmware from the flash card. The circuit was reset and put back to in-service.
-	NO BOARD	This is normal if the test is being done whenever either the circuit pack is not physically in the system or the system is booting up. 1. Verify that the circuit pack is physically in the system. 2. Verify that the system is not in the process of booting up. 3. Retry the command at one minute intervals a maximum of five times. 4. If the test continues to return NO BOARD, escalate the problem.

Impact Minimization Considerations

Synchronization for MMI Circuit Packs

The TN787 MMI circuit pack is used in some MMI systems as a synchronization source. Entering the **upgrade firmware *mmi* all** command automatically upgrades the MMI synchronization source.

Verifying the Upgrade

Once you enter the appropriate **upgrade firmware** command, the Board Firmware Upgrade Status report is displayed. This report indicates whether or not each appropriate circuit pack has been upgraded. For each upgrade failure (if any), the appropriate error code is displayed.

Issue command: *List configuration all*

Validate all circuit packs that were to be upgraded now show the correct firmware vintage.

The following figure is an example of the report output displayed after issuing the **upgrade firmware *mmi* all** command.

```
upgrade firmware mmi all                                  page 1 of 1

                      Board Firmware Upgrade Status

Location              Maintenance Name      Result          Error Code
1A05                  MMI_BD                PASS
1A07                  MMI_BD                PASS
1A11                  MMI_BD                ABORT           xxxx
1B04                  MMI_BD                PASS            yyyy
```

Figure 5-10. Board Firmware Upgrade Status Report

Canceling an Upgrade

Use the CANCEL key to cancel an upgrade in progress. Any circuit pack that is partially upgraded will complete; thereafter, the command is canceled. In the interim, the “please wait” message is displayed on the MT.

Upgrading Vintage

The technician can proceed with the pack upgrade/download only if the flash deployed has a newer vintage than that residing on the circuit pack. Therefore, the technician must be able to determine automatically what vintage is currently installed on the circuit pack. If the ***upgrade firmware cp* all** command is issued and a circuit pack in the system is not of an older vintage, the circuit pack is bypassed with an abort code indicating the reason for the bypass (for example, the current firmware vintage on the specific circuit pack is the same as or newer

than the firmware on the flash device). The user also receives feedback from the MT indicating that the **override** command must be issued to override the abort.

Overriding a Vintage Downgrade

Sometimes, an older vintage is more appropriate because a change in the new vintage causes customer problems. Therefore, an override of the firmware download where the current vintage is less (that is, older) than that of the deployed flash is allowed by entering the:

upgrade firmware cp all override command.

This command causes all the circuit packs of the specified type in the system to upgrade to the flash card vintage.

Modifying the Vintage Number

In Release 7.0 MCU the circuit pack labeling scheme indicates the hardware vintage instead of the previously reported “board vintage” for boards that support the Upgrade Firmware functionality. Therefore, the board vintage will be displayed on the “list configuration board/all” screen to reflect these changes. The vintage will be reported in three fields as described below.

```
list configuration all                                          Page   1

                              SYSTEM CONFIGURATION

Board                                        Vintage          Assigned Ports
Number    Board Type                  Code   Hw Fw  Bd     u=unassigned

01A02     DATA INTERFACE              TN2236B  00 007  u     01
01A03     MULTIMEDIA INTERFC          TN787 K  00 009  u     01 02 03 04 05 06 07 08
                                                             09 10 11 12 13 14 15 16
                                                             17 18 19 20 21 22 23 24
                                                             25 26 27 28 29 30 31 32
01A04     DIGITAL LINE                TN754    u   u  014    01 u  u  u  u  u  u  u
01A05     DS1 INTERFACE               TN2207   u   u  014    01 02 03 04 05 06 07 08
                                                             09 10 11 12 13 14 15 16
                                                             17 18 19 20 21 22 23 24
                                                             u  u  u  u  u  u  u  u
01A06     MULTIMEDIA INTERFC          TN787 K  00 009  u     01 02 03 04 05 06 07 08
                                                             09 10 11 12 13 14 15 16
                                                             17 18 19 20 21 22 23 24
                                                             25 26 27 28 29 30 31 32
```

Figure 5-11. List Configuration All Screen

In this example, the TN787K and TN2236B support the firmware upgrade feature. The “u” in the board field indicate that this is an unused field since both the firmware issue and the hardware vintage (strap) are accurately reported. The TN2207 and TN754 boards do not support firmware upgrade and will continue to report the board vintage which is a message from the firmware that gives the total board vintage. The “u” in the Fw and Hw fields indicates that this board does not support the firmware download feature, nor the messages to report the hardware vintage separately from the firmware issue. This will be true for all boards that do not support the upgrade firmware feature.

Recovery Strategy

If the **upgrade firmware** command is canceled for any reason not associated with the cancel operation (for example, a power outage), follow the instruction for Error Code 3329 in the preceding “Upgrade Firmware Error Log Entries” table.

If the ***upgrade firmware cp all*** command is issued and a circuit pack fails the upgrade, remove the circuit pack and send it to the appropriate personnel for troubleshooting.

Change Synchronization

If the change synchronization screen was blanked before upgrading TN2236B DI boards, issue the command: *change synchronization* and reenter the correct Primary and or Secondary board slot locations.

MCU Upgrade Procedure

MCU MSM Procedures

Use the following instructions to upgrade from MCU.6.0.25, or greater, to Release 7.0. To upgrade from a release prior to 6.0.25, follow the standard upgrade procedures as described in the Release 6.0 Maintenance Manual. 555-027-107 Comcode 108394636

A. Verify that all necessary hardware, firmware and software has been received. You will need:

   1. TN790B Processor circuit pack
   2. TN794 NetPkt/TN2400
   3. TN2182 Tone Clock (only if the system had a TN768v5 or older)
   4. Two 10 MB translations card (white label)
   5. 20 MB generic card containing the MCU software (orange label)
   6. (If the TN790B ships from the factory as an MCU upgrade, the software may already be loaded) Check the software issue label on the latch of the TN790B.
   7. 10 MB firmware download card containing the firmware, if applicable, for the TN2237C, TN787K, TN2236B and TN2303. (white label)

B. If the MCU has a CRCS adjunct, logout and exit from the CRCS, the CRCS release must also be upgraded to match the MCU Release 7.x.

C. If the CRCS has Web Pak, on the WEB Server, have the customer access the Control Panel, Services and stop Connection Manager.

D. If the MCU has an ESM adjunct, follow the shutdown procedures for the ESM as found in MCU Maintenance Manuals for R6.0 or R7.x.

E. Log in at the MCU Maintenance Terminal (MT).

F. Remove the translation card from the TN777B, insert the 20 MB MCU Release 7.x software card and issue the command: *status card-mem* to verify the correct software version for the upgrade is present on the flash card. Remove the software flash card and reinsert the 10 MB translation card.

G. Issue command: **change system-parameters maintenance**, set the Alarm Origination to OSS Numbers to *neither*.

H. Issue these commands and make sure all pages complete without an “error encountered can’t complete request” or “error translation corruption” displayed on the terminal status line.

   - **list trunk-group**

- **list mcu-extension**
- **list hunt-group**
- **list data-module**
- **list ars analysis**
- **list conference**
- **list partition-route-table**

I. File any dedicated or Reserved (inactive, in-use or active) conference. Get customer permission and note dedicated conferences for reactivation after the upgrade is compete.

J. Issue the command: **save translations** and verify it successfully completes.

K. Remove the current translation card and “write protect” it. Label the card “R6.0 Original” with a pencil. This card contains Release 6.0 translations and should be retained until after the upgrade is successful.

L. In preparation for this upgrade **print or copy** to a file the following MCU screens.

1. Enter **display system-parameters customer-options**.
2. Enter **list ars analysis partition-group** *1 – 8* (print only those with route patterns assigned)
3. Enter **list aar analysis partition-group** *1 – 8* (print only those with route patterns assigned)
4. Enter **list configuration control** (if your system **doesn’t** have a TN765, skip to N.

   Label second 10 MB translation card with pencil “Upgrade to R7.X” and plug into TN777B and proceed from there. If TN765 **is** present continue with next **step L.5**.
5. Enter **display communications-interface processor-channels** (read the next step closely)
6. Enter **display communications-interface links**

   a. If only *one* enable field is set to “***y***” and you determine from step 5 this link is for ESM, skip to M. (Refer to the “**display communications-interface links**” print out), follow the instructions for **M.2**.

   b. If *multiple* links in the enable column are set to “***y***” or the only one link is ISDN from step L.5 proceed to **step L.7**.

   c. If all enable columns are set to “***n***” and any PI Exts fields **have extension numbers** skip to **next paragraph M**. *R*efer to the “**display communications-interface links**” print out and follow the instructions for **M.3.**

d. If all enable columns are set to "**n**" and all *PI Exts* fields are *blank***,** go to **N**. (Label second 10 MB translation card with pencil "Upgrade to R7.X" and plug intoTN777B).

7. Enter **list signal-group**
8. Enter **display signal-group** *x* (for all signal-groups found in step L.7)
9. Enter **display synchronization**
10. Enter **list trunk-group**
11. Enter **display trunk-group** *x* for all trunk-groups with the Group Type ISDN
12. Enter **display ds1 1***XXXX* (for the DS1 your ESM link is on, if the system has an ESM, see L.9)

M. *Refer to the* "**display communications-interface links**" print out.

1. If there are multiple links 1 - 8 where the enable column field is set to "*y"* and is used for ISDN-PRI and or ESM, skip to M.3 and perform steps (a) – (i).
2. If only *one* link where the *enable* field was set to "***y"*** and is used for ESM, go to step M.3 and perform steps (b), (c), (d), (g) (h) and (i).
3. If all enable columns are set to "**n**" but PI Exts are still assigned, perform steps (d), (g) and (h) only.

   a. **Change synchronization** and blank the primary and secondary fields if a DS1 is the synchronization source.

   b. **Busy out** each enabled link 1 - 8

   c. **Change communications-interface links** – set all enabled links to "**n**"

   d. **Change communications-interface processor-channels** and blank all lines associated with esm or isdn.

   e. **Change trunk group** *x* and remove all ports from the trunk groups that are Group type; ISDN

   f. Remove all signal-groups that had DS1 boards associated with communication-interface links or ESM.

      1. If Associated Signaling is set to "**Y***"*, use command; **remove signal-group** *x*

      2. If Associated Signaling is set to "**N***"*, first **change signal-group** *x* and blank the Trunk Brd and Interface ID fields, then use the **remove signal-group** *x* command

   g. **Change communications-interface link**, for each row where the "Prot" field is ISDN set the Establish Conn field to "**n**", set the Prot field to "**bx25**", set the DTE/DCE field to "**dte**" and blank the Identification field.

h. Refer to your printed copy of the Display Communications-interface Link form and for each PI Ext execute the command: **remove data-module** *xxxx*

i. **Remove signal group and DS1 board 1***XXXX* for ESM *if* it used a TN765 Processor interface link.

N. Label second 10 MB translation card with pencil “Upgrade to R7.x” and plug into TN777B.

O. Issue the command: **save translations** and verify it successfully competes, logoff from the MT terminal and then remove the translation card form theTN777B.

P. Power down the system. (SCC—A Carrier only, MCC—the whole system) and put on wrist strap.

Q. Remove the TN790 Processor and replace it with TN790B, if it is already a TN790B, leave the TN790B in the processor slot.

R. Remove TN765 Processor Interface if it is present.

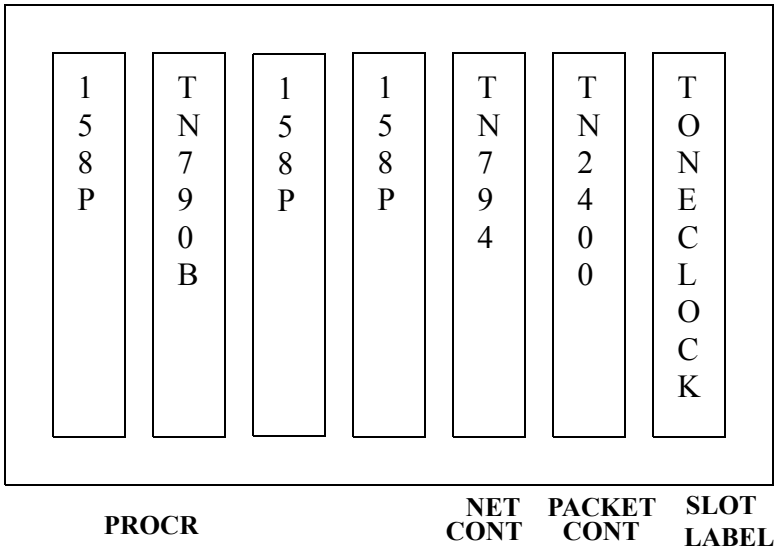
S. Remove TN777B NetCon

T. Remove TN778 Packet Interface if it is present.

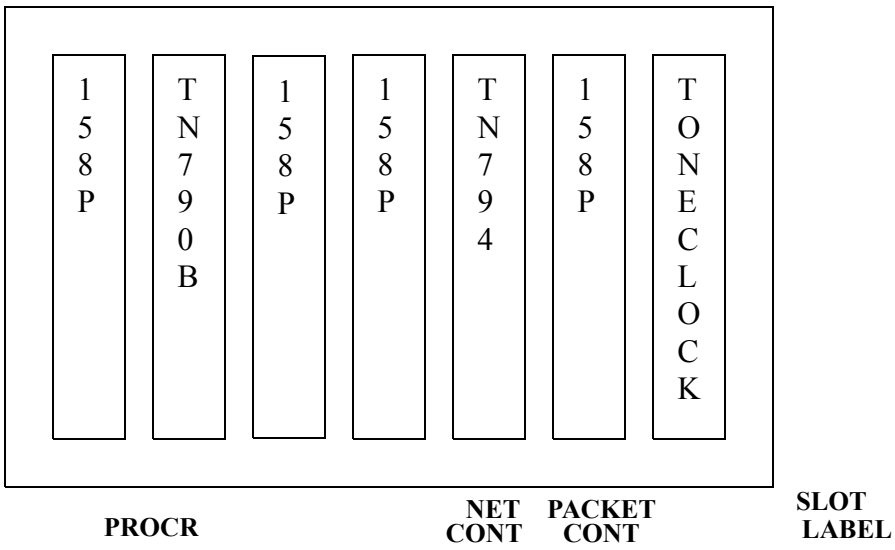
U. If Tone Clock is TN768v5 or less replace with TN2182

V. Install the Network Controller Interface Assembly (combination of TN794 and TN2400 circuit packs) in the NET CONT and PACKET CONT slots. If the Control Carrier A is labeled on the back of the carrier *SCC J58890L-2 List 25*> or *MCC J58890AH-2 List 13*> disassemble the TN2400 from the TN794 and only install the TN794 in the NetPKT slot.

J58890L - 2 List 10

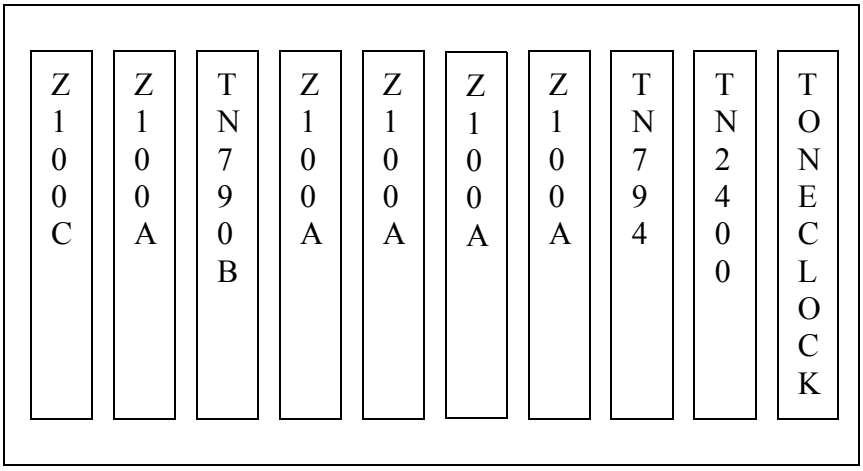


Control Complex - ESCC Control Cabinet 158P is a Blank face plate

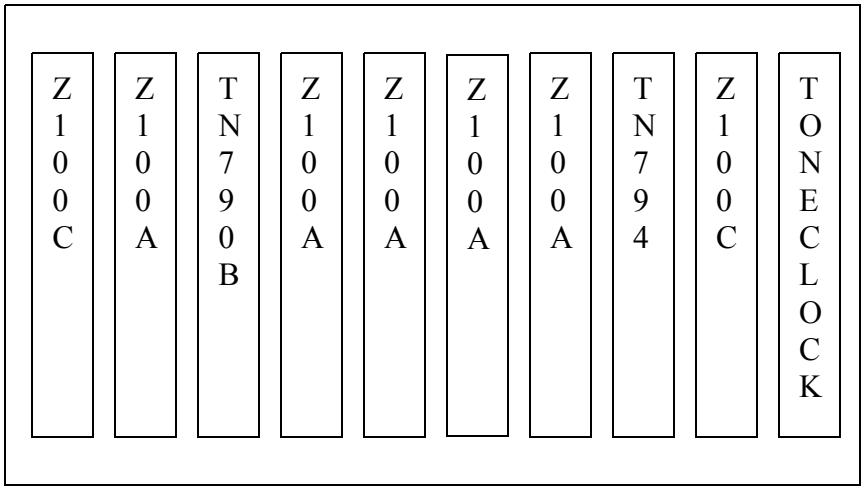


Control Complex - MCC Control CabinetZ100C is a Blank face plate

J58890AH -2 List 10



J58890AH -2 List 13



W. Install the 20 MB orange software upgrade card in the TN794.

X. Install any new carriers required for this installation and a TN744 Call classifier (Do not add any other new port boards at this time).

Y. Power the MT terminal Off and On to get the cursor at the top of the screen.

Z. Power up the system. Observe the MT for errors during the upgrade.

AA. After about 5 minutes you will be prompted for the translation card. Replace the 20 MB orange flash card with the Release 6 translation card saved earlier labeled "**Upgrade to R7.x**".

AB. The system will complete the reboot.

AC. Login (ASG is required for init and inads logins)

If your MCU resides in a geographic region that observes daylight savings time, issue the commands: **change daylight-savings-rules** and **set time**, see example.

AD. Issue these commands and make sure all pages complete without an "error encountered can't complete request" or error translation corruption" displayed on the terminal status line.

- **list conference**
- **list trunk-group**
- **list mcu-extension**
- **list hunt-group**
- **list data-module**
- **list ars analysis**
- **list aar analysis**
- **list partition-route-table** (new to MCU R7)

AE. Insert any new port circuit packs

AF. Insert firmware flash card and perform a **status card** to confirm appropriate firmware levels.

AG. Print the command: **list configuration all**

AH. Using the **upgrade firmware** commands, upgrade any TN2237C (VPP), TN787K (MMI), TN2236B (DI) or TN2303 (MEDIA PROCESSOR) circuit packs that do not meet the vintage level on the firmware upgrade card. Instructions on the firmware upgrade commands are in Appendix A of this document. Additional details on this can be found in the R6 and R7 Maintenance Manuals. If upgrading TN2236B DI boards, execute command: **change synchronization** and blank the Primary and Secondary fields if a Circuit Type *DI* is the sync source. After all the firmware is upgraded, replace the 10 MB firmware card with the 10 MB translation card (Upgrade to R7.x)

AI. If your system *did not* previously have a TN778 Packet Interface board and the MCU has an **ESM** adjunct attached and the link was programmed to the TN765 Processor Interface, Translation for the DS1 TN2207 board and Signal-group the ESM is assigned to, must be re-added. Execute the command: **add ds1 1***XXXX,* change the information for the MMI Interface field to mirror the print out from L.12, **MMI Interface: pac-esm, add signal group** *x*.

AJ. Retranslate any ISDN translations removed previously, synchronization, signal groups and trunk members. These are the only translations that need to be put back in. Interface data modules, communication-interface link and communication-processor-channels are no longer needed in the MCU R7.X. Validate the MCU system sanity with the following commands.

1. Power up the ESM (if you have one)
2. Enter **status synchronization**
3. Enter **status signal-group** *1 – x*
4. Enter **status trunk-group** *x*
5. Enter **list video**
6. Enter **list mmi/mp**
7. Enter **status ESM** (if you have one)

AK. Issue command: **display alarms**. If any alarms exist, resolve them by following normal maintenance procedures.

NOTE:
If a Trans-ID alarm is present, this alarm can only be cleared by the init level login. Contact your Technical Center to issue command: *reset trans-id*.

AL. If you filed any dedicated conferences in paragraph I. rededicate them now if the customer wishes you to do so.

AM. Issue the command: **save translations**.

AN. Add any new translations required for this upgrade. (If upgrades was from pre release 6 add customer level super-user login)

AO. Issue command: **change system-parameters maintenance** and set Alarm Origination to OSS Numbers back to it's original setting.

AP. Issue command: **save translations**.

AQ. Upgrade CRCS and verify it can communicate with the MCU. (i.e. **Query MCU Parameters**)

AR. Insert the 10 MB translation card labeled *R6 Original* (remove write protect) and execute the command: **save translations**.

Preventive Maintenance Procedures

The following preventive maintenance procedures should be followed on-site.

Inspecting Air Filters

Air filters should be inspected annually.

1. If a filter is dirty or clogged, first tap it on the ground.
2. If the filter is still dirty, wash it with warm water and a mild detergent.
3. If there is no facility for washing the filter, a vacuum cleaner may be used.
4. If no vacuum cleaner is available, replace the filter.
5. Enter the preventive measures taken onto the Avaya Preventive Maintenance Log that should be posted with the equipment.

Replacing Batteries

Replace the batteries every four years or whenever a control cabinet alarm occurs. Whenever the batteries are replaced, fill out the Avaya Preventive Maintenance Log that should be posted with the equipment.

Other Maintenance Aids

In addition to the various maintenance and test commands, the following features may also be useful for troubleshooting:

- Automatic Circuit Assurance (ACA)
- Busy Verification of Terminals and Trunks
- Trunk Identification
- Facility Test Calls

Automatic Circuit Assurance

ACA requires the use of a display-equipped voice terminal (maintenance alarm terminal). An *ACA activate/deactivate* button is required on the maintenance alarm terminal.

ACA helps to identify possible trunk malfunctions. The MCU maintains a record of the performance of individual trunks relative to short and long holding time calls. The MCU automatically initiates a referral call to the MCU-MT or maintenance alarm terminal when a possible failure is detected.

Holding time is elapsed time from when a trunk is connected to the time a trunk is released. When ACA is enabled via system administration, the MCU measures the holding time of each call. See the Administration document.

A short holding time limit and a long holding time limit are preset for each trunk group. The short holding time limit can be from **0** to **160** seconds. The long holding time limit can be from **0** to **10** hours (note that video conference calls are generally longer than most voice calls; the long holding time should be set accordingly). The measured holding time for each call is compared to the preset limits for the trunk group being used.

Measurements are not made on out-of-service trunks or trunks undergoing maintenance testing.

Busy Verification of Terminals and Trunks

Busy Verification of Terminals and Trunks also requires the use of a display-equipped voice terminal (maintenance alarm terminal). It allows you to make test calls to trunks. These test calls check the status of an apparently busy resource. This provides an easy method to distinguish between a resource that is truly busy and one that only appears busy because of a trouble condition.

Trunk Identification

Trunk Identification allows a specific trunk being used on a call to be identified. This also requires a display-equipped voice terminal (maintenance alarm terminal). This feature is useful when a conferee hears noise or gets poor transmission on a trunk call. The trunk identification (access code and group number) is displayed when the *trunk id* button is pressed while on a trunk call.

Use of this feature is denied if more than two trunks are on a call. If the call is trunk-to-trunk, the identification displayed is of the last trunk added to the call.

Facility Test Calls

The Facility Test Call feature provides the capability of placing test calls to access specific trunks, touch-tone Dual Purpose Multifrequency (DTMF) receivers, time slots, and system tones. The test call can be made from the maintenance alarm terminal by dialing an access code.

Trunk Test Call

The Trunk Test Call feature accesses specific DS1 tie trunks. To place a call:

1. Dial the Facility Test Call Feature Access Code (for example, 197) and listen for the dial tone. The Facility Test Call Access Code (FAC) is administered on the Feature Access Codes form. The 197 FAC code is used as an example here.
2. Dial the 6-digit port number "***PCSSpp***" where:

Table 5-6. Key for 6-Digit Port Number (Trunk Test Call)

P	Port network number	1 for PPN
C	Carrier number	A=1, B=2
SS	Slot number	0 through 20
pp	Port number	01 through 24

3. Listen for dial tone. If you do not hear dial tone, the far end may have been disabled. However, you may still be able to dial digits. All digits dialed after the port number are transmitted using end-to-end DTMF signaling. If the trunk being tested is a rotary trunk, it is not possible to break dial tone.
4. Place a call. If the call does not go through (no ringing), determine if the trunk circuit pack has been removed or if the trunk is rotary.

NOTE:
If you hear the reorder tone, the trunk is busy or is being maintenance tested. If you hear the intercept tone, a trunk or touch-tone receiver has not been accessed.

Touch-Tone (DTMF) Receiver Test Call

The touch-tone (DTMF) receiver call accesses and tests the four touch-tone receivers located on the Tone Detector circuit pack. To place a call:

1. Dial the FAC (for example, 197) and listen for the dial tone. The FAC is administered on the Feature Access Codes Form. The 197 FAC code is used as an example here.

2. Dial the 6-digit port number "***PCSSpp***" where:

Table 5-7. Key for 6-Digit Port Number (DTMF Receiver Test Call)

P	Port network number	1 for PPN
C	Carrier number	A=1, B=2
SS	Slot number	00 through 20
pp	Port number	01 through 08

3. Listen for dial tone to indicate the touch-tone receiver is connected. If you hear the reorder tone, the touch-tone receiver is busy. If you hear the intercept tone, a touch-tone receiver or trunk has not been accessed.
4. Dial **1234567890*#** and listen for dial tone to indicate the test passed. If you hear the intercept tone, the test failed. The test fails if the touch-tone receiver does not recognize all the touch-tone signals.
5. To test another touch-tone receiver, begin with Step 2.

Time Slot Test Call

The time slot test call connects the maintenance alarm terminal user to a specific time slot located on the TDM Buses (A or B) or out-of-service time slots. To place a call on a specific time slot:

1. Dial the FAC (for example, 197) and listen for dial tone. The FAC is administered on the Feature Access Codes form.
2. Dial **1** and then press **#** followed by the three-digit time slot number (000 through 255 for Bus A and 256 through 511 for Bus B).
3. Listen for the appropriate tone. A confirmation tone indicates the time slot is idle or maintenance busy. The reorder tone indicates the time slot is busy. Dedicated tones are listed in the following table.

Table 5-8. TDM-B Slot Numbers and Dedicated Tones

TDM-B Slot #	Tone
261	697 Hz*
262	770 Hz*
263	852 Hz*
264	941 Hz*
265	1209 Hz*
266	1336 Hz*
267	1447 Hz*
268	1637 Hz*
269	Dial
270	Reorder
271	Intercept
272	Busy
273	Ringing
274	Call Waiting Ringback†
275	2025 Hz
276	2225 Hz
277	Music‡

* Used to generate touch-tone (DTMF) signals.
† Not applicable to the MCU.
‡ Not applicable to the MCU.

Out-of-Service Time Slots

To place the call:

1. Dial the FAC (such as 197) and listen for dial tone.
2. Dial port network number **1** followed by ****.
3. Listen for the confirmation tone. Repeat Step 1 to alternate between out-of-service tone slots on TDM buses A and B. If you hear the reorder tone, no time slots are out of service.

System Tone Test Call

The system tone test call connects the caller to a specific system tone. Find the tone you want from the following table and then use the procedure to place the call.

Table 5-9. System Access Tones for Facility Test Calls

Two-Digit Code	Tone
00	Null
01	Dial
02	Reorder
03	Intercept
04	Busy
05	Recall Dial*
06	Confirmation*
07	Calls Waiting*
08	Ringing
09	Call Waiting Ringback
11	Dedicated Special Ringback
12	697 Hz*
13	770 Hz*
14	852 Hz*
15	941 Hz*
16	1209 Hz*
17	1336 Hz*
18	1447 Hz*
19	1633 Hz*

Table 5-9. System Access Tones for Facility Test Calls — *Continued*

Two-Digit Code	Tone
20	Chime
21	350 Hz*
22	440 Hz*
23	480 Hz*
24	620 Hz*
25	2025 Hz*
26	2225 Hz*
27	Counter
28	Calls Waiting 2*
29	Calls Waiting 3*
30	Busy Verification
31	Executive Override*
32	Incoming Call Identification
33	Dial Zero
34	Attendant Transfer*
35	Test Calls
36	Recall on Don't Answer*
37	Ringing
38	Camp-On Recall*
39	Camp-On Confirmation*
40	Hold Recall*
41	Hold Confirmation*
42	Zip
43	2804 Hz
44	1004 Hz (-16 dB)
45	1004 Hz (0 dB)
46	404 Hz
47	105-Type Test Line, Default Sequence
48	Redirect*
49	Voice Signaling

Table 5-9. System Access Tones for Facility Test Calls — *Continued*

Two-Digit Code	Tone
50	Digital Milliwatt
51	440 Hz + 480 Hz (Ringback)
52	Music*
53	100-Type Test Line
54	102-Type Test Line
55	Laboratory Test Tone 1
56	Laboratory Test Tone 2
57	Disable Echo Supervision Dial
58	3 Seconds of Answer
59	4 Seconds of Answer
60	Restore Music (or Silence)
61	Service-Observing Warning
62	Forced Music
63	Zip (1st of 2)
64	Incoming Call ID (1st of 2)
65	Tone on Hold
66	CO Dial
67	Repetitive Confirmation
68	Conference/Bridging

* Not available with the MCU.

After you have selected a tone identification number from the table, use the following procedure to make a test call:

1. Dial the FAC (such as 197) and listen for dial tone.
2. Dial port network number **1** followed by ***.
3. Enter the two-digit tone identification number you selected from the table.
4. Listen for the tone that you selected.

Troubleshooting Backplane Voltage Problems

The TN2036 Voltage Range circuit pack test tool allows easy access to the backplane pins that provide various voltages to control and port slots. Probes from a voltmeter can be plugged into the access point for the desired voltage and a ground access point to measure the voltage.

This circuit pack itself has instructions for use printed on the side as well as a listing of the voltage tolerance range for each voltage on the front panel. The voltages and tolerances are as listed in Table 5-7.

Table 5-10. Backplane Voltage and Tolerance Ranges

Voltage	Tolerance Ranges
Ringing Voltage	75 to 115 VAC
+12 VDC	11.4 to 12.6 VDC
+5 VDC	4.95 to 5.35 VDC
-5 VDC	-4.95 to 5.35 VDC
-48 VDC	-43 to -53 VDC
Neon Message Waiting Voltage	-80 VDC to -165 VDC

All voltages except +12 VDC and +5 VDC can be measured from any port slot. All control circuit packs should be removed from the backplane before this measurement is made.

The +5 VDC measurement must be made in two separate cabinet locations since the power unit has two independent +5 VDC outputs [+5 VDC and +5(B) VDC]. Each output supplies a different section of the cabinet with power. For the control cabinet, make one measurement in the processor slot and another in any port slot. For the port cabinet, make one measurement in any port slot from 1 to 6 and another in any port slot from 7 to 18.

ESM Maintenance

Heeding Warnings

Warnings and cautions appear throughout this book as needed when describing procedures. These notices indicate when the actions you are about to perform can harm you or the equipment unless you follow the procedure steps as listed. (See the “Typographical Conventions” section in *About this Book*.)

CAUTION:
Perform a “soft” boot on the UNIX operating system if it is on-line before shutting off power to the system.

WARNING:
Shut off the main power switch only after executing a “soft” system shutdown, and disconnect the power cord before removing the dress cover or access panel and before working within the ESM.

WARNING:
When lifting the ESM chassis, use proper handling practices to prevent back strain or hand injuries.

WARNING:
Do not use the edge of the chassis front bezel of the ESM as a way to lift the unit. The bezel cover comes off easily.

CAUTION:
Observe proper electrostatic discharge precautions when handling computer components. Wear a ground wrist strap against your bare skin and connect to an earth ground.

CAUTION:
The manufacturer(s) do not accept liability for a damaged unit if the individual equipment is not returned in the original packing materials and carton. The carton has been designed to ensure product warranty and to prevent damage.

Avoiding Electrostatic Discharge Damage to Circuit Cards

The human body can collect thousands of volts of destructive static electricity from ordinary activities; for example, walking on a rug, handling synthetic materials, or wearing synthetic cloths. When this static energy discharges onto another surface at a different voltage potential, it is called electrostatic discharge or *ESD*.

A person cannot feel ESD below approximately 3500 volts. However, only 30 volts are needed to damage ESD-sensitive electronic components.

Circuit cards and packing materials that contain ESD-sensitive components are often marked with a yellow and black warning symbol. Proper grounding techniques prevent the discharge of damaging static electricity from the body into these ESD sensitive components during material handling.

There is no quick method of testing for ESD damage. Components that are damaged may simply fail after a brief period of normal operation.

To avoid damaging ESD-sensitive components, follow these rules:

- Handle ESD-sensitive circuit cards only after you attach a ground wrist strap to the bare skin of your wrist. Attach the other end of the wrist strap to a ground that terminates to the system ground, such as an unpainted metallic chassis surface.
- Handle a circuit card by the faceplate or side edges only. Do not touch components, leads or connector areas (gold finger pins).
- Hold a short circuit card by the faceplate only. See the following figure.

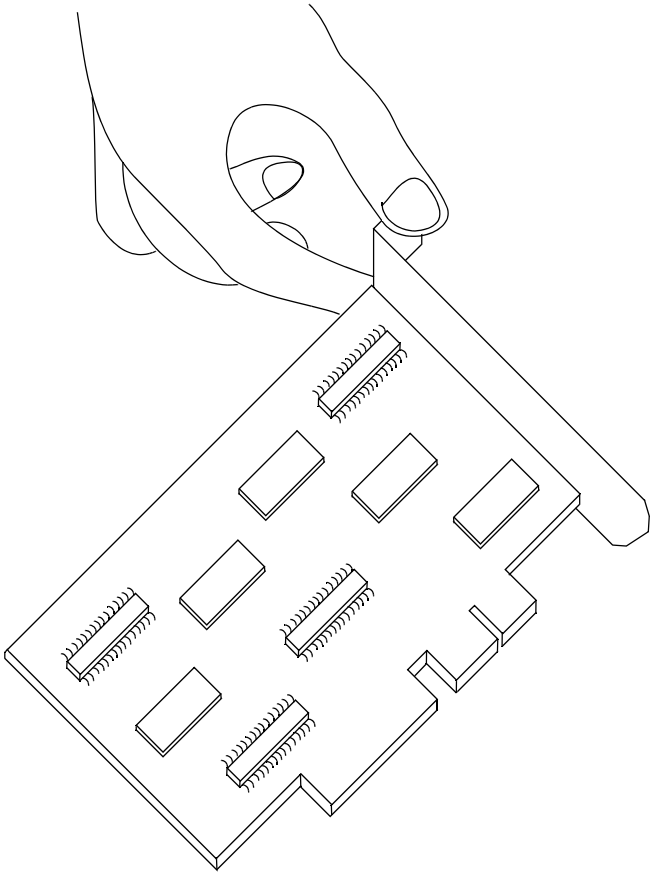


Figure 5-12. Holding a Short Circuit Card

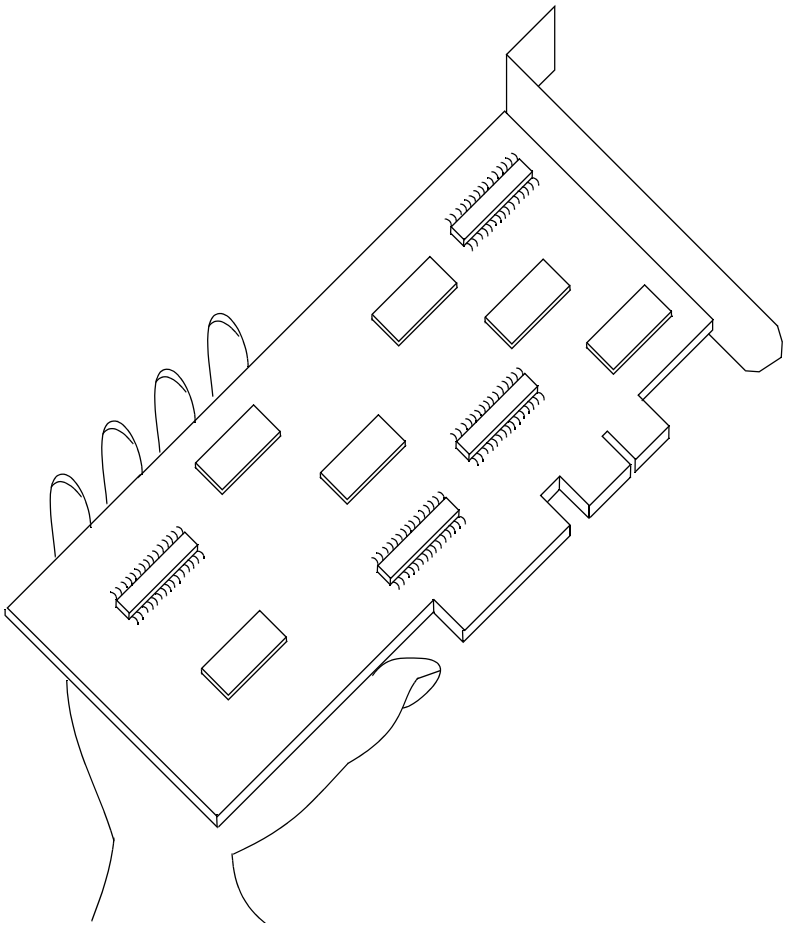


Figure 5-13. Holding a Large Circuit Card

CAUTION:
Ensure palm is not in contact with the board wiring side

- Keep the circuit cards away from plastics and other synthetic materials, such as polyester clothing.
- Do not hand a circuit card to another person unless that person is grounded at the same potential level.
- Hold devices such as a hard disk, floppy drive, or steaming tape as you would a large circuit card.

The ESD-sensitive area of these components is located on the bottom surface. Hold these drives on the areas recommended in the following figure.

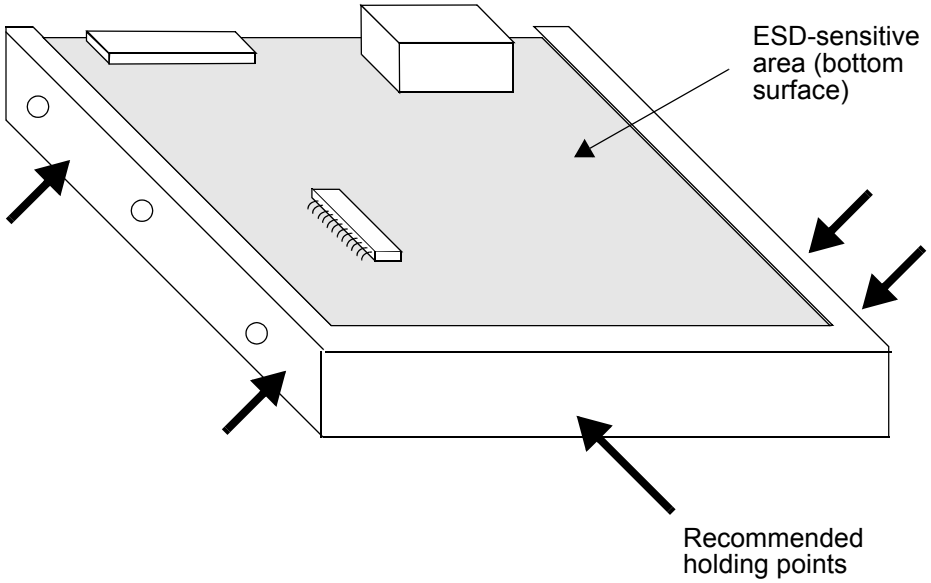


Figure 5-14. Electrical Component ESD-Sensitive Area

Gathering Tools and Test Equipment.

To assemble and disassemble the ESM hardware, the following tools are required:

- Medium screwdriver with flat blade
- No. 2 Phillips Screwdriver
- Small pair of needle-nose pliers
- Small pair of wire cutters
- A sharp pointed instrument, such as a pen

⚠ CAUTION:
Do not use a lead pencil point. The graphite can damage the circuit card, causing problems such as electrical shorts.

- Antistatic grounded wrist strap
- Antistatic grounded work mat

- Standard electronic test equipment, such as digital multi-meter, is recommended

Locating the Key Components on the ESM

Now that you can view the ESM, use the following sections and diagrams to locate key components on the unit. For additional information describing the ESM hardware, see the system description for your application.

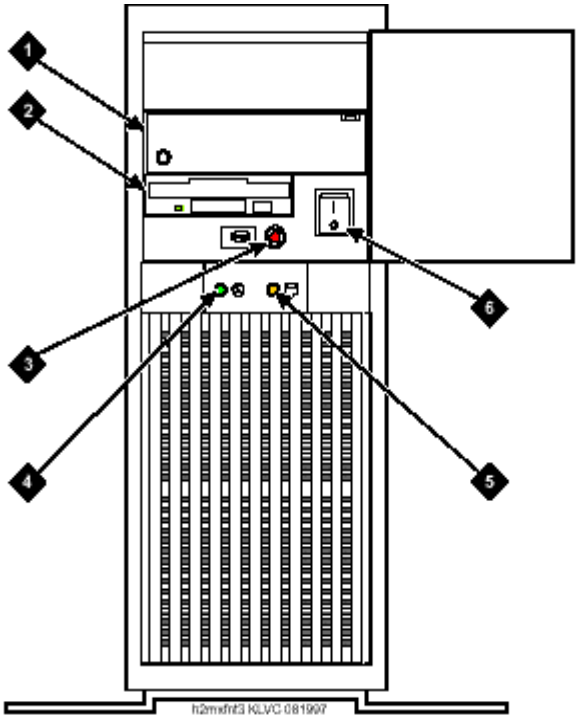
Front of the Chassis

See the following table for the description of and information on the function of the components on the front of the chassis.The subsequent figure shows the front view of the ESM.

Table 5-11. ESM Chassis Front Components

Component	Location	Description	Function
bezel cover	upper	—	covers peripheral bay - disk drives
keyboard receptacle	center control panel	5-pin circular DIN female	connects keyboard to ESM
power/reset switch	center control panel	rocker switch	turns ESM on and off
Power-On indicator	center control panel	LED	lights green when power is on
INT Drive indicator	center control panel	LED	lights green when hard disk is active
bezel cover	lower	—	covers air intake and holds air filter

Even though a second keyboard receptacle is located on the rear of the chassis, the front receptacle is provided as an ease-of-use option.



1. Cartridge tape drive
2. Diskette drive
3. Reset switch
4. Power indicator LED
5. Disk activity indicator LED
6. Power switch

Figure 5-15. Front View of the ESM

Location of Peripheral Drive Devices

Locate the various drives in the peripheral bay behind the upper bezel cover.

Table 5-12. Peripheral Bay Drives

Drive	Description	Function	Peripheral Bay Positions
cartridge tape	QIC 525 MB	backup and restore	2
floppy	3.5 inch 1.44 MB high density	system config diagnostic testing	1
hard disk (optional)	SCSI	mirroring	3
hard disk	1 GB SCSI	stores operating system application software speech data	4

Chassis Cooling System

One cooling fan is located in front of the circuit card cage area and behind the lower front bezel cover. An air filter sits inside the bezel cover. An additional cooling fan is located within the power supply and exhausts air to the rear of the unit.

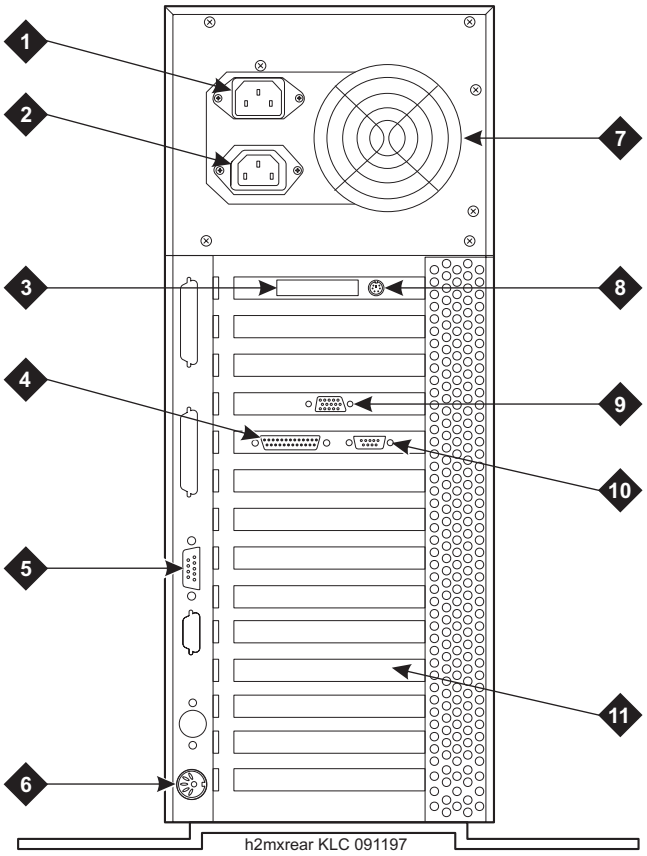
The fans maintain air flow in the unit to prevent components from overheating. Overheating can cause a component to malfunction. Air flows from the front through the vents of the bezel cover, and it exits through vents in the back of the unit. Maintain clearance around the unit so that air can circulate.

The Back of the Chassis

The following two figures show the back view of an AC- and DC-powered ESM, respectively. Do not use the monitor and keyboard receptacles for any other purpose than for connecting the monitor and keyboard. Only one keyboard can connect to the ESM. See the following table for the location and description of components on the back of the ESM chassis.

Table 5-13. Components on Rear of Chassis

Component	Location	Description	Function
asynchronous port COM1	CPU circuit card faceplate	9-pin male D-subminiature	communicates with host computer
parallel port	CPU circuit card faceplate—left of COM1	25-pin female	communicates with printer
video connector	video circuit card faceplate—slot #10	15-pin female D-submarine	connects ESM to monitor
AC power outlet connector	top left corner	3-prong 1/.5 AMP 120/230V	connects ESM to monitor via 6 foot monitor power cord
AC power inlet receptacle	top left corner below monitor outlet	3-prong 5/10 AMP 110/230V	connects ESM with 9 foot power cord power
keyboard receptacle	middle right chassis edge	3-prong female circular DIN	connects one keyboard only to ESM
asynchronous port COM2	mid-right chassis above keyboard inlet	9-pin male D-subminiature DB-9	communicates with host computer



1. AC power inlet receptacle
2. AC power supply outlet
3. External SCSI I/O connector
4. Parallel port
5. COM2
6. Keyboard connector
7. Power supply fan exhaust
8. Mouse connector
9. Video connector
10. COM1
11. MSM interface card

Figure 5-16. Back View of an AC-Powered ESM

ESM Software Requirements

To install or upgrade system software on the ESM successfully, the following components are required:

- ESM Boot Diskettes 1, 2, and 3
- ESM System Cartridge Tape

Getting Inside the ESM

This section describes how to open the ESM by removing the dress cover over the chassis and by removing the access panel to the circuit card cage. It also describes how to replace the dress cover and the access panel.

⚠ WARNING:
Shut off power before removing the dress cover or access panel of the EMS.

If your software operating system is on-line, perform a "soft" shutdown of the software operating system before shutting power off.

⚠ WARNING:
Notify the telephone company immediately if the EMS is to be permanently or temporarily disconnected from its present line or trunk circuits (digital circuits only).

Removing the Dress Cover

Use a Phillips #2 screwdriver to remove the dress cover from the chassis. See the following figure and use the following procedure.

1. In a tower configuration, keep the EMS in an upright, vertical position on the support base.
2. Locate the two screws on the left side and right side corners of the chassis cover.
3. Remove the two screws on the right side of the chassis, and remove the two screws on the left side of the chassis.
4. Place one hand on each side of the chassis, with the palm down toward the top edge.
5. Press inward slightly with your palms on both sides of the chassis and lift it up.
6. Be aware that, as more of the dress cover is removed, it may begin to collapse inward from the pressure of your hands. In such a case, move your hands downward on the dress panel to reduce the pressure of your lift.

7. Remove the dress cover.

The procedure is now completed.

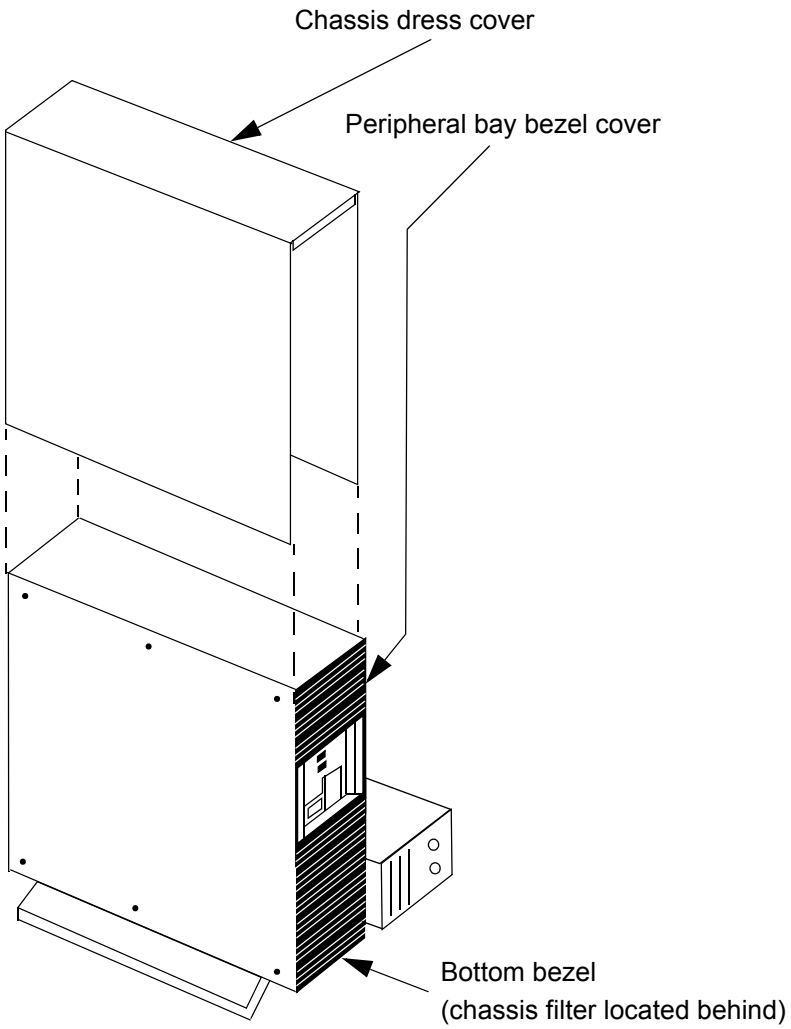


Figure 5-17. Removing the Dress Cover

Removing the Circuit Card Cage Access Panel

Use a Phillips #2 screwdriver to remove the left access panel to reach the circuit card cage. See the following two figures, and use the following procedure.

1. Place the ESM on its side using one of the two following methods.
   - If you have cables attached to the EMS and want to leave the computer on the floor:
     a. Place two books, similar in size to large phone books, or a similar form of support on the floor.
     b. Turn the ESM on its side, resting the side of the computer opposite from the support base of the two books. See the second figure.
   - If you do not have cables attached to the EMS or currently have it placed on table:
     a. Place the ESM (tower configuration) on its side with the support base over the edge of the table.
2. Loosen the flat head 1/4-inch length screws by *two turns only* with the Phillips screwdriver.

   Adequate clearance only should be provided. It is *not* necessary to remove the screws.
3. Apply pressure gently with your hands, palms down on the access cover.
4. Push into the chassis with your palms and slide the access cover back toward the chassis area.
5. Lift up and remove the cover once you have cleared the Phillips screw heads.

The procedure is now completed.

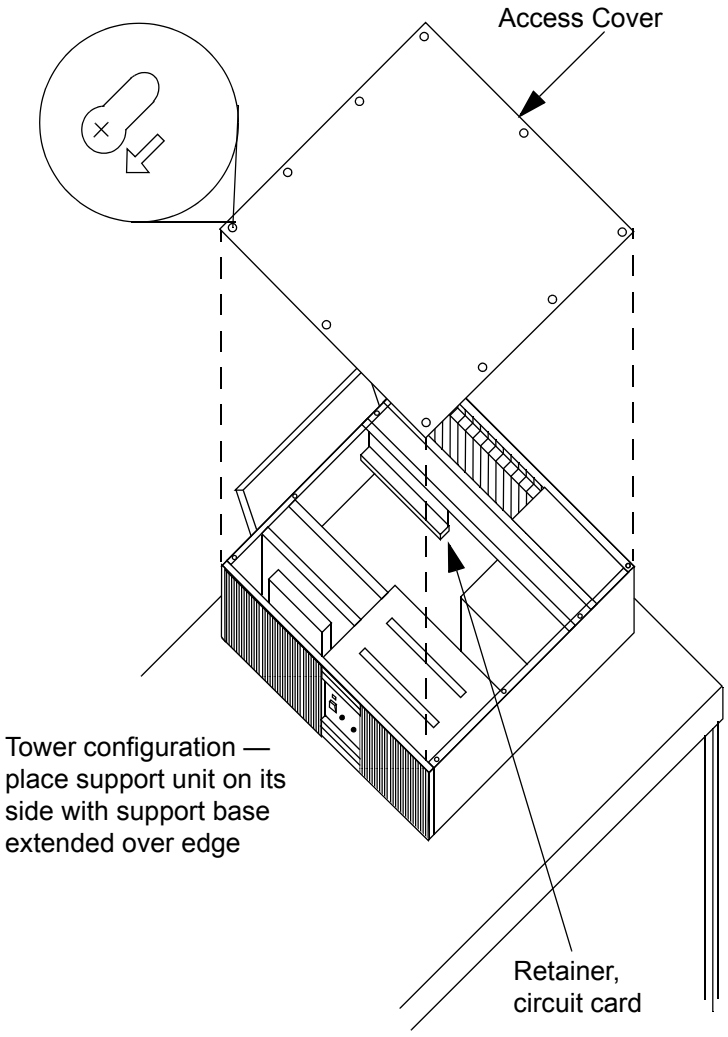


Figure 5-18. Removing the Access Cover

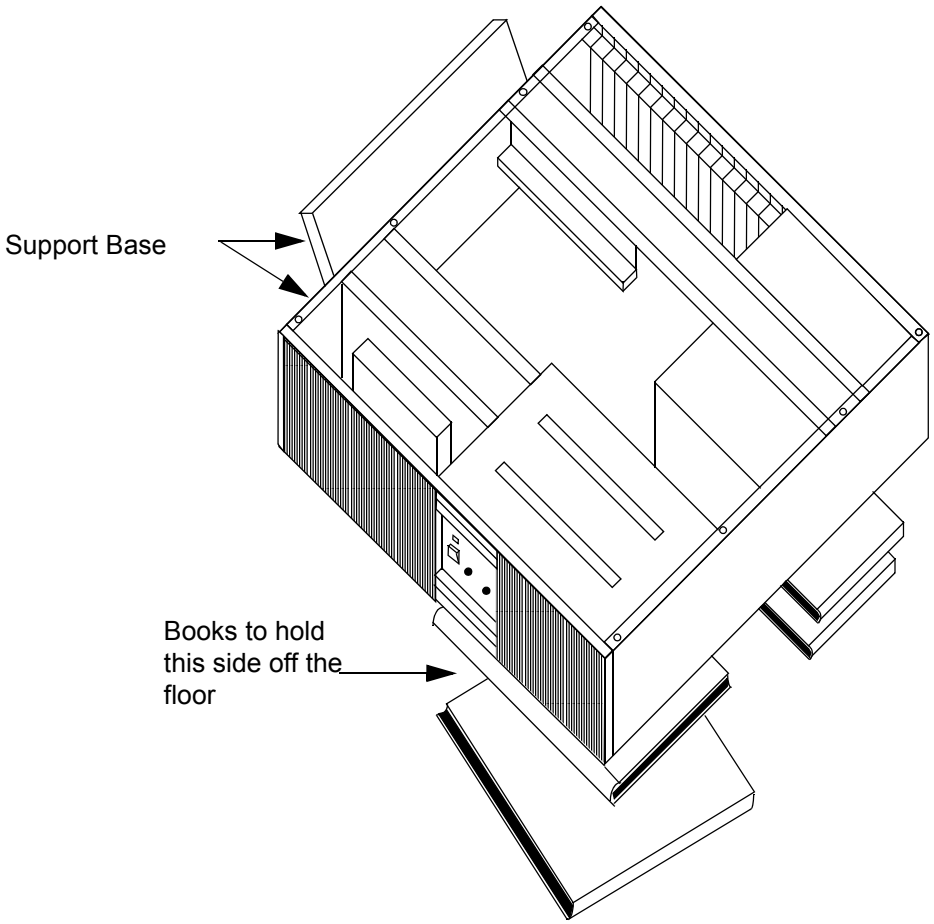


Figure 5-19. Working Within the Card Cage

Removing the Circuit Card Cage Retaining Bracket

The manufacturer equips the ESM card cage with a retainer to reduce shipping and environmental vibrations that could damage the circuit cards. To remove the retaining bracket, use a #2 Phillips screwdriver to remove the two-hold down screws in the retaining bracket. See the following figure.

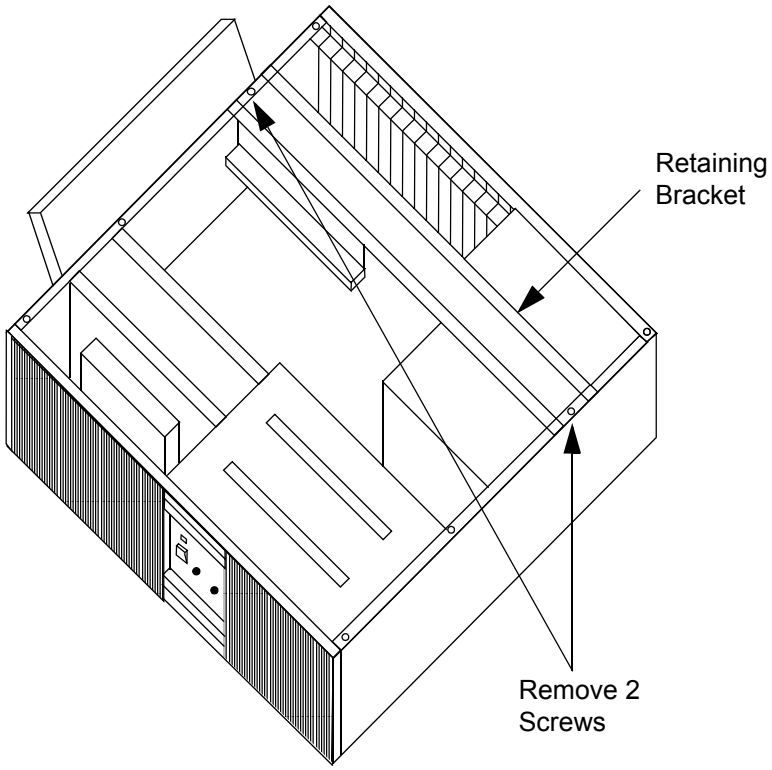


Figure 5-20. Removing Screw in Retaining Bracket

You now have complete access to the card cage.

Replacing the Left Access Panel and Chassis Cover

Complete the following procedure to replace the circuit card cage access panel and chassis cover.

1. Remount the circuit card cage retaining bracket. In doing so, leave the two Phillips screws only partially mounted to provide adequate access cover clearance.
2. Mount the eight Phillips screws, but ensure that the screws are only partially set to provide adequate clearance for assembling the access cover.
3. Reset the access cover over top the mounted screws.
4. Apply light pressure with your hands, palms down on the access cover.
5. Push in with your palms. and slide the access cover back into place.
6. Firmly secure the ten screws.
7. Slide the exterior dress cover over the unit. Again, use the palms of your hands.
8. Remount the four Phillips retaining screws that you removed originally.

The procedure is now completed.

General Steps for Circuit Card Installation

CAUTION:
Observe proper ESD precautions when handling computer components. Wear a ground wrist strap on your bare skin and connect to ground. See the "Heeding Warnings" section earlier in this chapter for more details.

WARNING:
Ensure that the Rack Mount Enclosure is properly secured to the floor or wall before extending an ESM Unit forward on the Track Slide. Shifting the weight of the ESM forward could cause the Rack to become unstable and tip over if it is not adequately secured.

Complete the following procedure for installing any kind of circuit card into the ESM. Follow the specific procedure for cable connection or special settings for each card type in the dedicated sections later in this chapter.

Installing a Circuit Card in the ESM

You may have to install a circuit card in any of the three following situations:

- Existing circuit card must be replaced or verified.
- New feature that requires a new card is being added.
- You are assembling and loading the ESM yourself rather than receiving a system that has been factory assembled?

Complete the following steps to install any circuit card. Specific information for each card is included in several sections later in this chapter.

1. Verify that the new or replacement card is on site and appears to be in usable condition (that is, there is no obvious shipping damage, etc.).
2. Refer to the Configuration Guidelines for the ESM to confirm that it is the correct type of card for that slot.

   NOTE:
   This is necessary only if you are adding (and not replacing) a circuit card.

3. Perform a “soft” shutdown of the system if the ESM has been operating as a fully loaded system (that is, with the software installed). Use the **esmshut** command. Refer to the “Shutting Down the UNIX Operating System” section in this chapter for details.
4. Turn off the ESM front panel main power switch, and remove the incoming AC or DC Power Cord from the ESM chassis.

   Also, disconnect the keyboard and video monitor cords from the ESM as well as the ESM-MSM link connection, UPS alarm connection, remote access modem connection, and any other external cabling connections.
5. Tag the power cord plugs with a note indicating that nobody other than you should reconnect power to this equipment.

   NOTE:
   Refer to the “Getting Inside the ESM “ section in this chapter for specific instructions for performing steps 6 through 8.

6. For a desk-side arrangement, remove the exterior chassis cover
   For a Rack-Mounted system, slide the ESM forward all the way on the Track Slide to gain access to the ESM circuit card access panel. If the Rack is at an inconvenient or unsafe height, disengage the ESM from the track and place it onto a table top to service it.

   WARNING:
   Ensure that the Rack Mount Enclosure is properly secured to the floor or wall before extending an ESM Unit forward on the Track Slide. Shifting the weight of the ESM forward could cause the Rack to become unstable and tip over if not adequately secured.

7. Remove the Circuit Card Access Panel and Circuit Card Retaining Bracket. Do not lose the bracket screws; place them where you can relocate them.
8. Place the desk-side ESM on its side to work within the circuit card cage. Use one of the two methods described in the “Removing the Circuit Card Cage Access Panel” section earlier in this chapter.

   Access for working within the circuit card cage of a Rack-Mounted ESM should come directly from the top of the ESM whenever it is extended out on the Track Slide or removed from the Track and placed on a table.
9. Carefully remove any internal connecting cables attached to the circuit card or peripheral to be replaced. Use pull tabs when available to reduce damage to the circuit card connector pin fields and cable connectors.
10. If a new card is being installed, remove the rear faceplate filler for the appropriate backplane slot, and save the retaining screw.
11. Align the circuit card faceplate and edge of the circuit card with the circuit card guide and the backplane slot position. The card is now over the expansion slot.
12. Lower the card until it touches the slot.
13. Place your thumbs flat on the edge of the card over the connector, and push it into the backplane slot. Firmly push on the card until it is completely seated.
14. Reinstall any internal and/or external cable assemblies that were previously removed. In doing so, ensure that the cable connector Pin-1 indicator is mated to the circuit card or to the pin header’s Pin-1 indicator. Refer to the appropriate circuit card section for additional information on cabling and connections specific to the type of card being installed.
15. Replace the retaining screw by placing it through the circuit card’s faceplate opening. (The faceplate is similar to the cover plate previously removed.)
16. Replace the Circuit Card Cage Retaining Bracket if you have completed work within the card cage. If not, return to Step 9 for the next circuit card installation or replacement.

17. Replace the Access Panel.
18. If you have completed work on the ESM, do the following: depending on the type of ESM, relocate the desk-side system in its original upright position, and remount the exterior chassis cover; or slide the Rack Mount ESM back into the stationary position within the Rack.
19. Reconnect all exterior cabling, including the ESM-MSM Link connections and modem connections, as well as the monitor, keyboard and power cords to the ESM. Remove the tag from the power cord.
20. Power up the ESM. If system software must be reloaded due to a System Release Level upgrade or hard disk replacement, refer to chapter 3 of the Installation and Test document for more details.

The procedure is now completed.

ESM Standard PC Circuit Cards

The standard ESM circuit cards are required for basic PC functionality. The manufacturer always equips the ESM with these cards. Standard ESM cards are used in conjunction with a Small Computer System Interface (SCSI) hard disk, floppy drive, and tape drive. The complete list of standard cards and peripherals include:

- 486/50MGHz Central Processing Unit (CPU)—Computing part of the system that manipulates data and processes instructions
- Small Computer System Interface (SCSI) Host Adapter Controller Card—Interface between the system processor and the SCSI bus via a 16-bit ISA backplane bus
- VGA Video Controller—Interface between the system processor and the video monitor
- SCSI Hard Disk—Storage device for ESM operating software and data
- Floppy Drive—Device for reading/writing 3.5-inch 1.44MB floppy diskettes
- SCSI Tape Drive—Device for reading/writing 1/4 inch cartridge tapes

Shutting Down the UNIX Operating System

Always perform a proper soft shutdown of the UNIX operating system before powering down the ESM PC to perform any hardware maintenance procedures.

The ESM Application software provides a shutdown command to kill all active UNIX processes and complete a proper UNIX shutdown. The command is

esmshut

and it can be executed under the inads login.

After the soft shutdown of the UNIX operating system is completed, power to the ESM can be turned off to initiate a software upgrade, perform hardware maintenance, or move the system by powering off the machine at the ON/OFF switch at the front of the unit. If the ESM Application software is not performing properly, and if executing the **esmshut** command does not perform a UNIX shutdown procedure successfully, execute the following sequence of UNIX commands directly to complete a proper shutdown of the UNIX operating system and to kill all running ESM Application software processes.

1. Log in as ROOT.
2. Enter **init S** to bring the system to a Single-User Mode. This will take from 10 to 30 seconds.
3. A prompt is then provided for entering the root password. Enter the root password to enter the Single-User Mode.
4. Enter **/usr/sbin/killall.**
5. Enter **/sbin/shutdown -g0 -y.**
6. Wait for the system to shut down and display “Press CNTRL_ALT_DEL to Reboot.” Do not press “(CTRL_ALT_DELETE).”
7. To turn off (if desired) the ESM at this time, power off the machine at the ON/OFF switch at the front of the unit.

NOTE:
It is recommended that the “Reset” button on the front of the ESM not be used.

WARNING:
Interruption of the ESM input power without first performing a proper UNIX shutdown sequence can cause file corruption. This can render the ESM in-operational and require reinstalling all ESM system software.

Rebooting the ESM

It is recommended that any system utilizing the UNIX Operating System incorporate a strategy for performing a periodic reboot of the operating system. This could be done via a manual reboot process or any automated process.

Automated Reboot

The ESM Maintenance Software has an automated mechanism that instructs the UNIX Operating System to perform a self-reboot once every seven days. The reboot occurs if there are no active T.120 data conferences at that time. If there are active data conferences, the reboot software continues to poll the system for a time when there are no active data conferences; thereupon, the software initiates the reboot. Coming out of the automated reboot, the system is 100% functional and ready for any new data conference that comes in. The automated reboot mechanism is 100% self-sufficient and should require no involvement by the customer or technician. The exception to this is described later in the “Reboot Failure Alarm” section.

NOTE:
The total reboot time (reset level 4) of the ESM is five minutes or less. During this time, any data conference that tries to get established fails. If this happens, the MSM and the endpoints must reinitialize the request for data conferencing after the ESM completes its reboot cycle.

Disabling the Automated Reboot Feature

There is a mechanism to disable the Automated Reboot mechanism on the ESM for users who want to have deliberate control over the frequency or time at which the reboots occur. The automated reboot feature can be disabled by executing the following command from the ESM Management Terminal:

- **disable autoboot**

To re-enable the automated reboot mechanism, the following command can be executed from the ESM-MT:

- **enable autoboot**

NOTE:
Allowing the disabling of the automated reboot feature does not remove the recommendation to reboot the ESM’s operating system at least once every seven days. The user can check whether or not an autoboot is enabled or disabled by executing the **display autoboot** command from the ESM-MT.

Manual Reboot

A manual reboot of the ESM’s operating system can be performed by executing a **reset 4** command from the ESM-MTI. However, before executing this command, the user should execute a **check gccmcs** command to ensure that there are no active start mcs or mcs processes.

Reboot Failure Alarm

If the automated reboot mechanism is unable to execute the reboot because of continuous data conferencing over a number of days, the ESM Maintenance Software eventually raises an alarm to advise the user to intervene and perform a manual reboot of the UNIX Operating System. This alarm is also raised whenever the automated reboot feature is disabled and a manual reboot has not been performed in a timely fashion.

Also, the alarm is raised if the ESM has not been rebooted in the last 10 days either manually or via the automated reboot mechanism. To clear this alarm, first check that there are no active data conferences via the **check mcs** command. Then initialize a manual reboot from the ESM-MT via the **reset 4** command.

Cleaning the Air Filter

The Fan Inlet Air Filter should be cleaned periodically. The appropriate frequency for cleaning depends on the air quality and dust level in the ESM's local environment.

At minimum, the air filters should be inspected annually.

See chapter 3 of the Installation and Test document for instructions on how to access the air filter for inspection and for proper procedures for cleaning the air filter should it be dirty or clogged.

Replacing Circuit Packs

See the "Avoiding Electrostatic Discharge Damage to Circuit Cards" section earlier in this chapter for guidelines on proper handling of ESM circuit cards. Also, consult your authorized Avaya service representative for details on each of the ESM circuit cards.

Monitoring and Replacing UPS Batteries

The UPS battery supplies internal backup power to the ESM UPS. The battery is classified as "maintenance-free" and should last from three to six years. If the battery runs down and does not recharge, order a replacement battery and install it per the instructions in the "Connecting the UPS" section in chapter 3 of the Installation and Test document.

Depending on the battery type, the user can observe specific indications to determine if the battery has run down and cannot be recharged after being plugged into a commercial power source for 12 hours.

- 250 VA UPS Battery—Line-in indicator is lit, and the audible alarm sounds a fast beep for 15 seconds. This means that the automatic battery test failed.
- 400 VA UPS Battery—Line-in indicator and warning indicator are lit. This means that the automatic battery test failed.

WARNING:
The UPS contains LETHAL VOLTAGES. All repairs and service should be performed by AUTHORIZED SERVICE PERSONNEL ONLY. There are NO USER SERVICEABLE PARTS inside the UPS.

WARNING:
This UPS contains its own energy source (batteries). The output receptacles may carry live voltage when the UPS is not connected to an AC supply.

CAUTION:
Never dispose of UPSs in fire. Batteries may explode.

CAUTION:
Never open or mutilate batteries. Related electrolyte is harmful to the skin and eyes, and it may be extremely toxic.

CAUTION:
Risk of Electrical Energy-High Current Levels. The internal battery supply voltage for this UPS is 12 volts. Do not disassemble the UPS.

Cleaning the ESM

Should the ESM unit or peripherals need cleaning, follow the recommendations outlined in chapter 3 of the Installation and Test document.

Status System 1 Command

The **status system 1** command is extended to include an ESM status page, similar to that available from executing a display version command on the ESM-MT.

The extensions to the ESM status page include display of the following information:

Vintages

Vintages are provided for all primary system components, as follows.

- MSM Interface Card Vintage
- ESM Software Revision Number
- UNIX System Revision Number
- State of ESM Process Manager

Status of D-channel

The D-channel status is a numeric value that indicates the status of the D-channel.

Display Alarms/Display Errors Command

To view alarms or errors execute either **display alarms** or **display errors**, respectively. Once this form is submitted, all of the alarms or errors that match the fields on the submitted form are displayed. If only ESM-related alarms or errors are to be displayed, **esm** should be entered in the *Category* field on the **display alarms** or **display errors** form before submitting them.

Using the ESM Management Terminal

Basic Troubleshooting

This section describes how to verify the hardware and software installation and how to troubleshoot the situation if the ESM does not power up correctly after installation.

From the ESM Management Terminal (or remote ESM login), log in as either CRAFT or CUSTOMER, and execute the **check esm** command**.**

The following suggested activities resolve most installation problems:

- Verifying the configuration
- Checking all cables

- Checking all circuit cards
- Checking ESM operating system and application software
- Checking MSM administration and configuration
- Checking the maintenance report from the MSM

Verifying the Configuration

Consult your authorized Avaya representative for information to verify that all circuit cards are in the correct slots and that all jumpers and addresses are set correctly.

Checking All Cables

Ensure that all cables are securely connected. Ribbon cables are especially fragile. Ensure they are not crimped or damaged in any way. Keeping extra cables on hand for troubleshooting may be helpful.

For each ribbon cable, verify that Pin 1 of the cable is matched to Pin 1 of the mating connector. Pin 1 is usually denoted by a stripe on the side of the ribbon cable.

CAUTION:
Do not reverse-plug the cables. This can damage the system.

Checking All Circuit Cards:

Ensure that all cards are securely seated in their slots on the backplane. Ensure that once the cards are permanently installed, the mounting screw is included in the faceplate to secure them.

In particular, check the LED status on the MSM Interface Card from the back of the ESM. Normal operation is indicated by an unlit yellow LED on the E1B and SYSFAIL lamps and a lit yellow LED on the E1A lamp. Proper microprocessor activity is indicated by a lit green LED on the RUN lamp. (See the following figure.)

NOTE:
For more details on LEDs, refer to Chapter 7.

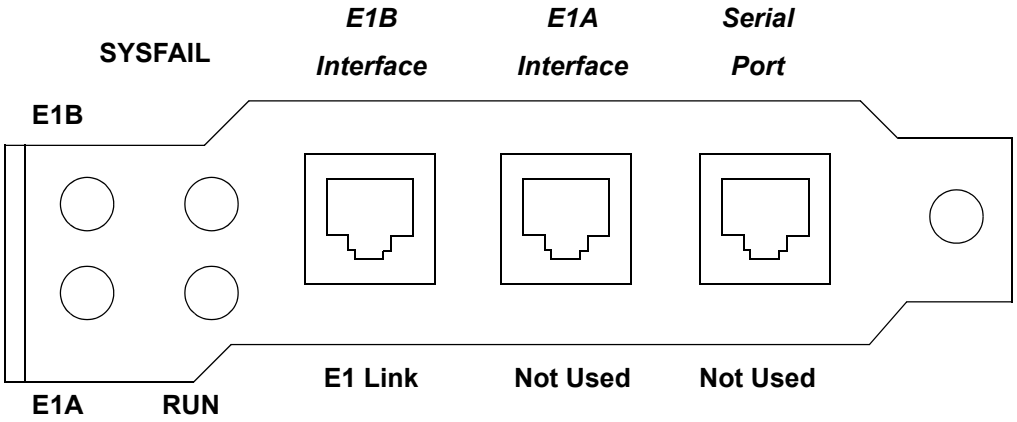


Figure 5-21. Rear Bracket of the MSM Interface Card

Checking ESM Operating System and Application Software

Run the **check esm** command from the ESM Management Terminal to verify that the system software was loaded successfully and is operating appropriately. Follow the instructions for running these tests as outlined in chapter 3 of the Installation and Test document.

NOTE:
These tests should not disrupt any active data conferences.

Checking MSM Administration and Configuration

Confirm that the MSM administration is correct for the ESM/MSM Link and the ESM-DS1 circuit pack and that the MSM cabling is correct for the ESM-DS1 and ESM-MMI circuit packs.

Checking the Maintenance Report from the MSM

Follow the guidelines in Chapter 4, *Initialization and Recovery* for checking ESM related error and alarm reports from system maintenance software.

Preparing the System for Moving

Ensure that there are no active conferences before moving the system. Moving your ESM can be detrimental to the disk drives. Both the floppy disk drive and the hard disk drive can be damaged by dropping the main unit or bumping it against something. The damage usually occurs to the disk heads.

You must shut down the system before moving it. Refer to the “Shutting Down the UNIX Operating System” section in this chapter for information about the procedures for doing a soft shutdown of the UNIX Operating System as well as a hard shutdown of the ESM system power. When power is removed from a hard disk, the disk heads automatically lock down on the platters to reduce the risk of bouncing.

Complete the following steps to move the system.

1. Perform a “soft shutdown” of the UNIX Operating System.
2. Turn off the front panel power switch and remove the incoming AC power cord.
3. Disconnect keyboards, monitor, modems, alarm cables, link cables, etc.

The procedure is now completed.

Moving Equipment

Before the ESM can be moved, it must be prepared for moving. This is true if the ESM is being moved a short distance or across the country. Specific procedures and precautions must be followed when shipping any part(s) of the ESM.

On short moves (across the room or down the hall), do not attempt to move all computer parts at one time. Disconnect the keyboard and all other peripherals and cables from the ESM and move each piece separately.

Before moving the ESM across a large distance, ensure that the original shipping box and packing materials are available and accessible. (See the Installation document.) Do not begin this job without these material. Be sure to install the shipping insert into the tape drive unit before shipping.

Accessing Alarms and Errors

6

Maintenance Subsystem

The maintenance subsystem is that part of the software responsible for initializing and maintaining the MCU. Through error and alarm logs, the maintenance subsystem maintains an error history of problems discovered. The maintenance subsystem provides a user interface for on-demand testing.

The MO is treated independently and is identified by what type of object (maintenance name) it is and where it is located in the MCU (physical name). Some examples of MOs are as follows:

Table 6-1. Examples of Maintenance Objects

Maintenance Name	Physical Name
TIE-DS1	1A0703
DETR-BD	1B05
CARD-MEM	1A

Error Generation/Tracking

All types of errors logged against an MO are kept in a maintenance record for that MO. This record is created when the first error is reported and remains active until maintenance determines that the problem no longer exists. A counter is kept for each type of error, and each time the error recurs, the associated counter is increased.

Maintenance monitors the status of the MO as long as a counter is active (an active counter has a non-zero value). To prevent the record from being active forever, a “leaky bucket” mechanism operates on each in-line error counter to slowly reduce the counter value over time.

An “in-line error” is the term used to describe an event or problem, usually associated with a circuit pack or a port, that occurs either during normal operation or during scheduled testing. Depending on the severity and frequency of an in-line error, the error may be resolved via the leaky bucket mechanism.

Periodically (usually every 15 minutes), these counter amounts are reduced. If the error is still being reported, the leaky bucket won’t have much effect. However, if the problem is transient and errors are no longer being reported, the leaky bucket method provides a mechanism for the counters to be reduced and the maintenance report to be retired.

Once a maintenance record becomes active, testing is scheduled to run more frequently to monitor the behavior of the MO. The results of any tests that fail are recorded in the maintenance record.

Each test has a counter associated with it; the counter increments when the test fails and decrements when the test passes. If the tests abort because the object to be tested is in use, the counters are not incremented or decremented. The leaky bucket method is not used for counters associated with tests.

Alarm Generation Thresholds

Each error and test counter is assigned a threshold value. Accelerated testing begins when the error counter becomes active (that is, when its value becomes non-zero). In general, alarms are raised only by test failures; in-line errors, in most cases, do not raise alarms. An alarm is not resolved until all tests have passed and all alarming counters go to zero. The maintenance record is active until all counters are reduced to zero.

Also, the alarm log shows an alarm for every active error in the error log. The alarm level is the highest level of alarm for all errors and test counters that still have non-zero values.

If an active error against an MO causes a minor alarm and an active error causes a major alarm, then the alarm log will show two major alarms. If the minor alarm problem is resolved first, the error is still marked as alarmed until the major alarm problem is resolved, and the alarm log will still show two major alarms. If the major alarm problem is resolved first, the error is still marked as alarmed until the minor alarm problem is resolved and the alarm log will show two minor alarms.

The active Hardware Error Log entries and the Alarm Log entries against a particular MO are not cleared from the logs until all the problems causing the alarms have been resolved.

Alarm Log

The MCU produces a software record of every alarm detected. This record, the alarm log, can be displayed on the MCU-MT or displayed remotely by your technical center and INADS personnel.

An entry in the alarm log is generated as a result of errors detected on an MO by automatic tests, demand tests, and in-line error detection. The high-level software determines if the errors are serious enough, or if enough errors have occurred to warrant alarm status.

Alarms are retired if the problem is resolved and further maintenance tests indicate the problem no longer exists. Alarms are also retired if the errors causing the alarm have not been reported for a predetermined time interval.

The alarm log is restricted in size. If the log is full, a new entry overwrites the oldest resolved alarm. If there are no resolved alarms, the oldest error (which is not alarmed) is overwritten. If the log consists of active alarms only, the new alarm is dropped. The error log is saved to the memory card by issuing a **reset system 4** or **reset system 5** command (see Chapter 4, “Initialization and Recovery” for further details).

Alarm Log Reporting Strategy

All major and minor alarms (and possibly downgraded warning alarms) are reported to INADS. When the MCU raises one of these alarms, an attempt is made to call INADS. If the call fails for any reason, the call is retried every seven minutes for four attempts. After four retries (a total of 21 to 30 minutes), the MCU waits one hour then retries the same procedure.

This cycle repeats until the call is completed or until six cycles are attempted without success. If at any time during the cycle a new alarm is raised, all timers and counters are reset and the strategy is repeated from the beginning.

During the four call attempts, the ACK lamp on the maintenance alarm terminal is turned off. Approximately 15 minutes into the hour interval between call attempts, the ACK lamp flashes. This indicates the MCU is having trouble reporting the alarm to INADS. At the end of the entire scenario just described, if the MCU cannot report the alarm to INADS, the ACK lamp continues to flash.

Alarm Log and System Reset Interactions

System restarts result in the removal of all alarm log entries and their associated error log entries.

Hardware Alarm Reports

When the **display alarms** command is entered, the Hardware Alarm Reports form is displayed. These options are available from the Hardware Alarm Reports form:

- **Alarm Types:** Specifies the type of alarms to be displayed by entering y in the blank following the alarm types. Entering **n** omits an alarm type. Multiple selections are permitted. If no entry is made, all active major, minor, and warning alarms are displayed.
- **Report Period:** Specifies the desired period of time during which the alarms were active. The three fields in this option define a *From* date and a *To* date, and all alarms falling between these dates are displayed.

  NOTE:
  The interval between the *From* date and the *To* date wraps around at the end of the year.

  Interval: Display alarm records for the **last hour**, **last day**, **last week**, **last month**, or **all**. The default is **all**. The *To* date is set to the current time, and the *From* date is computed backward from the current time based on the interval specified.

  From: Display alarm records from the time specified. If no date is specified, the *From* date used is the value computer by the *Interval* entry.

  To: Display alarm records to the time specified. If no date is specified, then the *To* date used is the value computed by the *Interval* entry.

- **Equipment Type**: Specifies alarms to be displayed for one of the following equipment types:

  Port Network: Alarms for a particular port network number (**1** or **2**).

  Board Number: Alarms for a particular circuit pack by location (**B01**, for example).

  Port: Alarms for a particular port circuit (**B0101**, for example).

  Category: Alarms for a particular equipment category (see the Errors/Alarms Category Lists for the names of the categories and the specific MOs that fall into each category).

  Extension: Alarms associated with a particular extension.

  Trunk (group/member): Alarms associated with a particular trunk group and member number as identified in translations. If no member number is specified, all errors for the trunk group are displayed.

If no options are selected, the entire alarm log is displayed.

Errors/Alarms Category Lists

The Hardware Alarm Reports form and the Hardware Error Reports form both contain a category field that shows the alarms (or errors) for a particular equipment category. The following tables contain comprehensive lists of Errors/Alarms categories. The first list is arranged alphabetically by category.

Table 6-2. Errors/Alarms Category List (Alphabetized by Category)

Category	MO Name
adm-conn	ADM-CONN
di	DI-BD, DI-PT
data-mod	PDMODULE, TDMODULE
detector	DETR-BD, DTMR-PT, GPTD-PT, TONE-BD
environ	DC-POWER, EXT-DEV, CUST-ALM
ext-dev	CUST-ALM, EXT-DEV
generatr	SYNC, TDM-CLK, TONE-BD, TONE-PT
gtkp	GTKP
inads-link	INADS
infc	ISDN-LNK, PI-BD, PI-LINK, PI-PT, PI-SCI
ip	IPMEDPRO, MEDPROPT, H323-SGRP, H323-BCH
maint	PR-MAINT
mbus	DATA-BD, MEMORY, PI-BD, PR-MAINT, PROCR,SW-CTL
memory	MEMORY
misc	CONFIG, ERR-LOG, PROC-SAN, SYSTEM, TIME-DAY
mmi	MMI-BD, MMI-PT, MMI-LEV
netpkt	DATA-BD, DATA-CHL, SW-CT
procr	PROCR, PR-MAINT
cdr	PRI-CDR
stabd	DIG-BD, DIG-LINE
stacrk	DIG-LINE
stations	DIG-LINE
sys prnt	SYS-PRNT
tdm	TDM-BUS, SW-CTL
tone	DETR-BD, DTMR-PT, GPTD-PT, TDM-CLK, TONE-BD, TTR-LEV
trkbd	DS1-BD, ISDN-TRK, TIE-DS1
trkcrk	ISDN-LNK, ISDN-TRK, TIE-DS1
trunks	ISDN-LNK, ISDN-TRK, TIE-DS1

Table 6-2. Errors/Alarms Category List (Alphabetized by Category) — *Continued*

Category	MO Name
vc	VC-BD, VC-DSPPT, VC-SUMPT, VC-LEV
vp	VPP-BD, VPP-PT

This second list is arranged alphabetically by MO name.

Table 6-3. Errors/Alarms Category List (Alphabetized by MO Name)

MO Name	Category
ADM-CONN	stations
CONFIG	misc
DATA-BD	mbus, netcon
DATA-CHL	netcon
DATA-CON	netcon
DC-POWER	environ
DETR-BD	detector, tone
DI-BD	di
DI-PT	di
DIG-BD	stabd
DIG-LINE	stabd, stacrk, stations
DS1-BD	trkbd
DTMR-PT	detector, tone
ERR-LOG	misc
EXT-DEV	environ, ext-dev
GPTD-PT	detector, tone
GTKP	gtkp
H323-SGRP	ip
H323-BCH	ip
INADS	inads-link
IPMEDPRO	ip
ISDN-LNK	infc, trkcrk, trunks
ISDN-TRK	trkbd, trkcrk, trunks
MEDPROPT	ip

Table 6-3. Errors/Alarms Category List (Alphabetized by MO Name) — *Continued*

MO Name	Category
MEMORY	mbus, memory
MMI-BD	mmi, vsp
MMI-LEV	mmi, vsp
MMI-PT	mmi, vsp
PDMODULE	data-mod
PI-BD	infc, mbus
PI-LINK	infc
PI-PT	infc
PI-SCI	infc
PR-MAINT	maint, mbus, procr
PROC-SAN	misc
PROCR	mbus, procr
SW-CTL	mbus, netcon, tdm
SYNC	generatr
SYS-PRNT	sys-prnt
SYSTEM	misc
TDM-BUS	tdm
TDM-CLK	generatr, tone
TDMODULE	data-mod
TIME-DAY	misc
TONE-BD	detector, generatr, tone
TONE-PT	generatr
TTR-LEV	tone
VC-BD	vc
VC-DSPPT	vc
VC-LEV	vc
VC-SUMPT	vc
VPP-BD	vp
VPP-PT	vp

Typical Alarm Log

Information contained on the alarm log display is listed under columns as follows:

- *Port:* Physical location of the MO.
- *Maintenance Name:* Abbreviated identifying name of the MO.
- *On Board?:* A **y** means the fault detected is on the associated circuit pack; an **n** means the fault has not been localized to a circuit pack. On-board alarms cause the red LED on the circuit pack to light; off-board alarms do not.
- *Alt Name:* Extension number for terminals or trunk group number for trunk groups.
- *Alarm Type:* major, minor, or warning.
- *Svc State:* **IN**, **OUT**, or **RDY.**

  IN stands for “in-service” and indicates the MO is currently in service.

  OUT stands for out of service and indicates the MO is currently not operational.

  RDY stands for ready for service and indicates the MO has been busied out at the local end.
- *ACK?:* A **y** or **n** indicates whether or not INADS has acknowledged the alarm. A **c** in the Resolved Alarm Log indicates a cleared alarm notification message was acknowledged by INADS.
- *Date Alarmed:* Month, day, hour, and minute the alarm was raised.
- *Date Resolved:* Month, day, hour, and minute the alarm was resolved. The display for active alarms is **00/00/00:00**.

If a number of alarms are active, the log can be used with the list of alarms in the following table to determine which alarms should be cleared first. The list presents all the alarms that can occur in their descending order of urgency. Alarms should always be cleared in this order.

Table 6-4. List of Alarms in Order of Urgency

Maintenance Name	Alarm Level	On/Off Board*	Circuit Pack Name
DC-POWER	Major	On	Single Carrier Cabinet Environmental Sensors
PROCR	Major	On	Processor
MEMORY	Major	On	Processor
TONE-PT	Major	On	Tone-Clock
PKT-BUS	Major	On	Packet Bus
TDM-CLK	Major	On	Tone-Clock
TDM-CLK	Major	Off	Tone-Clock
TDM-BUS	Major	On	TDM Bus
SW-CTL	Major	On	NetPkt Interface
INADS	Major	Off	INADS Link
DTMR-PT	Major	On	Tone Detector
GPTD-PT	Major	On	Tone Detector
CLAS-PT	Major	On	Call Classifier Port
TONE-BD	Major	On	Combined Tone Generator
MMI-BD	Major	On	Multimedia Interface
MMI-LEV	Major	On	Multimedia Interface Resource Level
MMI-PT	Major	On	Multimedia Interface
VC-BD	Major	On	Voice Conditioner
VC-DSPPT	Major	On	Voice Conditioner
VC-LEV	Major	On	Voice Conditioner Port Level
EXT-DEV	Major	On	External Alarm Lead
PI-SCI	Major	On	System Communications Interface
PI-SCI	Major	Off	System Communications Interface
PI-LINK	Major	On	Processor Interface Link
PI-LINK	Major	Off	Processor Interface Link
ADM-CONN	Major	Off	Administered Connection
PI-BD	Major	On	Processor Interface
ISDN-SGRP	Major	Off	ISDN-PRI Signaling Group
SYNC	Major	Off	Synchronization Maintenance

Table 6-4. List of Alarms in Order of Urgency — *Continued*

Maintenance Name	Alarm Level	On/Off Board*	Circuit Pack Name
PI-PT	Major	On	Processor Interface Port
PR-MAINT	Minor	On	Maintenance/Tape Processor
PR-MAINT	Minor	Off	Maintenance/Tape Processor
TDM-BUS	Minor	On	TDM Bus
SW-CTL	Minor	On	NetPkt Interface
TTR-LEV	Minor	On	Tone Detector
DTMR-PT	Minor	On	Tone Detector
GPTD-PT	Minor	On	Tone Detector
CLAS-PT	Minor	On	Call Classifier Port
TONE-PT	Minor	On	Tone-Clock
TDM-CLK	Minor	Off	Tone-Clock
SYNC	Minor	Off	Synchronization Maintenance
MMI-BD	Minor	On	Multimedia Interface
MMI-PT	Minor	On	Multimedia Interface
VC-BD	Minor	On	Voice Conditioner
VC-DSPPT	Minor	On	Voice Conditioner
VC-SUMPT	Minor	On	Voice Conditioner
EXT-DEV	Minor	Off	External Alarm Lead
ADM-CONN	Minor	Off	Administered Connection
ISDN-LNK†	Minor	On	ISDN-PRI Signaling Link Port
ISDN-LNK†	Minor	Off	ISDN-PRI Signaling Link Port
DATA-CHL	Minor	On	NetPkt Interface
DATA-CON	Minor	On	NetPkt Interface
TONE-BD	Minor	On	Tone-Clock
DETR-BD	Minor	On	Tone Detector
CLSFY-BD	Minor	On	Call Classifier
DIG-BD	Minor	On	Digital Line
DS1-BD	Minor	On	DS1 Interface
DS1-BD	Minor	Off	DS1 Interface
PI-BD	Minor	On	Processor Interface

Table 6-4. List of Alarms in Order of Urgency — *Continued*

Maintenance Name	Alarm Level	On/Off Board*	Circuit Pack Name
ISDN-TRK†	Minor	On	DS1 ISDN Trunk
DS1-TIE†	Minor	On	DS1/DMI Tie Trunk
DIG-LINE	Minor	On	Digital Line
PDMODULE	Minor	On	Digital Line
TDMODULE	Minor	On	Digital Line
PRI-CDR	Minor	Off	Primary CDR Link
SYNCH	Warning	Off	Synchronization Maintenance
DTMR-PT	Warning	On	Tone Detector
GPTD-PT	Warning	On	Tone Detector
CLAS-PT	Warning	On	Call Classifier Port
CLAS-PT	Warning	Off	Call Classifier Port
PI-BD	Warning	Off	Processor Interface
ADM-CONN	Warning	Off	Administered Connection
DETR-BD	Warning	On	Tone Detector
CLSFY-BD	Warning	On	Call Classifier
DETR-BD	Warning	Off	Tone Detector
CLSFY-BD	Warning	Off	Call Classifier
ISDN-SGRP	Warning	Off	ISDN-PRI Signaling Link
DIG-LINE	Warning	Off	Digital Line
PDMODULE	Warning	Off	Digital Line
TDMODULE	Warning	Off	Digital Line
ISDN-LNK	Warning	Off	DS1 ISDN Link
ISDN-TRK	Warning	On	DS1 ISDN Trunk

* On board means the fault detected is on the associated circuit pack. Off board means the fault has not been localized to a circuit pack.

† Alarms on this MO may appear as warnings. Use **set options** to determine current valid settings.

Error Log

A record of errors detected during automatic system tests, on-demand tests, and in-line error detection is maintained in the error log. The error log, like the alarm log, is restricted in size. A new entry overwrites the oldest un-alarmed entry. The overwritten entry must be at least six minutes old.

If no such entry is found, the error is not entered,. The error log can be displayed on the on-site MCU-MT or remotely. The error log is saved on the memory card via the **save translation** command or by issuing the **reset system 3** command (see Chapter 4, “Initialization and Recovery,” for further details).

Hardware Error Report

When the **display errors** command is entered, the Hardware Error Reports form is displayed.

Three options are available from the Hardware Error Reports form. If no options are selected, all errors with active alarms are displayed.

- Error Types: Specifies all error log entries for a particular error code entry.

  Error Type: Specifies the type of errors to be displayed. This field is defaulted to all the errors.

  Active Alarms Only?: The user may select error entries based on active alarms by entering **y** (the default). An entry of **n** displays the entire error log, or at least displays all applicable errors based on the other selection criteria.

- Report Period: Specifies the desired period of time during which the alarms were active.

  Interval: Display only error records for the **last hour**, **last day**, **last week**, **last month**, or **all**. The default is **last day**.

  From: Display error records from the time specified as the beginning of the period. If no beginning date is entered, the display shows the error records active since the earliest time of existing records.

  To: Display error records to the time specified as the end of the period. If no end data is entered, the display ends at the current time.

- Equipment Type: Specifies errors to be displayed for one of the following equipment types:

  Port Network: Errors for a particular network (**1** or **2**).

  Board Number: Errors for a particular circuit pack by location (**B01**, for example).

  Port: Errors for a particular port circuit (**B0101**, for example).

  Category: errors for a particular equipment category—same as for Alarm Log Display.

Extension: Errors associated with a particular extension.

Trunk (group/member): Errors associated with a particular trunk group and member number as identified in translations. If no member number is specified, all errors for the trunk group are displayed.

Error Log Display

Information contained in the Error log display is listed under columns as follows:

- *Port:* Physical location of the MO.
- *Mtce Name:* The abbreviated identifying name of the MO.
- *Alt Name:* Extension number for terminals or trunk group number for trunk groups.
- *Err Type:* Numerical error code that identifies the type of problem.
- *Aux Data:* Additional numerical information (auxiliary data) concerning the error type. Only the most recent auxiliary data related to the error type is displayed. A detailed listing of auxiliary data numbers by error code is included for many MOs under Chapter 8, “Maintenance Object Repair Procedures.”
- *First Occur:* Month, first day, hour, and minute this error type was reported.
- *Last Occur:* Month, day, hour, and minute the most recent occurrence of this error type was reported.

  NOTE:
  If the MCU is unable to retrieve the time of day when this error type occurred, **01:43** is displayed.

- *Err Cnt:* A count of the number of times this error type has occurred.
- *Err Rate:* Average hourly rate at which the errors have occurred from the first occurrence to the present.
- *Rt/Hr:* Approximation of the rate at which this error occurred in the last hour.
- *Alarm Status: s*tatus of this MO in the error and alarm logs (**n** = not alarmed, **a** = active alarm, and **r** = resolved alarm). A **c** indicates the alarm against the MO was forced clear with **clear test** command option.
- *Act?:* A flag indicating whether or not the MO is still under active consideration by the maintenance software.

  NOTE:
  If there are any SYSTEM errors in the error log, enter the **display initcauses** command to obtain additional information. It is possible that some information was not logged in the error log. By displaying the initcauses, this information can be seen and used to analyze system errors more closely.

Terminal Alarm Notification

This type of alarm alerts on the maintenance alarm terminal, which is usually located on the telecommunications manager's desk. When an alarm occurs, the green status lamp associated with the assigned button assumes a steady state.

The lamp may be turned off by pressing the button associated with the lighted alarm lamp. If the lamp is turned off before the alarm has been resolved, it will relight by the time maintenance reschedules testing. Each alarm type and its meaning are listed in Table 6-5.

Table 6-5. Alarm Types

Alarm Type	Name	Lights when...
Administered Connection	ac-alarm	a locally administered connection (ADM-CONN) has a major, minor, or warning alarm active
DS1 Facility	ds1-alarm	a DS1-BD has an off-board major, minor, or warning alarm active
Facility Access	trk-ac-alm	the facility access trunk test feature is used
Major	major-alrm	any major alarm in the MCU is active
Minor	minor-alrm	any minor alarm in the MCU is active
Multimedia Interface	mmi-cp-alm	a Multimedia Interface circuit pack or port has a major, minor, or warning alarm active
PI Link	link-alarm	links 11 through 4 have a major, minor, or warning alarm active
RS-Alert	rs-alert	a reset system 2 or 3 is performed
CDR1	cdr1-alrm	the primary link has a major, minor, or warning alarm active
System Printer	pr-sys-alm	the system printer (SYS-PRNT) has a major, minor, or warning alarm active
Voice Conditioner	vc-cp-alm	a Voice Conditioner circuit pack or port has an active major, minor, or warning alarm
Warning	warn-alm	any warning alarm in the MCU is active

LED Interpretation

7

LED Overview

LED on and off conditions indicate the status of various MCU maintenance components. LEDs are located on all circuit packs in the MCU cabinet and, optionally, on the maintenance alarm terminal.

The following LEDs are included in the MCU:

- Processor circuit pack and maintenance circuit packs
- Carrier power unit
- Power distribution unit
- Control and port circuit pack
- MSM interface card status

Processor Circuit Pack LEDs

The front panel of the TN786B Processor circuit pack has two groups of LEDs. One group (unlabeled) indicates the status of the pack, and the other group (which is labeled) includes the major, minor, and warning alarms and reflects MCU maintenance conditions.

Table 7-1. LEDs on Maintenance and Processor Circuit Packs

LED	Description	When LED is ON...
Red	Alarm Status*	A fault has been detected on this circuit pack.†
Green	Test Status*	Tests are running on this circuit pack.
Amber	Busy Status*	This circuit pack is in use.
Red	Major	A major alarm has been detected.
Red	Minor	A minor alarm has been detected.
Amber	Wrng	A warning is being sent.
Green	Ack	Acknowledges that a major or minor alarm has been reported to INADS.

* LEDs are not labeled on the circuit pack.

† Alarms on the PROCR, MEMORY, and PR-MAINT MOs are indicated by the first red LED on the processor circuit pack.

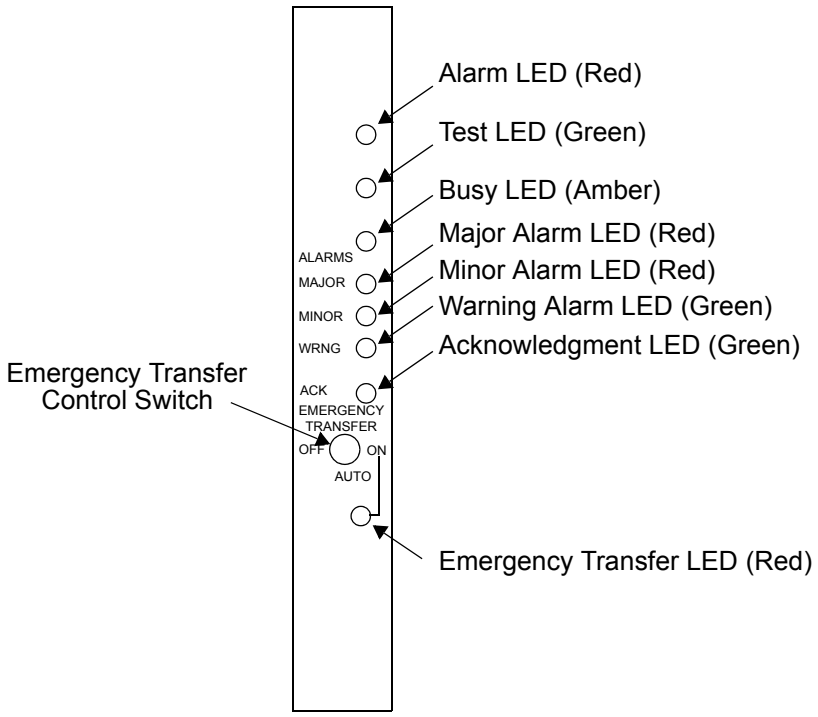


Figure 7-1. LEDs on the Processor Circuit Pack

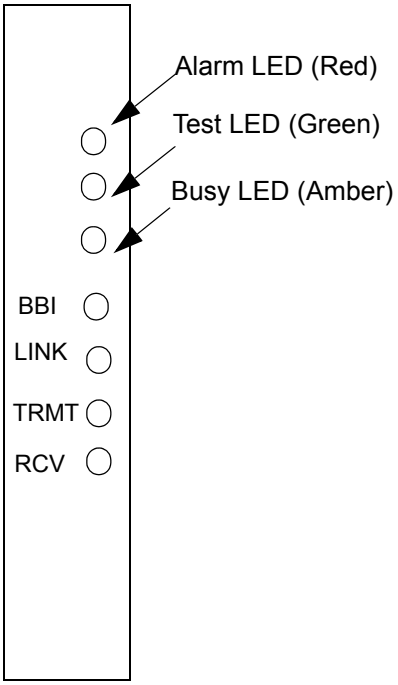


Figure 7-2. LEDs on the TN799B and TN2303 Circuit Packs

Carrier Power Unit LEDs

For a description of carrier power unit LEDs, refer to the DC-Power MO.

Power Distribution Unit LEDs

For a description of power distribution LEDs, refer to the DC-Power MO.

Control and Port Circuit Pack LEDs

Each circuit pack in the cabinet has three LEDs on the front panel visible at the front of the carrier. On all circuit packs, except the TN736 Power Unit, the LEDs indicate the following when on:

RED (Alarm)

If the circuit pack is communicating with the MCU, the MCU has detected a fault. An on-board alarm for this circuit pack is displayed in the alarm log.

The LED also lights when the circuit pack has not yet initialized communication with the MCU and therefore stops functioning (circuit pack is said to be “in reset”). In these cases, there may not be an alarm in the alarm log.

To determine if the red LED is lit because the circuit pack is not in contact with the MCU, enter the **list configuration board *PCSS*** command, where ***PCSS*** refers to the slot containing the circuit pack. If the MCU does not detect the circuit pack, this command returns the message identifier not assigned or no board.

If the circuit pack has just been inserted, the MCU may still be initializing. A circuit pack also lights its red LED when it performs initialization tests. When the tests pass, the red LED goes off. If after five minutes, the circuit pack has still not initialized communications with the MCU, check the procedures for maintaining the MO. If those procedures do not work, execute the following eight steps:

1. Check the Hardware Error Log for TONE-BD and TDM-BUS errors.
2. Enter **test tdm**.
3. Enter **test tone-clock**.
4. Follow the appropriate procedures in Chapter 8 for any TONE-BD and TDM-BUS errors. If the problem persists, go to Step 5.
5. Reseat the suspect circuit pack. Refer to “Handling Control Circuit Packs” in Chapter 5, “Routine Maintenance Procedures” for details.
6. Wait five minutes and then enter the **list configuration board *PCSS*** command. If the MCU has not registered the circuit pack, go to Step 7.
7. Try inserting the circuit pack into a different slot. Then insert a different circuit pack into the suspect slot (unless this action is prohibited for that circuit pack).
8. If the MCU appears to functioning, but the circuit pack does not start communicating with the MCU, replace the circuit pack.

GREEN (Test)

The MCU is running tests on this circuit pack.

AMBER (Busy)

The circuit pack is in use.

Table 7-2. Port Circuit Pack Status LEDs

LED Status	Description
Red	Lights briefly during power up, reseating, resetting, and MCU reset. Lights steadily if start-up test fails or fails while in use; otherwise, light stays off.
Green	Lights briefly during testing following power up, reseating, and MCU reset. Also lights during periodic, scheduled, and craft-demanded testing; otherwise, light stays off.
Amber	Lights steadily when any port is in use; otherwise, light stays off.

Table 7-3. Network Control Circuit Pack Status LEDs

LED Status	Description
Red	Lights briefly during power up and MCU reset. Lights steadily if startup test fails or fails while in use; otherwise, light stays off.
Green	Lights briefly during testing following power up, reseating, and MCU reset. Also lights during periodic, scheduled, and craft-demanded testing; otherwise, light stays off.
Amber	Lights steadily when one of the data channels is in use. On the TN777B, a fourth amber LED with the label *Card in use* lights whenever the memory card is in use.

Table 7-4. Processor Interface Circuit Pack Status LEDs

LED Status	Description
Red	Lights briefly during power up and MCU reset. Lights steadily if start-up test fails or fails while in use; otherwise, light stays off.
Green	Lights briefly during testing following power up, reseating and MCU reset. Also lights during periodic, scheduled, and craft-demanded testing; otherwise, light stays off.
Amber	Lights when one or more channels is in use.

Table 7-5. Processor Control Circuit Pack Status LEDs

LED Status	Description
Red	Lights briefly during power up and MCU reset. Lights steadily if start-up test fails or fails while in use; otherwise, light stays off.
Green	Lights briefly during testing following power up, reseating, and MCU reset. Also lights during periodic, scheduled, and craft-demanded testing; otherwise, light stays off.
Amber	Lights during processor initialization. Lights steadily during normal operation.

Table 7-6. Tone Detector/Generator Circuit Pack Status LEDs

LED Status	Description
Red	Lights briefly during power up and MCU reset. Lights steadily if start-up test fails or fails while in use; otherwise, light stays off.
Green	Lights briefly during testing following power up, reseating, and MCU reset. Also lights during periodic, scheduled, and craft-demanded testing; otherwise, light stays off.
Amber	Slow blinking when clock is in use; otherwise, light stays off.

MSM Interface Card's Status LEDs

If the ESM/MSM link is not in service, the D8W E1 cabling between the ESM and MSM should be checked. Also, the condition of the status LEDs on the TN2207 board and the MSM Interface Card should be checked.

The following figure illustrates the LED arrangement on the back of the MSM Interface Card.

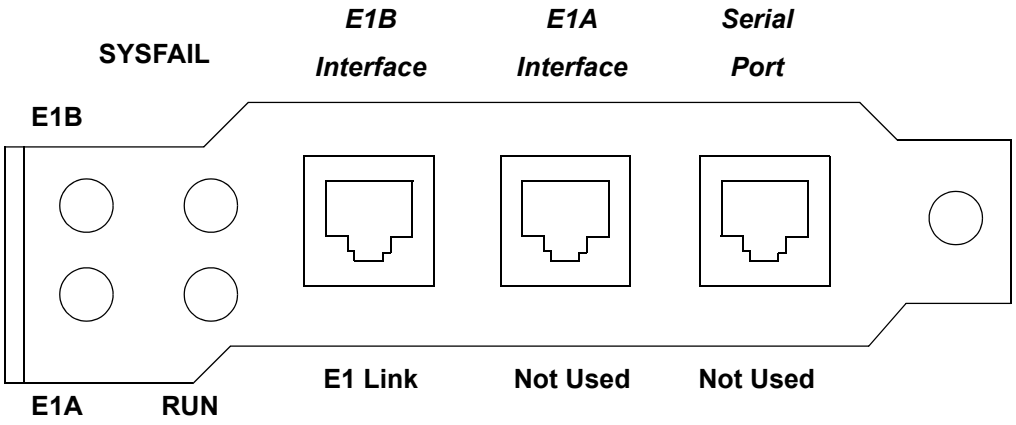


Figure 7-3. Rear Bracket of the MSM Interface Card

Normal operation is indicated by an unlit yellow LED on the **E1B** and **SYSFAIL** lamps and a lit yellow LED on the **E1A** lamp. Proper microprocessor activity is indicated by a lit green LED on the **RUN** lamp.

PRI-ISA64 board failures are indicated by a lit yellow LED on the SYSFAIL lamp or an unlit green LED on the **RUN** lamp. Failure on the E1B span is indicated by a lit yellow LED on the **E1B** lamp.

The second E1 span, using connector E1A on the ESM's MSM Interface Card, is not used.

Use the following table to evaluate the condition of the MSM Interface Card. Scenarios that show an LED status as **XXXX** imply that, with this particular combination of LED conditions, the description and resolution is the same independent of whether or not this specific LED is lit or unlit.

Table 7-7. MSM Interface Card Status LEDs

E1A	E1B	SYSFAIL	RUN	Description and Recommendation
YELLOW	unlit	unlit	GREEN	Normal Operation—MSM Card is fine. Execute the **check esm** command.
unlit	YELLOW	unlit	GREEN	Note a.
YELLOW	YELLOW	unlit	GREEN	The ESM/MSM E1 Link (E1B) is not healthy. Check the cabling between the ESM and MSM and execute the **test board** command for the TN2207 circuit pack from the MSM Management Terminal.
XXXX	XXXX	YELLOW	unlit	Note b.
XXXX	XXXX	YELLOW	GREEN	Note c.

Notes:

as. The MCU only uses a single E1 span between the ESM and MSM. The MSM Interface card provides two spans, E1A and E1B. When connecting only a single E1 span, as in the case of the ESM, always use the E1B connector. Therefore, the ESM/MSM Link D8W cable should always be plugged into the E1B connector, not into the E1A connector. The scenario where the E1A LED is unlit but the E1B LED is YELLOW indicates that the ESM/MSM link was erroneously cabled into the E1A span rather than into the E1B span. Check the E cabling. If it is inserted into the E1A connector, remove it and insert it into the E1B connector.

at. The MSM Interface card's microprocessor has halted due to a problem. Perform a Soft UNIX Shutdown. Then, power Cycle the ESM, or press the ESM **RESET** button to cause a hardware reinitialization of the MSM Interface Card. After resetting the ESM circuit packs, check the **RUN** lamp again. If it is still not GREEN, repeat the ESM hardware reset procedure just described. If the LED does not show a GREEN status after three reset attempts, replace the MSM Interface Card.

au. If the **SYSFAIL** LED is YELLOW but the microprocessor **RUN** status LED is GREEN, there is some other type of board failure. Execute the **reset 1** command from the ESM Management Terminal. This will reinitialize the MSM Interface card's on- board firmware and software, which are loaded from the ESM UNIX file system.

If a **reset 1** command does not clear the YELLOW LED status for **SYSFAIL**, one of several items could be the root cause. First, the ESM system software may not be operating properly. Check that the complete software package is fully installed, and check that there is no corruption of the UNIX filesystem. If either check is true, do a complete reinstall of the ESM system software starting with ESM boot diskette Secondly, if the ESM software appears to be properly loaded, and if there are no signs of file corruption, another root cause of the **SYSFAIL** error could be that the version of ESM software that was installed on the ESM is not compatible with the version of the MSM Interface card's hardware. Consult your authorized Avaya service representative for details on how to determine the version and comcode of the MSM Interface card. Contact your technical center with the card's comcode number and the ESM system software release number to check their compatibility.

Maintenance Object Repair Procedures

8

Troubleclearing Priorities

Troubleclearing is based on the type of indication received: MCU-alarmed troubles or user-reported troubles. When viewing the alarm log, alarms are displayed in order of importance: major, minor, and warning. Each alarm level appears by importance of functional area. The first alarmed entry should always be resolved first as it may be affecting the other alarmed entries.

Sometimes MCU-alarmed and user-reported troubles coexist. The MCU-alarmed troubles should always be cleared first, when possible, as this often clears the user-reported faults as well.

Port Troubles

Failures in trunk and service circuit packs in the port carrier and in the port slots of the control carrier are the easiest to repair. Failures are usually independent and can be cleared by replacing the circuit pack with the red alarm LED lit or reporting an on-board alarm in the error log. It is best to wait until the amber (busy) LED is off before removing the pack. However, during moderate to heavy MCU activity, at least one service port or trunk is usually busy.

There is an alternative to replacing a port circuit pack that has only one (or a few) failed port. The trunk assigned to the failed port can be moved to a good port on the same or another port pack. If this is done, wiring must also be changed at the cross-connect field. This method should be done only as a temporary measure until a new circuit pack is obtained.

This is an administrative function and should be performed by the on-site system administrator, if there is one. The new port must be compatible with the trunk. System records should be updated to identify the defective port so it is not reused.

Circuit packs with more than two or three defective ports should always be replaced.

Common Control Troubles

The circuit packs in the SPE of the control carrier are more difficult to repair. The MCU must be powered down before any of these packs are replaced. After the suspected circuit pack has been replaced, the MCU is powered up (rebooted).

Another factor increasing the difficulty of troubleclearing in the SPE is the high degree of interaction among the circuit packs. Multiple alarms and off-board alarms are more likely to occur in common control troubles than in port troubles. Use the alarm log and list of alarms to assist in clearing problems.

For more detailed information on repairing common control circuit packs, refer to the specific maintenance procedure at the end of this chapter.

Trunk Troubles

Trunk problems, reported by MCU alarms or by conference participants, can be evaluated through tests from the maintenance alarm terminal or from the MCU-MT or remotely using the MCU-ST. If trunk troubles appear to be outside the MCU, the network service provider should be asked to make the repairs.

Error Generation/Tracking

Errors may be detected by periodic maintenance tests run on an MO or by using the MO (for example, saving translations). These errors are reported to the maintenance subsystem and logged in the error log which then starts initial testing on the MO.

All types of errors logged against the MO are kept in a maintenance record for that MO. This record is created when the first error is reported and remains active until maintenance determines that the problem no longer exists. A counter is kept for each error type, and each time the error recurs the associated counter is increased.

Each error and test counter are assigned a threshold value. Accelerated testing begins when the counter becomes active. In general, alarms are raised only by test failures; in-line errors, in most cases, do not raise alarms. An alarm is not resolved until all tests have passed and all alarm counters go to zero. Also, the maintenance record is active until all counters are reduced to zero.

Error/Alarm Resolution

The same tests that run automatically are also available to the technician. The results of these craft-demanded tests affect the error counters in the same way. Thus, if an alarm is raised by a transient problem that is no longer active, the alarm can be resolved quickly by running the appropriate tests the correct number of times.

MO Test/Repair Procedures

This section contains information required for accurate interpretation of the alarm log, efficient maintenance testing, and speedy repair of alarmed MOs. The following details are provided for each MO, when applicable:

- Alarm level
- Hardware error associated with the MO
- Associated test that caused the error
- Test sequences
- Test description
- Error code description
- Recommended maintenance procedures

NOTE:
Some test commands may trigger test sequences for more than one MO.

For your convenience, the MOs have been arranged alphabetically in this chapter by their alarm log names. The only exception is XXX-BD which is a set of common tests used by certain circuit packs that share the generic hardware that interfaces with the TDM Bus. The circuit packs included in the XXX-BD category are listed in the beginning of the XXX-BD (Common Port Circuit Pack) section.

AC-POWER

AC Power for AC-Powered Systems

MO Name (in Alarm Log)	Alarm Level	Initial Command to Run*	Full Name of MO
AC-POWER	WARNING	test environment P	AC Power

* Where P is an appropriate port network number determined via the PORT field from the Alarm or Error Log.

The environment maintenance strategy to be used depends on both the cabinet configuration and the type of powering. Also refer to DC-POWER (DC Power) for environment maintenance strategy.

The AC Power MO represents the AC power provided to the system from a wall outlet. The AC power comes from the wall outlet, through the Power Distribution Unit (PDU), if installed, and is then distributed to the various cabinets. The battery charger monitors AC power via fuse F3. See the following figure. If no PDU is installed, the power is supplied directly to each cabinet from each individual wall outlets.

When the system loses power (for example, a power outage in the building), a Major alarm is logged against AC Power and the system goes on battery backup, which is known as Nominal Power Holdover (NPH). If power is restored before the NPH time expires, the alarm is resolved. Each basic control cabinet has separate batteries for NPH. For the nominal power holdover, the batteries power the system for 10 seconds in a cabinet and for 10 minutes in the control carrier.

WARNING:
Before powering down a cabinet or carrier that contains DEFINITY AUDIX circuit packs (TN566), first power down the AUDIX unit to avoid damaging the AUDIX software. Instructions for powering down this unit are in DEFINITY AUDIX documentation.

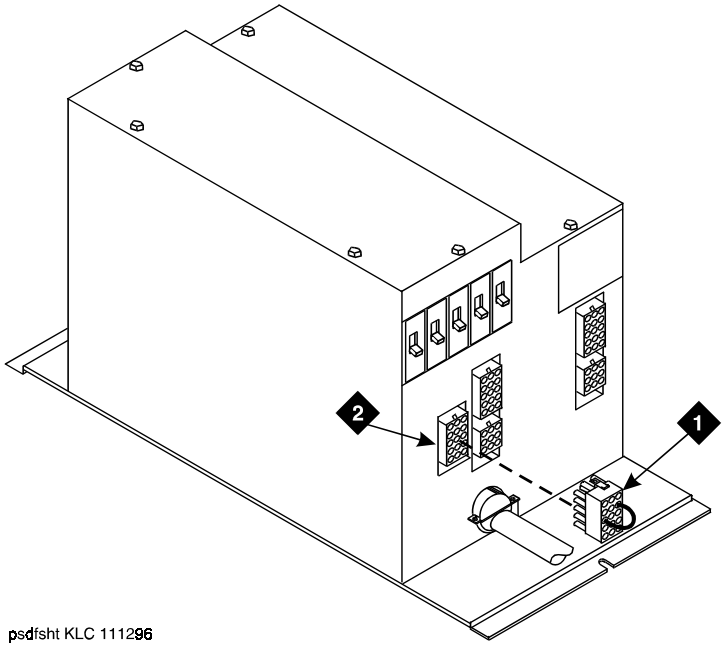


Figure Notes

1. Shorting Cable (H600-442-G1) (If Battery Charger is Not Installed)
2. J11

Figure 8-1. Cabinet Environment Components (AC-POWER)

Refer to the following table:

Circuit breaker	1	2	3	4	5
Carriers, side supplied	A (L&R) G (R)	B/C(L)	D,E,G (L)	B/C (R)	D/E (R)

Error Log Entries and Test to Clear Values

Table 8-1. AC Power Error Log Entries

Error	Aux	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	test environment P sh r 1
	Run the Short Test Sequence first. If all tests pass, run the Long Test Sequence. Refer to the appropriate test description and follow the recommended procedures				
513	Any	AC Power Query Test (#78)	WARNING	OFF	test environment P sh r 1

AC Power Query Test (#78)

Table 8-2. AC Power Query Test #78

Error Code	Test Result	Description Recommendation
1000	ABORT	System resources required to run this test are not available. 1. Retry the command at 1-minute intervals a maximum of 5 times.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at 1-minute intervals a maximum of 5 times. 2. If the test continues to ABORT with Error Code 2000, check for system powering problems with the A carrier. Resolve all DC-POWER alarms. Then, repeat the test. 3. If the test continues to ABORT with a 2000 Error Code, resolve all PR-MAINT (Maintenance/Tape Processor) errors. Repeat the test.
2029	ABORT	Internal system error 1. Retry the command at 1-minute intervals a maximum of 5 times.

Table 8-2. AC Power Query Test #78

Error Code	Test Result	Description Recommendation
1	FAIL	For a Global AC MCC (J58890CH) use the procedures outlined in step 2. The switch is currently without AC power. **⚠ CAUTION:** *Turn off power to the 397C Battery Charger before removing Fuse F5.* 1. Check for AC at the wall outlet. a. If there is no AC power at the wall outlet, then the problem is not with the system itself. Power must be restored to the wall outlet. b. If there is AC power at the wall outlet, then there could be a problem with the Battery or Battery chargers. Resolve all alarms logged against POWER (Battery & Battery Charger), and rerun the test. If the test still fails, the fuse F5 may have opened. Replace fuse F5 and rerun the test. If the test still fails, then the PR-MAINT (Maintenance/Tape Processor) may be incorrectly reporting the problem. c. Resolve alarms against these MOs, and rerun the test. There are failures that can occur on the Maintenance/Tape Processor that are not detected by the respective maintenance, but that cause many, if not all, environment tests to fail. If many environment tests are failing, the suspect circuit pack, depending on the system configuration, should be replaced and the test rerun. 2. Procedures for a Global MCC (J58890CH): a. For a nominal holdover system if there is no AC power at the wall outlet, then the problem is not with the system itself. Power must be restored to the wall outlet. b. If there is AC power at the wall outlet, then there could be a problem with the Rectifiers (RM850), Battery Interface Unit, or battery. Resolve all alarms logged against the POWER Maintenance Object, and rerun the test. If the test still fails, the BIU may be defective. Check to see if the BOD alarm LED is “on”, on the BIU. If the BOD LED is “on” replace the Battery Interface Unit (BIU). If the BOD LED is “off” and the BOK LED is “on” then the SYSAM circuit pack may be incorrectly reporting the problem. Resolve all alarms against these Maintenance Objects and rerun the test.
	FAIL	The switch is currently without AC power, and AC Power maintenance is in the middle of timing the NPH interval. 1. Follow the repair steps outlined above for Error Code 1.
None	PASS	The PR-MAINT (Maintenance/Tape Processor) has reported that the switch has AC power. If there is no AC power at the wall outlet, then look for and resolve all alarms against the appropriate MO listed.

AC Power for DC-Powered Systems

MO Name (in Alarm Log)	Alarm Level	Initial Command to Run*	Full Name of MO
AC-POWER	WARNING	test environment P	AC Power

* Where P is an appropriate port network number determined via the PORT field from the Alarm or Error Log.

The environment maintenance strategy to be used depends on both the cabinet configuration and the type of powering. Refer to the "DC-POWER (Single-Carrier Cabinet Power)" information for environment maintenance strategy.

In a DC-powered multicarrier cabinet system, the AC-POWER maintenance object still exists, but serves no functional purpose. Because the system cannot determine the type of powering provided, all AC-POWER tests should always either pass or abort.

Error Log Entries and Test to Clear Values

Table 8-3. AC Power Error Log Entries

Err	Aux	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	test environment P sh r 1
	Run the Short Test Sequence first. If all tests pass, run the Long Test Sequence. Refer to the appropriate test description and follow the recommended procedures				
513	Any	AC Power Query Test (#78)	WARNING	OFF	test environment P sh r 1

System Technician-Demanded Tests: Descriptions and Error Codes

Always investigate tests in the order presented in the following table. By clearing error codes associated with the *AC Power Query Test*, for example, you may also clear errors generated from other tests in the testing sequence.

Table 8-4. System Technician-Demanded Tests: AC-Power

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Battery & Battery Charger Query Test (#5) (a)	Short	Long	No
AC Power Query Test (#78)	Short	Long	No
Power Unit Query Test (carrier E) (#127) (b)	Short	Long	No
Power Unit Query Test (carrier D) (#127) (b)	Short	Long	No
Power Unit Query Test (carrier A) (#127) (b)	Short	Long	No
Power Unit Query Test (carrier B) (#127) (b)	Short	Long	No
Power Unit Query Test (carrier C) (#127) (b)	Short	Long	No
Emergency Transfer Query Test (#124) (c)	Short	Long	No
Cabinet Temperature Query Test (#122) (d)	Short	Long	No
External Alarm Lead Query Test (#120) (e)	Short	Long	No
Analog Ring Generator Initialization Test (#117) (f)	Short	Long	No
Analog Ring Generator Query Test (#118) (f)	Short	Long	No

Notes:

a. Refer to "POWER" for a description of this test.

b. Refer to "CARR-POW" for a description of this test.

c. Refer to "EMG-XFER" for a description of this test.

d. Refer to "CABINET" for a description of this test.

e. Refer to "EXT-DEV ADMIN? N" or "EXT-DEV ADMIN? Y" for a description of this test.

f. Refer to "RING-GEN" for a description of this test.

AC Power Query Test (#78)

This test queries the Maintenance/Tape Processor for the status of AC power to the switch. In a DC-powered system, this test should never fail.

Table 8-5. AC Power Query Test #78

Error Code	Test Result	Description/ Recommendation
1000	ABORT	System resources required to run this test are not available. Response to the test request was not received within the allowable time period. Internal system error 1. Retry the command at 1-minute intervals a maximum of 5 times.
2000	ABORT	System resources required to run this test are not available. Response to the test request was not received within the allowable time period. Internal system error 1. Retry the command at 1-minute intervals a maximum of 5 times.
2029	ABORT	System resources required to run this test are not available. Response to the test request was not received within the allowable time period. Internal system error 1. Retry the command at 1-minute intervals a maximum of 5 times.
any	FAIL	The Maintenance/Tape Processor is incorrectly reporting a problem with AC power. If this test fails, the problem is with the circuit pack and not with AC-POWER. The suspect circuit pack, depending on the system configuration, should be replaced and the test rerun.
	PASS	All that can be inferred is that the PR-MAINT (Maintenance/Tape Processor) is working properly.

ADM-CONN (Administered Connection)

An Administered Connection (ADM-CONN) provides an end-to-end connection between data modules. This connection is automatically established whenever the ADM-CONN is administered and is due to be active.

An error is logged whenever an ADM-CONN cannot be established, either initially, on retry, fast retry, redial, or auto restoration, or whenever an established connection fails (including one that is subsequently reestablished via fast retry, redial, or auto restoration). An alarm is logged whenever an ADM-CONN cannot be initially established or fails and cannot be reestablished.

An administrable alarming strategy is supported on a per-ADM-CONN basis. An alarm is raised when either the number of consecutive failed attempts to establish the ADM-CONN reaches the alarm threshold or it can be determined that a failed attempt to establish was caused by an administered error.

The alarm raised (major, minor, warning, or none) is specified under the Alarm Type field on the Administered Connection Administration form.

Alarm Level	Initial Craft Command to Run
Major	status administered-connection *N* *
Minor	status administered-connection *N*
Warning	status administered-connection *N*

* *N* is an appropriate ADM-CONN number determined via the *Port* field from the alarm log or error log.

Hardware Error Log Entries

For all ADM-CONN errors, review the following notes:

- Only error 127 is valid for a non-dial-out ADM-CONN established over non-ISDN facilities; all other errors are valid only for ADM-CONN established over ISDN facilities. All errors are valid for dial-out ADM-CONNs regardless of the facility used to establish the call.

- Check the *Aux Data* field as follows:

Table 8-6. Administered Connection Aux Data Field Error Log Entries

Aux Data	Description
1	ADM-CONN establishment failed
2	Active ADM-CONN failed; attempting reestablishment via auto restoration
3	Auto restoration failed (not applicable for dial-out)
4	Active ADM-CONN failed; attempting reestablishment via fast retry
5	Fast retry failed

The following table lists the error types in numerical order.

Table 8-7. ADM-CONN Error Log Entries

Error	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value
0	Any	None	Any	Off	None
	If this is not a temporary condition, follow normal escalation procedures.				
1	Any	None	Any	Off	None
	This error is typically associated with administrative problems and is not expected to be of a temporary nature. ADM-CONNs that are not used by the dial-out feature are not retried, and the failure is alarmed immediately (that is, the alarm threshold is ignored). On the other hand, for ADM-CONNs that are used by the dial-out feature, retries continue, and an alarm is raised after four failures occur. The address of the destination endpoint is an unassigned number or is restricted from terminating calls (“Access Denied”) due to Class of Restriction. Verify that the destination address is correct and that the destination endpoint is administered. The destination endpoint is not administered where this error is logged.				
2		None	Any	Off	None
	A request has been made to use a transit network or common carrier that cannot be accessed. Check the routing pattern used by this ADM-CONN and verify that the interexchange carrier specified is correct.				
6	Any	None	Any	Off	None
	The exact failure cause is unknown or has been mapped to one of these values. If this is not a temporary condition, try reversing the direction of the ADM-CONN (that is, originate the ADM-CONN from the destination). This may yield another failure cause; if not, and the condition persists, follow normal escalation procedures.				
16	Any	None	Any	Off	None
	If this is not a temporary condition, follow normal escalation procedures.				

Table 8-7. ADM-CONN Error Log Entries

Error	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value
17	Any	None	Any	Off	None
	The destination endpoint is not available. Check the status of the destination endpoint (for example, by using status access-endpoint or status data-module). Verify that the endpoint is not busy or otherwise unavailable. The status of the destination endpoint is not available where this error is logged.				
18	Any	None	Any	Off	None
	The MCU sent an ISDN message to the endpoint and the endpoint did not respond. This could be due to link failure or congestion or outage at the endpoint. If this is not a temporary condition, follow normal escalation procedures.				
21	Any	None	Any	Off	None
	The exact failure cause is unknown or has been mapped to one of these values. If this is not a temporary condition, try reversing the direction of the ADM-CONN (that is, originate the ADM-CONN from the destination). This may yield another failure cause; if not, and the condition persists, follow normal escalation procedures.				
22	Any	None	Any	Off	None
	This error is typically associated with administrative problems and is not expected to be of a temporary nature. ADM-CONNs that are not used by the dial-out feature are not retried, and the failure is alarmed immediately (that is, the alarm threshold is ignored). On the other hand, for ADM-CONNs that are used by the dial-out feature, retries continue, and an alarm is raised after four failures occur. The address of the destination endpoint has changed. Verify that the new address is correct and change the ADM-CONN accordingly. The destination endpoint is not administered where this error is logged.				
28	Any	None	Any	OFF	None
	This error is typically associated with administrative problems and is not expected to be of a temporary nature. ADM-CONNs that are not used by the dial-out feature are not retried, and the failure is alarmed immediately (that is, the alarm threshold is ignored). On the other hand, for ADM-CONNs that are used by the dial-out feature, retries continue, and an alarm is raised after four failures occur. The address of the destination endpoint has an invalid number format or is restricted from terminating calls (“Access Denied”) due to Class of Restriction. Verify that the destination address is correct and that the destination endpoint is administered. The destination endpoint is not administered where this error is logged.				
29	Any	None	Any	OFF	None
	If this is not a temporary condition, follow normal escalation procedures.				

Table 8-7. ADM-CONN Error Log Entries

Error	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value
31	Any	None	Any	OFF	None
	The exact failure cause is unknown or has been mapped to one of these values. For non-dial-out ADM-CONNs, if this is not a temporary condition, try transposing the entries in the Originator and Destination fields of the ADM-CONN (that is, originate the ADM-CONN from the destination). This may yield another failure cause; if not, and the condition persists, follow normal escalation procedures.				
34	Any	None	Any	OFF	None
	This error indicates that a resource (for example, a circuit or bearer capability) required by the ADM-CONN is not available. If this is not a temporary condition, follow normal escalation procedures.				
38	Any	None	Any	OFF	None
	A network failure has occurred. Error Log entries for other maintenance objects (such as DS1-BD or ISDN-LNK) may indicate a local problem; if not, and this condition persists, follow normal escalation procedures.				
40	Any	None	Any	OFF	None
	This error indicates that a resource (for example, a circuit or bearer capability) required by the ADM-CONN is not available. If this is not a temporary condition, follow normal escalation procedures.				
41	Any	None	Any	OFF	None
	A temporary failure has occurred. Error Log entries for other maintenance objects (such as DS1-BD or ISDN-LNK) may indicate a local problem; if not, and this condition persists, follow normal escalation procedures.				
42	Any	None	Any	OFF	None
	This error indicates that a resource (for example, a circuit or bearer capability) required by the ADM-CONN is not available. If this is not a temporary condition, follow normal escalation procedures.				
43	Any	None	Any	OFF	None
	This error indicates that an ISDN protocol error has occurred. If this is not a temporary condition, follow normal escalation procedures.				
44	Any	None	Any	OFF	None
	This error indicates that a resource (for example, a circuit or bearer capability) required by the ADM-CONN is not available. If this is not a temporary condition, follow normal escalation procedures.				

Table 8-7. ADM-CONN Error Log Entries

Error	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value
50	Any	None	Any	OFF	None
	This error is typically associated with administrative problems and is not expected to be of a temporary nature. ADM-CONNs that are not used by the dial-out feature are not retried, and the failure is alarmed immediately (that is, the alarm threshold is ignored). On the other hand, for ADM-CONNs that are used by the dial-out feature, retries continue, and an alarm is raised after four failures occur. A request to use a network service has been denied because the service has not been purchased. Check the routing pattern used by this ADM-CONN and verify that the service type is correct. If the service type appears correct, check with the network provider to determine what services have been purchased.				
52	Any	None	Any	OFF	None
	This error is typically associated with administrative problems and is not expected to be of a temporary nature. ADM-CONNs that are not used by the dial-out feature are not retried, and the failure is alarmed immediately (that is, the alarm threshold is ignored). On the other hand, for ADM-CONNs that are used by the dial-out feature, retries continue, and an alarm is raised after four failures occur. These errors indicate that outgoing calls may be barred. To restore an ADM-CONN failure, enter status administered connection for the current ADM-CONN state (observe the retry count). If the state is “failed,” verify and correct the Administered Connection Administration form.				
54	Any	None	Any	OFF	None
	These errors indicate that incoming calls may be barred. To restore an ADM-CONN failure, enter status administered connection for the current ADM-CONN state (observe the retry count). If the state is “failed,” verify and correct the Administered Connection Administration form. NOTE: This is not applicable to dial-out ADM-CONNs.				
58	Any	None	Any	OFF	None
	This error indicates that a resource (for example, a circuit or bearer capability) required by the ADM-CONN is not available. If this is not a temporary condition, follow normal escalation procedures.				
65	Any	None	Any	OFF	None
	This error is typically associated with administrative problems and is not expected to be of a temporary nature. ADM-CONNs that are not used by the dial-out feature are not retried, and the failure is alarmed immediately (that is, the alarm threshold is ignored). On the other hand, for ADM-CONNs that are used by the dial-out feature, retries continue, and an alarm is raised after four failures occur. The requested bearer capability is not implemented or is unknown to the network. Check the address of the destination endpoint and the routing pattern used by this ADM-CONN. Verify that they are correct and available. If no problem is found, follow normal escalation procedures.				

Table 8-7. ADM-CONN Error Log Entries

Error	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value
66	Any	None	Any	OFF	None
	This error is typically associated with administrative problems and is not expected to be of a temporary nature. ADM-CONNs that are not used by the dial-out feature are not retried, and the failure is alarmed immediately (that is, the alarm threshold is ignored). On the other hand, for ADM-CONNs that are used by the dial-out feature, retries continue, and an alarm is raised after four failures occur. The requested channel type is not implemented or is unknown to the network. Check the address of the destination endpoint and the routing pattern used by this ADM-CONN. Verify that they are correct and available. If no problem is found, follow normal escalation procedures.				
69	Any	None	Any	OFF	None
	This error is typically associated with administrative problems and is not expected to be of a temporary nature. ADM-CONNs that are not used by the dial-out feature are not retried, and the failure is alarmed immediately (that is, the alarm threshold is ignored). On the other hand, for ADM-CONNs that are used by the dial-out feature, retries continue, and an alarm is raised after four failures occur. The requested facility is not implemented or is unknown to the network. Check the address of the destination endpoint and the routing pattern used by this ADM-CONN. Verify that they are correct and available. If no problem is found, follow normal escalation procedures.				
81	Any	None	Any	OFF	None
	This error indicates an ISDN protocol error has occurred. If this is not a temporary condition, follow normal escalation procedures.				
82	Any	None	Any	OFF	None
	If this is not a temporary condition, follow normal escalation procedures.				
88	Any	None	Any	OFF	None
	This error is typically associated with administrative problems and is not expected to be of a temporary nature. ADM-CONNs that are not used by the dial-out feature are not retried, and the failure is alarmed immediately (that is, the alarm threshold is ignored). On the other hand, for ADM-CONNs that are used by the dial-out feature, retries continue, and an alarm is raised after four failures occur. The destination endpoint (or some intermediate facility) is not compatible with the originating endpoint. Check the BCC fields of the routing pattern used by this ADM-CONN. Also check whether or not the originating and destination endpoints are compatible. Finally, for dial-out ADM-CONNs, check whether the destination number is correct.				
91, 95 , 96	Any	None	Any	OFF	None
	This error indicates that an ISDN protocol error has occurred. If this is not a temporary condition, follow normal escalation procedures.				

Table 8-7. ADM-CONN Error Log Entries

Error	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value
97	Any	None	Any	OFF	None
	This error indicates that an ISDN protocol error has occurred. If this is not a temporary condition, follow normal escalation procedures.				
98 , 99	Any	None	Any	OFF	None
	This error indicates that an ISDN protocol error has occurred. If this is not a temporary condition, follow normal escalation procedures.				
100	Any	None	Any	OFF	None
	This error indicates that an ISDN protocol error has occurred. If this is not a temporary condition, follow normal escalation procedures.				
102	Any	None	Any	OFF	None
	The MCU sent an ISDN message to another endpoint that did not respond within the allotted time. This could be due to a link failure or congestion or outage at the other end. If this is not a temporary condition, follow normal escalation procedures.				
111	Any	None	Any	OFF	None
	This error indicates that an ISDN protocol error has occurred. If this is not a temporary condition, follow normal escalation procedures.				
127	Any	None	Any	OFF	None
	The exact failure cause is unknown or has been mapped to one of these values. If this is not a temporary condition, try reversing the direction of the ADM-CONN (that is, originate the ADM-CONN from the destination). This may yield another failure cause; if not, and if this condition persists, follow normal escalation procedures.				
193	Any	None	Any	OFF	None
	NOTE: This error is applicable only to dial-out ADM-CONNs. The endpoint has answered the call, but it has failed to handshake with the MCU. Check the endpoint to ensure it is H.320 compatible. ADM-CONN is retried up to the retry threshold specified in the “Dialout Post Answer Failure Retry Limit;” on the System-Parameters Features Form.”				
194	Any	None	Any	OFF	None
	NOTE: This error is applicable only to dial-out ADM-CONNs. The endpoint was alerted, but it did not answer the dial-out call. Check the data modem equipment for the endpoint. ADM-CONN is continually retried. An alarm is raised after four retries.				
195	Any	None	Any	OFF	None
	NOTE: This error is applicable only to dial-out ADM-CONNs. The endpoint is busy.				

Table 8-7. ADM-CONN Error Log Entries

Error	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value
196	Any	None	Any	OFF	None
	NOTE: This error is applicable only to dial-out ADM-CONNs. No network facilities were available.				
198	Any	None	Any	OFF	None
	NOTE: This error is applicable only to dial-out ADM-CONNs. The wrong number was dialed.				
200	Any	None	Any	OFF	None
	NOTE: This error is applicable only to dial-out ADM-CONNs. No feedback was received for the dial-out call. Usually, this error occurs when the first call attempt fails to reach an endpoint using robbed bit facilities.				
201	Any	None	Any	OFF	None
	NOTE: This error is applicable only to dial-out ADM-CONNs. There is a cascade mode administration error on both the near and far end MCUs. Check the cascade modes on both MCUs for a Primary/Secondary mismatch. One conference must be Primary, the other Secondary. The ADM-CONN is not retried, and the failure is alarmed immediately.				
202	Any	None	Any	OFF	None
	NOTE: This error is applicable only to dial-out ADM-CONNs. A tone resource was not available to diagnose a failure condition. This error has no effect on retries or alarms, and it is logged only for information versions.				

ALARM-PT (ALARM PORT)

MO Name (in Alarm Log)	Alarm Level	Initial Command to Run*	Full Name of MO
ALARM-PT	MIN	test port PCSSpp l	Alarm-Port
ALARM-PT	WRN	test port PCSSpp sh	Alarm-Port

* Where P is the port network number (1 for PPN and 2 or 3 for EPN); C is the carrier designation (for example, A, B, C, D, or E); SS is the address of the slot in the carrier where the circuit pack is located (for example, 01, 02, ..., etc.); and pp is the 2-digit port number (for example, 01).

The Alarm Port Maintenance Object provides on-board maintenance for an analog line port that is administered as an external device alarm port. Tests are provided to verify the analog line port's ability to detect an external device alarm.

The External Device Alarm (EXT-DEV) Maintenance Object is used for the off-board external device alarm.

ANL-BD (Analog Line Circuit Pack)

Alarm Level	Initial Command To Run
MIN	test board UUCSS sh
WRN	test board UUCSS sh

Refer to XXX-BD (Common Port Circuit Pack) Maintenance documentation for circuit pack level errors. Also, see ANL-LINE maintenance documentation for related line information.

ANL-LINE

Alarm Level	Initial System Technician Command To Run
MIN	test port UUCSSpp l
WRN	test port UUCSSpp sh

The TN746B Analog Line card provides analog access to modem pooling for remote administration or CRCS.

Hardware Error Log Entries

Table 8-8. Analog Line Error Log Entries

Error	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Error
1	40960 40977 40975	None	Any	Any	test port UUCSSpp sh r 1	See a
15	Any	Audits and Updates Test (#36)	Any	Any	test port UUCSSpp sh r 1	See b
18	0	busy-out station extension	WARNING	OFF	release station extension	
130	0	None	WARNING	ON	test port UUCSSpp sh	See c

Table 8-8. Analog Line Error Log Entries

Error	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Error
257	0	Station Present Test (#48)	WARNING	OFF	test port UUCSSpp sh r 3	See d
513	0	Battery Feed Test (#35)	MIN/WRN**	ON	test port UUCSSpp sh r 2	
769	0	Loop-Around and Conference Test (#47)	MIN/WRN**	ON	test port UUCSSpp l r 3	See e
1025	0	NPE Crosstalk Test (#6)	MIN/WRN**	ON	test port UUCSSpp l r 3	
1281	0	NPE Crosstalk Test (#6)	MIN/WRN**	ON	test port UUCSSpp l r 3	See f
1793	0	NPE Crosstalk Test (#6)	MIN/WRN**	ON	test port UUCSSpp l r 3	See f

*Run the Short Test Sequence first. If all tests pass, run the Long Test Sequence. Refer to the appropriate test description and follow the recommended procedures.

** Minor alarms on this MO may be downgraded to Warning alarms based on the values used in the **set options** command.

NOTES:

a. These are in-line errors that can only be resolved over time.

- 40960 Indicates that too many simultaneous incoming ringing attempts were made on this board. Only four ports on a board may ring simultaneously. A fifth incoming call will cause an inline error from the board.
- 40975 indicates that the terminal equipment was on-hook when ring-tip was detected during ringing. This usually indicates a failure in the terminal equipment or the type of terminal has a low ringer impedance. Call the terminal equipment and verify that the terminal rings. If the terminal doesn't ring, then replace it. Otherwise, issue the **test port UUCSSpp** command, and follow the procedure for test #48.
- 40977 indicates that no terminal equipment was connected when ringing was attempted. Run the short test via the **test port UUCSSpp** command, and follow the procedure for the results of test #48.

b. This is a software audit error that does not indicate any hardware malfunction. Run Short Test Sequence and investigate errors (if any).

c. This error type indicates that the circuit pack has been removed or has been insane for more than 11 minutes. To clear the error, reinsert or replace the circuit pack.

d. Test #48 may cause some terminal equipment to ring briefly during daily maintenance. If this ringing is disturbing the customer or the terminal equipment, it should be disabled via the **change station** extension command. However, on some releases of the software, this will disable tests #6, 47, and 35 as well as Test #48.

e. Test #47 may cause a false alarm when the port is connected to off-premises equipment, some non-voice terminal equipment, and some loop equipment. If this causes a false alarm, then disable the test by changing the Tests field of the **change station** command to "no."

f. Refer to XXX-BD (Common Port Circuit Pack) Maintenance documentation.

Craft-Demanded Tests

Always investigate tests in the order presented in the table below when inspecting errors in the system. By clearing error codes associated with the *Battery Feed Test*, for example, you may also clear errors generated from other tests in the testing sequence

Table 8-9. System Technician-Demanded Tests: ANL-LINE

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Battery Feed Test (#35)	Short	Long	No
Station Present Test (#48)	Short	Long	No
NPE Crosstalk Test (#6)	Long		No
Loop-Around and Conference Test (#47)	Long		No
Station Status and Translation Audits and Updates Test (#36)	Short	Long	No

NPE Crosstalk Test (#6)

One or more Network Processing Elements (NPEs) reside on each circuit pack with a TDM Bus interface. The NPE controls port connectivity and gain, and provides conferencing functions on a per-port basis. The NPE Crosstalk Test verifies that this port's NPE channel talks on the selected time slot and never crosses over to time slots reserved for other connections. If the NPE is not

working correctly, one-way and noisy connections may be observed. This test is usually only part of a port's Long Test Sequence and takes about 20 to 30 seconds to complete.

Table 8-10. NPE Crosstalk Test #6

Error Code	Test Result	Description Recommendation
1000	ABORT	System resources required to run this test are not available. The port may be busy with a valid call. This result is also reported for the system's Music-on-Hold port when it is off-hook, which is usually the case. 1. Enter display port UUCSSpp to determine the station's extension. Enter status station extension to determine the service state of the port. If the port is in use, it will be unavailable for certain tests. Wait until the port is idle before retesting. 2. When the port is idle, retry the command at one-minute intervals up to five times. If the test continues to abort, escalate the problem.
1001	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to fail, escalate the problem.
1002	ABORT	The system could not allocate time slots for the test. The system may be under heavy traffic conditions or it may have time slots out-of-service due to TDM-BUS errors. Refer to TDM-BUS (TDM Bus) Maintenance documentation to diagnose any active TDM-BUS errors. 1. If system has no TDM-BUS errors and is not handling heavy traffic, repeat test at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
1003	ABORT	The system could not allocate a tone receiver for the test. The system may be oversized for the number of Tone Detectors present or some Tone Detectors may be out-of-service. 1. Look for TTR-LEV errors in the Error Log. If present, refer to TTR-LEV (TTR Level) Maintenance documentation. 2. Look for TONE-PT errors in the Error Log. If present, refer to TONE-PT (Tone Generator) Maintenance documentation. 3. If neither condition exists, retry the test at one-minute intervals a maximum of five times. If the test continues to abort, escalate the problem.

Table 8-10. NPE Crosstalk Test #6

Error Code	Test Result	Description Recommendation
1004	ABORT	The port was seized by a valid call during the test. The test has been aborted. Use the display port UUCSSpp command to determine the station extension. Use the status station command to determine the service state of the port. If the service state indicates that the port is in use, then the port is unavailable for certain tests. You must wait until the port is idle before retesting. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort and the port is not in use, escalate the problem.
1005	ABORT	This code indicates that this test is not applicable in the current configuration. This code is provided if the analog port is used in a combined modem pool.
1018	ABORT	Test disabled via administration. To enable the test for a particular station, enter change station extension and set the Test field on the Station Form to y.
1020	ABORT	The test did not run due to a previously existing error on the specific port or a more general circuit pack error. Examine the Error Log for existing errors against this port or the circuit pack and attempt to diagnose the previously existing error.
2000	ABORT	Response to the test request was not received within the allowable time period.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.

Table 8-10. NPE Crosstalk Test #6

Error Code	Test Result	Description Recommendation
Any	FAIL	The NPE of the tested port was found to be transmitting in error. This caused noisy and unreliable connections. Replace the circuit pack.
None	PASS	The port is correctly using its allocated time slots. User-reported troubles on this port should be investigated by using other port tests, by examining station wiring, by examining the station, and by ensuring that the terminal is correctly translated as off-premises or on-premises.
0	NO BOARD	The test could not relate the interval ID to the port (no board). This could be due to incorrect translations or because no circuit pack is inserted, an incorrect circuit pack is inserted, or an insane circuit pack is inserted. 1. Check to ensure that the circuit pack translations are correct. Use the list configuration command, and resolve any problems that are found. 2. If the circuit pack was found to be incorrectly inserted in Step 1, issue the busyout board command. 3. Issue the reset board command. 4. Issue the release board command. 5. Issue the test board long command. This should reestablish the linkage between the internal ID and the port. If this is not the case, dispatch to check to ensure that there is a valid circuit pack inserted.

Battery Feed (Port Diagnostic) Test (#35)

The battery feed chip provides power to the telephone equipment, signaling, rotary dial pulsing, transmission, and balance. This test checks the signaling and switchhook capabilities of the battery feed chip by terminating the port, applying the battery, and trying to detect a current.

NOTE:
This test always passes for the TN746B circuit pack. No actual testing is performed on this circuit pack while the test is running.

Table 8-11. Battery Feed Test #35

Error Code	Test Result	Description Recommendation
None	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to fail, escalate the problem.
1000	ABORT	System resources required to run this test are not available. The port may be busy with a valid call. 1. Enter display port UUCSSpp to determine the station's extension. Enter status station extension to determine the service state of the port. If the port is in use, it is unavailable for certain tests. Wait until the port is idle before retesting. 2. When the port is idle, retry the command at one-minute intervals up to five times. 3. If the test continues to abort, escalate the problem.
1004	ABORT	System resources required to run this test are not available. The port may be busy with a valid call. Use the display port UUCSSpp command to determine the station extension. Use the status station command to determine the service state of the port. If the service state indicates that the port is in use, the port is unavailable for certain tests. You must wait until the port is idle before retesting. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort and the port is not in use, escalate the problem.
1005	ABORT	This code indicates that this test is not applicable in the current configuration. This code is provided if the analog port is used in a combined modem pool.
1018	ABORT	Test disabled via administration. To enable the test for a particular station, enter change station extension and set the Test field on the Station Form to y.
1392	ABORT	This port is currently a TTI port, and the test does not execute on it. 1. Verify that the port is a TTI port using either the display port command (the display shows that the port is a TTI port) or the list config command (the display shows a t for the port). 2. If either list config or display port indicate that the port is not a TTI port, escalate the problem. If both commands indicate that the port is a TTI port, the abort is correct for the test, and no action is necessary.
2000	ABORT	Response to the test request was not received within the allowable time period.

Table 8-11. Battery Feed Test #35

Error Code	Test Result	Description Recommendation
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to fail, escalate the problem.
None	FAIL	The port's battery feed chip is unable to supply sufficient power to the terminal equipment. This may occur when the test is performed at the same time that the terminal equipment goes off-hook. 1. Use status station to determine when the port is available for testing. When the port becomes available for testing, retry the command at one-minute intervals a minimum of five times. 2. If the test continues to fail, replace the board. 3. If the test continues to fail, escalate the problem.
	PASS	The port's battery feed chip is able to provide power to the station equipment to detect on-/off-hook. However, the battery feed chip may still be unable to provide power for touch-tones. If tones are heard when buttons are pressed, the battery feed chip is functioning correctly; otherwise, replace the circuit pack because this port is defective. User-reported troubles on this port should be investigated by using other port tests, by examining station wiring, by examining the station, and by ensuring that the terminal is correctly translated as off-premises or on-premises.
0	NO BOARD	The test could not relate the interval ID to the port (no board). This could be due to incorrect translations or because no circuit pack is inserted, an incorrect circuit pack is inserted, or an insane circuit pack is inserted. 1. Check to ensure that the circuit pack translations are correct. Use the list configuration command, and resolve any problems that are found. 2. If the circuit pack was found to be incorrectly inserted in Step 1, issue the busyout board command. 3. Issue the reset board command. 4. Issue the release board command. 5. Issue the test board long command. This should reestablish the linkage between the internal ID and the port. If this is not the case, dispatch to check to ensure that there is a valid circuit pack inserted.

Station Status and Translation Audits and Updates Test (#36)

This test updates the analog port's translations (such as station type, dial type, network connection) with information kept in the software. The software is updated with the switchhook state reported by the port processor. When the ringer is in the off state, this test also turns off the station's ringer to prevent constant ringing caused by defective hardware.

Table 8-12. Station Status and Translation Audits and Updates Test #36

Error Code	Test Result	Description Recommendation
None	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to fail, escalate the problem.
1004	ABORT	System resources required to run this test are not available. The port may be busy with a valid call. Use the display port UUCSSpp command to determine the station extension. Use the status station command to determine the service state of the port. If the service state indicates that the port is in use, the port is unavailable for certain tests. You must wait until the port is idle before retesting. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to fail, escalate the problem.
1005	ABORT	This code indicates that this test is not applicable in the current configuration. This code is provided if the analog port is used in a combined modem pool. This error can be ignored.
1006	ABORT	This port has been busied out by command or taken out-of-service by the failure of the NPE Crosstalk Test. 1. Look in the Error Log for Error Type 18 (port busied out) for this port. If this error is present, release the port with the release station extension command and run the test again. 2. Look in the Error Log for Error Type 1025 (NPE Crosstalk Test failed) for this port. If this error is present, investigate the errors associated with the NPE Crosstalk Test (#6) first. 3. If the test continues to abort, escalate the problem.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to fail, escalate the problem.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to fail, escalate the problem.

Table 8-12. Station Status and Translation Audits and Updates Test #36

Error Code	Test Result	Description Recommendation
1	FAIL	This does not indicate a hardware problem. The switchhook audit failed, and the other updates were not performed because of this failure. This condition may occur when the audit is performed at the same time that the terminal equipment goes off-hook. Use the status station command to determine when the port is available for testing. 1. When the port becomes available for testing, retry the command at one-minute intervals a maximum of five times. 2. If the test continues to fail, escalate the problem.
5	FAIL	This does not indicate a hardware problem, but it may indicate an internal software error. The message waiting lamp update failed. The translation and ringer updates were not performed because of this failure. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to fail, escalate the problem.
7	FAIL	The translation update failed. The ringer update was not performed because of this failure. This does not indicate a hardware problem, but it may be an internal software error.
8	FAIL	This does not indicate a hardware problem, but it may be an internal software error. The ringer update failed.
None	PASS	The software and the port processor have the same status. User-reported troubles on this port should be investigated by using other port tests, by examining station wiring, by examining the station, and by ensuring that the terminal is correctly translated as off-premises or on-premises.
0	NO BOARD	The test could not relate the interval ID to the port (no board). This could be due to incorrect translations or because no circuit pack is inserted, an incorrect circuit pack is inserted, or an insane circuit pack is inserted. 1. Check to ensure that the circuit pack translations are correct. Use the list configuration command, and resolve any problems that are found. 2. If the circuit pack was found to be incorrectly inserted in Step 1, issue the busyout board command. 3. Issue the reset board command. 4. Issue the release board command. 5. Issue the test board long command. This should reestablish the linkage between the internal ID and the port. If this is not the case, dispatch to check to ensure that there is a valid circuit pack inserted.

Loop-Around and Conference Test (#47)

Each Analog Port consists of the following:

- Network Processing Element (NPE) for port connectivity and gain, and conferencing functionality
- Codec, which converts the digital signals of the TDM Bus to analog signals
- Battery feed chip, which provides power to the telephone set for signaling, dial pulsing, transmission, and balance.

This test is designed to check the on-board transmission capabilities of the NPE, the codec, and the battery feed chip of the Analog Port. A Tone Detector and a Tone Generator talk and listen on the same pair of time slots as the Analog Port. The Analog Port is then instructed to go into loop-around mode. The test passes if the signal measured by the Tone Detector is within acceptable limits.

The Conference Circuit Test verifies that the NPE channel for the port being tested can correctly perform the conferencing function. Test #47 also tests the operation of the port conference circuits in the NPE for three and four parties. In addition, a test is run to measure noise. The NPE is instructed to listen to several different tones and to conference the tones together. The resulting signal is then measured by a Tone Detector port. If the level of the tone is within a certain range, the test passes.

The noise test is performed by filtering out the tone and then measuring inherent port noise.

This test is sensitive to the length of the loop, the equipment in the loop, or the equipment terminating the loop, such as off-premises stations. If this test is

causing a false alarm, disable the test by changing the *Tests* field to **no** by using the **change station** command for this station.

Table 8-13. Loop-Around and Conference Test #47

Error Code	Test Result	Description Recommendation
None	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to fail, escalate the problem.
7	ABORT	The port was seized by a user for a valid call. 1. Enter display port PCSSpp to determine the station's extension. Enter status station extension to determine the service state of the port. If the port is in use, it is unavailable for certain tests. Wait until the port is idle before retesting. 2. When the port is idle, retry the command at one-minute intervals up to five times.
1000	ABORT	System resources required to run this test are not available. The port may be busy with a valid call. 1. Enter display port UUCSSpp to determine the station's extension. Enter status station extension to determine the service state of the port. If the port is in use, it is unavailable for certain tests. Wait until the port is idle before retesting. 2. When the port is idle, retry the command at one-minute intervals up to five times. 3. If the test continues to abort, escalate the problem.
1002	ABORT	The system could not allocate time slots for the test. The system may be under heavy traffic conditions or it may have time slots out-of-service due to TDM-BUS errors. Refer to TDM-BUS (TDM Bus) Maintenance documentation to diagnose any active TDM-BUS errors. 1. If system has no TDM-BUS errors and is not handling heavy traffic, repeat test at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
1003	ABORT	The system could not allocate a tone receiver for the test. The system may be oversized for the number of Tone Detectors present, or some Tone Detectors may be out-of-service. 1. Look for TTR-LEV errors in the Error Log. If present, refer to TTR-LEV (TTR Level) Maintenance documentation. 2. Look for TONE-PT errors in the Error Log. If present, refer to TONE-PT (Tone Generator) Maintenance documentation. 3. If neither condition exists, retry the test at one-minute intervals a maximum of five times. If the test continues to abort, escalate the problem.

Table 8-13. Loop-Around and Conference Test #47

Error Code	Test Result	Description Recommendation
1004	ABORT	The port has been seized for a valid call during the conference or noise test. 1. When the port is available for testing, retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort and the port is not in use, escalate the problem.
1005	ABORT	This code indicates that this test is not applicable in the current configuration. This code is displayed if the analog port is used in a combined modem pool.
1018	ABORT	Test disabled via administration. To enable the test for a particular station, enter change station extension and set the Test? field on the Station Form to y.
1392	ABORT	This port is currently a TTI port, and the test does not execute on it. 1. Verify that the port is a TTI port using either the display port command (the display shows that the port is a TTI port) or the list config command (the display shows a t for the port). 2. If either list config or display port indicates that the port is not a TTI port, escalate the problem. If both commands indicate that the port is a TTI port, the abort is correct for the test, and no action is necessary.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
2100	ABORT	Could not allocate the necessary system resources to run this test.
7	FAIL	The Conference Test or the Noise Test failed. This causes noisy or unreliable connections. Other users calling this port may hear an echo. 1. Disconnect the terminal equipment from the circuit pack at the cross-connect and run the test again. 2. If the test fails again, replace the circuit pack and reconnect the terminal equipment. If, however, the test passes the second time, the terminal equipment connected to the port affected the test results; in this case, if all other tests pass or abort, and if the station is operating properly, ignore the results of test #47. Failures of test #47 do not cause an alarm. However, if other tests fail, investigate those errors. User-reported troubles with this port should be investigated by using other port tests, by examining station wiring, and by examining the station to ensure that it is correctly translated as off-premises or on-premises.
13	FAIL	The reflective loop-around with gain set to low, and the 600-ohm balance failed. This causes noisy or unreliable connections.
14	FAIL	The reflective loop-around with gain set to high and the RC balance failed. This causes noisy or unreliable connections.

Table 8-13. Loop-Around and Conference Test #47

Error Code	Test Result	Description Recommendation
15	FAIL	The non-reflective Loop-Around Test failed. Other users calling this port may hear an echo. See the preceding procedure for a failure with error code 7. NOTE: If the Reflective Loop-Around Test fails for all ports on a circuit pack, a -5 volt power problem is indicated. In particular, the WP91153-L3, 631DB1, or 645B1, or 676B power unit may be defective. (The 631DB1 power unit is used in a medium cabinet powered by an AC source. The 645B power source is used in a medium cabinet powered by a DC power source.) The WP91153-L3 power source is used in an SCC cabinet powered by an AC power source. A 646B power source is used in an SCC cabinet powered by a DC power source.
None	PASS	The port is able to provide an analog transmission path to the station equipment. User-reported troubles on this port should be investigated by using other port tests, by examining station wiring, by examining the station, and by ensuring that the terminal is correctly translated as off-premises or on-premises.
0	NO BOARD	The test could not relate the interval ID to the port (no board). This could be due to incorrect translations or because no circuit pack is inserted, an incorrect circuit pack is inserted, or an insane circuit pack is inserted. 1. Check to ensure that the circuit pack translations are correct. Use the list configuration command, and resolve any problems that are found. 2. If the circuit pack was found to be incorrectly inserted in Step 1, issue the busyout board command. 3. Issue the reset board command. 4. Issue the release board command. 5. Issue the test board long command. This should reestablish the linkage between the internal ID and the port. If this is not the case, dispatch to check to ensure that there is a valid circuit pack inserted.

Station Present (Ringing Application) Test (#48)

This test provides a burst of ringing current to the terminal equipment, and it detects that current flows. This test is to ascertain whether or not terminal equipment is connected to the port.

This test may cause some terminal equipment to ring briefly during daily maintenance. If this ringing is disturbing the customer or the terminal equipment, it should be disabled using the *Tests* field of the station administration screen.

However, on some releases of the software, this action disables tests #6, #47, #35, and #48.

Table 8-14. Station Present (Ringing Application) Test #48

Error Code	Test Result	Description Recommendation
None	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to fail, escalate the problem.
1000	ABORT	System resources required to run this test are not available. The port may be busy with a valid call. 1. Enter display port UUCSSpp to determine the station's extension. Enter status station extension to determine the service state of the port. If the port is in use, it is unavailable for certain tests. Wait until the port is idle before retesting. 2. When the port is idle, retry the command at one-minute intervals a maximum of five times. 3. If the test continues to abort, escalate the problem.
1004	ABORT	System resources required to run this test are not available. The port may be busy with a valid call. Use the display port UUCSSpp command to determine the station extension. Use the status station command to determine the service state of the port. If the service state indicates that the port is in use, the port is unavailable for certain tests. You must wait until the port is idle before retesting. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort and the port is not in use, escalate the problem.
1005	ABORT	This code indicates that this test is not applicable in the current configuration. This code is displayed if the analog port is used in a combined modem pool.
1008	ABORT	Could not allocate a ringing circuit for one of the following reasons: all the ringing circuits are in use, the ringing generator is defective, or the generator it is not wired correctly. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, look for RING-GEN errors in the Error Log. If an ABORT 1008 occurs for test #48 on other circuit packs as well, the ringing generator may be defective or not wired correctly. If it does not occur on other ports, that circuit pack is currently using all four ringing phases.
1018	ABORT	Test disabled via administration. To enable the test for a particular station, enter change station extension and set the Test? field on the Station Form to y.

Table 8-14. Station Present (Ringing Application) Test #48

Error Code	Test Result	Description Recommendation
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
2100	ABORT	Could not allocate the necessary system resources to run this test.
None	FAIL	The terminal equipment is not connected to the circuit pack, or the ringing generator may have failed. Some terminal equipment such as modems may fail even when connected properly. 1. The set may be defective. Check it and replace if necessary. 2. Check all of the wiring between the station equipment and the switch. Then run the test again. 3. If the test fails again, look for RING-GEN errors in the Error Log. If present, refer to the RING-GEN section. If no RING-GEN errors are present, disable the test using the change station extension command and entering n for the Test field. Note that this action will also disable tests #6, 7, 161, and 35 on this port.
	PASS	The station is connected properly to the switch. This test may also pass if no terminal equipment is connected and the terminal is located very far from the switch. User-reported troubles on this port should be investigated by using other port tests, by examining station wiring, or by examining the station.
0	NO BOARD	The test could not relate the interval ID to the port (no board). This could be due to incorrect translations or because no circuit pack is inserted, an incorrect circuit pack is inserted, or an insane circuit pack is inserted. 1. Check to ensure that the circuit pack translations are correct. Use the list configuration command, and resolve any problems that are found. 2. If the circuit pack was found to be incorrectly inserted in Step 1, issue the busyout board command. 3. Issue the reset board command. 4. Issue the release board command. 5. Issue the test board long command. This should reestablish the linkage between the internal ID and the port. If this is not the case, dispatch to check to ensure that there is a valid circuit pack inserted.

BRI-BD (ISDN-BRI Line Circuit Pack)

Alarm Level	Initial Craft Command to Run*
Major/Minor	test board PCSS l
Warning	test board PCSS sh

* Where P is *1*; C is the carrier designation (*A, B, C, D,* or *E*); and SS is the address of the slot in the carrier where the circuit pack is located (*01, 02,* ... etc.).

NOTE:
Some of the information in this section is reserved for future use.

CAUTION:
A detailed flowchart for isolating and resolving Packet Bus faults is included in Chapter 9, "Packet Bus Fault Isolation and Correction". This flowchart, along with the other information presented in the chapter, can help in resolving problems that involve more than a single station or circuit pack. Whenever the repair procedures for this Maintenance Object refer to Packet Bus and/or Packet Control maintenance, be sure to reference Chapter 9, "Packet Bus Fault Isolation and Correction", in addition to the relevant MO documentation.

ISDN-BRI Line is a packet port circuit pack that provides access to ISDN-BRI endpoints. The ISDN-BRI Line circuit pack supports 12 ports, each of which provides access to ISDN stations. Voice and circuit-switched data from the ISDN stations are carried on the Time Division Multiplex (TDM) Bus. Signaling is carried over the Packet Bus.

LEDS

The ISDN-BRI Line circuit pack performs extensive initialization tests and lights both the red and green LEDS during the initialization testing. See Chapter 7, "LED Interpretation" for more details on circuit pack status LEDs.

Hardware Error Log Entries

Table 8-15. BRI-BD Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	test board PCSS sh r 1
	Run the Short Test Sequence first. If all tests pass, run the Long Test Sequence. Refer to the appropriate test description and follow the recommended procedures				
1	Any	None	Minor	On	test board PCSS sh r 1
	The circuit pack totally stopped functioning or it was physically removed from the system. (The alarm is logged approximately 11 minutes after the circuit pack has been removed and/or SAKI Sanity Test [#53] fails.) If the circuit pack is not in the system, insert a circuit pack (in the same slot as the error indicates) to resolve this error. Or, if the circuit pack is in the system and the red LED is on, then follow the instructions for ‘‘Red (alarm)’’ in the ‘‘Control and Port Circuit Pack Status LEDs’’ section in Chapter 7Chapter ‘‘LED Interpretation.’’ (Also, refer to the ‘‘Handling Common Port Circuit Packs’’ section in Chapter 5", ‘‘Routine Maintenance Procedures.’’)				
18	0	None	Warning	Off	release board PCSS
	This circuit pack has been busied out via the busyout board PCSS command.				
23	0	None	Warning	Off	release board PCSS
	Port(s) has(have) been administered on this circuit pack but the circuit pack is not physically present.				
257	65535	#52	Minor	On	test board PCSS r 20
	This error indicates transient communication problems between the switch and this circuit pack. Execute the test board PCSS command and refer to the repair procedures for the Control Channel Loop-Around Test (#52).				
513	4352 to 4357				
	An on-board hardware failure has been detected by the circuit pack.The reported aux data values correspond to the following detected errors: 4352— external RAM error; 4353— internal RAM error; 4355— ROM Checksum error; 4357— Instruction set error. Reset the circuit pack by executing the busyout board PCSS and reset board PCSS commands. When it is reset, the circuit pack executes a set of tests to detect the presence of any of the above faults. The detection of one of these errors during initialization causes the circuit pack to lock-up and appear insane to the system. See the repair procedure for error type 1				

Table 8-15. BRI-BD Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
769	4358				
	This error is reported by the circuit pack when it detects a program logic error. While no action is required, this error may lead to errors of other types being reported against this circuit pack.				
1025	4363	#50			
	This error is reported by the circuit pack when it cannot update NPE memory and read it back. This error type can be ignored, but it may lead to errors of other types being reported against this circuit pack.				
1293 to 1294	46088	#534	Minor	On	
	A critical hardware failure has been detected on the circuit pack. Reset the circuit pack via the busyout board PCSS and reset board PCSS commands. If the Circuit Pack Restart Test (#594) passes, then the on-board circuitry is healthy. Retire the alarm via the test board PCSS long clear command. If the Circuit Pack Restart Test (#594) fails, replace the circuit pack. The reported error types correspond to the following detected errors: 1293— on-board auxiliary processor insane; 1294— internal memory access error.				
1537 to 1538	46082		Minor	On	
	These error types are reported when the following errors are detected: 1537— Frame overrun at Packet Bus interface. This condition may be caused by an on-board fault or by faulty data received on one of the circuit pack's external ports. If any of the ports on this circuit pack are alarmed, refer to the repair procedures for those maintenance objects; 1538—Circuit packet is hyperactive; that is, it is flooding the switch with messages sent over the control channel. The circuit pack is taken out-of-service when a threshold number of these errors is reported to the switch. Clear the alarm via the following commands: busyout board PCSS, reset board PCSS, test board PCSS long clear, release board PCSS. If the error recurs within 10 minutes, replace the circuit pack.				
1793	46080		Minor		
	These errors indicate that the circuit pack is having problems transmitting data to the Packet Bus Parity errors are detected when transmitting data to the Packet Bus.				
1794	46094		Minor		
	These errors indicate that the circuit pack is having problems transmitting data to the Packet Bus Overflow of Packet Bus transmit buffers has occurred.				
1795	46085		Minor		
	These errors indicate that the circuit pack is having problems transmitting data to the Packet Bus Circuit pack cannot find end of frame when transmitting to Packet Bus. Clear the alarm via the following commands: **busyout board PCSS**, **reset board PCSS**, **test board PCSS long clear**, **release board PCSS**. If the error recurs within 10 minutes, then replace the circuit pack.				

Table 8-15. BRI-BD Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
2306		#595			
	These errors indicate that the circuit pack is having problems transmitting data to the Packet Bus This error occurs when the circuit pack detects an error in a received frame from the packet bus. These errors are most likely caused by a packet bus problem, but may be due to a circuit pack fault. An invalid Link Access Procedure Data (LAPD) frame error occurs if the frame contains a bad Cyclical Redundancy Checking (CRC), is greater than the maximum length, or violates the link level protocol. When bus parity errors are reported, the LANBIC Receive Parity Error Counter Test (#595) should be performed to determine if the condition had cleared. Refer to the PKT-BUS Maintenance documentation to determine if the problem is isolated to this circuit pack or if the problem is caused by Packet Bus faults.				
3330	46083		Minor	On	
	A critical failure has been detected in the Packet Bus interface of the circuit pack. This failure may be due to an on-board fault or a Packet Bus fault. If the Packet Bus is alarmed, refer to the PKT-BUS Maintenance documentation for recommended repair procedures. If the Packet Bus is not alarmed, reset the circuit pack via the busyout board PCSS and reset board PCSS commands. If the Circuit Pack Restart Test (#594) passes, then the on-board circuitry is healthy. Retire the alarm via the test board PCSS long clear command. If the Circuit Pack Restart Test (#594) fails, replace the circuit pack. If the problem persists and if this is the only ISDN-BRI circuit pack in the port network, again refer to PKT-BUS Maintenance documentation and follow the recommended maintenance procedure.				
3840	4096 -to 4101				
	These errors are not service-affecting. No action is required. These errors are reported by the circuit pack when it receives a bad control channel message from the switch. The auxiliary data identifies the following error events: 4096-Bad Major heading 4097-Bad port number 4098-Bad data 4099-Bad sub-qualifier 4100-State inconsistency 4101-Inconsistent downlink message				
3843	46097				
	This error is not service-affecting. No action is required Bad translation RAM detected, but call continues by using another translation location.				

Table 8-15. BRI-BD Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
3999	Any	None			
	Indicates that the circuit pack sent a large number of control channel messages to the MCU within a short period of time. If error type 1538 is also present, the circuit pack was taken out of service due to hyperactivity. If error type 1538 is not present, the circuit pack has not been taken out of service, but it has generated 50% of the messages necessary to be considered hyperactive. This may be completely normal during heavy traffic periods. However, if this error type is logged when the circuit pack is being lightly used, it may indicate a problem with the circuit pack of the equipment attached to it.				

Craft-Demanded Tests

Always investigate tests in the order presented in the following tables when inspecting errors in the system. By clearing error codes associated with the *Control Channel Loop-Around Test,* for example, you may also clear errors generated from other tests in the testing sequence.

System Technician-Demanded Tests: BRI-BD

Table 8-16. System Technician-Demanded Tests: BRI-BD

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Control Channel Loop-Around Test (#52)	Short	Long	No
NPE Audit Test (#50)	Long		No
LANBIC Receive Parity Error Counter Test (#595)	Long		No

NPE Audit Test (#50)

Refer to the repair procedure described in the XXX-BD (Common Port Circuit Pack) Maintenance documentation as NPE Audit Test (#50).

Control Channel Loop-Around Test (#52)

Refer to the repair procedure described in the XXX-BD (Common Port Circuit Pack) Maintenance documentation as Control Channel Loop-Around Test (#52).

SAKI Sanity Test (#53)

Refer to the repair procedure described in the XXX-BD (Common Port Circuit Pack) Maintenance documentation as SAKI Sanity Test (#53).

LANBIC Receive Parity Error Counter Test (#595)

This test is destructive.

The test reads and clears the LANBIC Receive Parity Error Counter on the circuit pack. This counter is incremented by the circuit pack when it detects a parity error in data received from the Packet Bus.

These errors may be indicative of a circuit pack problem, Packet Bus problem, or a problem with another circuit pack on the bus. This test is useful for verifying the repair of the problem.

Table 8-17. LANBIC Receive Parity Error Counter Test #595

Error Code	Test Result	Description Recommendation
2000	ABORT	Response to the test was not received from the circuit pack within the allowable time period. 1. If the test aborts repeatedly a maximum of five times, reset the circuit pack via the busyout board PCSS and reset board PCSS commands. 2. If the test aborts again, replace the circuit pack.
2012	ABORT	Internal system error. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to fail, escalate the problem.
2100	ABORT	Could not allocate the necessary system resources to run this test.
1 to 10	FAIL	The circuit pack is still detecting errors of this type. The error code indicates the value of the on-board error counter. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to fail, verify the validity of the Packet Bus. Run the Packet Bus maintenance test with the test pkt P long command. If any Packet Bus tests fail, refer to the PKT-BUS (Packet Bus) Maintenance documentation for recommended repair procedures. 3. If the Packet Bus test passes, check the validity of the circuit pack. Execute a test that involves data transmission onto the Packet Bus. For example, the BRI may use the connectivity tests of the port-level maintenance object (BRI-PORT) by executing the test port PCSSpp command. Refer to the repair procedures for the executed test if it fails. Otherwise, proceed to the next step. 4. Other circuit packs on the Packet Bus may be the cause of the parity error. Use the display errors command to check the Error Log for other circuit packs that are alarmed. If any alarms are present for the other circuit packs, retire those alarms also. Then, rerun the LANBIC Receive Parity Error Counter Test (#595) on this circuit pack.
-	PASS	No errors detected by circuit pack.

BRI-DAT (ISDN-BRI)

Alarm Level	Initial Craft Command to Run
Warning	test data-module

Refer to BRI-SET (ISDN-BRI Set) Maintenance documentation.

BRI-PORT (ISDN-BRI Port)

Alarm Level	Initial Craft Command to Run*
Minor	test port PCSSpp l
Warning	test port PCSSpp sh

* Where P is *1*; C is the carrier designation (*A, B, C, D,* or *E*); and SS is the address of the slot in the carrier where the circuit pack is located (*01, 02,* ... etc.); and pp is the 2-digit port number (for example, *01*).

NOTE:
Some of the information in this section is reserved for future use.

CAUTION:
A detailed flowchart for isolating and resolving Packet Bus faults is included in Chapter 9, "Packet Bus Fault Isolation and Correction". This flowchart, along with the other information presented in the chapter, can help in resolving problems that involve more than a single station or circuit pack. Whenever the repair procedures for this Maintenance Object refer to Packet Bus and/or Packet Control maintenance, be sure to reference Chapter 9, "Packet Bus Fault Isolation and Correction" in addition to the relevant MO documentation.

WARNING:
If a significant Packet Bus failure occurs, errors and alarms may not be logged as expected for BRI-PORT. Conditions under which this occurs are detailed in the "Packet Bus Maintenance" section of Chapter 9, "Packet Bus Fault Isolation and Correction"'.

The TN556 ISDN-BRI Line circuit pack provides the MCU with the interface to ISDN-BRI endpoints. The circuit pack contains 12 ports of line circuit interface, each of which operates at 192 kbps with two B-channels (referred to as B1 and B2 throughout this section) and one D-channel as specified in the Avaya ISDN-BRI Specification. In this context, the term ‘‘ISDN-BRI port’’ is used to refer collectively to ports on the TN556 circuit pack that are connected to BRI endpoints.

For BRI endpoints, each B-channel may support voice or circuit-switched data and may be circuit-switched simultaneously. The D-channel is used for conveying signaling between the switch and one or more BRI endpoint(s). Each ISDN-BRI D-channel is connected to the switch processor and the ISDN-BRI port through the Packet Control circuit pack and the Packet Bus.

ISDN-BRI endpoints are available in various configurations. All endpoints require the D-channel to convey signaling information to the switch. Only one B-channel is required for a voice-only set or a stand-alone data module (BRI-DAT). A voice and data-capable set requires both B-channels (one for voice and one for data). Therefore, each TN556 port can support either two voice-only sets, two stand-alone data modules (BRI-DAT), or one voice and data-capable set

The following figure illustrates the physical connection (solid line) between an ISDN-BRI Port and its associated ISDN-BRI set(s). Each physical connection allows for two B-channels and one D-channel. Each ISDN-BRI circuit pack can support up to 12 of these *physical* connections to different voice and voice/data sets.

This section covers the maintenance documentation for ISDN-BRI ports. Some of the results of maintenance testing of ISDN-BRI ports may be affected by the health of the ISDN-BRI Line circuit pack (BRI-BD) or BRI endpoint (BRI-SET). These interactions should be kept in mind when investigating the cause of ISDN-BRI port problems. For more information on the circuit pack and endpoints, refer to the BRI-BD (ISDN-BRI Line Circuit Pack) Maintenance documentation and the BRI-SET (ISDN-BRI Endpoint) Maintenance documentation.

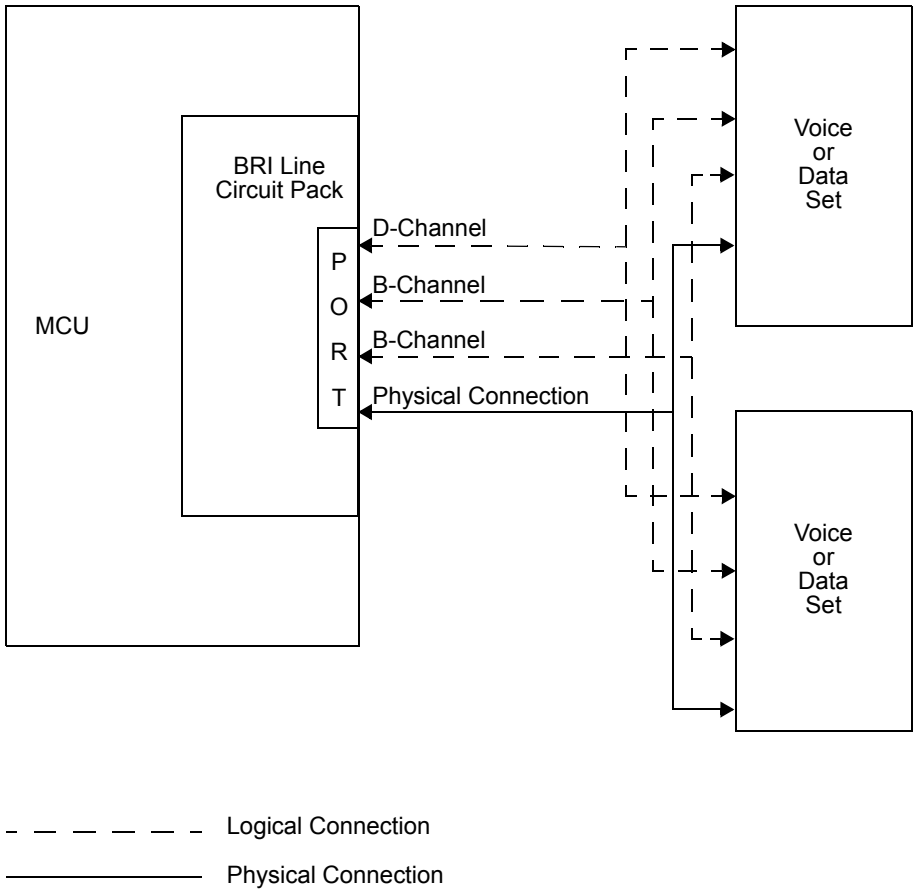


Figure 8-2. ISDN-BRI Port Interactions

Hardware Error Log Entries

Table 8-18. ISDN-BRI Port Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value
0	0	Any	Any	Any	test port PCSSpp sh r 1
	Run the Short Test Sequence first. If all tests pass, run the Long Test Sequence. Refer to the appropriate test description and follow the recommended procedures.				
1		#621	Warning	Off	test port PCSSpp sh r 2
	This error occurs when the Level 1 Status Inquiry fails or when the BRI circuit pack detects that Level 1 has been deactivated on the port. The Aux Data field contains one of the following values: ■ blank—this indicates that the Level 1 Status Inquiry failed. ■ 32773—this is a message from the BRI-LINE circuit pack indicating Level 1 has been deactivated. Major and Minor alarms on this MO may be downgraded to Warning on alarms based on the value used in the **set options** command.				
18			Warning	Off	release port PCSSpp
130			Warning	On	test port PCSS sh
	Circuit pack has been removed or has been insane for more than 11 minutes. To clear the error, replace or reinsert the circuit pack.				
257		#622	Warning	Off	test port PCSSpp sh r 1
	This error occurs when the EPF Status Inquiry fails due to an over-current condition or when the BRI-LINE circuit pack detects that the EPF is in an over-current condition. The aux data field contains one of the following values: ■ blank—this indicates that the EPF Status Inquiry failed due to an overcurrent condition. ■ 40988—this indicates that the BRI-LINE circuit pack has detected an over-current condition and has turned the EPF off. Execute the Short Test Sequence and see the repair procedures for Test #622. Major and Minor alarms on this MO may be downgraded to Warning on alarms based on the value used in the **set options** command.				

Table 8-18. ISDN-BRI Port Error Log Entries — *Continued*

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value
513	46222	none	Minor/Warning†	On	
	This error indicates that the circuit pack is having problems transmitting data to the Packet Bus, thus affecting the conveyance of signaling information over the D-channel. Specifically, this error occurs when the Packet Bus transmit buffers overflow. This condition probably indicates a hardware problem. The BRI-PORT Alarm Level for the error with Aux Data 46222 is “Minimum/Warning.” With Aux Data 0, this error occurs whenever the Packet Bus transmit FIFO buffers overflow. This condition can be caused by an on-board hardware problem as well as by problems on the Packet Bus that disrupt the BRI circuit pack’s ability to transmit data onto the Packet Bus. Use troubleshooting procedures for both on-board hardware problems and potential off-board Packet Bus problems. See the PKT-BUS MO section in this chapter as well as Chapter 9, “Packet Bus Fault Isolation and Correction” for more details on Packet Bus troubleshooting procedures. The BRI-PORT Alarm Level for the error with Aux Data 0 is “Minor.”				
769	0	none	Warning	Off	
	This error occurs when the NPE Crosstalk Test (#617) fails. Run the Long Test Sequence and pay particular attention to the results of Test #617.				
1281		#617	Minor/Warning†	On	test port PCSSpp l r 2
	This error occurs when broadcast signaling links associated with this port have too much link establishment related traffic. This could occur if an endpoint on this port is sending link establishment traffic on a port level broadcast link or if there are Level 1 problems on the port. Check the error logs for Level 1 errors. If Level 1 problems exist, follow the repair procedures listed for test #621. Software will suspend activity to this port for 75 minutes when the port is alarmed due to this error. If this problem persists, replace the endpoint or endpoints associated with this port. If replacing the endpoints does not fix the problem, follow normal escalation procedures.				
1537	46210	#623	Warning	Off	
	This error occurs when the port receives an invalid frame over the D-channel. When CRC errors exceed five within 15 minutes, the port is taken out of service for five seconds. If five more CRC errors are received within 15 minutes of the first set of five errors, the port is taken out of service for one minute. If five more CRC errors are received within 15 minutes of the last five, the port is taken out of service for 15 minutes. This error is most likely due to a problem with the wiring to the set or adjunct, interference on the wiring due to a noise source, or no termination (an open circuit). It usually does not indicate a problem with the circuit pack. ■ Check the wiring to the endpoints or the adjunct. ■ If the problem persists, replace the endpoints or adjuncts, or escalate the problem. Major and Minor alarms on this MO may be downgraded to Warning on alarms based on the value used in the **set options** command.				

Table 8-18. ISDN-BRI Port Error Log Entries — *Continued*

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value
1793		#619	Minor/Warning†	On	test port PCSSpp l r 2
	BRI Port Local TDM Loop-Around Test (#619) failed. Run the Long Test Sequence and pay particular attention to the results of Test #619. There are no Test to Clear Values for the following error types. The error types are simply provided as additional data that may prove useful while troubleshooting.				
3841	46208	None			
	This error occurs when a Layer 1 Transmission error is detected for the port. Run the Long Test Sequence and pay particular attention to the results of the Layer 1 Transmission Error Counter Test (#624).				
3842	0	None			
	A BRI port supports up to three Terminal Endpoint Identifiers (TEIs). This error occurs when the switch receives a request for a fourth TEI on a port. Check the number of endpoints administered for this port.				
3843	0	None			
	This error occurs when an SPID initialization request is made from an endpoint and the switch determines that the SPID value is invalid or is a duplicate of another SPID that is already initialized at Layer 3 on the port. Check the administration of the endpoints.				
3844	46223	None			
	This error occurs when the circuit pack detects an overflow of its receive buffers. Run the Long Test Sequence and pay particular attention to the results of the Receive First In First Out (FIFO) Overflow Error Counter Test (#625).				
3845		None			
	This error occurs when the BRI Port Local LAN Loop-Around Test (#618) fails. Run the Long Test Sequence and pay particular attention to the results of Test #618.				
3847	0	None			
	Indicates that sets on the port do not support Layer 3 initialization. Consult the Service Set documentation.				

Craft-Demanded Tests

Always investigate tests in the order presented in the following tables when inspecting errors in the system. By clearing error codes associated with the *NPE Crosstalk Test*, for example, you may also clear errors generated from other tests in the testing sequence.

Table 8-19. System Technician-Demanded Tests: BRI-PORT

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
NPE Crosstalk Test (#617)	Long		Yes
BRI Port Local LAN Loop-Around Test (#618)	Long		Yes
BRI Port Local TDM Loop-Around Test (#619)	Long		Yes
Electronic Power Feed Restoral Test (#620)	Short	Long	No
Level 1 Status Inquiry Test (#621)	Short	Long	No
Electronic Power Feed Inquiry Test (#622)	Short	Long	No
CRC Error Counter Test (#623)	Long		No
Layer 1 Transmission Error Counter Test (#624)	Long		No
Receive FIFO Overflow Error Counter Test (#625)	Long		No
Clear Error Counters (#270)	Short	Long	No

NPE Crosstalk Test (#617)

This test is destructive.

One or more NPEs reside on each circuit pack with a TDM Bus interface. The NPE controls port connectivity and gain, and provides conferencing functions on a per-port basis. The NPE Crosstalk Test verifies that this port's NPE channel talks on the selected time slot and never crosses over to time slots reserved for other connections. If the NPE is not working correctly, one-way and noisy connections may be observed. This test is part of a port's Long Test Sequence and takes approximately 20 to 30 seconds to complete. Crosstalk testing is performed on both B-channels (B1 and B2) associated with a BRI port. If this test fails on either channel, any endpoints connected to the port are taken out-of-service.

Table 8-20. NPE Crosstalk Test #617

Error Code	Test Result	Description Recommendation
1000	ABORT	System resources required to run this test are not available. The port may be busy with a valid call. Use the display port PCSSpp command to determine the station extension or trunk group/member number of the port. Use the status bri-port PCSSpp command to determine the service state of the port. If the service state indicates that the port is in use, then the port is unavailable for certain tests. Wait until the port is idle before retesting. 1. If the port status is idle, retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
1004	ABORT	The port has been seized by a user for a valid call. Use the status station command for the station associated with this port and determine when the port is available for testing. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort and the port is not in use, escalate the problem.
1005	ABORT	This test is not valid for this type of translation. Ports administered as“ASAI” or “ADJK” cannot run this test, because the B channels associated with the port are not used by ASAI or Avaya Adjunct Links. This is a normal condition.
2012	ABORT	Internal system error
2100	ABORT	Could not allocate the necessary resources to run this test. 1. Retry the command at 1-minute intervals a maximum of 5 times.
1 , 2	FAIL	The NPE of the tested port was found to be transmitting in error. This causes noisy and unreliable connections. NPE Crosstalk Test failed on Channel B1. 1. Replace the circuit pack.
None	PASS	The port is correctly using its allocated time slots. 1. To be sure that this is not an intermittent problem, repeat this test a maximum of 10 times to make sure it continues to pass. 2. If complaints still exist, examine the station, connections, and wiring.

BRI Port LAN Loop-Around Test (#618)

This test is destructive.

This test, which verifies the connectivity of a BRI port across the LAN Bus, executes only if the port is out-of-service. The test aborts if calls associated with the port are in-progress. Failures of this test indicate either on-board faults associated with the BRI-PORT hardware on the circuit pack, or problems with the LAN Bus, which is used to form connectivity between the switch and the BRI-PORT.

The dotted lines in the following figure show how a Loop-Around Test is performed across the Packet Bus for the D-channel.

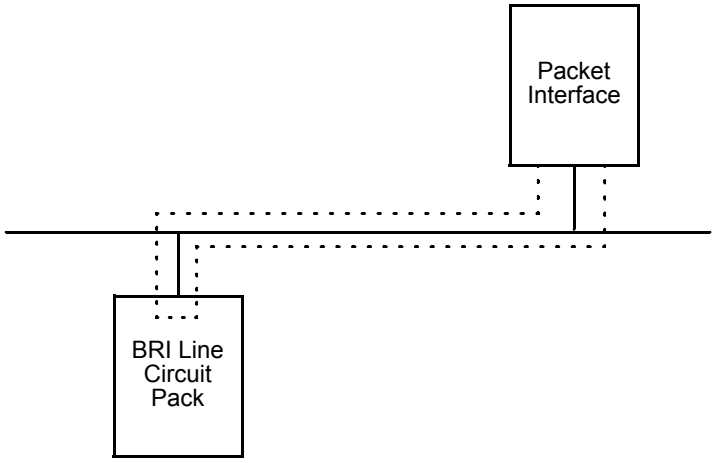


Figure 8-3. Path of the BRI Port LAN Loop-Around

Table 8-21. BRI Port LAN Loop-Around Test #618

Error Code	Test Result	Description Recommendation
1015	ABORT	The port is not in the out-of-service service state. 1) Display the BRI Port Status form via the status bri-port PCSSpp command to determine which stations or adjuncts are on this port. 2) Use the extension shown on this form in the status station command to determine if the station or adjunct is in use. 3) If it is in use, wait until it is idle, and then busyout the port (using the busyout port PCSSpp command) to place it in the out-of-service state and repeat this test. **⚠ CAUTION:** *Since the "busyout" command is destructive, execution of this command prior to the port being idle causes all calls associated with BRI endpoints to be torn down.*
1139	ABORT	The Packet Bus is out of service. 1) Follow the repair procedures for the Packet Bus. 2) After completing Step 1, execute the test port long PCSSpp command, and review the results of the BRI Port Local LAN Loop-Around Test to verify the repair.
1141	ABORT	The PKT-CTRL is out of service. 1) Follow the repair procedures for the PKT-CTRL. 2) After completing Step 1, execute the test port long PCSSpp command, and review the results of the BRI Port Local LAN Loop-Around Test to verify the repair.
1144	ABORT	The Packet Bus is out of service. 1) Follow the repair procedures for the Packet Bus. 2) After completing Step 1, execute the test port long PCSSpp command, and review the results of the BRI Port Local LAN Loop-Around Test to verify the repair.
2012	ABORT	Internal system error.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1) Retry the command at one-minute intervals a maximum of five times. 2) If the test continues to abort, escalate the problem.

Table 8-21. BRI Port LAN Loop-Around Test #618

Error Code	Test Result	Description Recommendation
Error Code	**Test Result**	**Description Recommendation**
None	FAIL	The Loop-Around Test has failed. 1) If the test fails repeatedly, attempt to reset the circuit pack if the other ports on the board are not in use. Reset the circuit pack by issuing the busyout board PCSS and the reset board PCSS commands. 2) If the test fails again, execute test pkt P on the MCU-MT. If this fails, follow failure procedures in PKT-BUS section. 3) If tests executed in Step 2 pass, the problem is local to the BRI circuit pack. Replace the circuit pack.
	PASS	The BRI Port Local LAN Loop-Around Test has passed.

BRI Port Local TDM Loop-Around Test (#619)

This test is destructive.

This test verifies the connectivity of a BRI port across the TDM Bus. It aborts if calls associated with the port are in progress. Failure of this test indicates an on-board fault associated with the port hardware on the circuit pack.

This Loop-Around Test runs a series of individual tests on the two B-channels (B1 and B2) associated with the port. It is a collection of the following:

- A Loop-Around Test across the TDM Bus for B1.
- A Conference Circuit Test for B1.
- A Loop-Around Test across the TDM Bus for B2.
- A Conference Circuit Test for B2.

The tests are run in the above order. If one fails, the remaining tests in the sequence are not executed. An error code is returned at that point.

The dotted lines in the following figure show how a Loop-Around Test is performed for the B-channels.

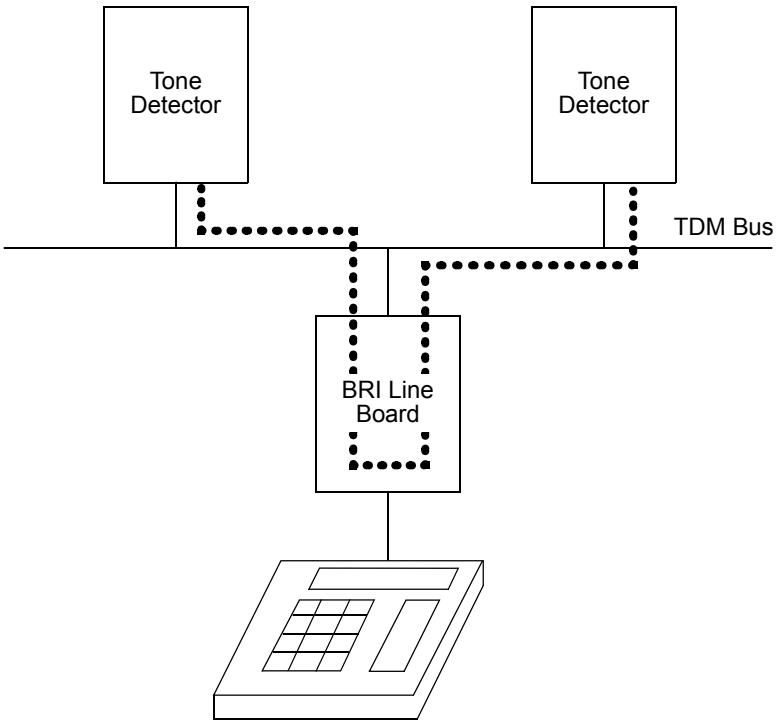


Figure 8-4. Path of the BRI Port Local TDM Loop-Around

Table 8-22. BRI Port Local TDM Loop-Around Test #619

Error Code	Test Result	Description Recommendation
1000	ABORT	System resources required to run this test are not available. The port may be busy with a valid call. Use the display port PCSSpp command to determine the station extension or trunk group/member number of the port. Use the status bri-port PCSSpp command to determine the service state of the port. If the service state indicates that the port is in use, then the port is unavailable for certain tests. Wait until the port is idle before retesting. 1. If the port status is idle, then retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
1002	ABORT	The system could not allocate time slots for the test. The system may be under heavy traffic conditions or it may have time slots out-of-service due to TDM-BUS errors. Refer to TDM-BUS (TDM Bus) Maintenance documentation to diagnose any active TDM Bus errors. 1. If the system has no TDM-BUS errors and is not handling heavy traffic, repeat test at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
1003	ABORT	The system could not allocate a tone receiver for the test. The system may be oversized for the number of Tone Detectors present or some Tone Detectors may be out of service. 1. Look for TTR-LEV errors in the Error Log. If present, refer to TTR-LEV (TTR Level) Maintenance documentation. 2. Look for Tone-PT errors in the Error Log. If present, refer to Tone-PT (Tone Generator) Maintenance documentation. 3. If neither condition exists, retry the test at one-minute intervals a maximum of five times. 4) If the test continues to abort, escalate the problem.
1004	ABORT	The port has been seized by a user for a valid call. Use the status station command for the station associated with this port and determine when the port is available for testing. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort and the port is not in use, escalate the problem.
2000	ABORT	Response to the test was not received from the BRI-LINE circuit pack within the allowable time period. 1. If this result occurs repeatedly, attempt to reset the circuit pack if the other ports are not in use. Reset the circuit pack by issuing the busyout board PCSS and the reset board PCSS commands. 2. If this result occurs again, replace the circuit pack.

Table 8-22. BRI Port Local TDM Loop-Around Test #619

Error Code	Test Result	Description Recommendation
2012	ABORT	Internal system error.
2100	ABORT	Could not allocate the necessary resources to run this test. 1. If the port status is idle, then retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
2103	ABORT	The system could not make the conference connection for the test. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
1 , 2	FAIL	As stated previously, this test runs a TDM Loop-Around Test on each B-channel. This indicates that the loop-around failed on one of the channels. Error Code 1 indicates that the TDM Loop-Around Test failed on B1. Error Code 2 indicates that the TDM Loop-Around Test failed on B2. 1. If the test fails repeatedly, attempt to reset the circuit pack if the other ports on the circuit pack are not in use. Reset the circuit pack by issuing the busyout board PCSS and the reset board PCSS commands. 2. If the test fails again, replace the circuit pack.
7 , 8	FAIL	As stated previously, this test runs a Conference Circuit Test on each B-channel. A failure here indicates that one of these conference tests failed; Error Code 7 means that the test failed on B1; Error Code 8 means that the test failed on B2.
None	PASS	The BRI Port Local TDM Loop-Around Test has passed.

Electronic Power Feed Restoral Test (#620)

This test attempts to restore the Electronic Power Feed (EPF) on an ISDN-BRI port twice. In this test, the processor requests that the EPF be turned on for a given port. An attempt is made to turn on the power unit to the station or adjunct. If no current is being drawn by a station, this probably indicates that the station is not connected. No current being drawn by an adjunct is the normal condition. If an over-current condition is sensed (that is, too much current is being drawn), this condition may indicate a short in the wiring to the endpoint or adjunct. Depending on what condition is sensed, a message is returned stating that either the EPF was turned on successfully with no problems or that an over-current condition is sensed. This response is reported by the Electronic Power Feed Inquiry (#622), which follows in the testing sequence. EPF Restoral is attempted again by this test five seconds later.

Table 8-23. Electronic Power Feed Restoral Test #620

Error Code	Test Result	Description Recommendation
1005	ABORT	This test is not valid for this port type. The TN2208 does not have an electronic power feed, and the test will abort.
2012	ABORT	Internal system error. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
None	PASS	The EPF Test passed. The message to turn on the power feed to the station or the adjunct was successfully sent to the port. 1. Although this test should not return a fail result, after running this test, the Error Log should be checked for any entries with error type 257 to examine the real results of this test. 2. An error type of 257 in the Error Log indicates some problem with the power to the station or the adjunct. Check for a short in the wiring, a damaged jack, a defective voice terminal or adjunct, or an incorrect type of terminal.

Level 1 Status Inquiry Test (#621)

This test determines the state of the transmission facility of a BRI port at the physical layer (that is, Level 1). Level 1 can be in one of three possible states: Activated, Pending Activation, or Deactivated.

The Activated state is the correct state for an ISDN-BRI port. In this state, the Level 1 interface can communicate with the BRI endpoint administered on this port. This test passes if the state of Level 1 (L1) is Activated. This test also passes if software has taken this port out of service.

The Pending Activation state indicates a problem with the endpoints or adjunct, the wiring to the sets or the BRI-LINE circuit pack. When in this state, the Level 1 interface is either not receiving any L1 framing from the endpoint (Endpoint Idle), or it is communicating with the endpoint but cannot transition to the Activated state (Endpoint Active).

The Deactivated state indicates a problem with the BRI-LINE circuit pack. When in this state, the Level 1 interface is idle and is not trying to communicate with the BRI endpoints. When an ISDN-BRI port is placed in the out-of-service state, Level 1 is also put into the Deactivated state. This could be due either to the system detecting a fault with the port or to a **busyout port PCSSpp** request.

Table 8-24. Level 1 Status Inquiry Test #621

Error Code	Test Result	Description Recommendation
1187	ABORT	The board, port or station may have been busied out by a technician. The board, port or station may have been busied out by a technician. 1. Look in the Error Log for Error Type 18 (port busied out) for this port and BRI-BD (board busied out). If this error type is present for BRI-PORT only, then release the port via the release port pp command and run the test again. If the error is present for both BRI-BD and BRI-PORT, then release the board via the release port PCSS command and run the test again. NOTE: When you release a port, you release all ports associated with it. If certain ports still need to be busied out, use the release port PCSSpp command to busy them out. 2. Make sure the terminal is connected. 3. Retry the command at one-minute intervals a maximum of five times. 4. If the test continues to abort, escalate the problem.
2000	ABORT	Response to the test was not received from the circuit pack within the allowable time period. 1. If the test aborts repeatedly a maximum of five times, reset the circuit pack via the busyout board PCSS and reset board PCSS commands. 2. If the test aborts again, replace the circuit pack.
2012	ABORT	Internal system error.

Table 8-24. Level 1 Status Inquiry Test #621

Error Code	Test Result	Description Recommendation
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to fail, escalate the problem.
1	FAIL	Received a status of Level 1 Pending Activation-Endpoint Idle, which indicates a problem with the BRI endpoint, the wiring to the endpoint, or the ISDN-BRI port. 1. Verify that an endpoint is connected to the port. If an endpoint is connected to the port, then proceed to Step 2. 2. As necessary, check and repair the wiring between the circuit pack and the endpoint or adjunct. Execute the test port PCSSpp command, and review the results of the Level 1 Status Inquiry Test to verify the repair. If this test is still failing, proceed to Step 3. 3. For BRI endpoints, try replacing the BRI endpoint(s) connected to the port. Then execute the test port PCSSpp command and review the results of the Level 1 Status Inquiry Test to verify repair. If this test is still failing, proceed to Step 4. 4. Escalate the problem to the next tier.
2	FAIL	Received a status of Level 1 Pending Activation-Endpoint Active, which indicates a problem with the BRI endpoint, the wiring to the endpoint, or the ISDN-BRI port. 1. As necessary, check and repair the wiring between the circuit pack and the endpoint. Execute the test port PCSSpp command, and review the results of the Level 1 Status Inquiry test to verify the repair. If this test is still failing, proceed to Step 2. 2. For BRI endpoints, try replacing the BRI endpoint(s) connected to the port. Then execute the test port PCSSpp command, and review the results of the Level 1 Status Inquiry test to verify repair. If this test is still failing, proceed to Step 3. 3. Escalate the problem to the next tier.

Table 8-24. Level 1 Status Inquiry Test #621

Error Code	Test Result	Description Recommendation
3	FAIL	Received a status of Level 1 Deactivated; the port is out of service. 1. Issue the status bri-port PCSSpp command to verify that the service state of the port is out-of-service. If the service state of the port is not out-of-service, escalate the problem to the next tier. Otherwise, proceed to Step 2. 2. If the port has been placed out-of-service via the busyout port PCSSpp command, try releasing the port by executing the release port PCSSpp command. Then issue the test port long PCSSpp command, and review the results of Level 1 Status Inquiry test. If this test is still failing, proceed to Step 3. 3. After executing the test port long PCSSpp command, review the results of all the tests. Follow the repair procedures for any tests that fail. Verify repair of the problem by executing the test port PCSSpp command and by determining that the Level 1 Status test passes. If the test continues to fail for this reason, proceed to Step 4. 4. Escalate the problem to the next tier.
4	FAIL	For the TN2198 circuit pack only, received a status of Level 1 Pending Activation. The NT1 has a loss of power; this indicates a problem with the NT1. 1. For the NT1, follow the manufacturer's recommended repair procedures. 2. Execute the test port PCSSpp command, and review the results of the Level 1 Status Inquiry test to verify the repair. If the test is still failing, proceed to Step 3. 3. Escalate the problem to the next tier.
None	PASS	This test indicates that Level 1 is activated, or that software has taken the port out of service.

Electronic Power Feed Inquiry (#622)

This test queries the BRI-LINE circuit pack for the status of the Electronic Power Feed (EPF) supplied to a BRI endpoint. If the EPF is on and no over-current condition exists, this test passes. All other states are not normal and indicate a problem with the endpoint, the wiring to the endpoint, or the BRI-LINE circuit pack.

Table 8-25. Electronic Power Feed Inquiry Test #622

Error Code	Test Result	Description Recommendation
1005	ABORT	This test is not valid for this port type. Ports on the TN2208 cannot run this test because this board does not have an electronic power feed.
2000	ABORT	Response to the test was not received from the circuit pack within the allowable time period. 1. If the test aborts repeatedly a maximum of five times, reset the circuit pack via the busyout board PCSS and reset board PCSS commands. 2. If the test aborts again, replace the circuit pack.
2012	ABORT	Internal system error. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to fail, escalate the problem.
2100	ABORT	Could not allocate the necessary system resources to run this test 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to fail, escalate the problem
1	FAIL	The BRI-LINE circuit pack reports that it has detected an over-current condition and has turned off the EPF. 1. As necessary, check and repair the wiring between the circuit pack and the endpoint or adjunct. Check the endpoints and replace one or both sets if the sets are drawing too much current. Execute the test port PCSSpp command and review the results of the EPF Inquiry Test to verify the repair. If this test is still failing, proceed to Step 2. 2. Execute the test port PCSSpp command, and review the results of the Level 1 Status Inquiry Test. If this test is also failing, then follow the repair procedure for the Level 1 Status Inquiry Test. Otherwise, escalate this problem to the next tier.
None	PASS	The EPF Inquiry Test reports that the EPF is on.

Layer 1 Transmission Error Counter Test (#624)

This test reads and clears the BRI port's Layer 1 Transmission error counter maintained on the BRI-LINE circuit pack. This counter is incremented by the circuit pack when it detects a Layer 1 transmission problem. The test passes if the value of the counter is 0 (that is, the error is cleared). If the counter is not zero, the test fails, and the value of the counter is displayed in the Error Code field.

This error is most likely due to a problem with the wiring or the endpoint. (Verify that the wiring meets the configuration rules defined in *DEFINITY Communications System Generic 1 and Generic 3i Wiring*, 555-204-111.) It does not indicate a problem with the ISDN-BRI circuit pack. This test is useful for verifying the repair of the problem.

Table 8-26. Layer 1 Transmission Error Counter Test #624

Error Code	Test Result	Description Recommendation
2000	ABORT	Response to the test was not received from the circuit pack within the allowable time period. 1. If the test aborts repeatedly a maximum of five times, reset the circuit pack via the busyout board PCSS and reset board PCSS commands. 2. If the test aborts again, replace the circuit pack.
2012	ABORT	Internal system error. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to fail, escalate the problem.
2100	ABORT	Could not allocate the necessary system resources to run this test.
value	FAIL	The BRI-LINE circuit pack is still detecting errors of this type. The Error Code field contains the value of this counter. 1. Retry the command at one-minute intervals a maximum of five times 2. If the test continues to fail, review the results of other tests in the Long Test Sequence. Pay particular attention to the results of the Level 1 Status Inquiry test. Follow repair procedures for any of the executed tests if they fail. Otherwise, go to the next step. 3. If the tests for the endpoints pass and the Layer 1 Transmission Error Counter Test continues to fail, check the wiring to the endpoints. If the wiring appears to be fine, escalate the problem.
None	PASS	The Layer 1 Transmission error counter was read correctly and has a value of 0.

Receive FIFO Overflow Error Counter Test (#625)

This test reads and clears the BRI port's Receive FIFO Overflow error counter maintained on the BRI-LINE circuit pack. This counter is incremented by the circuit pack when it detects an overflow of its receive buffers. The test passes if the value of the counter is 0 (that is, the error is cleared). If the counter is non-zero, the test fails, and the value of the counter is displayed in the Error Code field.

This error can occur if signaling frames are being received from the Packet Bus at a rate sufficient to overflow the receive buffers on the circuit pack for a port or if a hardware fault is causing the receive buffers not to be emptied properly by the circuit pack. This test is useful for verifying the repair of the problem.

Table 8-27. Receive FIFO Overflow Error Counter Test #625

Error Code	Test Result	Description Recommendation
2000	ABORT	Response to the test was not received from the circuit pack within the allowable time period. 1. If the test aborts repeatedly a maximum of five times, reset the circuit pack via the busyout board PCSS and reset board PCSS commands. 2. If the test aborts again, replace the circuit pack.
2012	ABORT	Internal system error. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to fail, escalate the problem.
2100	ABORT	Could not allocate the necessary system resources to run this test.
value	FAIL	The BRI-LINE circuit pack is still detecting errors of this type. The Error Code field contains the value of this counter. The BRI-LINE circuit pack is still detecting errors of this type. The Error Code field contains the value of this counter. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to fail, run the Long Test Sequence and pay particular attention to the Loop-Around Tests (#618 and #619). See the repair procedures for the executed test if it fails. Otherwise, go to the next step. 3. Replace the circuit pack.
None	PASS	The Receive FIFO Overflow error counter was read correctly and has a value of 0.

Clear Error Counters Test (#270)

This test is not an actual test in the strict sense of the word. There are various error counters associated with each BRI-PORT. This test clears those counters and triggers the auditing of Terminal Endpoint Identifier (TEI) values and layer 3 reinitialization. This test is used only to send messages to the BRI-PORT and, therefore, should neither abort nor fail.

Table 8-28. Clear Error Counters Test #270

Error Code	Test Result	Description Recommendation	
Any	ABORT	This test should never abort.	
Any	FAIL	This test should never fail. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to fail, escalate the problem.	
None	PASS	The message to clear the error counters of BRI-Port has been sent.	

BRI-SET, BRI-DAT

The following table pertains to BRI-SET.

Alarm Level	Initial Craft Command to Run*
Warning	test station extension l, test data-module extension

* Where P is *1*; C is the carrier designation (*A, B, C, D,* or *E*); and SS is the address of the slot in the carrier where the circuit pack is located (*01, 02,* ... etc.); and pp is the 2-digit port number (for example, *01*). The alternate name field contains the extension of the endpoint. This field is used to distinguish between endpoints on the same port.

The following table pertains to BRI-DAT.

Alarm Level	Initial Craft Command to Run*
	test data-module

* Where P is *1*; C is the carrier designation (*A, B, C, D,* or *E*); SS is the address of the slot in the carrier where the circuit pack is located (*01, 02,* ... etc.); and pp is the 2-digit port number (for example, *01*). The alternate name field contains the extension of the endpoint. This field is used to distinguish between endpoints on the same port.

CAUTION:

A detailed flowchart for isolating and resolving Packet Bus faults is included in Chapter 9, "Packet Bus Fault Isolation and Correction". This flowchart, along with the other information presented in the chapter, can help in resolving problems that involve more than a single station or circuit pack. Whenever the repair procedures for this Maintenance Object refer to Packet Bus and/or Packet Control maintenance, be sure to reference Chapter 9, "Packet Bus Fault Isolation and Correction" in addition to the relevant MO documentation.

WARNING:

If a significant Packet Bus failure occurs, errors and alarms may not be logged as expected for BRI-SET/BRI-DAT. Conditions under which this occurs are detailed in the "Packet Bus Maintenance" on page 9-7.

ISDN-BRI station endpoints may be connected to ISDN-BRI (ISDN Basic Rate Interface Line) TN556 circuit packs. This circuit pack type contains 12 ports of line circuit interfaces, each of which operates at 192 kilobits per second (kbps) with two B-channels and one D-channel as specified in the Avaya ISDN-BRI specification (PUB 801-802-100). For BRI endpoints, each B-channel may support voice or circuit-switched data and may be circuit-switched simultaneously. The D-channel is used for conveying signaling between the switch and a BRI endpoint. Each ISDN-BRI D-channel is connected to the switch processor and the ISDN-BRI port through the PKT-CTRL (Packet Control) and the PKT-BUS (Packet Bus).

ISDN-BRI endpoints come in a number of configurations. All endpoints require the D-channel to convey signaling information to the switch. A voice-only set requires only one B-channel. A voice and data-capable set requires both B-channels (one for voice and one for data). Therefore, each TN556 port can support either two voice-only sets or one voice and data-capable set.

The following figure illustrates the physical connection (solid line) between an ISDN-BRI circuit pack and a voice or voice/data set. Each physical connection

allows for two B-channels, as stated previously, plus one D-channel. Each ISDN-BRI circuit pack can support up to 12 of these physical connections to different voice and voice/data sets.

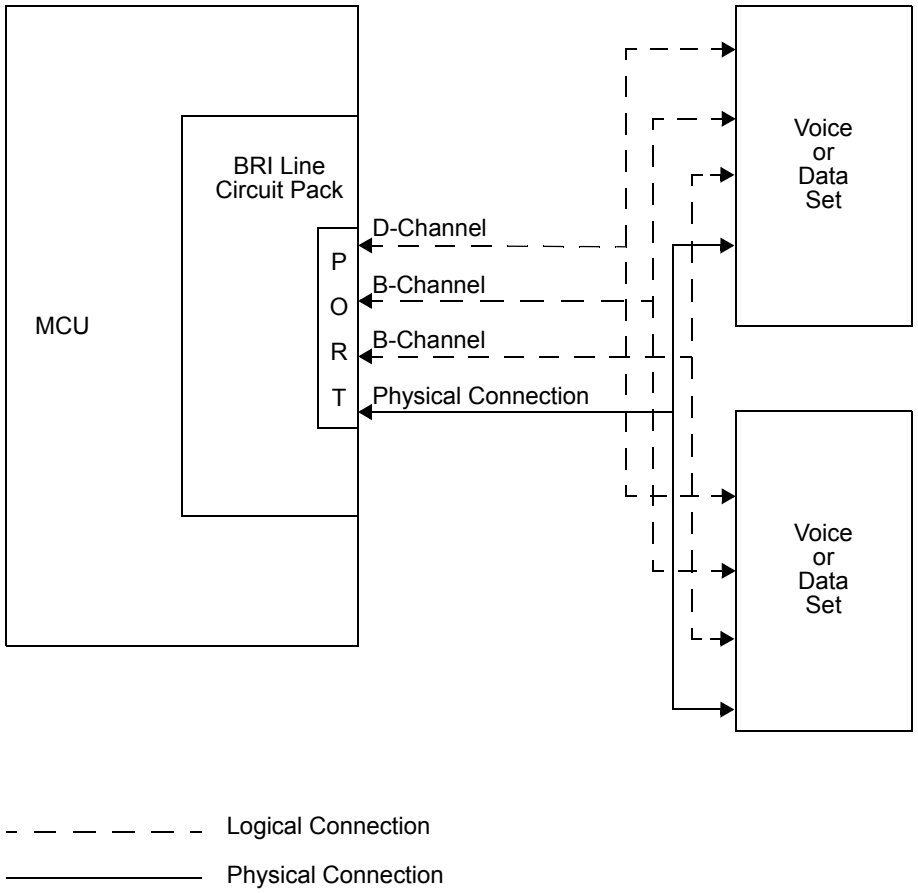


Figure 8-5. ISDN-BRI Set Interactions

This section contains the ISDN-BRI Set documentation. Some of the results of maintenance testing of the ISDN-BRI Set may be affected by the health of the ISDN-BRI circuit pack and Port. These interactions should be kept in mind when investigating the cause of ISDN-BRI Set problems.

Hardware Error Log Entries

Table 8-29. BRI-SET Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	test BRI-SET
	Run the Short Test Sequence first. If all tests pass, run the Long Test Sequence. Refer to the appropriate test description and follow the recommended procedures.				
2	2-102	None			
	Errors of this type indicate violations of the ISDN-BRI signaling protocol; timers associated with certain Layer 3 messages have expired before a required response was received. In the following table, the aux data field indicates which timer has just expired. (For more information, refer to the Avaya ISDN-BRI Specification. **Aux Data/Timer Type** 2-First T303 (SETUP timer) 3-Second T303 (SETUP timer) 4-T305 (DISConnect timer) 5-First T308 (RELease timer) 6-Second T308 (RELease timer) 10-T316 (RESTart timer) 12-T309 (Layer 2 Failure timer) 16-TM100 (Management Information Message timer 1) 17-TM200 (Management Information Message timer 2) The switch sent a message to the endpoint, which did not respond in the allotted time. This can happen occasionally due to failure of the point-to-point signaling link or because of a problem in the BRI endpoint. Execute the **test station extension sh** command and pay particular attention to the results of the BRI Layer 3 Query Test (#629). If this test fails, follow the repair procedure for Test #629.				
18	0		Warning	Off	release station <ext>
130	0		Warning	On	test port PCSS sh
	Circuit pack has been removed or has been insane for more than 11 minutes. To clear the error, replace or reinsert the circuit pack.				

Table 8-29. BRI-SET Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
257	Any	#629	Warning	Off	test station ext r 2 test data-module ext r 2
	This error occurs when the endpoint does not respond to the service state query message sent to the endpoint. This error causes an alarm to be raised. The alarm is retired when the switch receives a response to the service state query to the endpoint. For BRI endpoints, the Aux Data field for this error contains ‘‘0.’’ When it occurs, execute the **test station extension sh** command and pay particular attention to the results of the BRI Layer 3 Query Test (#629). If this test fails, follow the repair procedure for Test #629.				
513	0	none			
	This error occurs when the endpoint sends more messages than the switch can handle. The switch suspends the reception of messages from the endpoint for a short period of time. There is no repair procedure for this error. If the condition persists, replace the endpoint.				
769	0	none	Warning	Off	
	The signaling link associated with a BRI endpoint has too much link establishment related traffic. This could occur if the signaling link is bouncing between assigned and established states. Software suspends activity to this endpoint for 75 minutes when the endpoint is alarmed due to this problem. If this problem persists, replace the endpoint. If replacing the endpoint does not fix the problem follow normal escalation procedures.				
2817	0	#628	Warning	Off	test station ext r 2 test data-module ext r 2
	This error indicates a problem with Layer 2 over the D-channel between the switch and the endpoint. When this error occurs, an alarm is raised against the station. Execute the test station extension short command and pay particular attention to the results of the BRI XID Test (#628). If this test fails, follow the repair procedure for Test #628.				
3073	0	#627	Warning	Off	test station ext l r 2 test data-module ext l r 2
	This error indicates a problem with the B-channel connection between the switch and the endpoint. When this error occurs, a warning alarm is raised against the endpoint. Execute the test station extension l command and pay particular attention to the results of the BRI Remote Loop-Back Test (#627). If this test fails, follow the repair procedure for Test #627.				

Table 8-29. BRI-SET Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
3329	Any	#626	Warning	Off	
	This error occurs whenever the point-to-point signaling link to the endpoint goes down (except when it goes down because either the PKT-CTRL or the PKT-BUS has failed or has been busied out by system technician). When this error occurs, an alarm is raised against the endpoint or adjunct. Execute the test station extension short command and pay particular attention to the results of the Signaling Link Status Test (#626). If this test fails, follow the repair procedure for Test #626. The alarm is retired when the signaling link is reestablished to the endpoint or adjunct.				
3584	0.1	#626			
3585 to 3839	0	None			
	This error indicates a problem with Layer 2 over the D-channel between the switch and the endpoint. When this error occurs, an alarm is raised against the station. Execute the test station extension short command and pay particular attention to the results of the BRI XID Test (#628). If this test fails, follow the repair procedure for Test #628.				
3840 to 4095	0	None			
	Certain ISDN-BRI cause codes are logged by switch software. The cause code can be determined from the following formula: ■ If the error type is greater than 3968, the ISDN-BRI cause code is equal to the error type minus 3968. This code was sent to the endpoint by the switch. ■ If the error type is less than 3968, the ISDN-BRI cause code is equal to the error type minus 3840. This code was sent to the switch by the endpoint. A description of the various ISDN-BRI cause values is contained in the following table. This table also contains recommended system technician actions associated with the cause value. Further information can also be found in the Avaya ISDN-BRI Specification (Avaya PUB 801-802-100). In addition, the Aux Data field of the Error Log entry contains additional diagnostic information. Error 3847 indicates that sets on the port do not support level 3 initialization. Consult the Set Service documentation.				

Table 8-30. ISDN-BRI Cause Values

Code	Explanation	Recommendation
1	CHANNEL IN USE	Requested channel is in use by another station on the BRI-PORT. For BRI endpoints: 1. Try to originate a call to or from this port. 2. If the error persists, busy out and release the port. 3. If the problem still persists, replace stations on the port. 4. If the problem still persists, escalate to the next tier.
34	SWITCH RESOURCES NOT AVAILABLE No circuit or channel available	A resource on the switch is unavailable for a call. For BRI endpoints, this cause value is not logged.
42	Switch equipment congestion	Switch takes control to limit received traffic. For BRI endpoints, the cause value is not logged.
50	SERVICE OR OPTION NOT AVAILABLE Requested facility not subscribed	Requested facility is implemented, but not administered. Potential administration problem with the endpoint. For BRI endpoints: 1. Verify the switch administration of endpoint using either the **display station** or **display data-module** commands. 2. If Step 1 does not resolve the problem, refer to the endpoint's service manual and verify administration on the endpoint. 3. If Step 2 does not resolve the problem, escalate to the next tier.
58	Bearer capability not presently available	Requested bearer capability is implemented, but not administered. No B-channel administered. See recommendation 50 above.

Table 8-30. ISDN-BRI Cause Values — *Continued*

Code	Explanation	Recommendation
	SERVICE OR OPTION NOT IMPLEMENTED	
65	Bearer service not implemented	Requested service not implemented in switch or endpoint.
69	Requested facility not implemented	Requested service not supported in switch or endpoint. 1. Consult switch and endpoint documentation to determine service support. 2. If Step 1 does not resolve the problem, escalate to the next tier.

Craft-Demanded Tests

When inspecting errors in the system and deciding which ones to address, always investigate errors associated with the circuit pack and port first. Clearing these error codes first may also clear errors generated against the endpoint. When all circuit pack and port errors have been cleared, and errors still exist against the endpoint, always investigate errors in the order they are presented in the following table. By clearing error codes associated with the *Signaling Link Status Test,* for example, you may also clear errors generated from other tests in the testing sequence.

Table 8-31. System Technician-Demanded Tests: BRI-SET, BRI-DAT

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Signaling Link Status Test (#626)	Short	Long	No
BRI XID Test (#628)	Short	Long	No
BRI Layer 3 Query (#629)	Short	Long	No
BRI Remote Loop-Back (#627)	Long		No
BRI Set Audits (#630)	Short	Long	No
BRI Vendor ID Test (#631)	Long		No
BRI Model/Vintage ID Test (#632)	Long		No

Signaling Link Status Test (#626)

This test determines the current status of the signaling link. This test passes if the link is "bound" to an endpoint and fails if the link is "not bound."

The definition of the term "bound" for a link depends on the type of endpoint and may depend on the successful completion of procedures at both Layers 2 and 3 of the protocol. For BRI endpoints administered for management information messages (MIM) initialization (multipoint), the signaling link is "bound" when the link is connected at Layer 2 and the link has been associated with an endpoint [that is, the endpoint has completed SPID initialization (L3 established)].

NOTE:
An MIM is a level 3 message that conveys management and maintenance information between a communications system and a BRI terminal.

For all endpoint types, a signaling link becomes "unbound" when it is disconnected at Layer 2. For BRI endpoints supporting MIM initialization, a signaling link may also become "unbound" if a subsequent attempt to perform SPID initialization on a "bound" link fails (that is, the wrong SPID is entered into the endpoint by the user).

Table 8-32. Signaling Link Status Test #626

Error Code	Test Result	Description Recommendation
1139	ABORT	The Packet Bus is out of service. 1. Follow the repair procedures for the Packet Bus. 2. After completing Step 1, execute the test port long PCSSpp command, and review the results of the BRI Port Local Area Network (LAN) Loop-Around Test to verify the repair.
1141	ABORT	The PKT-CTRL is out of service. 1. Refer to PKT-CTRL Maintenance documentation. 2. If Step 1 does not resolve the problem, escalate to the next tier.
1144	ABORT	The Packet Bus is out of service. 1. Follow the repair procedures for the Packet Bus. 2. After completing Step 1, execute the test port long PCSSpp command, and review the results of the BRI Port LAN Loop-Around Test to verify the repair.

Table 8-32. Signaling Link Status Test #626

Error Code	Test Result	Description Recommendation
1187	ABORT	The circuit pack, port, or station may have been busied out by a technician. 1. Look in the Error Log for Error Type 18 (busied out) for BRI-BD, BRI-PORT, or BRI-SET. a. If this error type is present for BRI-SET only, release the station via the release station <extension> command and run this test again. b. If this error type is present for BRI-PORT and BRI-SET, release the port via the release port PCSSpp command and run the test again. c. If the error is present for BRI-BD, BRI-PORT, and BRI-SET, release the circuit pack via the release port PCSSpp command and run the test again. If the error is present for BRI-SET only, release the circuit pack via the release port PPCSS command and run the test again. If the error is present for both BRI-BD and BRI-PORT, release the circuit pack via the release board PPCSS command and run the test again. NOTE: When you release the circuit pack, you release all ports associated with it. If certain ports still need to be busied out, use the release port PCSSpp command to busy them out. 2. Make sure the terminal is connected. 3. Retry the command at one-minute intervals a maximum of five times. 4. If the test continues to abort, escalate the problem.
2012	ABORT	Internal system error. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem

Table 8-32. Signaling Link Status Test #626

Error Code	Test Result	Description Recommendation
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
1113	FAIL	The signaling link is not “bound” to the endpoint. For BRI endpoints supporting MIM initialization, this error indicates that the endpoint has not been bound to a signaling link (that is, SPID initialization has not been completed). Since the signaling link associated with the endpoint is not identified until SPID initialization completes, this error does not imply that the signaling link is connected or disconnected at Layer 2, nor does it provide the status of TEI assignment for the endpoint. For BRI endpoints not supporting MIM initialization, this error indicates that the link is disconnected at Layer 2. Since the signaling link associated with the endpoint has been identified via administration, the link is only ‘‘unbound’’ from the endpoint when it is disconnected. 1. Execute the status bri-port PCSSpp command and refer to the associated procedures for this command contained in the BRI-PORT (ISDN-BRI Port) Maintenance documentation. 2. If the test continues to fail, escalate the problem.
None	PASS	The signaling link is connected at Layer 2 and “bound” to the BRI endpoint.

BRI Remote Loop-Back Test (#627)

This test checks the integrity of a circuit switched B-channel connection between the switch and the endpoint.

In this test, the endpoint is put in the ‘‘maintenance busy’’ state to prevent the switch from issuing calls to the endpoint during the test. An application message containing a loop-back activate request for the appropriate B-channel is sent to the endpoint. The endpoint responds with a loop-back activated response. Maintenance then sends data to the endpoint over the B-channel under test. Since the B-channel is looped back at the endpoint, maintenance should receive the data that it sent. If no data is detected, the test fails. An application message containing a loop-back deactivate request is then sent to the endpoint to terminate the remote loop-back test. The endpoint responds with an MIM message

containing a loop-back deactivate response. Maintenance then releases the endpoint so that it is available to terminate calls.

Table 8-33. BRI Remote Loop-Back Test #627

Error Code	Test Result	Description Recommendation
1000	ABORT	Could not seize the endpoint or B-channels for test. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
1005	ABORT	The endpoint's MMs supported field is administered to "no." 1. Use the change station extension command to change parameter only if the endpoint documentation reflects support for ISDN-BRI Management and Maintenance Procedures.
1113	ABORT	The signaling link between the switch and the endpoint is down. 1. Use the test port PCSSpp long command to clear any errors that prevent establishment of the signaling link. 2. Examine the results of the Signaling Link Status Test (#626), which is run as part of this command. If this test aborts or fails, follow the repair procedure for Test #626. 3) If the XID test continues to abort, escalate the problem.
1139	ABORT	The Packet Bus is out of service. 1. Follow the repair procedures for the Packet Bus. 2. After completing Step 1, execute the test port long PCSSpp command, and review the results of the BRI Port LAN Loop-Around Test to verify the repair.
1141	ABORT	The PKT-CTRL is out of service. 1. Refer to PKT-CTRL Maintenance documentation. 2. If Step 1 does not resolve the problem, escalate to the next tier.
1144	ABORT	The Packet Bus is out of service. 1. Follow the repair procedures for the Packet Bus. 2. After completing Step 1, execute the test port long PCSSpp command, and review the results of the BRI Port LAN Loop-Around Test to verify the repair.

Table 8-33. BRI Remote Loop-Back Test #627

Error Code	Test Result	Description Recommendation
1187	ABORT	The circuit pack, port, or station may have been busied out by a technician. 1. Look in the Error Log for Error Type 18 (busied out) for BRI-BD, BRI-PORT, or BRI-SET. a. If this error type is present for BRI-SET only, release the station via the release station <extension> command and run this test again. b. If this error type is present for BRI-PORT and BRI-SET, release the port via the release port PCSSpp command and run the test again. c. If the error is present for BRI-BD, BRI-PORT, and BRI-SET, release the circuit pack via the release port PCSSpp command and run the test again. If the error is present for BRI-SET only, release the circuit pack via the release port PPCSS command and run the test again. If the error is present for both BRI-BD and BRI-PORT, release the circuit pack via the release board PPCSS command and run the test again. NOTE: When you release the circuit pack, you release all ports associated with it. If certain ports still need to be busied out, use the release port PCSSpp command to busy them out. 2. Make sure the terminal is connected. 3. Retry the command at one-minute intervals a maximum of five times. 4. If the test continues to abort, escalate the problem.
2012	ABORT	Internal system error. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
2068	ABORT	The endpoint has rejected the switch sent application message. This indicates that the endpoint does not support the ISDN-BRI Management and Maintenance Procedure for Loop-Back Testing. 1. Use the change station extension command and change the MIMs Supported field to ‘‘no.’’
2069	ABORT	The endpoint has returned an error response to the application message sent by the switch. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
2100	ABORT	Could not allocate the necessary system resources to run this test.

Table 8-33. BRI Remote Loop-Back Test #627

Error Code	Test Result	Description Recommendation
2000	FAIL	No loop-back activation or deactivation response is received from the endpoint. 1. Consult the endpoint documentation to determine if ISDN-BRI Management and Maintenance Procedures are supported. If not supported, use change station extension command to change the MIMs Supported? field to ‘‘no.’’ Use the busyout station extension and release station extension commands to busyout and release the endpoint to resolve any endpoint alarms resulting from failure of this test. 2. If the endpoint supports these procedures and the test continues to fail, assume the endpoint is defective and replace it.
2071	FAIL	No data is detected on Channel B1 during loop-back. 1. Replace the endpoint and repeat test. 2. If test continues to fail, check the wiring between the endpoint and the switch and repeat the test. 3. If test continues to fail, escalate the problem.
2072	FAIL	No data is detected on Channel B2 during loop-back.
None	PASS	The endpoint has responded to the switch activate and deactivate loop-back application messages. Data has been detected on the looped-back channels.

BRI XID Test (#628)

This test checks the D-channel connection between the SPE and the endpoint. In this test, a D-channel XID frame is sent to the endpoint over the point-to-point signaling link. The test passes if the endpoint responds with a Layer 2 XID-RESPONSE frame.

B

Table 8-34. BRI XID Test #628

Error Code	Test Result	Description Recommendation
1000	ABORT	The BRI-SET is busy. The test cannot be executed at this time. 1. Pause momentarily (30 seconds) and re-execute at this time. 2. If this problem persists, escalate this problem. NOTE: A BRI-PORT can also be busy. When using this for BRI-PORT tests, the term ‘‘BRI-SET ’’ can be changed to ‘‘BRI-PORT.’’
1005	ABORT	The endpoint is not administered to support XID testing. 1. If the endpoint documentation reflects support XID testing, use the change station extension command to change the XID Testing? field on the form to ‘‘yes.’’
1113	ABORT	The signaling link between the switch and the endpoint is down. 1. Use the test port PCSSpp long command to clear any errors that prevent establishment of the signaling link. 2. Examine the results of the Signaling Link Status Test (#626), which is run as part of this command. If this test aborts or fails, follow the repair procedure for Test #626. 3. If the XID test continues to abort, escalate the problem.
1139	ABORT	The Packet Bus is out of service. 1. Follow the repair procedures for the Packet Bus. 2. After completing Step 1, execute the test port long PCSSpp command, and review the results of the BRI Port LAN Loop-Around Test to verify the repair.
1141	ABORT	The PKT-CTRL is out of service. 1. Refer to PKT-CTRL Maintenance documentation. 2. If Step 1 does not resolve the problem, escalate to the next tier.
1144	ABORT	The Packet Bus is out of service. 1. Follow the repair procedures for the Packet Bus. 2. After completing Step 1, execute the test port long PCSSpp command, and review the results of the BRI Port LAN Loop-Around Test to verify the repair.

Table 8-34. BRI XID Test #628

Error Code	Test Result	Description Recommendation
1187	ABORT	The circuit pack, port, or station may have been busied out by a technician. 1. Look in the Error Log for Error Type 18 (busied out) for BRI-BD, BRI-PORT, or BRI-SET. a. If this error type is present for BRI-SET only, release the station via the release station <extension> command and run this test again. b. If this error type is present for BRI-PORT and BRI-SET, release the port via the release port PCSSpp command and run the test again. c. If the error is present for BRI-BD, BRI-PORT, and BRI-SET, release the circuit pack via the release port PCSSpp command and run the test again. If the error is present for BRI-SET only, release the circuit pack via the release port PPCSS command and run the test again. If the error is present for both BRI-BD and BRI-PORT, release the circuit pack via the release board PPCSS command and run the test again. NOTE: When you release the circuit pack, you release all ports associated with it. If certain ports still need to be busied out, use the release port PCSSpp command to busy them out. 2. Make sure the terminal is connected. 3. Retry the command at one-minute intervals a maximum of five times. 4. If the test continues to abort, escalate the problem.
2012	ABORT	Internal system error. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals a maximum of five times 2. If the test continues to abort, escalate the problem.
2000	FAIL	The XID-RESPONSE message was not received from the endpoint. 1. Consult the endpoint documentation to determine if the Layer 2 XID and XID-RESPONSE messages are supported. If the documentation reflects no support for these messages, change XID Testing? field to ‘‘no’’ using the change station extension command. 2. If the endpoint supports these Layer 2 messages and the test continues to fail, assume the endpoint is defective and replace it. 3. If the test continues to fail, escalate the problem.
None	PASS	The switch can successfully pass messages over the D-channel to the BRI endpoint.

BRI Layer 3 Query Test (#629)

This test is used to check the application layer communications between the switch and the endpoint or adjunct.

For BRI endpoints, an application message containing the appropriate endpoint service state is sent by the switch to the endpoint. The endpoint responds with an acknowledgment to the application message.

Table 8-35. BRI Layer 3 Query Test #629

Error Code	Test Result	Description Recommendation
1005	ABORT	The endpoint's MIMs Supported? field is administered to "no." 1. Use the change station extension command to change the parameter only if the endpoint documentation reflects support for ISDN-BRI Management and Maintenance Procedures.
1113	ABORT	The signaling link between the switch and the endpoint is down. 1. Use the test port PCSSpp long command to clear any errors that prevent establishment of the signaling link. 2. Examine the results of the Signaling Link Status Test (#626), which is run as part of this command. If this test aborts or fails, follow the repair procedure for Test #626. 3. Escalate the problem if the BRI Layer 3 Query Test continues to abort.
1139	ABORT	The Packet Bus is out of service. 1. Follow the repair procedures for the Packet Bus. 2. After completing Step 1, execute the test port long PCSSpp command, and review the results of the BRI Port LAN Loop-Around Test to verify the repair.
1141	ABORT	The PKT-CTRL is out of service. 1. Refer to PKT-CTRL Maintenance documentation. 2. If Step 1 does not resolve the problem, escalate to the next tier.
1144	ABORT	The Packet Bus is out of service. 1. Follow the repair procedures for the Packet Bus. 2. After completing Step 1, execute the test port long PCSSpp command, and review the results of the BRI Port LAN Loop-Around Test to verify the repair.

Table 8-35. BRI Layer 3 Query Test #629

Error Code	Test Result	Description Recommendation
1187	ABORT	The circuit pack, port, or station may have been busied out by a technician. 1. Look in the Error Log for Error Type 18 (busied out) for BRI-BD, BRI-PORT, or BRI-SET. a. If this error type is present for BRI-SET only, release the station via the release station <extension> command and run this test again. b. If this error type is present for BRI-PORT and BRI-SET, release the port via the release port PCSSpp command and run the test again. c. If the error is present for BRI-BD, BRI-PORT, and BRI-SET, release the circuit pack via the release port PCSSpp command and run the test again. If the error is present for BRI-SET only, release the circuit pack via the release port PPCSS command and run the test again. If the error is present for both BRI-BD and BRI-PORT, release the circuit pack via the release board PPCSS command and run the test again. NOTE: When you release the circuit pack, you release all ports associated with it. If certain ports still need to be busied out, use the release port PCSSpp command to busy them out. 2. Make sure the terminal is connected. 3. Retry the command at one-minute intervals a maximum of five times. 4. If the test continues to abort, escalate the problem.
2012	ABORT	Internal system error. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
2068	ABORT	The endpoint has rejected the switch sent application message. This indicates that the endpoint does not support the ISDN-BRI Management and Maintenance Procedure for Endpoint Service Messages. 1. Use the change station extension command and change the MIMs Supported? field to “no.”

Table 8-35. BRI Layer 3 Query Test #629

Error Code	Test Result	Description Recommendation
2069	ABORT	The endpoint has returned an error response to the switch-sent application message. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
2000	FAIL	No response is received from the endpoint or adjunct. 1. Consult the endpoint documentation to determine if ISDN-BRI Management and Maintenance Procedures are supported. If not supported, use the change station extension command to change the ''MIMs Supported?'' field to ''no.'' Use the busyout station extension and release station extension commands to busyout and release the endpoint to resolve any endpoint alarms resulting from failure of this test. 2. If the endpoint supports these procedures and the test continues to fail, assume the endpoint is defective and replace it.
None	PASS	The endpoint has successfully responded to the switch's application message.

BRI Set Audits Test (#630)

This is a series of two tests, which are classified as audits. The switch sends messages to the BRI endpoint to perform the following tests:

- Ringer Audit ensures that both the switch and the endpoint agree as to the current state of the endpoint's ringer.
- Lamps Audit ensures that both the switch and the endpoint agree as to the current state of the endpoint's lamps.

- Call Activity Audit ensures that the state of calls is consistent between the switch and the endpoint.

Table 8-36. BRI Set Audits Test #630

Error Code	Test Result	Description Recommendation
1113	ABORT	The signaling link between the switch and the endpoint is down. 1. Use the test port PCSSpp long command to clear any errors that prevent establishment of the signaling link. 2. Examine the results of the Signaling Link Status Test (#626), which is run as part of this command. If this test aborts or fails, follow the repair procedure for Test #626. 3. If the BRI Set Audits test continues to abort, escalate the problem.
1139	ABORT	The Packet Bus is out of service. 1. Follow the repair procedures for the Packet Bus. 2. After completing Step 1, execute the test port long PCSSpp command, and review the results of the BRI Port LAN Loop-Around Test to verify the repair.
1141	ABORT	The PKT-CTRL is out of service. 1. Refer to PKT-CTRL Maintenance documentation. 2. If Step 1 does not resolve the problem, escalate to the next tier.
1144	ABORT	The Packet Bus is out of service. 1. Follow the repair procedures for the Packet Bus. 2. After completing Step 1, execute the test port long PCSSpp command, and review the results of the BRI Port LAN Loop-Around Test to verify the repair.

Table 8-36. BRI Set Audits Test #630

Error Code	Test Result	Description Recommendation
1187	ABORT	The circuit pack, port, or station may have been busied out by a technician. 1. Look in the Error Log for Error Type 18 (busied out) for BRI-BD, BRI-PORT, or BRI-SET. a. If this error type is present for BRI-SET only, release the station via the release station <extension> command and run this test again. b. If this error type is present for BRI-PORT and BRI-SET, release the port via the release port PCSSpp command and run the test again. c. If the error is present for BRI-BD, BRI-PORT, and BRI-SET, release the circuit pack via the release port PCSSpp command and run the test again. If the error is present for BRI-SET only, release the circuit pack via the release port PPCSS command and run the test again. If the error is present for both BRI-BD and BRI-PORT, release the circuit pack via the release board PPCSS command and run the test again. NOTE: When you release the circuit pack, you release all ports associated with it. If certain ports still need to be busied out, use the release port PCSSpp command to busy them out. 2. Make sure the terminal is connected. 3. Retry the command at one-minute intervals a maximum of five times. 4. If the test continues to abort, escalate the problem.
2012	ABORT	Internal system error. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
2100	ABORT	Could not allocate the necessary system resources to run this test.
None	PASS	The endpoint has successfully executed the BRI station audits.

SPID Facility Test

This test is used to verify the wiring and operation of the signaling link between the switch and an endpoint on a BRI interface. **This test is not executed from the administration terminal; it is executed by using a BRI test set equipped with a display.** The test set may replace the BRI set under test by plugging it into the same jack or by bridging it onto the wiring at some point between the switch and the endpoint, thereby creating a pseudo-BRI multipoint configuration.

When plugged into the port in this manner, the test set establishes a signaling link connection with the switch and attempts to complete SPID initialization by using the Service SPID administered for the system (see the System Maintenance Administration Form). If the test set displays the correct administered port address for the endpoint under test, the test passes (see the Service SPID Display table, which follows). If after one minute nothing is displayed on the test set, the test fails.

Table 8-37. SPID Facility Test

Test Result	Description	Recommendation
FAIL	No response is received from the endpoint.	1. Check the physical wiring between the switch and the endpoint or adjunct. 2. If test continues to fail, escalate to the next tier.
FAIL	Display does not match administered port address for the endpoint or adjunct.	1. Change station administration for endpoint or adjunct to match displayed port address. 2. If test continues to fail, escalate the problem.
PASS	Display matches administered port address for the endpoint or adjunct.	

The abbreviations used in the following table have the following meanings:

P	port network (1 , 2...)
C	Carrier (A,B,C, ...)
SS	Slot (01, 02, ...)
pp	port (01-12)
ext	extension one and two (one through 99999)
SPID	service order profile identifier

Table 8-38. Service SPID Display

Restricted Service Starting Display Column

		8		14		25		31
PCSSpp	-	ext1	-	SPID111111	-	ext2	-	SPID222222

Bound to First Endpoint Translation Starting Display Column

		8		14		25		31
PCSSpp	*	ext1	*	SPID111111	-	ext2	-	SPID222222

Bound to Second Endpoint Translation Starting Display Column

		8		14		25		31
PCSSpp	-	ext1	-	SPID111111	*	ext2	*	SPID222222

CABINET (Cabinet Sensors)

MO Name (in Alarm Log)	Alarm Level	Initial Command to Run*	Full Name of MO
CABINET	MAJOR	test environment P	Cabinet Sensors
CABINET	MINOR†	test environment P	Cabinet Sensors

* Where P is an appropriate port network number determined via the Port field from the Alarm or Error Log.

† If a minor alarm occurs for a variable speed fan, the fan should be checked for a dirty filter. If the filter is not dirty, the fan should be replaced.

NOTE:
CABINET is valid only in a multicarrier cabinet system. For information concerning single-carrier cabinet systems, refer to the DC-POWER (Single-Carrier Cabinet Power) Maintenance documentation.

Each multicarrier cabinet is equipped either with six non-variable speed fans or with six variable speed fans.

Non-Variable Speed (Standard) Fan Option. A non-variable speed (standard) fan is indicated by one of the following Product Codes: “ED67077 G1,” “ED67077 G2,” or “ED67077 G3.” Multicarrier cabinets with non-variable speed fans contain a fan speed control unit known as the AHD1 circuit pack. This circuit pack is designed to keep the temperature within the cabinet below 65^0 C (149^0 F). Air is drawn in by the three fans located in the front of the cabinet. The air is channeled upwards through a filter, then through carriers A, B, and C and out the top of the cabinet. Air is drawn in by the three fans located in the back of the cabinet as well. The air is channeled down through a filter, then through carriers D and E and out the bottom of the cabinet. The AHD1 circuit pack monitors five of the six temperature sensors located throughout the multicarrier cabinet, and it uses the output of these sensors to adjust fan speed and to report air flow problems. The Maintenance/Tape Processor directly monitors the sixth sensor (S1) to report temperature problems. The Cabinet Sensors maintenance object represents the air flow and temperature problems reported by the AHD1 circuit pack and by the Maintenance/Tape Processor in the multicarrier cabinet systems.

The fans and the AHD1 circuit pack obtain their power from the -48 volt DC power supply of the 631 DB DC power unit in the A carrier. The power goes from the power unit(s) to the current limiter card (982LS), over a wiring harness from the A carrier to the back of the fan unit, through the AHD1 circuit pack, and then to the fans. The front fans are wired in parallel with a rear fan. The repair scenarios that follow rely on the technician’s ability to distinguish between high fan speed and low fan speed. The only way to distinguish between the fan speeds is by the sound of the fans. When operating at high speed, the fans make a higher pitched

sound than when they run at low speed. The technician probably knows from prior experience what the fans sound like at low speed as well as at high speed.

The following figure shows a multicarrier cabinet system and the location of the temperature sensors S1 through S4 (there are actually two S3 sensors and two S4 sensors) as well as the location of the fans, the AHD1 circuit pack, and the filters. The figure also shows other environment-related components of a multicarrier cabinet system and can be ignored for this section on Cabinet Sensors.

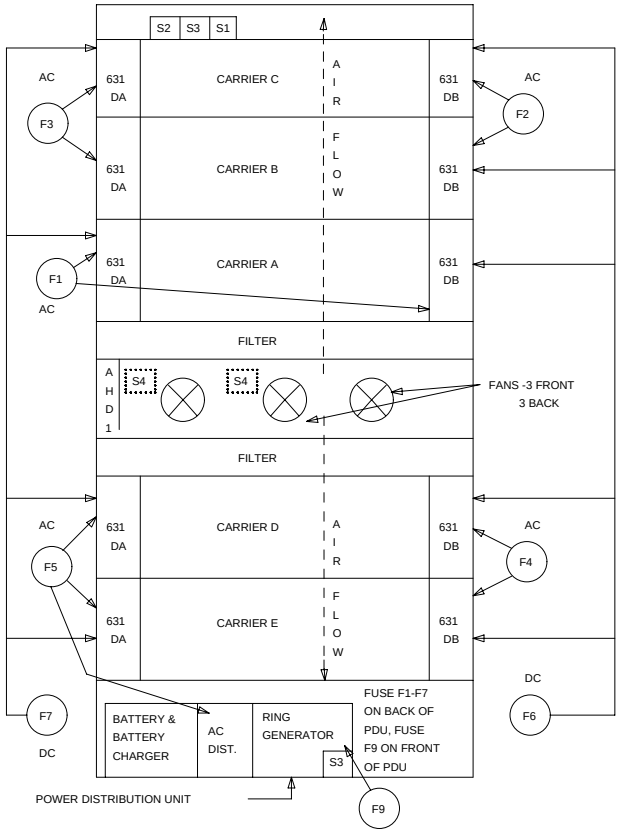


Figure 8-6. Multicarrier Cabinet Environment Components (CABINET) [Non-Variable Speed Fan Option]

Sensor S1 informs the Maintenance/Tape Processor when the temperature at the top of the cabinet reaches 65^0 C (149^0 F). Sensor S2 is not monitored by any circuit pack. However, when the temperature at the top of the cabinet reaches 70^0 C (158^0 F), this sensor causes the Power Distribution Unit to shut down power to the entire cabinet. At this point, Emergency Transfer is invoked, and no other system functions are provided.

The S3 and S4 sensors constantly report the temperature at the air exhaust in the cabinet (top and bottom S3 sensors) and at the air intake (S4 sensors). The AHD1 circuit pack uses this information to determine fan speed and air flow alarm state. If there is at least a 15 ^{0}C (27 ^{0}F) air temperature difference between the air exhaust and air intake, **and** if the air exhaust temperature is greater than 50 ^{0}C (122 ^{0}F), all the fans are turned up to high speed. If this condition exists, the AHD1 circuit pack reports an air flow problem which results in a Minor alarm against the Cabinet Sensors.

Variable Speed Fan Option. A variable speed fan is indicated by the Product Code “ED67077 Gx,’ where x is 4 or a number greater than 4. A variable speed fan contains Thermal Speed Control and an alarm circuit. As a result, the AHD1 circuit pack is not required in this type of fan.

A variable speed fan has two connectors: a two pin connector for the -48 volt input power for backward compatibility, and the five pin Molex connector for speed control and alarm circuitry. The -48 volt power circuitry is isolated from the speed control and the alarm circuitry.

An alarm lead from all six variable speed fans is tied to a single lead leading to the processor circuit pack. Three fans on the front of the system are connected to an S3 sensor, which monitors the exhaust air temperature above carrier position “C.” Three fans on the back of the system are connected to another S3 sensor, which monitors the exhaust air in the power distribution unit. The speed of the variable speed fans is determined by the temperature detected by the S3 sensors. Thus, the fans’ speed changes continuously according to the temperature of the exhaust air. If the fan speed drops below the preset limit, or if the fan fails, the fan alarm circuit reports an air flow problem, which results in a minor alarm.

A multicarrier cabinet containing variable speed fans is presented in the following figure. Note that the two S4 sensors that are included with non-variable speed fans are not required with variable speed fans.

NOTE:
The new variable speed fans are backward compatible to the carriers for the non-variable speed fans. However, the carriers for the variable speed fans are not backward compatible to cabinets configured for the carriers for the non-variable speed fans. Finally, the carriers for the non-variable speed fans are not forward compatible to cabinets configured for the carriers for variable speed fans.

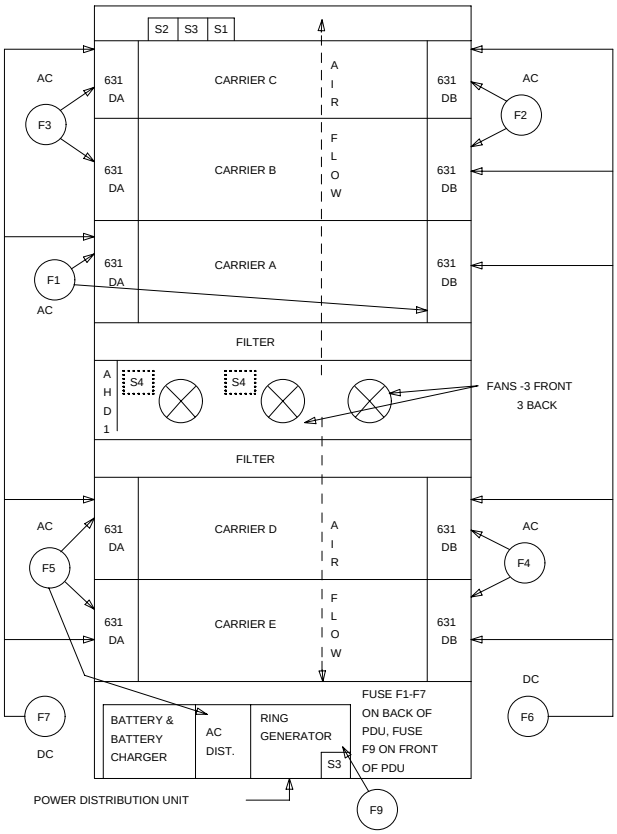


Figure 8-7. Multicarrier Cabinet Environment Components (CABINET) [Variable Speed Fan Option]

Replacement Procedures for AHD1 Fan Speed Controller Circuit Packs and Fans

AHD1 Fan Speed Controller Circuit Pack Replacement Procedure

NOTE:
The procedures in this section pertain only to non-variable speed (standard) fans.

1. Refer to Chapter 5, “Routine Maintenance Procedures”, for details on removing power from the system.
2. Remove the fan assembly cover by pulling the cover outward.
3. Loosen and remove the retaining screw nearest the power plug on the front fan located to the extreme left.
4. Disconnect the power plug from the fan.
5. Loosen and remove the other retaining screw on the fan.
6. Remove the fan from the fan assembly.

   CAUTION:
   DO NOT TOUCH! Resistors on the circuit pack are hot.

7. Lift the latch on the AHD1 fan speed controller circuit pack.
8. Using the latch as a handle, pull the circuit pack up and out of its holder.
9. Insert a replacement AHD1 circuit pack, and push down on the latch until the latch snaps in place.
10. Position the fan, and reconnect the fan power plug.
11. Insert and tighten the retaining screws.
12. Replace the fan assembly cover.
13. Refer to Chapter 5, “Routine Maintenance Procedures”, for details on restoring power to the switch.

Fan Replacement Procedure

NOTE:
The procedures in this section pertain to both non-variable speed (standard) fans and variable speed fans.

First, determine which fans are defective:

NOTE:
The following instructions are for servicing a Medium Cabinet. For a Small Cabinet (only two fans in the rear), follow Step 2A below, but start from the rear of the cabinet.

1. If any fan is **not** rotating, a more detailed inspection is required to determine why the fan has stopped operating. The fact that a fan is not spinning is not always proof that it is damaged. Since each front fan is electrically in parallel with a rear fan, an internal short circuit in a front fan prevents power from reaching the rear fan (and vise versa).

   Remove the fan assembly cover by pulling the cover outward. Remove the power connector from each inoperative front fan.

2. The following must be done to determine if the front fan or the rear fan has failed:

   A. Test the front fan:

   Measure the input impedance between the (+) and (-) input terminals of the front fan with an ohmmeter. **IMPORTANT: Attach the "common" lead of the ohmmeter to the fan's (-) input terminal and the "ohms" or (+) lead of the ohmmeter to the fan's (+) input terminal.**

   Follow the guidelines in the following table:

Input Impedance	Fan Analysis	Action	Next Step
2.0M < ohms < 20M	Good	None	Go to Step 2B
ohms < 2.0M	Short Circuit	Replace	Go to Step 3
ohms > 20M	Open Circuit	Replace	Go to Step 3

   B. Test the "paired" rear fan:

   From the front of the cabinet, use a voltmeter to measure the DC voltage across the two female contact pins in the connector housing of the fan wire harness removed from the inoperative front fan in Step 1. (This voltage is the same voltage seen across the input terminals of the paired fan in the rear of the assembly.)

Follow the guidelines in the following table:

Input Impedance	Fan Analysis	Action	Next Step
VDC > 25V	Good	(AHD1 or Front Fan failed)	
VDC < 25V	Short Circuit	Replace	Go to Step 3

3. To replace a fan located at the front of the switch cabinet, remove the fan assembly cover by pulling the cover outward. To replace a fan located at the rear of the switch cabinet, use a No. 10 slot screwdriver or 5/16-inch (8mm) wrench and remove the panel covering the fan assembly.
4. Loosen and remove the retaining screw nearest the power plug on the defective fan.

   DANGER:
   48-volt power is present on the fan plug.

5. Disconnect the power plug from the defective fan.
6. Loosen and remove the other retaining screw on the fan.
7. Remove the fan from the fan assembly.
8. Position the replacement fan and reconnect the fan power plug.
9. Insert and tighten the retaining screws.
10. Replace the fan assembly cover or panel.

Hardware Error Log Entries and Test to Clear Values

Table 8-39. Cabinet Sensors Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	test environment P sh r 1
	Run the Short Test Sequence first. If all tests pass, run the Long Test Sequence. Refer to the appropriate test description and follow the recommended procedures				
1	Any	Cabinet Temperature Query Test (#122)	MINOR	ON	test environment P sh r 3
257	Any	Cabinet Temperature Query Test (#122)	MAJOR	ON	test environment P sh r 3

System Technician-Demanded Tests: Descriptions and Error Codes

Always investigate tests in the order presented in the table below when inspecting errors in the system. By clearing error codes associated with the *Battery & Battery Charger Query Test*, for example, you may also clear errors generated from other tests in the testing sequence.

Table 8-40. System Technician-Demanded Tests: CABINET

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Battery & Battery Charger Query Test (#5) (a)	Short	Long	No
AC Power Query Test (#78) (b)	Short	Long	No
Power Unit Query Test (carrier E) (#127) (c)	Short	Long	No
Power Unit Query Test (carrier D) (#127) (c)	Short	Long	No
Power Unit Query Test (carrier A) (#127) (c)	Short	Long	No
Power Unit Query Test (carrier B) (#127) (c)	Short	Long	No
Power Unit Query Test (carrier C) (#127) (c)	Short	Long	No

Table 8-40. System Technician-Demanded Tests: CABINET

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Emergency Transfer Query Test (#124) (d)	Short	Long	No
Cabinet Temperature Query Test (#122)	Short	Long	No
External Alarm Lead Query Test (#120) (e)	Short	Long	No
Analog Ring Generator Initialization Test (#117) (f)	Short	Long	No
Analog Ring Generator Query Test (#118) (f)	Short	Long	No

Notes:

a. Refer to POWER (Battery & Battery Charger) Maintenance documentation for a description of this test.

b. Refer to AC-POWER (AC-Power) Maintenance documentation for a description of this test.

c. Refer to CARR-POW (Carrier Port Power Unit for AC- and DC-Powered Systems) Maintenance documentation for a description of this test.

d. Refer to EMG-XFER (Emergency Transfer) Maintenance documentation for a description of this test.

e. Refer to EXT-DEV (External Alarm) Maintenance documentation for a description of this test.

f. Refer to RING-GEN (Analog Ring Generator) Maintenance documentation for a description of this test. This test shows up in the test sequence only if there is a TN768 Tone-Clock circuit pack in the port network being tested.

Cabinet Temperature Query Test [for Non-Variable Speed Fans] (#122)

This test queries the Maintenance/Tape Processor for the status of the cabinet sensors in the cabinet that contains non-variable speed fans.

NOTE:
The descriptions for Error Codes 1 and 2 (FAIL) in the following table are reversed for Generic 1 systems that use a TN731B maintenance circuit pack. That is, Error Code 1 indicates an “over temperature” problem while

Error Code 2 indicates an “air flow” problem. If you are servicing a Generic 1 system, be sure to follow the proper service strategy.

Table 8-41. Cabinet Temperature Query Test #122 [Non-Variable Speed Fans]

Error Code	Test Result	Description Recommendation
1000	ABORT	System resources required to run this test are not available. 1. Retry the command at 1-minute intervals a maximum of 5 times.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at 1-minute intervals a maximum of 5 times. 2. If the test continues to ABORT with Error Code 2000, check for system powering problems with the A carrier. Look for and resolve all AC-POWER and CARR-POW alarms in a multicarrier cabinet system or DC-POWER alarms in a single-carrier cabinet system. Then, repeat the test. 3. If the test continues to ABORT with a Error Code 2000, check for and resolve all PR-MAINT (Maintenance/Tape Processor) errors. Then, repeat the test. 4. If the test continues to ABORT with a Error Code 2000, escalate the problem.
2029	ABORT	Internal System Error. 1. Retry the command at 1-minute intervals a maximum of 5 times.

Table 8-41. Cabinet Temperature Query Test #122 [Non-Variable Speed Fans]

Error Code	Test Result	Description Recommendation
1	FAIL	The AHD1 circuit pack has reported an air flow problem. The temperature difference between the air intake and the air exhaust is at least 150 C (27 0 F) and the absolute temperature at the top of the cabinet is at least 500 C (122 0F) (referred to as the 150 C/500 C criteria). The fans should be running at high speed. 1. If none of the fans are running, then: a. Look for and resolve all alarms against the CARR-POW (Carrier Port Power Unit). b. Verify -48 volt DC power is available to the fan units. Check the fan unit wiring harness connector. Check that there is 48 volt DC between pins 3, 9, 11 and 2, 8, 10. — If there is -48 volt DC power at the connector, there should be power to the fans. If the fans are not running, replace the AHD1. If the fans still do not run, escalate the problem. — If there is no -48 volt DC power at the connector, then the current limiter card (982LS) is probably defective. Replace the current limiter card. If the fans still do not run, escalate the problem. 2. If only a few of the fans are not running, replace the defective fans. 3. If all the fans can be started, wait five minutes and rerun the test. If the test fails again, proceed to Step 4 or 5 as applicable. 4. If the fans are not at high speed, measure the cabinet temperature at the air intake and the air exhaust at the top of the cabinet. a. If the 150 C/500 C criteria is met, there is a problem with either the AHD1 circuit pack or the fans that is preventing the fans from operating at high speed. Replace the AHD1 circuit pack and/or the fans. If this succeeds in getting the fans to run at high speed, wait five minutes to give the cabinet time to cool down and, rerun the test. If the problem persists, go to step 5. b. If the 150 C/500 C criteria is not met, the PR-MAINT (Maintenance/ Tape Processor) is incorrectly reporting this condition. Look for and resolve all errors on these maintenance objects first, then rerun the test. If the test still fails, escalate the problem. 5. If the fans are running at the high speed, check the items on list that follows. Any on of the items could be restricting or redirecting the flow of air within the cabinet. a. Check both filters. If a filter is dirty or clogged it should be cleaned or replaced. The filters can either be washed with soap and water or vacuumed. b. Make sure there is nothing (other than circuit packs) in the carrier slots that could be restricting the air flow. c. Make sure there are no missing (blank) circuit pack or carrier faceplates. Install and/or replace them as necessary. d. Make sure the cabinet door is properly closed. The door must be closed for the fans to be able to properly cool the cabinet. Wait five minutes to give the fans a chance to cool the cabinet. Rerun the test. If the tests still fails, proceed to Step 6. 6. At this point, there should be nothing impeding the air flow, and the fans should be running at high speed. Check the temperatures for the 150 C/500 C criteria. a. If the 150 C/500 C criteria exists, a temperature problem exists, and the fans (at high speed) should cool down the switch. Wait five minutes and rerun the test. If the test still fails, the ambient room temperature is probably too high, and the room should be cooled. b. If the 150 C/500 C criteria does not exist, the AHD1 circuit pack, the fans, or the S3 or S4 sensors are defective. Replace these items one at a time (in the order listed). Rerun the test between each replacement. Failures can occur on the Maintenance/Tape Processor that are not detected by the respective maintenance, but that cause many, if not all, environment tests to fail. If many environment tests are failing, the suspect circuit pack, depending on the system configuration, should be replaced and the test rerun. If this does not clear the problem, follow normal escalation procedures.

Table 8-41. Cabinet Temperature Query Test #122 [Non-Variable Speed Fans]

Error Code	Test Result	Description Recommendation
2	FAIL	The PR-MAINT (Maintenance/Tape Processor has reported a temperature problem because the S1 sensor has detected a temperature of at least 650 C (1490 F). The entire cabinet is in danger of being powered down if the temperature reaches 70 0C (1580 F). 1. If none of the fans are running: a. Look for and resolve all alarms against the CARR-POW (Carrier Port Power Unit). b. Verify that 48 volt DC is available to the fan units. Check the fan unit wiring harness connector. Verify that there is 48 volt DC between pins (3, 9, 11 and 2, 8, 10). — If there is 48 volt DC at the connector, there should be power to the fans. If the fans are not running, replace the AHD1. If the fans still do not run, follow normal escalation procedures. — If there is not 48 volt DC at the connector, the current limiter card (982LS) is probably defective. Replace the current limiter card. If the fans still do not run, escalate the problem. 2. If only a few of the fans are not running, replace the defective fans 3. If all the fans can be started, wait five minutes, and rerun the test.If the test fails again, proceed to Step 4. 4. Check the temperature at the top of the cabinet. If the temperature is at least 650 C (1490 F), the ambient room temperature is too high, and the fans cannot cool the system. Unless the room temperature is reduced, the system is going to shut down soon. If the temperature is less than 650 C, then: a. The PR-MAINT (Maintenance/Tape Processor) may be incorrectly reporting this condition. First, look for and resolve all errors on these MOs, then rerun the test. If this test fails again, return to Step 1. If there are no errors, continue. b. The sensor S1 may be incorrectly reporting the temperature at the top of the cabinet. Replace sensor S1, and rerun the test. If the test still fails, escalate the problem.
3	FAIL	The AHD1 circuit pack has reported both air flow and temperature problems. Resolve the airflow error first, then, correct the temperature error as described previously.
None	PASS	The AHD1 circuit pack has not reported any temperature or air flow problems. The temperatures at the air exhaust at the top of the cabinet and the air intake at the bottom of the cabinet can be measured and the results compared against the criteria described previously. If a problem has been reported, troubleshoot this problem by using the procedures for the "FAIL" cases described previously.

CAP-MEM (Memory Card Capacity)

MO Name (in Alarm Log)	Alarm Level	Initial Command to Run	Full Name of MO
CAP-MEM	MINOR/ WARNING*	test card-mem long	Memory Card Capacity

* The WARNING alarm is generated when the alarm is downgraded by using the **set option** command.

Memory Card Capacity tracks the percentage of used translation storage space on the memory card. Whenever translation space usage on the memory card reaches 98% of capacity, an alarm is generated. This alarm serves to inform the user that a larger flash card may be required for the system.

Error Log Entries and Test to Clear Values

Table 8-42. Memory Card Capacity Error Log Entries

Err	Aux	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
1	112	Memory Card Capacity Test (#1014)	MINOR/ WARNING	OFF	test card-mem long
	The memory card translation storage space is at least or more than 98% full. This alarm has been downgraded by the **set option** command.				

System Technician-Demanded Tests: Descriptions and Error Codes

Always investigate tests in the order presented in the table that follows when you are inspecting errors in the system. By clearing error codes associated with the “Memory Card Capacity Test,” for example, you may also clear errors generated from other tests in the testing sequence. The Memory Card Capacity Test can be initiated via either the **test card-mem long** command or after a **save translation** command.

Table 8-43. System Technician-Demanded Tests: CAP-MEM

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
12 Volt Power Supply Test (#701) (a)	Short	Long	No
Memory Card Insertion Test (#695) (b)	Short	Long	No
Memory Card Format and Read Test (#696) (b)	Short	Long	No
Memory Card Match Test (#697) (b)	Short	Long	No
Memory Card Write-Protected Test (#698) (b)	Short	Long	No
Memory Card Directory Recovery Test (#699) (b)	Short	Long	No
Memory Card Translation Data Integrity Test (#694) (b)	Long		No
Memory Card Erase/Write/Read Test (#693) (b)	Long		No
Memory Card Capacity Test (#1014)	Long		No

Notes:

a. Refer to 12V-PWR (12 Volt Power Supply) Maintenance documentation for a description of this test.

b. Refer to CARD-MEM (Memory Card) Maintenance documentation for a description of this test.

Memory Card Capacity Test (#1014)

This test is a nondestructive test. The purpose of the test is to verify that the percentage of translation storage space used in the memory card is less than 98%.

This test can be initiated through a system technician demanded **test card-mem long** command, or it can be executed as part of a maintenance test sequence after the **save translation** operation.

Table 8-44. Memory Card Capacity Test #1014

Error Code	Test Result	Description/ Recommendation
112	ABORT	The Memory Card Translation storage is at least 98% full. 1. Inform the user that it may be necessary to upgrade to a larger flash card. 2. Replace the memory card with a larger one, or downgrade the alarm to WARNING by using the **set option** command. 3. Rerun the test.
2012 2106 2114	ABORT	Internal System Error 1. Retry the command at 1-minute intervals a maximum of 5 times.
2013 2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at 1-minute intervals a maximum of 5 times
2108	ABORT	The NetPkt Interface circuit pack is not a TN794 circuit pack. 1. Follow the Standard Repair Procedures for repairing the NetPkt Interface circuit pack with the TN794 circuit pack. 2. Re-enter the **test card-mem long** command.
2110	ABORT	No Memory card is inserted. 1. Insert a formatted memory card into the slot at the TN794 NetPkt Interface circuit pack. 2. Rerun the test.
	PASS	The Memory Card Translation storage is less than 98% full.

CARD-MEM (Memory Card)

A memory card contains a set of flash Erasable Programmable Read-Only Memory (EPROM) devices. The data can be stored in a memory card and can remain nonvolatile, even when the power is off. The memory card is installed into the TN794 NetPkt Interface circuit pack to save translations and core dumps. During system reboot or a system power down, the in-core system maintenance hardware error logs are temporarily saved in the memory card before the system goes down. When the system is restarted, the error log file is read back from the memory card.

Alarm Level	Initial Craft Command to Run
Major*	
Minor	test card-mem long
Warning	test card-mem sh

* The major alarm occurs only at power-up or on a **reset system 3**, **4**, or **5** when the MCU cannot load all translations from the memory card.

The hard patch feature uses the memory card as a temporary storage when LMM applied an update file to the in-core system software. The system software is stored in the flash section of the main memory. The memory card used for saving translations does not contain a copy of the MCU software.

The recommended size of a memory card for each configuration is described in the following table:

Table 8-45. Recommended Size of Memory Card

Memory Card Size	Usage	File Names
*1 & 4 megabytes	saving translations	translation
10 megabytes (Standard)	saving translations	translation
10 megabytes	firmware upgrade	firmware
20 megabytes	maintenance	translation & core_ dump
20 megabytes	system	upgrade MCU software

* Must be formatted via “format card-mem translation” command, depending on the MCU system size the 1 & 4 megabyte translation cards may not be large enough to hold the MCU translations. They should only be used for emergency backup.

A memory card has a write-protection switch along its edge. If this switch is enabled, the memory card cannot be written on.

The 12-volt power supply unit located in the TN794 NetPkt Interface circuit pack supports the erase and write operations of flash memory devices in the TN786B processor circuit pack. The unit also supports the memory card inserted in the TN794 NetPkt Interface circuit pack. If the12-volt power supply unit cannot be turned on to supply 12-volts, all erase and write operations fail. Refer to 12-volt PWR (12-Volt Power Supply) MO for details.

To write data (for example, translations) onto a memory card, the MCU software first erases the memory card and then writes the data. An erased bit can be written again, but a written bit cannot be changed or written again until the next erasure. Software erase and write operations on a memory card take longer as the card usage increases. When a memory card cannot be erased or written to by software, it should be replaced.

Removing a Memory Card from the Slot

A memory card can be removed from the slot at the TN794 NetPkt Interface circuit pack only when the fourth yellow LED with a label “card-in-use” is not glowing. Otherwise, the memory card operation may be interrupted abnormally and the files stored in the memory card may become corrupted.

Resolving an Alarm

To resolve an alarm raised against a memory card, follow these procedures:

1. Remove the inserted memory card from the slot in the TN794 NetPkt Interface circuit pack while the “card-in-use” amber LED is not glowing.
2. Insert the new formatted memory card firmly into the slot in the circuit pack.
3. Enter **test card-mem** to verify the new memory card.
4. If the alarm cannot be resolved by replacing the memory card, follow these steps:
   A. Remove the memory card from the TN794 NetPkt Interface circuit pack.
   B. Insert the memory card back into the slot.
   C. Enter **test network-control [long]** to verify the memory card.
5. Once the alarm is resolved, enter **save translation** to store the current system translations to the memory card.

Hardware Error Log Entries

The following table shows the error log entries and related information.

Table 8-46. CARD-MEM Error Log Entries

Error Type	Aux Data	Assoc Test #	Alarm Level	On/ Off Board	Test to Clear Value
0	0	Any	Any	Any	test card-mem
	Run the short test sequence first. If all tests pass, run the long test sequence.				
1		#695	Minor	Off	test card-mem
	System detects no memory card is inserted in the slot of the TN794 NetPkt Interface circuit pack. If a memory card is in place, it may have a bad physical connection.				
257	0-1	#696	Minor	Off	test card-mem
	System software cannot recognize the inserted memory card because the inserted memory card is not formatted or it has been corrupted. The system cannot use this memory card. Replace it.				
513	Any	#697	Warn	Off	test card-mem
	The inserted memory card does not have enough storage space to support system operations, such as saving translations, or the memory card is a system upgrade memory card that cannot be used to save translations. This error raises a Warning/Off-Board alarm. The memory card must be replaced. The *Aux Data* field values are as follows: **101:** inserted memory card is a system-upgrade memory card **102:** N/A **103:** inserted memory card is a system upgrade memory card **116:** the capacity of the inserted memory card does not match the system configuration **118:** N/A **132:** System translation reaches 98% capacity of the memory card reserved storage space **134:** N/A **148:** capacity of the inserted memory card does not match the system configuration and the system translation reaches a 98% capacity of the memory card reserved storage space **150:** N/A				

Table 8-46. CARD-MEM Error Log Entries — *Continued*

Error Type	Aux Data	Assoc Test #	Alarm Level	On/ Off Board	Test to Clear Value
769		#698	Warn	Off	test card-mem
	The write-protection switch of the memory card is in the protected position; it cannot be erased or written. 1. Follow the procedure for taking the memory card out of the slot. 2. Enter **test card-mem** to resolve the alarm. 3. Change the write-protection switch to the not-protected position. 4. Reinsert the memory card into the slot.				
1025	Any	#699	Minor	Off	test card-mem
	The memory card detected a broken directory. A Minor/Off-Board alarm is raised when maintenance cannot restore it. The memory card must be replaced before running the test to resolve the alarm. The *Aux Data* field contains the following error codes: **104:** directories on the memory card are corrupted and cannot be replaced. **105:** 0 cannot be written into the memory card before an erase operation. **106:** memory card cannot be erased. **107:** Data cannot be written into a memory card after an erasure. **108:** 12-volt power supply cannot be turned on; it may be defective. See 12V-PWR for details.				
1281	Any	#694	Minor	Off	test card-mem long
	The translations file stored in the memory card is corrupted with a checksum error during the read operation. The memory card cannot hold the written data. 1. Enter **save translation** to restore the translations. 2. Run **test card-mem long** to clear the alarm. 3. If the error occurs repeatedly, replace the memory card.				

Table 8-46. CARD-MEM Error Log Entries — *Continued*

Error Type	Aux Data	Assoc Test #	Alarm Level	On/ Off Board	Test to Clear Value
1537	Any	#693	Minor	Off	test card-mem long
	Test #693 failed. 1. Enter **status card-mem** to verify that a user's memory card is inserted and the write-protect switch is off. 2. Enter **test card-mem long** to verify that the 12-volt power supply is functional. 3. Reenter the test command to verify the test result of Test #693. 4. If the test still fails, replace the memory card. 5. After the new memory card is inserted, enter **test card-mem long** to resolve the alarm.				
3329	Any	None	Minor/ Major	Off	
	An error occurred while translations were being loaded. The relevant alarm occurs at power-up or on a reset system 3, 4, or 5 if the MCU cannot load translations. Use the following procedure only when there are no other memory card errors or alarms. 1. Resolve any memory card errors or alarms first. 2. Enter **reset system 3.** 3. After the MCU is restarted, enter **status card-mem**. 4. If the translation is not present, insert a backup memory card and reissue **reset system 3**. 5. If the problem is not resolved, escalate it.				

Table 8-46. CARD-MEM Error Log Entries — *Continued*

Error Type	Aux Data	Assoc Test #	Alarm Level	On/ Off Board	Test to Clear Value
3841	Any	None	Minor	Off	save transla-tion
	The save translation operation failed. The reasons are indicated in the Aux Data field as follows: **1.** Directory file on the memory card failed the checksum test. **2**. NetPkt Interface is not a TN794 circuit pack. **3**. Too many commands are running. **4**. Command has been ABORTed. **5.** Command has collided with a current command. **6**. Software controller is idle. **7**. Memory card has been erased. **8**. Only one good directory is on the card. **9**. All directories are corrupted; memory card needs reformatting. **10**. Hard patch file is full. **11**. Hardware fault, data cannot be written. **12**. Software error, passed parameters are out-of-range. **13**. Command has been ABORTed. **14**. Magic number is illegal. **15**. Driver was trapped when reading the memory card. **16**. No memory card is inserted. **17**. Second directory in the memory card cannot be found. **18**. File in the memory card is not available. **19**. Memory card does not match system usage. **20**. Memory card is too small. **21**. Broken directory cannot be recovered. **22**. System upgrade card inserted. **23**. Illegal write is requested. **24**. Generic software failure. **25**. Drive times out. **26**. Driver is unable to program 0s. **27**. Memory card cannot be erased. **28**. Memory card is write-protected. **29.**12-volt power supply could not be turned on.				
3843	Any	Save Trans	Minor	Off	Save Trans
	The save translations failure is due to other hardware failures. Enter the **test card-mem long** command and resolve other card-mem failures first. After the “all test card-mem pass” message is received, use the **save translation** command to resolve this error.				

Craft-Demanded Tests

Always investigate tests in the order presented in the following table when you are inspecting errors in the system. By clearing error codes associated with the Memory Card Insertion test, for example, you may also clear errors generated by other tests later in the sequence

Table 8-47. System Technician-Demanded Tests: CARD-MEM

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
12-Volt Power Supply Test #701 (See 12V-PWR for a description of this test)	Short	Long	No
Memory Card Insertion Test #695	Short	Long	No
Memory Card Format and Read Test #696	Short	Long	No
Memory Card Match Test #697	Short	Long	No
Memory Card Write-Protected Test #698	Short	Long	No
Memory Card Directory Recovery Test #699	Short	Long	No
Memory Card Translation Data Integrity Test #694	Long		No
Memory Card Erase/Write/Read Test #693	Long		No

Memory Card Erase/Write/Read Test #693

The purpose of this test, which is nondestructive, is to verify the erase, write, and read operations of the memory card. The test erases the backup copy of the translation file stored in the memory card and verifies that the erase operation is successful. The test then writes the primary copy of the translation file from the same memory card to the erased flash segment, and verifies that the translation file is written successfully.

The test can be initiated through a craft-demanded test, which is **test card-mem long**, or it can be executed as part of a maintenance test sequence when the

save translation operation fails. The test and relevant applications (for example, saving translations) cannot be executed simultaneously.

Table 8-48. Memory Card Erase/Write/Read Test #693

Error Code	Test Result	Description Recommendation
None	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
1192	ABORT	Applications are accessing the memory card. 1. Wait ten minutes for the applications to complete. 2. Retry the command at one-minute intervals up to a of five times. 3. If the test continues to ABORT, escalate the problem.
2012	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2013	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2106	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2108	ABORT	The NETCON circuit pack is not a TN794 circuit pack. 1. Replace the circuit pack with a TN794 circuit pack. 2. Reenter test card-mem.
2110	ABORT	No memory card is inserted. 1. Insert a formatted memory card into the slot in the TN794 NetPkt Interface circuit pack. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to ABORT, escalate the problem.
2111	ABORT	Inserted memory card cannot be recognized. 1. Insert a formatted memory card into the slot in the TN794 NetPkt Interface circuit pack. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to ABORT, escalate the problem.

Table 8-48. Memory Card Erase/Write/Read Test #693

Error Code	Test Result	Description Recommendation
2112	ABORT	The inserted memory card is a system-upgrade memory card. 1. Replace the inserted memory card with a user's memory card. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to ABORT, escalate the problem.
2113	ABORT	The inserted memory card has only one directory file. 1. Enter test card-mem and verify that test #699 passes. 2. If the directory file cannot be recovered, replace the memory card. 3. Retry the command at one-minute intervals up to five times. 4. If the test continues to ABORT, escalate the problem.
2114	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2115	ABORT	The memory card is write-protected. 1. Take out the memory card and change the write protect switch to the not-protected position. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to ABORT, escalate the problem.
2117	ABORT	No translation file has been saved onto the memory card. 1. Enter save translation and verify that the translations are saved onto the memory card successfully. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to ABORT, escalate the problem.
104	FAIL	Directories on the memory card are corrupted and cannot be recovered. 1. Replace the memory card. 2. Rerun the test. 3. If the test fails again, escalate the problem.
105	FAIL	0 cannot be written into memory before an erase operation. 1. Replace the memory card. 2. Rerun the test. 3. If the test fails again, escalate the problem.
106	FAIL	Memory card cannot be erased. 1. Replace the memory card. 2. Rerun the test. 3. If the test fails again, escalate the problem.

Table 8-48. Memory Card Erase/Write/Read Test #693

Error Code	Test Result	Description Recommendation
107	FAIL	Data cannot be written onto a memory card after an erasure. 1. Replace the memory card. 2. Rerun the test. 3. If the test fails again, escalate the problem.
108	FAIL	12-volt power supply for Test #693 cannot be turned on. It may be defective. 1. Reenter test card-mem and verify the results of Test #701 for the 12-volt power supply. (See 12V-PWR for details.) 2. If Test #701 fails, replace the TN794 NetPkt Interface circuit pack. 3. Reenter the command at one-minute intervals up to five times. 4. If the test continues to fail, escalate the problem.
None	PASS	The system could erase, read and write to the memory card.

Memory Card Translation Data Integrity Test #694

This nondestructive test verifies the integrity of the translation file stored in the memory card by reading (without any PREC updates) the translation file from the memory card and by then performing checksum error checking. The calculated checksum value is compared with the recorded checksum value in the translation file. If the two values are different, the translation file may be corrupted.

Table 8-49. Memory Card Translation Data Integrity Test #694

Error Code	Test Result	Description Recommendation
None	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2012	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2013	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.

Table 8-49. Memory Card Translation Data Integrity Test #694

Error Code	Test Result	Description Recommendation
2106	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2108	ABORT	The NetPkt Interface circuit pack is not a TN794 circuit pack. 1. Replace the circuit pack with a TN794 circuit pack. 2. Reenter test card-mem.
2110	ABORT	No memory card is inserted. 1. Insert a formatted memory card into the slot in the TN794 NetPkt Interface circuit pack. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to ABORT, escalate the problem.
2111	ABORT	Inserted memory card cannot be recognized. 1. Insert a formatted memory card into the slot in the TN794 NetPkt Interface circuit pack. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to ABORT, escalate the problem.
2112	ABORT	The inserted memory card is a system-upgrade memory card. 1. Replace the inserted memory card with a user's memory card. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to ABORT, escalate the problem.
2114	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
Any	FAIL	A checksum error is detected in the translation file that is stored in the inserted memory card. 1. Enter save translation to verify that translations can be successfully saved onto the memory card. 2. Rerun the test. 3. If the test fails again, replace the memory card and repeat steps 1 and 2. 4. If the test continues to fail after the memory card is replaced, escalate the problem.
None	PASS	No checksum error is found in the translation file.

Memory Card Insertion Test #695

This nondestructive test verifies whether a memory card is inserted into the slot in the TN794 NetPkt Interface circuit pack and also whether the MCU detects its existence

Table 8-50. Memory Card Insertion Test #695

Error Code	Test Result	Description Recommendation
None	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2012	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2013	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2106	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2108	ABORT	The NETCON circuit pack is not a TN794 circuit pack. 1. Replace the circuit pack with a TN794 circuit pack. 2. Reenter test card-mem.

Table 8-50. Memory Card Insertion Test #695

Error Code	Test Result	Description Recommendation
2114	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
Any	FAIL	No memory card is inserted in the TN794 NetPkt Interface circuit pack or the inserted memory card has a bad connection. 1. Insert a memory card into the slot in the TN794 NetPkt Interface circuit pack. 2. If a memory card is present, remove it and examine the connectors of both the memory card and the circuit pack. 3. Insert the memory card into the slot and make sure it is seated firmly. 4. Reenter test card-mem. 5. If this test fails again, replace the memory card and repeat Step 4. 6. If the test fails after you replace the memory card, replace the TN794 NetPkt Interface circuit pack. 7. If the problem is still unresolved, escalate it.
None	PASS	A memory card is inserted in the TN794 NetPkt Interface circuit pack and the system recognizes its existence.

Memory Card Format and Read Test #696

This nondestructive test reads the directory file from the memory card and verifies the integrity of the directory file. The memory card must be formatted before attempting an application

Table 8-51. Memory Card Format and Read Test #696

Error Code	Test Result	Description Recommendation
None	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2012	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2013	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.

Table 8-51. Memory Card Format and Read Test #696

Error Code	Test Result	Description Recommendation
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2106	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2108	ABORT	The NetPkt Interface circuit pack is not a TN794 circuit pack. 1. Replace the circuit pack with a TN794 circuit pack. 2. Reenter test card-mem.
2110	ABORT	No memory card is inserted. 1. Insert a formatted memory card into the slot in the TN794 NetPkt Interface circuit pack. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to ABORT, escalate the problem.
2113	ABORT	One of the two directories on the memory card is corrupted. 1. Reenter test card-mem and verify that test #696 passes. 2. If the test ABORTs again with this error code, replace the memory card.
2114	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
Any	FAIL	System software cannot recognize the inserted memory card. The memory card is not formatted or the directories are corrupted. 1. Replace the memory card with a new formatted memory card. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to fail, escalate the problem.
None	PASS	System recognizes the inserted memory card and can read the directories.

Memory Card Match Test #697

This nondestructive test verifies the inserted memory card for consistency with the system configuration. This test helps to answer the following questions:

- Is the inserted memory card a system software-upgrade card?

- Does the size of the inserted memory card match the capacity of the system configuration?
- Does the size of the translations in the system reach 98 percent of the reserved storage space on the memory card?

If the answer is yes to any of these questions, maintenance raises a warning alarm for service attention. A new memory card is usually required.

Table 8-52. Memory Card Match Test #697

Error Code	Test Result	Description / Recommendation
None	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2012	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2013	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2106	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2108	ABORT	The NetPkt Interface circuit pack is not a TN794 circuit pack. 1. Replace the circuit pack with a TN794 circuit pack. 2. Reenter **test card-mem.**
2110	ABORT	No memory card is inserted. 1. Insert a formatted memory card into the slot in the TN794 NetPkt Interface circuit pack. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to ABORT, escalate the problem.
2111	ABORT	Inserted memory card is not formatted. 1. Insert a formatted memory card into the slot in theTN794 NetPkt Interface circuit pack. 2. Rerun the test.

Table 8-52. Memory Card Match Test #697 — *Continued*

Error Code	Test Result	Description / Recommendation
2114	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
101	FAIL	The inserted memory card is a system-upgrade memory card. 1. Replace the memory card with a user's memory card. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to fail, escalate the problem.
103	FAIL	The memory card is a system-upgrade memory card. 1. Replace the memory card with a larger one. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to fail, escalate the problem.
116	FAIL	The capacity of the inserted memory card does not match the system configuration. 1. Replace the memory card with one of a larger size. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to fail, escalate the problem.
118	FAIL	The capacity of the inserted memory card does not match the system configuration. 1. Replace the memory card with a larger one. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to fail, escalate the problem.
132	FAIL	Translation reaches 98 percent of the memory card reserved storage space. 1. Replace the memory card with one of a larger size. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to fail, escalate the problem.
134	FAIL	Translation reaches a 98 percent capacity of the memory card reserved storage. 1. Replace the memory card with a larger one. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to fail, escalate the problem.

Table 8-52. Memory Card Match Test #697 — *Continued*

Error Code	Test Result	Description / Recommendation
148	FAIL	The capacity of the inserted memory card does not match the system configuration and the system translation reaches 98 percent of the memory card reserved storage space. 1. Replace the memory card with a larger one. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to fail, escalate the problem.
150	FAIL	The capacity of the inserted memory card does not match the system configuration and the system translation reaches 98 percent of the memory card reserved storage space. 1. Replace the memory card with a larger one. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to fail, escalate the problem.
	PASS	The inserted memory card matches the system configuration and the card has enough space for saving translations.

Memory Card Write-Protection Test #698

This nondestructive tests confirms whether the write-protection switch on the memory card is turned on. The memory card cannot be erased or written to when the write-protection switch is on.

Table 8-53. Memory Card Write-Protection Test #698

Error Code	Test Result	Description / Recommendation
	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2012	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2013	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.

Table 8-53. Memory Card Write-Protection Test #698

Error Code	Test Result	Description / Recommendation
2106	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2108	ABORT	The NETCON circuit pack is not a TN794 circuit pack. 1. Replace the circuit pack with a TN794 circuit pack. 2. Reenter test card-mem.
2110	ABORT	No memory card is inserted. 1. Insert a formatted memory card into the slot in the TN794 NetPkt Interface circuit pack. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to ABORT, escalate the problem.
2111	ABORT	Inserted memory card is not formatted. 1. Insert a formatted memory card into the slot in the TN794 NetPkt Interface circuit pack. 2. Retry the command at one-minute intervals up to five times.
2114	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
Any	FAIL	The write-protection switch on the memory card is in the on position. 1. Take out the inserted memory card and move the write-protection switch to the “not protected” position. 2. Insert the memory card back into the slot. 3. Retry the command at one-minute intervals up to five times. 4. If the test continues to fail, escalate the problem.
None	PASS	The inserted memory card is not write-protected.

Memory Card Directory Recovery Test #699

This is a nondestructive test. All memory cards, except the memory card for system software upgrades, have two copies of both directory files and translation files to ensure there is at least a good translation file in the memory card at any time, especially during the save translation operation.

If one of the two directory files is missing or broken (for example, one directory file has a bad checksum), maintenance can build the directory file. This test verifies the integrity of both active and backup directory files on the memory card and requests a rebuild of a directory file that is missing or corrupted.

When the test passes, both directories are sane. If the memory card is a system-upgrade memory card, the test ABORTs. If the test fails, the broken or missing directory cannot be rebuilt. As a result, all subsequent write-to-memory card operations are blocked. Whenever an alarm is raised and error type 1025 for CARD-MEM is active, the memory card should be replaced.

Table 8-54. Memory Card Directory Recovery Test #699

Error Code	Test Result	Description Recommendation
None	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
1192	ABORT	Contention error. Applications are accessing the memory card. 1. Wait ten minutes for the applications to complete. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to ABORT, escalate the problem.
2012	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2013	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2106	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.

Table 8-54. Memory Card Directory Recovery Test #699

Error Code	Test Result	Description Recommendation
2108	ABORT	The NetPkt Interface circuit pack is not a TN794 circuit pack. 1. Replace the circuit pack with a TN794 circuit pack. 2. Reenter test card-mem.
2110	ABORT	No memory card is inserted. 1. Insert a formatted memory card into the slot in the TN794 NetPkt Interface circuit pack. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to ABORT, escalate the problem.
2111	ABORT	Inserted memory card cannot be recognized. 1. Insert a formatted memory card into the slot in the TN794 NetPkt Interface circuit pack. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to ABORT, escalate the problem.
2112	ABORT	The inserted memory card is a system-upgrade memory card. 1. Replace the inserted memory card with a user's memory card. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to ABORT, escalate the problem.
2114	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2115	ABORT	The memory card is write-protected. 1. Take out the memory card and change the write protect switch to the "not protected" position. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to ABORT, escalate the problem.
104	FAIL	Directories on the memory card are corrupted and cannot be recovered. 1. Replace the memory card. 2. Rerun the test. 3. If the test fails again, escalate the problem.
105	FAIL	0 cannot be written into memory before an erase operation. 1. Replace the memory card. 2. Rerun the test. 3. If the test fails again, escalate the problem.

Table 8-54. Memory Card Directory Recovery Test #699

Error Code	Test Result	Description Recommendation
106	FAIL	Memory card cannot be erased. 1. Replace the memory card. 2. Rerun the test. 3. If the test fails again, escalate the problem.
107	FAIL	Data cannot be written onto a memory card after an erasure. Maintenance cannot restore the missing or broken directory file in the inserted memory card. 1. Replace the memory card with a new formatted one. 2. Retry the command at one-minute intervals up to five times. 3. If the test fails again, escalate the problem.
108	FAIL	12-volt power supply for test #693 cannot be turned on. It may be defective. 1. Reenter test card-mem and verify the results of test #701 for the 12-volt power supply. (See 12V-PWR for details.) 2. If test #701 fails, replace the TN794 NetPkt Interface circuit pack. 3. Reenter the command at one-minute intervals up to five times. 4. If the test continues to fail, escalate the problem.
None	PASS	Both directory files on the memory card are sane.

CARR-POW (Carrier Port Power Unit) for AC-Powered Systems

MO Name (in Alarm Log)	Alarm Level	Initial Command to Run*	Full Name of MO
CARR-POW	MAJOR	recycle carrier PC	Carrier Port Power Unit

* Recycle the carrier indicated by the PORT field in the Alarm Log.

The R6.0 MCU or later offers two basic cabinet type configurations: (1) the multicarrier cabinet system and (2) the single-carrier cabinet system. Both cabinet system configurations may be powered by either an external AC or DC power source.

The environment maintenance strategy to be used depends on both the cabinet configuration and the type of powering. Therefore, refer to the following list to find the appropriate MO section(s).

- For a single-carrier cabinet system, refer to the “DC-POWER” Maintenance documentation for environment maintenance strategy.
- For a multicarrier cabinet system using an external AC power source, refer to one or more of the following Maintenance documentation sections: “AC-POWER”, “CUST-ALM (Customer-Provided Alarming Device)”, or “POWER (Battery & Battery Charger) for AC-Powered Systems”.
- For a multicarrier cabinet system using an external DC power source, refer to one or more of the following Maintenance documentation sections: “AC-POWER (AC Power) for DC-Powered Systems”, “CUST-ALM (Customer-Provided Alarming Device)”, or “POWER (Battery & Battery Charger) for DC-Powered Systems”.

Every carrier in the system must be supplied with +5 volt, -48 volt, and -5 volt DC power for the various circuit packs to operate properly. This power is supplied to the carriers as follows: AC from a wall outlet comes into the PDU, which distributes the power via a set of fuses (F1 to F7) to the power units. Each carrier in the system is equipped with two power units: the 631 DA AC power unit and the 631 DB AC power unit, which together supply the required voltages to the carrier. Figure 8-8 illustrates the position of the power unit and the power distribution unit (PDU) and shows which power unit each fuse controls (Figure 8-8 also shows other Environment maintenance-related items that can be ignored for this section on Carrier Port Power Unit). Figure 8-9 illustrates the position of the power unit and the PDU and shows which power unit each fuse controls in a small cabinet. Figure 8-10 shows the position of the fuses on the PDU and describes how to replace a fuse. The TN2036 Voltage Range circuit pack provides easy access for testing the various voltages on the backplane pins. For more information, refer to the “Troubleshooting Backplane Voltage Problems” section found in Chapter 5, “Routine Maintenance Procedures”.

The power unit has two LEDs: if the yellow LED is lit it means the power unit is operating as normal; if the red LED is lit it means the power unit has a fault; and if neither is lit it LED means no external power is being supplied. The CARR-POW (Carrier Port Power Unit) MO represents the pair of power units that power each carrier in a multicarrier cabinet system. If a problem is reported by hardware for a power unit on a port carrier, the system can recycle the pair of power units in a port carrier; however, if the problem is reported on a control carrier, the system cannot recycle the pair of power units in a control carrier. In a standard multicarrier cabinet, carrier A is the control carrier, and carriers B, C, D, and E are the port carriers.

Loss of the 631 DB Carrier Port DC Power Unit in the active control carrier (the A carrier) causes loss of the administration terminal. Recycling a carrier turns off the pair of power units, and turns them back on two seconds later.

⚠ WARNING:
Recycling carriers disrupts service for all circuit packs on the carrier.

The MCU can also support neon message waiting lamps on analog telephones. If this is required, then the carrier(s) that contains the TN769 Analog Neon circuit packs must also be supplied with 165 volt to power the neon lights. The 165 volt can only be supplied by a TN752 or a TN755B power unit circuit pack. The following table lists all power unit and power-related circuit packs for the system and indicates the voltages they can supply. Figure 8-8 through Figure 8-13 show a schematic of each power unit type. The TN2036 Voltage Range circuit pack provides easy access for testing the various voltages on the backplane pins.

Power Supply	+5	-48V	-5V	Cabinet Position
631 WA	yes	no	no	Left Side
631 WB	no	yes	no	Right Side
631 AR	yes	no	no	Left Side
631 BR	no	yes	no	Right Side
631 DA	yes	no	no	Left Side
631 DB	no	yes	yes	Right Side
1217A	yes	yes	yes	Right Side
WP91153	yes	yes	yes	Right Side

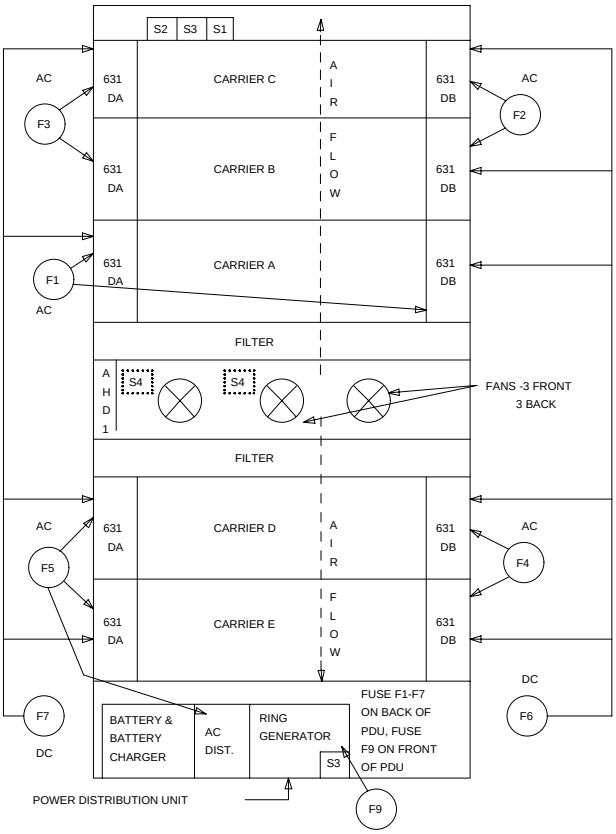


Figure 8-8. Multicarrier Cabinet Environment Components (CARR-POW)

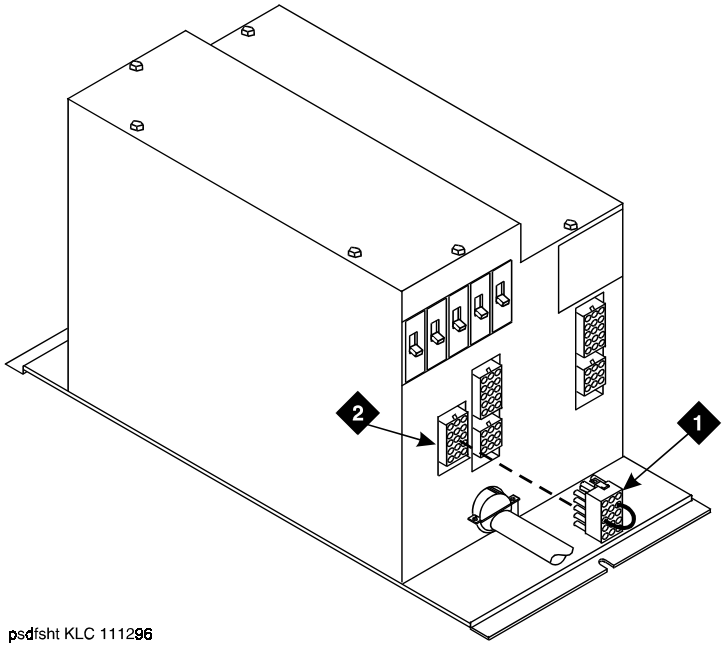
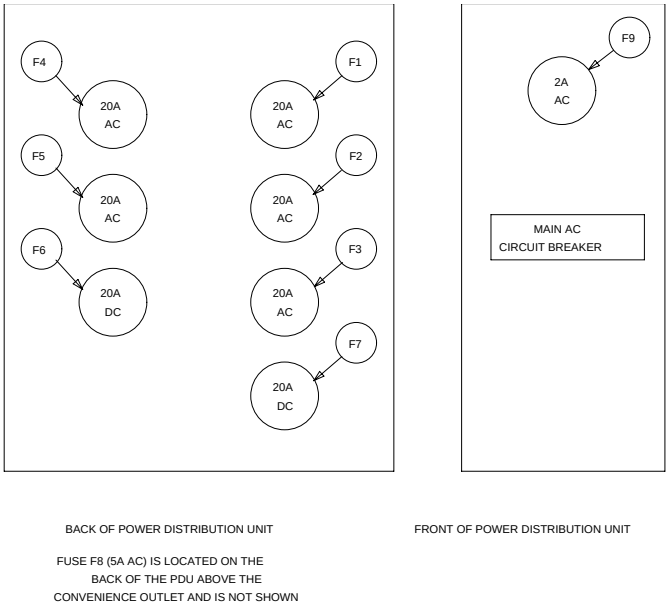
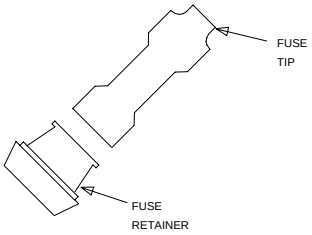


Figure Notes

1. Shorting Cable (H600-442-G1) (If Battery Charger is Not Installed)
2. J11

Figure 8-9. Small Cabinet Environment Components (CARR-POW)





FUSES F1-F7 ARE ILLUSTRATED AT THE LEFT.
WHEN REPLACING ONE OF THESE FUSES, CARE
MUST BE TAKEN TO INSTALL THEM FUSE TIP
FIRST.
FUSES F8-F9 ARE SYMMETRICAL AND CAN BE
INSERTED EITHER WAY.

Figure 8-10. Multicarrier Cabinet Fuse Location and Replacement

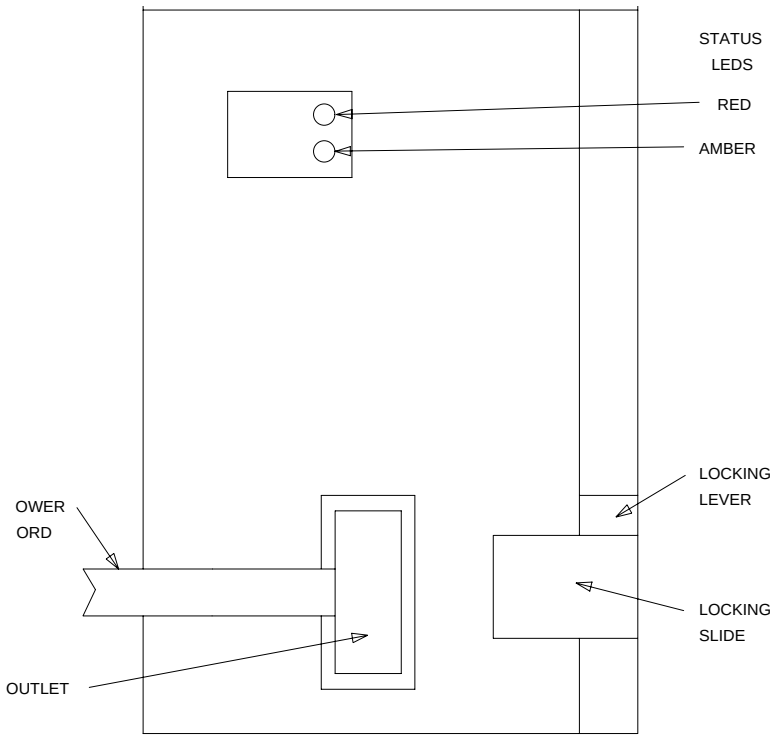


Figure 8-11. 631WA or 631WB AC Power Unit

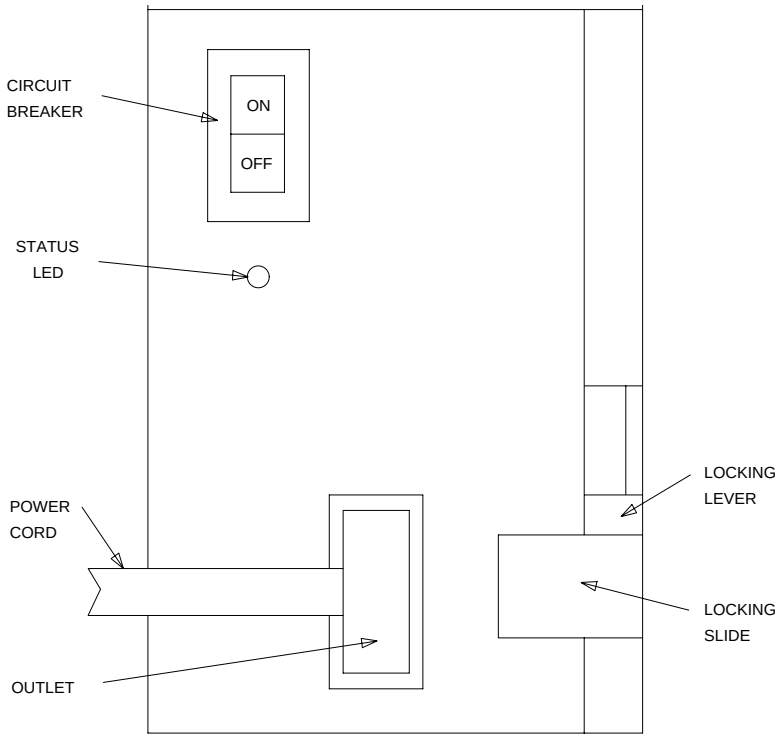


Figure 8-12. 631AR or 631BR AC Power Unit

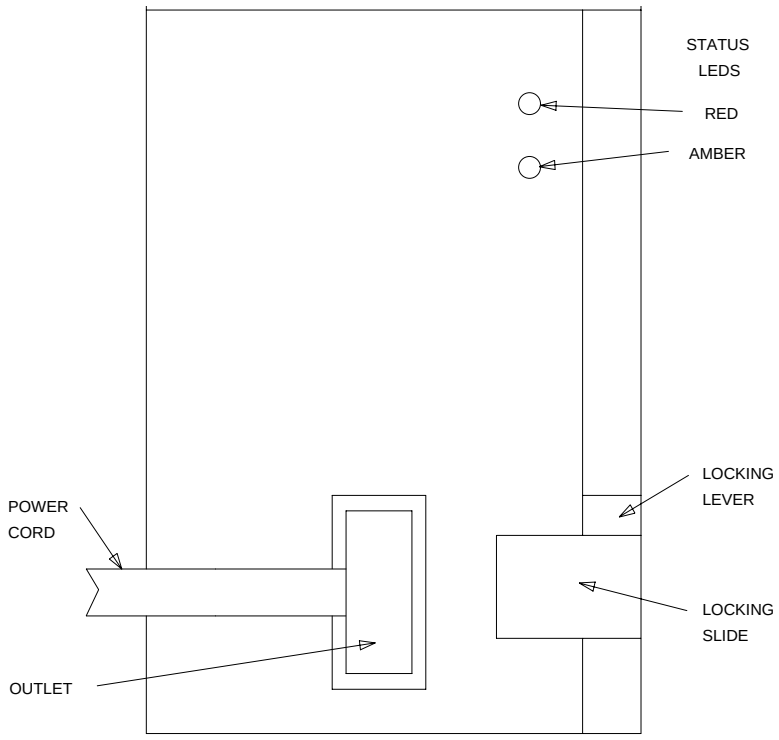


Figure 8-13. 631DA or 631DB AC Power Unit

Power Unit Replacement Procedures

The procedures for replacing the various power units are given in the following section:

Replacing a 631AR or 631BR AC Power Unit

If the power unit to be replaced is in a control carrier of a PPN system, refer to the “Powering the Cabinet” section in Chapter 5, “Routine Maintenance Procedures”, before replacing the power unit. To replace the power unit, implement the following steps:

1. Set the power switch to OFF, and unplug the power cord.
2. Move the locking slide on the power unit to its left most position and unlatch the locking lever.
3. Remove the power unit from the carrier.

4. Before installing the replacement power unit in the carrier, turn the power unit on its side and operate rocker switches 1 through 4 on the dip switch as follows:

Switch	631AR Position	631BR Position
1	open	open
2	closed	closed
3	open	open
4	closed	open

NOTE:
In the open position, the rocker is down on the side opposite the number. In the closed position, the rocker is down on the side adjacent to the number.

5. Move the locking slide on the replacement power unit to the extreme left position and open the locking lever.
6. Insert the power unit into the carrier until some resistance is felt.
7. Lift the locking lever upward until it latches.
8. Move the locking lever slide on the power unit to the extreme right position.
9. Connect the power cord and set the power switch to ON.

Replacing a 631DA or 631DB AC Power Unit

If the power unit to be replaced is in a control carrier of a PPN system, refer to the “Powering the Cabinet” section in Chapter 5, “Routine Maintenance Procedures” before replacing the power unit. To replace the power unit, use the following procedure:

1. Unplug the power cord.
2. Move the locking slide on the power unit to the extreme left position and unlatch the locking lever.
3. Remove the power unit from the carrier.
4. Move the locking slide on the replacement power unit to the extreme left position and open the locking lever.
5. Insert the power unit into the carrier until some resistance is felt.
6. Lift the locking lever upward until it latches.
7. Move the locking lever slide on the power unit to the extreme right position.
8. Connect the power cord and set the power switch to ON.

Replacing a TN736 or TN752 Power Unit Circuit Pack

If the TN736 or TN752 power unit circuit pack is in a control carrier, then refer to the “Handling Control Circuit Packs” section in Chapter 5, “Routine Maintenance Procedures”. Replacing either power unit interrupts the -5 volt supply to the carrier. This causes all the analog circuit packs in the carrier to fail their Loop Around Tests and may cause failures in circuit packs in the control complex. After the power unit has been replaced, look for alarms against these maintenance objects. If ANL-LINE alarms exist, refer to Test #47 (Loop Around and Conference Test) in ANL-LINE Maintenance documentation. For CO-TRK alarms, refer to Test #33 (Loop Around and Conference Test) in CO-TRK Maintenance documentation.

Hardware Error Log Entries and Test to Clear Values

Table 8-55. Carrier Port Power Unit (AC) Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	test environment P sh r 1
	Run the Short Test Sequence first. If all tests pass, run the Long Test Sequence. Refer to the appropriate test description and follow the recommended procedures				
1	0 , 1	Power Unit Query Test (#127)	MAJO R	ON	test environment P r 2
	a. Where P is an appropriate port network number taken for the Port field of the Error Log. b. Run the Power Unit Query Test (#127) first using the test environment P r 2 command. Then, if a carrier must be recycled to clear the CARR-POW alarm, use the recycle carrier PC command to run the Power Unit Recycle Test (#126). The Power Unit Recycle Test (#126) is not included in either the long or Short Test Sequences. Warning: The Power Unit Recycle Test (#126) is destructive. For more information, refer to the description of this test.				

System Technician-Demanded Tests: Descriptions and Error Codes

Always investigate tests in the order presented in the following table when inspecting errors in the system. By clearing error codes associated with the *Battery & Battery Charger Query Test*, for example, you may also clear errors generated from other tests in the testing sequence.

Table 8-56. System Technician-Demanded Tests: CARR-POW (AC)

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Battery & Battery Charger Query Test (#5) (a)	Short	Long	No
AC Power Query Test (#78) (b)	Short	Long	No
Power Unit Query Test (carrier E) (#127)	Short	Long	No
Power Unit Query Test (carrier D) (#127)	Short	Long	No
Power Unit Query Test (carrier A) (#127)	Short	Long	No
Power Unit Query Test (carrier B) (#127)	Short	Long	No
Power Unit Query Test (carrier C) (#127)	Short	Long	No
Emergency Transfer Query Test (#124) (c)	Short	Long	No
Cabinet Temperature Query Test (#122) (d)	Short	Long	No
External Alarm Lead Query Test (#120) (e)	Short	Long	No
Analog Ring Generator Initialization Test (#117) (f)	Short	Long	No
Analog Ring Generator Query Test (#118) (f)	Short	Long	No

Notes:

a. Refer to POWER (Battery & Battery Charger) Maintenance documentation for a description of this test.

b. Refer to AC-POWER (AC Power) Maintenance documentation for a description of this test.

c. Refer to EMG-XFER (Emergency Transfer) Maintenance documentation for a description of this test.

d. Refer to CABINET (Cabinet Sensors) Maintenance documentation for a description of this test.

e. Refer to EXT-DEV (External Alarm) Maintenance documentation for a description of this test.

f. Refer to RING-GEN (Analog Ring Generator) Maintenance documentation for a description of this test. This test only shows up in the test sequence if there is a TN768 Tone-Clock circuit pack in the port network being tested.

Power Unit Recycle Test (#126)

This test is destructive.

This test is destructive because it requires all circuit packs in the recycled carrier to be removed and inserted. These actions cause all calls originating or terminating on circuit packs in this carrier to be dropped. The pair of power units in the specified carrier is recycled. Both power units in the carrier are turned off for two seconds and then back on again. After the power units have been turned back on, the test queries the Maintenance/Tape Processor for the status of pair of power units in the specified carrier. If both power units are on and functioning, then the test passes. If both power units are not on and functioning, the test fails, and BOTH power units are turned off.

Table 8-57. Power Unit Recycle Test #126

Error Code	Test Result	Description/ Recommendation
1000	ABORT	System resources required to run this test are not available. 1. Retry the command at 1-minute intervals a maximum of 5 times. 2. If the test continues to abort, escalate the problem.
2000	ABORT	Response to the test request was not received within the allowable time period.
2029	ABORT	Internal System Error. 1. Retry the command at 1-minute intervals a maximum of 5 times.
1 (Carrier E) 2 (Carrier D) 4 (Carrier A) 8 (Carrier B) 16 (Carrier C)	FAIL	There is a problem with one or both Power Unit(s) on the recycled carrier. 1. Since the Power Unit Recycle Test failed, both Power Units in the recycled carrier should have been powered off by the system software. Both power units should be showing a red status LED, instead of a green one. Since the Power Unit Query Test is a subset of the Power Unit Recycle Test, the Power Unit Query Test (#127) should also fail. Run the Power Unit Query Test by using the **test environment P** command where P is the appropriate port network number. 2. If the test fails, follow the repair procedures described for Test #127. If problem persists, follow normal escalation procedures.
	PASS	Both power units in the recycled carrier were found to be healthy by the Maintenance/Tape Processor after the power units were powered down and back up. If the status LEDs on both power units are not showing green, then the PR-MAINT (Maintenance/Tape Processor) may have incorrectly reported the state of the power units. Look for and resolve any alarms on these MOs.

Power Unit Query Test (#127)

This test queries the Maintenance/Tape Processor for the status of pair of power units in the specified carrier. If both power units are on and functioning, then the test passes. If both are not on and functioning, it fails.

Table 8-58. Power Unit Query Test #127

Error Code	Test Result	Description/ Recommendation
1000	ABORT	System resources required to run this test are not available. 1. Retry the command at one minute intervals a maximum of 5 times.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at 1-minute intervals a maximum of 5 times. 2. If the test continues to ABORT with error code 2000, check for system powering problems with the A carrier. Look for and resolve all AC-POWER and CARR-POW alarms in a multicarrier cabinet system or DC-POWER alarms in a single-carrier cabinet system. Then, repeat the test. 3. If the test continues to ABORT with a 2000 error code, check for and resolve all PR-MAINT (Maintenance/Tape Processor) errors. Then, repeat the test. 4. If the test continues to ABORT with a 2000 error code, escalate the problem.
2029	ABORT	Internal System Error. 1. Retry the command at 1-minute intervals a maximum of 5 times.

Table 8-58. Power Unit Query Test #127

Error Code	Test Result	Description/ Recommendation
	FAIL	There is a problem with one or both power units on the tested carrier. 1. For each power unit that has all status LEDs OFF, check the AC input to the power unit at the power unit outlet (see Figure 8-8 and Figure 8-9). If there is no AC, then check the appropriate fuses (see Figure 8-10) for the affected power unit. If the fuses are blown out, replace the fuses. If the fuses blow out again or AC does not show up at the power unit outlet, then there is probably a power wiring problem in the cabinet. Follow normal escalation procedures. 2. At this point AC should be present at the power unit outlet. If the carrier being tested is the 1A or 2A carrier, refer to “Troubleshooting Control Carrier Power Units” in Chapter 5, “Routine Maintenance Procedures”. Otherwise, use the **recycle carrier PC** command (where PC is the appropriate port network and carrier) in an attempt to bring back the power units for this carrier. If the test passes, the trouble is cleared. If the test does not pass, one power unit, or both, in the tested carrier is defective. If only one power unit is defective, the status LEDs on the healthy power unit light green for a moment. When the recycle test determines that both power units are defective, the software turns off power to both the good and defective power units. This causes the status LED(s) on the good power unit to light red. 3. Unplug both power units, and wait about one minute to allow the power units to cool down. Plug in the power units. If either power unit is operating properly (that is, the status LEDs show green), then replace the defective power unit(s). See "Power Unit Replacement Procedures" in this section.

Table 8-58. Power Unit Query Test #127

Error Code	Test Result	Description/ Recommendation
	FAIL *(cont'd.)*	4. If the replaced power unit still does not operate properly, then a circuit pack or a defective telephone connected to a circuit pack in the affected carrier may be causing an electrical load which is preventing the power unit from operating properly. Unseat all the circuit packs in the carrier and reissue the **recycle carrier** command. a. If the recycle passes, then the power units are healthy, and the problem is with one of the circuit packs. Reinsert the circuit packs one at a time. If the status LED shows red after reinserting a circuit pack, replace the defective circuit pack. If the status LED still shows red, remove the Amphenol. connector on the back of the slot containing this circuit pack and reissue the **recycle carrier** command. If the status LED shows green, the problem is with one of the telephones or the wiring to one of the telephones on this slot. If the status LED still shows red, escalate the problem. b. If either power unit still shows a red status LED, check for bent pins and cable placement in the affected carrier. There are failures that can occur on the Maintenance/Tape Processor that **are not** detected by the respective maintenance, but that cause many, if not all, environment tests to fail. If many environment tests are failing, the suspect circuit pack, depending on the system configuration, should be replaced and the test rerun. If no other problems can be found, escalate the problem.
	PASS	Both power units in the tested carrier were found to be healthy by the Maintenance/Tape Processor. If the status LEDs on both power units are not showing green, the PR-MAINT (Maintenance/Tape Processor) may have incorrectly reported the state of the power units. Look for and resolve any alarms on these MOs.

CARR-POW (Carrier Port Power Unit) for DC-Powered Systems

MO Name (in Alarm Log)	Alarm Level	Initial Command to Run*	Full Name of MO
CARR-POW	MAJOR	recycle carrier PC	Carrier Port Power Unit

* Recycle the carrier indicated by the Port field in the Alarm Log.

The R6.0 MCU or later offers two basic cabinet type configurations: (1) the multicarrier cabinet system and (2) the single-carrier cabinet system. Both cabinet system configurations may be powered by either an external AC or DC power source.

The environment maintenance strategy to be used depends on both the cabinet configuration and the type of powering. Therefore, refer to the following list to find the appropriate MO section(s).

- For a single-carrier cabinet system, refer to the “DC-POWER (Single-Carrier Cabinet Power)” Maintenance documentation for environment maintenance strategy.
- For a multicarrier cabinet system using an external AC power source, refer to one or more of the following Maintenance documentation sections: “AC-POWER (AC Power) for AC-Powered Systems”, “CUST-ALM (Customer-Provided Alarming Device)”, or “POWER (Battery & Battery Charger) for AC-Powered Systems”.
- For a multicarrier cabinet system using an external DC power source, refer to one or more of the following Maintenance documentation sections: “AC-POWER (AC Power) for DC-Powered Systems”, “CUST-ALM (Customer-Provided Alarming Device)”, or “POWER (Battery & Battery Charger) for DC-Powered Systems”.

Every carrier in the system must be supplied with +5 volt, -48 volt, and -5 volt DC power for the various circuit packs to operate properly. A multicarrier system can be supplied by an external AC power source or an external DC power source.

In a DC-powered system, power is supplied to the carriers as follows: DC power from an external device comes into Power Distribution Units (PDU J58890CF and PDU J58890CF-1), which distribute the power via circuit breakers (CB1-CB12 for PDU J58890CF, CB1-CB6 for J58890Cf-1) to the carrier power units. Each carrier in the system is equipped with two power units, the 644A and the 645B, which together supply the required voltages to the carrier. Figure 8-14 illustrates the position of the carrier power units and PDU J58890CF and shows which power unit each circuit breaker controls (Figure 8-14 also shows other Environment maintenance-related items that can be ignored for this section on Carrier Port

Power Unit). Figure 8-15 shows the position of the circuit breakers on the PDU J58890CF. Figure 8-16 illustrates the position of the carrier power units and PDU J58890CF-1 and shows which power unit each circuit breaker controls (Figure 8-16 also shows other Environment maintenance-related items that can be ignored for this section on Carrier Port Power Unit). Figure 8-17 shows the position of the circuit breakers on the PDU J58890CF-1. The TN2036 Voltage Range circuit pack provides easy access for testing the various voltages on the backplane pins.

The CARR-POW (Carrier Port Power Unit) MO represents the pair of power units for each carrier in a multicarrier cabinet system. If a problem is reported by hardware for a power unit on a port carrier, the system can recycle the pair of power units in a port carrier; however, if the problem is reported on a control carrier, the system cannot recycle the pair of power units in a control carrier. In a standard multicarrier cabinet, carrier A is the control carrier, and carriers B, C, D, and E are the port carriers.

The carrier port power unit has one LED: the yellow LED on means operating as normal and the LED off means no external power is being supplied or that the power unit has a fault.

Loss of the 645B Carrier Port Power Unit in the active control carrier (the A carrier) causes loss of the administration terminal. Recycling a carrier turns off the pair of carrier power units and turns them back on two seconds later.

WARNING:
Recycling carriers disrupts service for all circuit packs on the carrier.

The MCU can also support neon message waiting lamps on analog telephones. If this is required, then the carrier(s) that contains the TN769 Analog Neon circuit packs must also be supplied with 165 volt DC power to power the neon lights. The 165 volt DC power can only be supplied by a TN752 or a TN755B power unit circuit pack. The following table lists the power units and power-related circuit packs that can be used in a DC-powered system and indicates the voltages they can supply. Figure 8-18 and Figure 8-19 show a schematic of the 644A and 645B power supplies, respectively. The TN2036 Voltage Range circuit pack provides easy access for testing the various voltages on the backplane pins.

Power Supply	+5V	-48V	-5V	165V	Cabinet Position
644A	yes	no	no	no	Left Side
645B	no	yes	yes	no	Right Side
TN736	no	no	yes	no	-
TN752	no	no	yes	yes	-
TN755B	no	no	no	yes	-

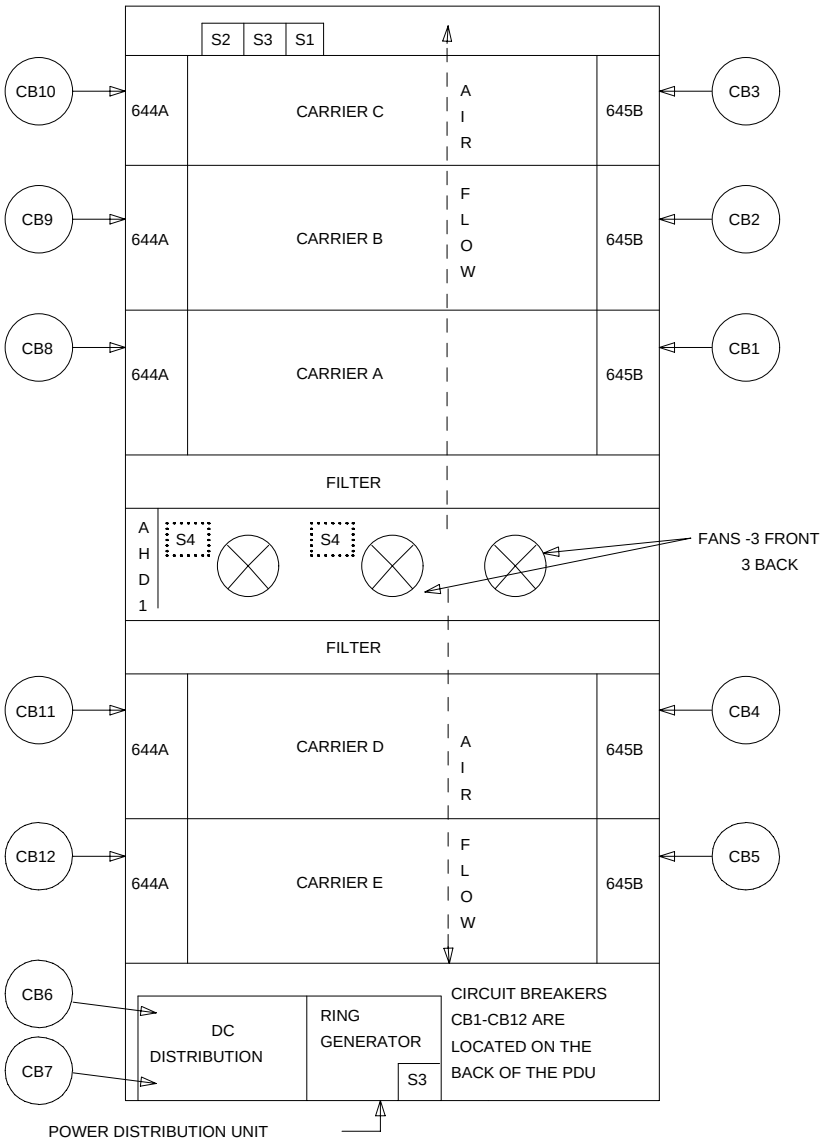


Figure 8-14. Power Distribution Unit for DC-Powered Systems (PDU8890CF)

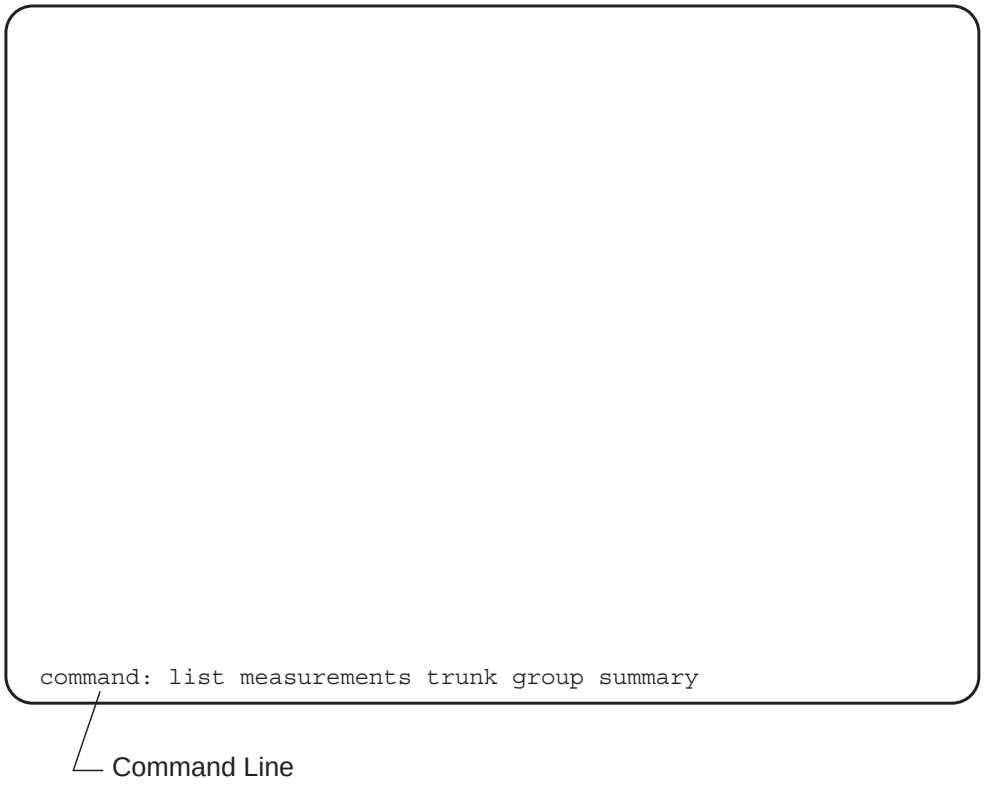


Figure 8-15. Power Distribution Unit for DC-Powered Systems (PDU 58890CF)

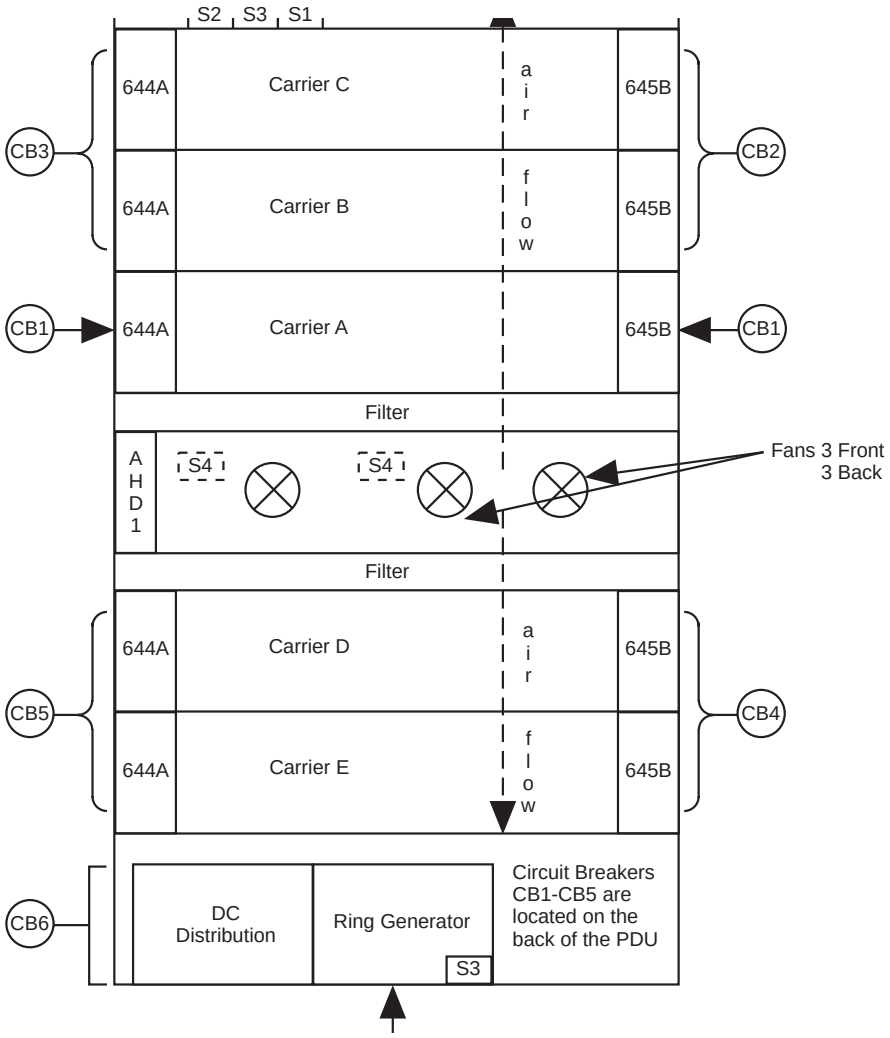


Figure 8-16. Power Distribution Unit for DC-Powered Systems (PDU8890CF-1)

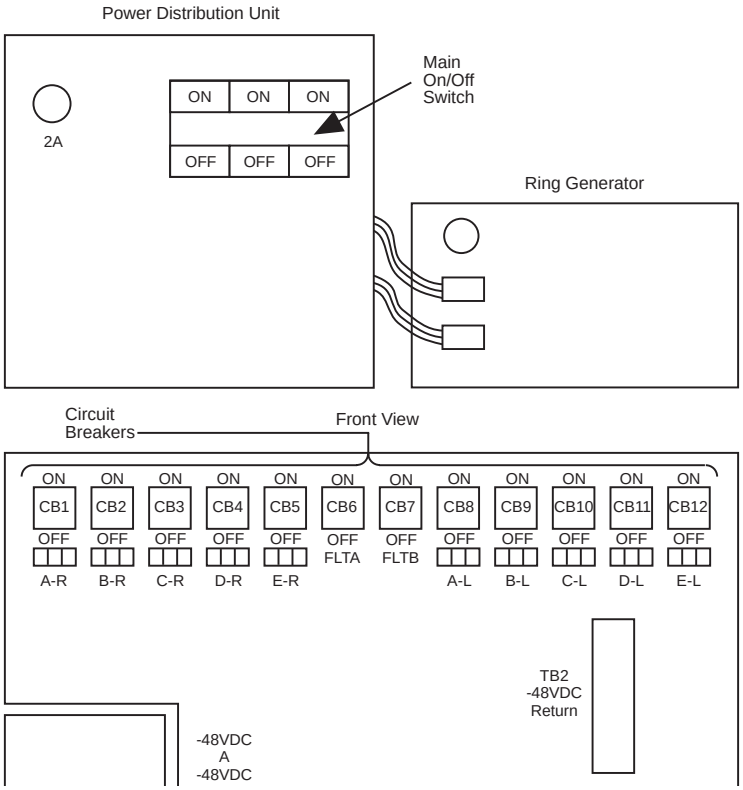


Figure 8-17. Power Distribution Unit for DC-Powered Systems (PDU 58890CF-1)

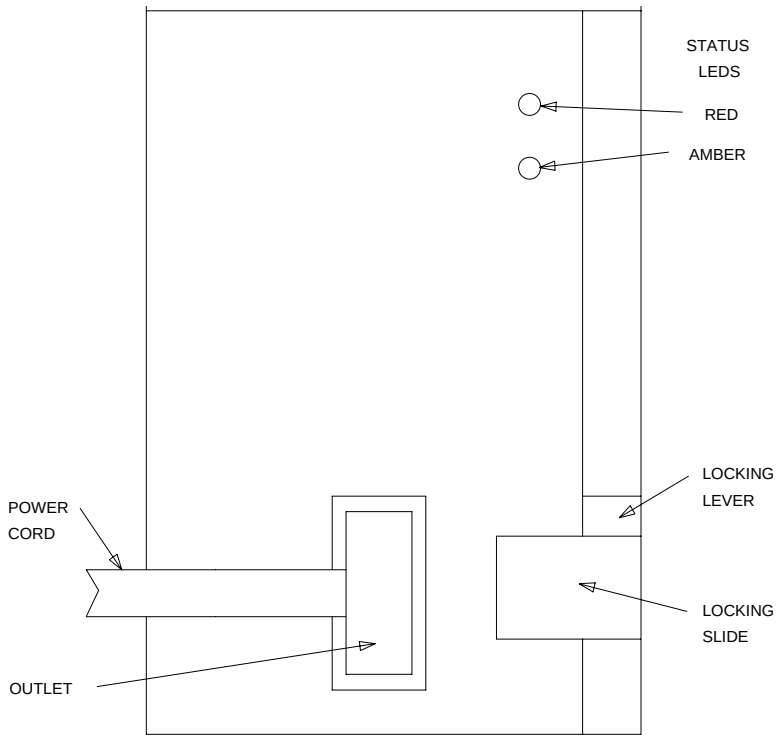


Figure 8-18. 644A Port Carrier Power Unit for DC-Powered Systems

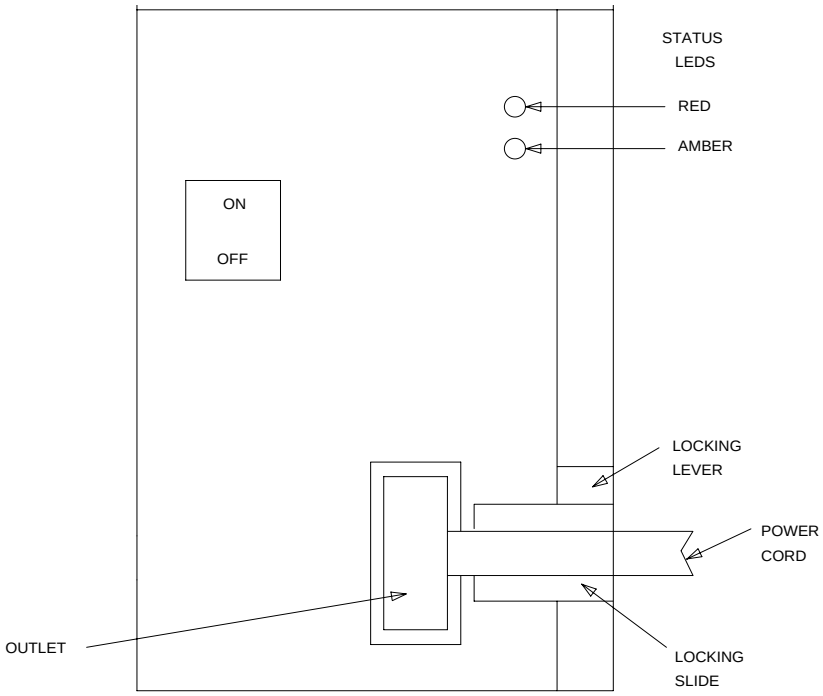


Figure 8-19. 645B Port Carrier Power Unit for DC-Powered Systems

Port Carrier Power Unit Replacement Procedures

The procedures for replacing a 644A or 645B carrier DC power unit are given below.

If the port carrier power unit to be replaced is in a control carrier of a PPN system, refer to the “Powering the Cabinet” section in Chapter 5, “Routine Maintenance Procedures” before replacing the port carrier power unit. To replace the port carrier power unit, follow the procedure below:

1. If this is a 645B power unit, set the power switch to OFF.
2. Unplug the power cord.
3. Move the locking slide on the power unit to the extreme left position, and unlatch the locking lever.
4. Remove the power unit from the carrier.
5. Move the locking slide on the replacement power unit to the extreme left position and open the locking lever.
6. Insert the power unit into the carrier until some resistance is felt.

7. Lift the locking lever upward until it latches.
8. Move the locking lever slide on the power unit to the extreme right position.
9. Connect the power cord.
10. If this is a 645B power unit, set the power switch to ON.

Hardware Error Log Entries and Test to Clear Values

Table 8-59. Carrier Port Power Unit (DC) Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	test environment P sh r 1
	Run the Short Test Sequence first. If all tests pass, run the Long Test Sequence. Refer to the appropriate test description and follow the recommended procedures				
1	0 , 1	Power Unit Query Test (#127)	MAJO R	ON	test environment P r 2
	a. Where P is an appropriate port network number taken for the Port field of the Error Log. b. Run the Power Unit Query Test (#127) first using the test environment P r 2 command. Then, if a carrier must be recycled to clear the CARR-POW alarm, use the recycle carrier PC command to run the Power Unit Recycle Test (#126). The Power Unit Recycle Test (#126) is not included in either the long or Short Test Sequences. Warning: The Power Unit Recycle Test (#126) is destructive. For more information, refer to the description of this test.				

System Technician-Demanded Tests: Descriptions and Error Codes

Always investigate tests in the order presented in the table below when inspecting errors in the system. By clearing error codes associated with the *Battery & Battery Charger Query Test*, for example, you may also clear errors generated from other tests in the testing sequence.

Table 8-60. System Technician-Demanded Tests: CARR-POW (DC)

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Battery & Battery Charger Query Test (#5) (a)	Short	Long	No
AC Power Query Test (#78) (b)	Short	Long	No
Power Unit Query Test (carrier E) (#127)	Short	Long	No
Power Unit Query Test (carrier D) (#127)	Short	Long	No
Power Unit Query Test (carrier A) (#127)	Short	Long	No
Power Unit Query Test (carrier B) (#127)	Short	Long	No
Power Unit Query Test (carrier C) (#127)	Short	Long	No
Emergency Transfer Query Test (#124) (c)	Short	Long	No
Cabinet Temperature Query Test (#122) (d)	Short	Long	No
External Alarm Lead Query Test (#120) (e)	Short	Long	No
Analog Ring Generator Initialization Test (#117) (f)	Short	Long	No
Analog Ring Generator Query Test (#118) (f)	Short	Long	No

Notes:

a. Refer to POWER (Battery & Battery Charger) Maintenance documentation for a description of this test.

b. Refer to AC-POWER (AC Power) Maintenance documentation for a description of this test.

c. Refer to EMG-XFER (Emergency Transfer) Maintenance documentation for a description of this test.

d. Refer to CABINET (Cabinet Sensors) Maintenance documentation for a description of this test.

e. Refer to EXT-DEV (External Alarm) Maintenance documentation for a description of this test.

f. Refer to RING-GEN (Analog Ring Generator) Maintenance documentation for a description of this test.

NOTE:
This test only shows up in the test sequence if there is a TN768 Tone-Clock circuit pack in the port network being tested.

Power Unit Recycle Test (#126)

This test is destructive.

This test is destructive because it requires all circuit packs in the recycled carrier to be removed and inserted. These actions cause all calls originating or terminating on circuit packs in this carrier to be dropped. The pair of port carrier power units in the specified carrier is recycled. Both port carrier power units in the carrier are turned off for two seconds and then back on. After the port carrier power units have been turned back on, the test queries the Maintenance/Tape Processor for the status of the pair of port carrier power units in the specified carrier. If both port carrier power units are on and functioning, then the test passes. If both port carrier power units are not on and functioning, the test fails, and BOTH port carrier power units are turned off.

Table 8-61. Power Unit Recycle Test #126

Error Code	Test Result	Description/ Recommendation
1000	ABORT	System resources required to run this test are not available. 1. Retry the command at 1-minute intervals a maximum of 5 times.
2000	ABORT	Response to the test request was not received within the allowable time period.

Table 8-61. Power Unit Recycle Test #126 — *Continued*

Error Code	Test Result	Description/ Recommendation
2029	ABORT	Internal System Error. 1. Retry the command at 1-minute intervals a maximum of 5 times.
1 (Carrier E) 2 (Carrier D) 4 (Carrier A) 8 (Carrier B) 16 (Carrier C)	FAIL	There is a problem with one or both port carrier power units on the recycled carrier. 1. Since the Power Unit Recycle Test failed, both port carrier power supplies in the recycled carrier should have been powered off by the system software. Both port carrier power units should be showing a red status LED, instead of a green one. Since the Power Unit Query Test is a subset of the Power Unit Recycle Test, the Power Unit Query Test (#127) should also fail. Run the Power Unit Query Test by using the **test environment P** command where P is the appropriate port network number. 2. If the test fails, follow the repair procedures described for Test #127. If the problem persists, follow normal escalation procedures.
	PASS	Both port carrier power units in the recycled carrier were found to be healthy by the Maintenance/Tape Processor after the port carrier power units were powered-down and powered up again. If the status LEDs on both port carrier power units are not showing green, then the PR-MAINT (Maintenance/Tape Processor) may have incorrectly reported the state of the port carrier power units. Look for and resolve any alarms on these MOs.

Power Unit Query Test (#127)

This test queries the Maintenance/Tape Processor for the status of the pair of port carrier power units in the specified carrier. If both port carrier units are on and functioning, the test passes. If both are not on and functioning, the test fails.

Table 8-62. Power Unit Query Test #127

Error Code	Test Result	Description/ Recommendation
1000	ABORT	System resources required to run this test are not available.
2000	ABORT	Response to the test request was not received within the allowable time period.
2029	ABORT	Internal System Error. 1. Retry the command at 1-minute intervals a maximum of 5 times.

Table 8-62. Power Unit Query Test #127

Error Code	Test Result	Description/ Recommendation
	FAIL	There is a problem with one or both port carrier power units on the tested carrier. 1. For each port carrier power unit that has all status LEDs OFF, check the DC input to the port carrier power unit at the port carrier power unit outlet. If there is no DC, then check the appropriate circuit breakers for the affected port carrier power unit. If the circuit breaker has tripped (that is, it is in the down position), reset the circuit breaker. If the circuit breaker trips again or DC is not present at the port carrier power unit outlet, there is probably a power wiring problem in the cabinet. Follow normal escalation procedures. 2. At this point, DC should be present at the port carrier power supply outlet. If the carrier being tested is the 1A or 2A carrier, refer to ”Troubleshooting Control Carrier Power Units” in Chapter 5, “Routine Maintenance Procedures”. Otherwise, use the **recycle carrier PC** command (where PC is the appropriate port network and carrier) in an attempt to bring back the power units for this carrier. If the test passes, the trouble is cleared. If the test does not pass, one port carrier power unit, or both, in the tested carrier is defective. If only one port carrier power unit is defective, the status LEDs on the healthy port carrier power unit light green for a moment. When the recycle test determines that both port carrier power units are defective, the software turns off power to both the good and defective port carrier power units. This causes the status LED(s) on the good port carrier power unit to light red.

Table 8-62. Power Unit Query Test #127

Error Code	Test Result	Description/ Recommendation
	FAIL *(cont'd.)*	3. Unplug both port carrier power units, and wait about 1-minute to allow the port carrier power units to cool down. Plug in the port carrier power units. If either port carrier power unit is operating properly (that is, the status LEDs show green), then replace the defective port carrier power unit(s). See "Port Carrier Power Unit Replacement Procedures" in this section. 4. If the replaced port carrier power unit(s) still does (do) not operate properly, then a circuit pack or a defective telephone connected to a circuit pack in the affected carrier could be causing an electrical load which is preventing the port carrier power unit from operating properly. Unseat all the circuit packs in the carrier, and reissue the **recycle carrier** command. a. If the recycle passes, then the port carrier power units are healthy, and the problem is with one of the circuit packs. Reinsert the circuit packs one at a time. If the status LED shows red after reinserting a circuit pack, replace the defective circuit pack. If the status LED still shows red, remove the Amphenol connector on the back of the slot containing this circuit pack and reissue the **recycle carrier** command. If the status LED shows green, the problem is with one of the telephones or the wiring to one of the telephones on this slot. If the status LED still shows red, escalate the problem. b. If either port carrier power unit still shows a red status LED, check for bent pins and cable placement in the affected carrier. There are failures that can occur on the Maintenance/Tape Processor that **are not** detected by the respective maintenance, but that cause many, if not all, environment tests to fail. If many environment tests are failing, the suspect circuit pack, depending on the system configuration, should be replaced and the test rerun. If no other problems can be found, escalate the problem.
	PASS	Both port carrier power units in the tested carrier were found to be healthy by the Maintenance/Tape Processor. If the status LEDs on both port carrier power units are not showing green, the PR-MAINT (Maintenance/Tape Processor) may have incorrectly reported the state of the port carrier power units. Look for and resolve any alarms on these MOs.

C-LAN-BD (Control LAN Circuit Pack)

Control LAN Circuit Pack

The TN799 Control LAN (C-LAN) packet port circuit pack provides TCP/IP connection to adjuncts applications. The C-LAN circuit pack has 1 10baseT Ethernet connection and up to 16 DS0 physical interfaces for PPP connections.

A remote socket control link (RSCL) links the C-LAN and the SPE to pass call control and other management information. Since one link serves all the ports on the circuit pack, maintenance of the RSCL is part of the C-LAN circuit pack maintenance.

The C-LAN TN799 circuit pack combines the functions of the PGATE and PI circuit packs into one circuit pack. The PGATE or PI can be used with the C-LAN to create an X.25-to-TCP/IP bridge for adjunct and DCS connectivity.

Control LAN Congestion Controls

The switch activates congestion controls on C-LAN when it detects buffers exceeding the threshold. The switch releases the congestion controls when the C-LAN reports that its buffer level has returned to normal levels.

If congestion:	Then the switch:
Persists for a 14-minute interval	Raises MINOR alarm.
Exhausts buffers,	Raises MINOR alarm.
Ceases for 12 minutes,	Retires MINOR alarm.

Error Log Entries and Test to Clear Values

Table 8-63. C-LAN-BD Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
1	0		MINOR	ON	
	Circuit pack stopped functioning or is not physically present. 1. Verify that the circuit pack is present. 2. If circuit pack is present, reset the circuit pack (reset board UUCSS). 3. If the error persists, replace the circuit pack.				
18	0		WARNING	OFF	release board UUCSS
	The C-LAN circuit pack busied out.				
217	0	None	WARNING	ON	
	Applies to 10 circuit packs: 1. Remove the circuit pack(s) against which the error is logged.				
257	65535	Control Channel Loop Test (#52)	MINOR	ON	test board UUCSS l r 20
	Transient communication problem between switch andcircuit pack; does not affect service and can be ignored. 1. Ignore this error, unless the Control Channel Loop Test (#52) fails. 2. If Test #52 fails, replace the circuit pack. Repetitive failures of the Control Channel Loop Test indicate circuit pack hardware failure.				
513	4352-4357	Control Channel Loop Test (#52)	MINOR	ON	
	Circuit pack detected and reported hardware failure. 1. Reset the circuit pack (reset board UUCSS). Aux Data: 4352 External RAM error 4353 Internal RAM error 4355 ROM Checksum error 4356 Angel Message Corruption error 4357 Instruction set error				

Table 8-63. C-LAN-BD Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
769	4358	Control Channel Loop Test (#52)	MINOR	ON	
	Logic error. By itself this error may be ignored, but it may result in other error types being reported.				
1293 - 1295	Any	Control Channel Loop Test (#52)	MINOR	ON	reset board UUCSS
	Critical hardware or firmware error. If the switch detects 1 error, it will reset the circuit pack. If the switch detects 3 errors in 15 minutes, it will raise a MINOR alarm. Error Type descriptions are as follows: 1293 Insane onboard processor 1294 Onboard translation RAM error 1295 (Aux 3) RSCL link down — (Aux 0) RSCL keep alive failure 1. Attempt to clear the alarm (reset board UUCSS). 2. If alarm persists, replace circuit pack.				
1537	Any	Control Channel Loop Test (#52)	MINOR	ON	
	Switch removed hyperactive circuit pack that reported threshold number of errors. 1. Attempt to clear the alarm (reset board UUCSS). 2. If the error recurs within 15 minutes, replace the circuit pack.				
1794	Any	Control Channel Loop Test (#52)	MINOR	ON	
	Packet bus transmit buffers has overflowed. 1. Attempt to clear the alarm (reset board UUCSS). 2. If the error recurs within 15 minutes, replace the circuit pack.				
1798	Any	Control Channel Loop Test (#52)	MINOR	ON	
	Unable to write translation RAM. 1. Attempt to clear alarm (reset board UUCSS). 2. If alarm recurs within 15 minutes, replace the circuit pack.				

Table 8-63. C-LAN-BD Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
2049	Any	Packet Interface Test (#598)	MINOR	ON	test board UUCSS l r 3
	Packet Interface Test (#598) failed. 1. Attempt to clear the alarm (test board UUCSS l r 3). 2. If alarm does not clear, reset the circuit pack (reset board UUCSS). 3. If circuit pack resets, execute Packet Interface Test (#598) several times. 4. If Packet Interface Test (#598) continues to fail, replace the circuit pack.				
2305 - 2306	Any	Packet Interface Test (#598)	MINOR	ON	
	Error in received frame from packet bus Error type 2305 indicates received invalid LAPD frame. Error type 2306 indicates a detected parity error on received frame Most likely cause—packet bus problem. Other cause—circuit pack fault. Invalid LAPD frame errors occur when the frame ■ contains a bad Cyclic Redundancy Check (CRC), ■ is greater than the maximum length, ■ violates the link level protocol. 1. Retry the command (test board UUCSS) and see if the condition clears. 2. If condition persists, execute PPE/LANBIC Receive Parity Error Counter Test (# 597) and determine if the condition clears. 3. If condition persists, execute Packet Interface Test (# 598) to verify circuit pack integrity. 4. If Packet Interface Test (# 598) fails, consult repair procedure for the packet bus.				
2561 - 2668	Any	Packet Interface Test (#598)	MINOR	ON	
	System software received an indication that the socket was closed due to an error. Errors are reported as log only. Errors logged here are for the sockets that had no processor channels associated with them, for example, sockets to read SNMP data. The counter base is offset by the application type of the application associated with this socket that is down. The Aux Data field of the log entry contains this application's number, for example, a SNMP application would have its application number in the Aux Data field. Note: 2561 - 2668 is a range of reserved numbers for future applications. 2570 currently represents an SNMP socket failure.				

Table 8-63. C-LAN-BD Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
2817 - 2819	Any	Congestion Query Test (#600)	MINOR	ON	test board UUCSS s r 3
	Congestion Query Test (#600) failed. The Error Types correspond to the descriptions: 2817 All buffers exhausted. 2819 Utilized buffers exceed threshold If active buffers exceed threshold then the C-LAN enters congested state. Refer to Congestion Query Test (#600) for Abort and Fail Error.				
3073	Any	Link Status Test (3601)	MINOR	ON	test board UUCSS s
	Remote Socket Control Link (RSCL) or Link Status Test (#601) failed. This failure may be due to: ■ This circuit pack ■ The packet bus ■ The packet interface circuit pack If the RSCL disconnects at link level, then the Link fails. If the Link cannot be reconnected quickly, the Switch raises a MINOR alarm.				
3330	Any	Link Status Test (3601)	MINOR	ON	reset board UUCSS
	Critical failure in Packet Bus interface. If the Switch detects 1 error, then it resets the circuit pack. If the Switch detects 2 errors in 15 minutes, then it raises a MINOR alarm. 1. Attempt to clear the alarm (reset board UUCSS). 2. If alarm persists, replace circuit pack.				
3586	Any	Link Status Test (3601)	MINOR	ON	
	Switch removed hyperactive circuit pack that reported threshold number of errors. One or more of the following symptoms may be present: n Circuit pack port tests return NO BOARD. n List configuration command shows circuit pack and ports are installed properly				

Table 8-63. C-LAN-BD Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
3999	Any	None	MINOR	ON	
	f this error accompanies error type 3586 and the traffic volume is heavy, then the Circuit pack is in service, but sent at least Half hyperactive threshold. With heavy traffic this is normal. If this error does not accompany error type 3586 and the traffic level is light, then the Circuit pack is in service, but sent at least half hyperactive threshold. With light traffic, this error indicates a problem with the circuit pack, its links, or the equipment attached to the links. If this error type accompanies error type 3586 and the traffic is either Light of Heavy, then the Switch removed hyperactive circuit pack. 1. Busyout (busyout board UUCSS) and release (release board UUCSS) circuit pack 2. Allow 30 minutes for condition to clear itself. 3. To re-establish circuit pack into service manually, busyout (busyout board UUCSS), reset (reset board UUCSS), and release (release board UUCSS) the circuit pack. 4. If error recurs within 15 minutes, replace the circuit pack. 5. If the same error occurs on a different circuit pack, follow normal escalation procedures.				
3840	4096-4102	None	MINOR	ON	
	Circuit pack received bad control channel message from switch. Aux Data: 4096 Bad major heading 4097 Bad port number 4098 Bad data 4099 Bad sub-qualifier 4100 State inconsistency 4101 Bad logical link 4102 Bad application identifier				
3841 , 3843	4096-4102	None	MINOR	ON	
	Errors do not affect service. Below, Error Types correspond to descriptions. 3841 Internal firmware error. 3843 Bad translation RAM. Call uses another translation location. These errors do not affect service, however, they may cause reports of other errors that do affect service. If Error Type 3843 begins to affect service, it escalates to Error Type 1294.				

Table 8-63. C-LAN-BD Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
3842	4096-4102	None	MINOR	ON	
	Packet interface receive buffers overflowed. If this error occurs frequently, the overflow may be congesting the circuit pack. 1. Refer to Receive FIFO Overflow Error Counter Test (#596).				
3844	Any	None	MINOR	ON	
	LAPD frame contains LAPD Protocol Error. By themselves, these errors do not affect service.				
3845	Any	None	MINOR	ON	
	Angel inter processor error. By themselves, these errors do not affect service.				
3846	Any	None	MINOR	ON	
	High CPU occupancy. By themselves, these errors do not affect service.				
3848	Any	None	MINOR	ON	
	Interprocessor LAPD protocol error. By themselves, these errors do not affect service.				
3849	Any	None	MINOR	ON	
	Interprocessor LAPD frame error. By themselves, these errors do not affect service.				
3850 - 3861	Any	None	MINOR	ON	
	IBL error. By themselves, these errors do not affect service. These errors can occur only on a G3csi machine that has an Interboard Link (IBL).				
3862	Any	None	MINOR	ON	
	Memory allocation failure. By themselves, these errors do not affect service.				

System Technician-Demanded Tests: Descriptions and Error Codes

Investigate errors in the order they appear below.

Table 8-64. System Technician-Demanded Tests: C-LAN-BD

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Packet Interface Test #598	Short	Long	No
Congestion Query Test #600	Short	Long	No
Link Status Test #601	Short	Long	No

Table 8-64. System Technician-Demanded Tests: C-LAN-BD

Control Channel Loop-Around Test #52	Short	Long	No
Circuit Pack Restart Test #252			Yes
PPE/LANBIC Receive Parity Error Counter Test #595	Long		No
Receive FIFO Overflow Error Counter Test #596	Long		No

Control Channel Loop-Around Test (#52)

This non-destructive test fails if the circuit pack does not return to a sane state after being reset. This test queries the circuit pack for its code and vintage, and verifies its records.

Table 8-65. TEST #52 Control Channel Loop-Around Test

Error Code	Test Result	Description / Recommendation
None , 2100	ABORT	Could not allocate the necessary system resources to run test. 1. Retry the command at 1-minute intervals, up to 5 times. 2. If the problem persists, escalate the problem.
None	FAIL	The circuit pack failed to return the code or vintage. 1. Retry command at 1-minute intervals, up to 5 times. 2. Reset the board (reset board UUCSS). 3. If reset aborts with error code 1115, busyout (busyout board UUCSS),reset (reset board UUCSS), and release board (release board UUCSS). 4. If test continues to fail, replace the circuit pack. 5. Escalate the problem if failures continue.
None	PASS	Test successful.

Circuit Pack Restart Test (#252)

NOTE:
This test is destructive.

Execute this test (not part of either short or long demand test sequence) to reset the circuit pack only if there are PPCPU errors. This test fails if the circuit pack does not return to a sane state after being reset. The circuit pack resets through the SAKI Sanity Test (#53)

Table 8-66. Test #252 Circuit Pack Restart Test

Error Code	Test Result	Description Recommendation
None	ABORT	Could not allocate the necessary system resources to run test. 1. Retry the command at 1-minute intervals, up to 5 times. 2. If the problem persists, escalate the problem.
1015	ABORT	Port is not out-of-service. 1. Busyout the circuit pack (busyout board UUCSS). 2. Retry the command at 1-minute intervals, up to 5 times. 3. If the problem persists, escalate the problem.
2100	ABORT	Could not allocate the necessary system resources to run test. 1. Retry the command at 1-minute intervals, up to 5 times. 2. If the problem persists, escalate the problem.
1 , 2	FAIL	The circuit pack failed to reset. 1. Retry command at 1-minute intervals, up to 5 times. 2. If the problem persists, pull out and reseat the circuit pack. 3. If the problem persists, replace the circuit pack.
None	PASS	The circuit pack initialized correctly.

PPE/LANBIC Receive Parity Error Counter Test (#595)

This test is non-destructive. When the C-LAN circuit pack detects a parity error with a received frame, it increments the PPE/LANBIC Receive Parity error counter. This test reads and clears the counter, and may verify repair of problem.

Errors may indicate a problem with:

- This circuit pack
- A packet bus
- Another circuit pack on the bus

Table 8-67. EST #595 PPE/LANBIC Receive Parity Error Counter Test

Error Code	Test Result	Description / Recommendation
2000	ABORT	Did not receive circuit pack test response within the allowable time period. 1. Retry command at 1-minute intervals, up to 5 times. 2. If the problem persists, reset the circuit pack (reset board UUCSS). 3. If the problem persists, replace the circuit pack.
2100	ABORT	Could not allocate the necessary system resources to run test. 1. Retry the command at 1-minute intervals, up to 5 times. 2. If the problem persists, escalate the problem.
2500	ABORT	Internal system error. 1. Retry the command at 1-minute intervals, up to 5 times. 2. If the problem persists, escalate the problem.
1 - 10	FAIL	Circuit pack detects parity errors. The Error Code indicates the value of the on-board error counter. 1. Retry the command at 1-minute intervals, up to 5 times. 2. If the test continues to fail, execute the Packet Interface Test (#598) (test board UUCSS). 3. If Packet Interface Test (#598) fails, see Packet Bus repair procedures.
None	PASS	Circuit pack detects no errors.

Receive FIFO Overflow Error Counter Test (#596)

This test is non-destructive. When the C-LAN circuit pack detects packet bus buffer overflow, it increments the error on the FIFO Overflow error counter. This test reads and clears the counter.

If errors are:	Then they may be due to:
Occasional	Statistical buffer sizing
Persistent	Circuit pack congestion that requires redistribution of traffic load

Table 8-68. TEST #596 Receive FIFO Overflow Error Counter Test

Error Code	Test Result	Description / Recommendation
2000	ABORT	Did not receive circuit pack test response within the allowable time period. 1. Retry command at 1-minute intervals, up to 5 times. 2. If the problem persists, reset the circuit pack (reset board UUCSS). 3. If the problem persists, replace the circuit pack.
2100	ABORT	Could not allocate the necessary system resources to run test. 1. Retry the command at 1-minute intervals, up to 5 times. 2. If the problem persists, escalate the problem.
2500	ABORT	Internal system error. 1. Retry the command at 1-minute intervals, up to 5 times. 2. If the problem persists, escalate the problem.
1 - 10	FAIL	Circuit pack detects overflow errors. The error code indicates the value of the on-board error counter. 1. Retry the command at 1-minute intervals, up to 5 times. 2. If the test continues to fail, execute the Packet Interface Test (#598) (test board UUCSS). 3. If Packet Interface Test (#598) fails, refer to Packet Bus repair procedures.
None	PASS	Circuit pack detects no errors.

Invalid LAPD Frame Error Counter Test (#597)

This test is non-destructive.

C-LAN detects invalid frames when it receives

- a frame with a CRC error
- an unrecognizable frame
- a recognizable frame in an unexpected state

When the C-LAN circuit pack detects an invalid LAPD frame, it increments the Invalid LAPD Frame error counter. This test reads and clears the counter, and verifies the repair of the problem.

Errors may indicate a

- circuit pack problem
- packet bus problem
- problem with another circuit pack on the bus

Table 8-69. TEST #597 Invalid LAPD Frame Error Counter Test

Error Code	Test Result	Description / Recommendation
2000	ABORT	Did not receive circuit pack test response within the allowable time period. 1. Retry command at 1-minute intervals, up to 5 times. 2. If the problem persists, reset the circuit pack (reset board UUCSS). 3. If the problem persists, replace the circuit pack.
2100	ABORT	Could not allocate the necessary system resources to run test. 1. Retry the command at 1-minute intervals, up to 5 times. 2. If the problem persists, escalate the problem.
2500	ABORT	Internal system error. 1. Retry the command at 1-minute intervals, up to 5 times. 2. If the problem persists, escalate the problem.
1 - 10	FAIL	The circuit pack detects LAPD frame errors. The error code indicates the value of the on-board error counter. 1. Retry the command at 1-minute intervals, up to 5 times. 2. If the test continues to fail, execute the Packet Interface Test (#598) (test board UUCSS long). 3. If Packet Interface Test (#598) fails, refer to Packet Bus repair procedures.
None	PASS	Circuit pack detects no errors.

Packet Interface Test (#598)

This non-destructive test checks the packet bus interface circuitry on the C-LAN circuit pack. Test failure indicates faulty circuit pack.board

Table 8-70. TEST #598 Packet Interface Test

Error Code	Test Result	Description / Recommendation
2000	ABORT	Did not receive circuit pack test response within the allowable time period. 1. Retry command at 1-minute intervals, up to 5 times. 2. If the problem persists, reset the circuit pack (reset board UUCSS). 3. If the problem persists, replace the circuit pack.
2100	ABORT	Could not allocate the necessary system resources to run test. 1. Retry the command at 1-minute intervals, up to 5 times. 2. If the problem persists, escalate the problem.
2500	ABORT	Internal system error. 1. Retry the command at 1-minute intervals, up to 5 times. 2. If the problem persists, escalate the problem.
1 - 10	FAIL	Circuit pack has detected a failure of the Packet Interface Test (#598). 1. Retry command at 1-minute intervals, up to 5 times. 2. If the problem persists, reset the circuit pack (reset board UUCSS). 3. If the test continues to fail, replace the circuit pack.
None	PASS	The Packet Interface Test (#598) passed.

Congestion Query Test (#600)

This non-destructive test queries the number of used buffers to determine if the CLAN circuit pack is congested.

If:	Then:
Used buffers are, or are nearly, exhausted,	The test fails
The test fails,	The switch redirects outgoing calls to another available C-LAN, and denies new incoming calls

Normal call handling resumes when the C-LAN circuit pack has recovered from congestion. another available C-LAN,

Table 8-71. TEST #600 Congestion Query Test

Error Code	Test Result	Description / Recommendation
2000	ABORT	Did not receive circuit pack test response within the allowable time period. 1. Retry command at 1-minute intervals, up to 5 times. 2. If the problem persists, reset the circuit pack (reset board UUCSS). 3. If the problem persists, replace the circuit pack.
2012	ABORT	Could not allocate the necessary system resources to run test. 1. Retry the command at 1-minute intervals, up to 5 times. 2. If the problem persists, escalate the problem.
2100	ABORT	Internal system error. 1. Retry the command at 1-minute intervals, up to 5 times. 2. If the problem persists, escalate the problem.
1	FAIL	The buffer level is nearly exhausted. 1. Retry command at 1-minute intervals, up to 5 times. 2. If command continues to fail, examine the C-LAN port measurements to determine which ports are heavily utilized and the processor occupancy of the circuit pack. Low processor occupancy when C-LAN congested indicates circuit pack failure. 1. If the problem persists, reset the circuit pack (reset board UUCSS). 2. If congestion recurs, replace the circuit pack. High processor occupancy indicates the C-LAN is congested due to traffic load. 1. To relieve congestion in the short term, selectively busyout ports (busy out port UUcSSpp) on the Control LAN circuit pack. 2. To achieve a more permanent resolution, it may be necessary to move ports on this circuit pack to other Control LAN circuit packs. 3. Consider replacing affected C-LAN ports with new ports.

Table 8-71. TEST #600 Congestion Query Test

Error Code	Test Result	Description / Recommendation
2	FAIL	The C-LAN is congested, and no buffers are available. 1. Retry command at 1-minute intervals, up to 5 times. 2. If command continues to fail, examine the C-LAN port measurements to determine which ports are heavily utilized and the processor occupancy of the circuit pack. Low processor occupancy when C-LAN congested indicates circuit pack failure. 1. If the problem persists, reset the circuit pack (reset board UUCSS). 2. If congestion recurs, replace the circuit pack. High processor occupancy indicates the C-LAN is congested due to traffic load. 1. To relieve congestion in the short term, selectively busyout ports (busy out port UUcSSpp) on the Control LAN circuit pack. 2. To achieve a more permanent resolution, it may be necessary to move ports on this circuit pack to other Control LAN circuit packs. Consider replacing affected C-LAN ports with new ports
3	FAIL	The C-LAN circuit pack is not operating normally and is congested.
None	PASS	Hardware setting and attached cable type match C-LAN circuit pack administration. The circuit pack detects no errors.

Link Status Test (#601)

This non-destructive test determines the state of the call control signaling link for Control LANs. If the signaling link is physically connected, the test sends a test frame over the link and checks for a response. The test passes only if both the signaling link is connected and the test frame is successfully transmitted.

A failure may indicate a problem with:

- This circuit pack
- The packet bus

- The packet interface circuit pack

Table 8-72. TEST #601 Link Status Test

Error Code	Test Result	Description / Recommendation
2012	ABORT	Could not allocate the necessary system resources to run test. 1. Retry the command at 1-minute intervals, up to 5 times. 2. If the problem persists, escalate the problem.
2100	ABORT	Internal system error. 1. Retry the command at 1-minute intervals, up to 5 times. 2. If the problem persists, escalate the problem.
2	FAIL	The RSCL control link disconnected. 1. Retry command at 1-minute intervals, up to 5 times. 2. If the test continues to fail, execute the Packet Interface Test (#598) (test board UUCSS) to determine if the problem is due to the circuit pack. 3. If the Packet Interface Test (#598) fails, refer to Packet Interface Test repair procedures. 4. If the Packet Interface Test (#598) passes, refer to Packet Control Circuit Pack and Packet Bus repair procedures.his circuit
3	FAIL	Received no response to RSCL control link test frame. 1. Retry command at 1-minute intervals, up to 5 times. 2. If the problem persists, reset the circuit pack (reset board UUCSS). 3. If test continues to fail, replace the circuit pack.
None	PASS	RSCL control link connected.

CLSFY-BD (Call Classifier Circuit Pack)

Refer to XXX-BD (Common Port Circuit Pack) Maintenance documentation for circuit pack level errors. See also Call Classifier Port (CLSFY-PT) Maintenance documentation for related port information.

Alarm Level	Initial Craft Command to Run
Minor	test board *PCSS sh*
Warning	test board *PCSS sh*

CLSFY-PT (Call Classifier Port)

The TN744C Call Classifier (CLSFY-BD) circuit pack is a service circuit pack that is used for failure analysis. There are eight ports (CLSFY-PTs) on the Call Classifier circuit pack. Each port can handle call classification, touch-tone reception, or, for MCU systems, MFC tone generation and detection or touch-tone reception.

The CLSFY-PT maintenance feature defines a set of tests to ensure that the Call Classifier circuit pack ports are capable of detecting tones for call classification, and detecting and generating necessary tones for correct MFC feature operation.

Alarm Level	Initial Craft Command to Run
Major	test board *PCSSpp sh*
Minor	test board *PCSSpp sh*
Warning	release port PCSSpp

Hardware Error Log Entries

The following table shows the error log entries and related information

Table 8-73. CLSFY-PT Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
1	Any	#43	Major/Minor	On	test port PCSSpp r 2
	There are two possible alarm levels for this error type: major and minor. A major alarm is raised if the total number of call classifier ports currently in service is less than or equal to 1/2 of the administered threshold number. Otherwise, a minor alarm is raised. In either case, run the short test sequence against the port and follow the error code procedures for the individual tests. The threshold number of call classifier ports for service is administered using the change system-parameters maintenance command. For details, refer to Chapter 5, “Routine Maintenance Procedures.”’				
18	Any	(Port busied out by craft)	Warning	Off	release port PCSSpp
257	17666	#43	Major/Minor	On	test port PCSSpp r 3
	The call classifier port lost its translation. Testing the call classifier port is sufficient to reload its translation. If testing the port does not clear the error, the call classifier circuit pack containing the defective call classifier port should be replaced.				

Table 8-73. CLSFY-PT Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
513	Any	#42	Major/Minor	On	test port PCSSpp r 3
	The call classifier port is having problems detecting system tones (DTMF, etc.) or detecting and generating necessary R2-MFC tones. This error should accompany some percentage of failed calls. If this error type is persistently logged, the call classifier circuit pack containing the defective call classifier port should be replaced.				

Craft-Demanded Tests

Always investigate tests in the order presented in the following table when inspecting errors in the system. For example, by clearing error codes associated with the Tone Detection Verification Test (#79), you may also clear errors generated from the other test in the testing sequence.

Table 8-74. System Technician-Demanded Tests: CLSFY-PT

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Tone Detection Verification Test (#42)	Short	Long	No
Tone Detection Audit/Update Test (#43)	Short	Long	No

Tone Detection Verification Test (#42)

This test checks out each port in both the touch-tone receiver mode and in the R2-MFC tone detection/generation mode. During the first half of the test, the touch-tone receiver mode is tested. In the second half of the test, each port's ability to accurately detect and generate all forward and backward MFC tones is verified.

Table 8-75. Tone Detection Verification Test #42

Error Code	Test Result	Description Recommendation
None	ABORT	The system was not able to allocate all the resources needed for this test or there was an internal system error. 1. Retry the command at one minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
1	ABORT	The system could not allocate all the resources needed to test the tones. 1. Retry the command at one minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
1001	ABORT	The system was unable to put the Call Classifier port in the appropriate mode to test it. 1. Retry the command at one minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
1002	ABORT	The system could not allocate time slots for the test connection. This situation could occur when the system is heavily loaded. If the system is not heavily loaded, test the TDM-BUS via the test tdm [1/2] command. Refer to the TDM-BUS (TDM Bus) Maintenance documentation for details.
1003	ABORT	The system could not allocate a Tone-Clock circuit pack for the test connection. This situation could occur when the system is heavily loaded or if a Tone-Clock circuit pack is not present when this test is executed. 1. Verify the existence of a Tone-Clock circuit pack in the same port network. 2. If a Tone-Clock circuit pack is missing, install one in the same port network. 3. Allow approximately one minute for the Tone-Clock circuit pack maintenance to run on the newly inserted Tone-Clock circuit pack. 4. Retry the command at one minute intervals up to five times. 5. If the test continues to abort, escalate the problem.

Table 8-75. Tone Detection Verification Test #42

Error Code	Test Result	Description Recommendation
2006	ABORT	The active Tone-Clock circuit pack might not be functioning properly. If there is more than one Tone Detector circuit pack in the system, the problem can be either with the Tone-Clock circuit pack or the Tone Detector circuit pack. This could also be caused by the companding mode administered for the system not matching that of the Tone Detector circuit pack. 1. Ensure that the companding mode of the system matches that of the Tone Detector (TN748 for Mu-law systems and TN420 for A-law systems). 2. Test the active Tone-Clock circuit pack in the port network. This test is being executed via the test tone-clock qualifier craft command. (“Qualifier’’ is the carrier of the active Tone-Clock circuit pack to be tested. Valid qualifiers are: a, b, 1a, 1b, 2a, and 2b.) Refer to the TONE-BD (Tone-Clock Circuit Pack) Maintenance documentation for details. 3. Retry the command at one-minute intervals up to five times. 4. If the test continues to abort, escalate the problem.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1 - 3	FAIL	DTMF digits were not detected correctly. This may or may not impact reception of R2-MFC calls. 1. Run the short test sequence via the test port PCSSpp sh r 1 command. 2. If the problem persists, the system is still operating properly but system capacity will be reduced. To restore system performance to normal, replace the Call Classifier circuit pack containing the defective CLSFY-PT (Call Classifier Port).
101 - 122	FAIL	Forward or Backward MFC signals were not correctly generated or detected. This impacts reception of incoming MFC calls. 1. Run the short test sequence via the test port PCSSpp sh r 1 command. 2. If the problem persists, the system is still operating properly but system capacity will be reduced. To restore system performance to normal, replace the Call Classifier circuit pack containing the defective CLSFY-PT (Call Classifier Port).
None	PASS	Tone Detection Verification is successful. The Call Classifier Port (CLSFY-PT) is able to detect and/or generate all necessary tones.

Table 8-76. Tone Detector Audit/Update Test #43

Error Code	Test Result	Description Recommendation
None	ABORT	The system was not able to allocate all the resources needed for this test. 1. Wait one minute. Then retry the command up to five times.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
None	FAIL	Hardware audit failed. 1. Run the short test sequence via the test port PCSSpp sh r 1 command. 2. If the problem persists, the system is still operating properly but system capacity will be reduced. To restore system performance to normal, replace the CLSFY-BD (Call Classifier circuit pack) containing the defective CLSFY-PT (Call Classifier Port).
	PASS	The (CLSFY-PT) Call Classifier Port has passed the sanity inquiry.

CONFIG (System Configuration)

The System Configuration MO oversees logical insertion and removal of circuit packs in the MCU. When the MCU detects that a circuit pack is in a port slot, it notifies System Configuration, and System Configuration queries the circuit pack to determine its type or vintage.

Similarly, when the MCU detects that a circuit pack has been removed from a port slot, it informs System Configuration.There are no alarms or tests for System Configuration, but two types of errors are logged to the Hardware Error Log.

Hardware Error Log Entries

The following table shows the error log entries and related information.

Table 8-77. CONFIG Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	none
	Run the short test sequence first. If all tests pass, run the long test sequence.				
2 - 117	0 - 1	none	Any	Any	
	A port circuit pack in the MCU did not respond to a circuit pack type inquiry. As a result, a port circuit pack may be physically inserted in a port slot, but the MCU is unaware of its presence. The Error Type and Aux Data fields specify the location of the port circuit pack that caused the error as indicated in the following table.				
257	0 - 1	none	Any	Any	
	This error indicates that less than 25% of the trunk group is available.				
1002 - 1117	0 - 1	none	Any	Any	
	A port circuit pack in the MCU did not respond to a vintage query. As a result, a port circuit pack may be physically inserted in a slot, but the MCU is unaware of its presence. Use the following table to determine the location of the port circuit pack that caused the error. To use the following table, subtract 1000 from the number in the Error Type field (for example, Error Type 1059 would be listed under 59 in the Error Type field).				

Once the port circuit pack location has been determined from the following table, use **list configuration all** to make sure the circuit pack is installed. If not, insert the pack. If the circuit pack is installed, but the error persists, replace the circuit pack.

Table 8-78. System Configuration Port Circuit Pack Location

Error Type	Aux Data	Port Circuit Pack Location
1	0	GAMUT Circuit Pack*
1	1	GAMUT Circuit Pack*
2	0	1E01
3	0	1E02
3	1	2E02
3	2	3E02
4	0	1E03
5	0	1E04

Table 8-78. System Configuration Port Circuit Pack Location — *Continued*

Error Type	Aux Data	Port Circuit Pack Location
6	0	1E05
7	0	1E06
8	0	1E07
9	0	1E08
10	0	1E09
11	0	1E10
12	0	1E11
13	0	1E12
14	0	1E13
15	0	1E14
16	0	1E15
17	0	1E16
18	0	1E17
19	0	1E18
20	0	1E19
21	0	1E20
26	0	1A NetPkt Interface
26	1	Maintenance Circuit Pack
27	0	1A NetPkt Interface
28	0	1A Tone-Clock
29	0	1A Tone-Clock
30	0	1A01
31	0	1A02
32	0	1A2 Processor Interface
34	0	1D01
35	0	1D02
36	0	1D03
37	0	1D04
38	0	1D05
39	0	1D06
40	0	1D07
41	0	1D08
42	0	1D09

Table 8-78. System Configuration Port Circuit Pack Location — *Continued*

Error Type	Aux Data	Port Circuit Pack Location
43	0	1D10
44	0	1D11
45	0	1D12
46	0	1D13
47	0	1D14
48	0	1D15
49	0	1D16
50	0	1D17
51	0	1D18
52	0	1D19
53	0	1D20
56	0	1A03
57	0	1A04
58	0	1A05
59	0	1A06
60	0	1A07
61	0	1A08
62	0	1A09
63	0	1A10
66	0	1B01
67	0	1B02
68	0	1B03
69	0	1B04
70	0	1B05
71	0	1B06
72	0	1B07
73	0	1B08
74	0	1B09
75	0	1B10
76	0	1B11
77	0	1B12
78	0	1B13
79	0	1B14

Table 8-78. System Configuration Port Circuit Pack Location — *Continued*

Error Type	Aux Data	Port Circuit Pack Location
80	0	1B15
81	0	1B16
82	0	1B17
83	0	1B18
84	0	1B19
85	0	1B20
94	0	1A1 Processor Interface
98	0	1C01
99	0	1C02
100	0	1C03
101	0	1C04
102	0	1C05
103	0	1C06
104	0	1C07
105	0	1C08
106	0	1C09
107	0	1C10
108	0	1C11
109	0	1C12
110	0	1C13
111	0	1C14
112	0	1C15
113	0	1C16
114	0	1C17
115	0	1C18
116	0	1C19
117	0	1C20
other	-	Unknown Circuit Pack

* Development Laboratory only

CUST-ALM (Customer-Provided Alarming Device)

The MCU provides a way to connect a separately orderable alarm indication device. The CUST-ALM maintenance object represents this Customer-Provided Alarming Device (CPAD). When an alarm occurs at least to the level to which the CPAD is administered, the CPAD is activated.

The CPAD is administered via the Maintenance-Related System Parameters form (*CPE Alarm Activation* field). The CPAD is connected to the maintenance processor.

Valid CPE Alarm Activation levels are none, warning, minor, or major. The CUST-ALM MO is not maintained by the MCU and does not generate alarms. If a problem is suspected with the CPAD, it may be tested using **test customer-alarm**, which activates the device by closing the relay on the maintenance processor for one minute. The repeat parameter may be used to close the relay for a longer time (five minutes is recommended).

Alarm Level	Initial Craft Command to Run
none	**test customer-alarm *PC*** *

* *PC* is an appropriate port network number and carrier.

Craft-Demanded Tests

There are no errors associated with the CPAD CUST-ALM MO. The **test customer-alarm PC** command is provided for the technician to check that the alarming device is correctly installed and functional. It is recommended that this test be run at least once after both the MCU and the customer alarm have been installed.

Table 8-79. System Technician-Demanded Tests: CUST-ALM

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Customer-Provided Alarming Device test (#115)	Short	Long	No

Customer-Provided Alarming Device Test #115

This test closes the relay that activates the CPAD for one minute. If it takes longer than a minute to check that the CPAD has been activated, the *Repeat* field on **test customer-alarm PC** can be used to close the relay for up to 99 minutes.

Note that when the **repeat** command is used, the results for test #115 come back immediately and, for each test that passed, the CPAD is kept on for that many minutes. The CPAD does not go off after one minute and then comes back on. Instead, the CPAD is kept on continuously.

If the CPAD is being activated and deactivated in a flickering fashion, a problem exists with either the device or the maintenance processor.

Table 8-80. Customer-Provided Alarming Device Test #115

Error Code	Test Result	Description Recommendation
None	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
1000 - 2029	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
None	PASS	The MCU software successfully sent the request to the Maintenance Processor to turn on the CPAD. 1. Inspect the CPAD to verify it is working. 2. If the customer complains that the CPAD does not indicate an alarm, check the administered levels for turning on the CPAD via the Display System-Parameters Maintenance form. Compare the levels on the form with the customer's requirements. 3. If the CPAD is not being activated, check the connection from the CPAD to the maintenance processor. 4. If the CPAD cannot be deactivated, check the administered levels for the CPAD via the Display System-Parameters Maintenance form and compare them against the alarm levels currently present in the MCU.

DATA-BD (NetPkt Interface Circuit Pack)

TheTN794 NetPkt Interface circuit pack contains the following objects: the Switch Control (SW-CTL), four NetPkt Interface Data Channels (DATA-CHLs), the NetPkt Interface Driver (DATA-CON), and the generic hardware that interfaces with the TDM Bus (that is, DATA-BD). The generic hardware DATA-BD is described here.

All circuit packs that have an interface with the TDM Bus have a common set of generic hardware that provides the TDM Bus interface. Consequently, these circuit packs share a common set of tests that verify the integrity of the generic hardware. The circuit packs and common set of tests that they share are described under Common Port Circuit Pack (XXX-BD). Because the NetPkt

Interface circuit pack has this common set of hardware, it is classified under XXX-BD as a service port circuit pack.

An MCU has a single NetPkt Interface circuit pack. Because the NetPkt Interface circuit pack is an SPE circuit pack, it has two important characteristics that make maintenance on the DATA-BD MO different from the maintenance on other XXX-BD MOs.

First, because the NetPkt Interface circuit pack has the SW-CTL on it, it must always be physically installed in the MCU. Therefore, the DATA-BD MO is always logically administered. Second, because the NetPkt circuit pack is an SPE circuit pack, it has no PCSS designation. Therefore, the DATA-BD MO cannot be accessed by craft via the **test board PCSS**, **reset board PCSS**, **busyout board PCSS**, or **release board PCSS**. The only craft access to the DATA-BD MO is via **test network-control [short | long]**.

Alarm Level	Initial Craft Command to Run
Warning	test network-control
Minor	test network-control

Hardware Error Log Entries

Refer to the appropriate test description and follow the recommended procedures.

Table 8-81. NetPkt Interface Circuit Pack Error Log Entries

Error Type	Aux Data	Assoc Test #	Alarm Level	On/Off Board	Test to Clear Value
0	0	Any	Any	Any	test data- module <ext> sh r 1
	Run the short test sequence first. If all tests pass, run the long test sequence.				

Table 8-81. NetPkt Interface Circuit Pack Error Log Entries — *Continued*

Error Type	Aux Data	Assoc Test #	Alarm Level	On/Off Board	Test to Clear Value
1	0	#107	Minor	On	test data- module <ext> l
	The DATA-BD portion of the NetPkt Interface circuit pack stopped functioning. Since the NetPkt Interface circuit pack cannot be reset via **reset board**, the Data Channel Reset test (#107) in the long test sequence for the DATA-CHLs and DATA-CON must be used as follows: 1. Issue **list data** to determine if one or more DATA-CHLs is administered. 2. If a DATA-CHL is not administered, use **add data-module [<ext. | next]** to do so. 3. From the form resulting from the **list data** command, choose a NetPkt Interface Data Channel. 4. Issue **test data-module <ext> long** (use the extension for the DATA-CHL chosen in Step 3). **WARNING:** ***Issuing this command drops all data channel extensions.*** 5. If the red LED stays on, replace the circuit pack.				
23	0	none	Warning	Off	-
	The circuit pack has been logically administered but is not installed. The alarm is cleared when the circuit pack is installed.				
257	Any	#52	Minor	On	test network-control sh r 20
257	0	None	-	-	-
	Transient communications problems exist with this circuit pack. No action is required.				
513	Any	None	-	-	-
	The circuit pack has reported a hardware failure. Replace the circuit pack.				
769	4358	None	-	-	-
	Ignore this error but look for other errors on this circuit pack.				
1025	4363	#50	-	-	test network-control sh
	No action required.				

Table 8-81. NetPkt Interface Circuit Pack Error Log Entries — *Continued*

Error Type	Aux Data	Assoc Test #	Alarm Level	On/Off Board	Test to Clear Value
1538	-	#107	Minor	On	test data-module <ext> l
	The DATA-BD portion of the NetPkt Interface circuit pack is out of service. Since the circuit pack cannot be reset via **reset board**, the Data Channel Reset Test (#107) in the long test sequence for the DATA-CHL and DATA-CON must be used as follows: 1. Issue **list data** to determine if one or more DATA-CHLs are administered. **NOTE:** A DATA-CHL is identified by a type value of NetPkt Interface 2. If a DATA-CHL is not administered, use **add data-module [<ext> | next]** to do so. 3. From the form resulting from **list data**, choose a DATA-CHL. 4. Determine if CDR and system printer are using the DATA-CHLs. Be sure to busy out these links prior to running destructive tests on DATA-CHLs. Also check SW-CTL documentation before going on to Step 5 to determine the consequences of running test #93 5. Issue t**est data-module <ext> long** using the extension for the DATA-CHL chosen in Step 3. 6. If the error occurs again within 15 minutes, replace the circuit pack.				
3840	Any	None	-	-	-
	No action required.				
3841	Any	None	-	-	-
	The vintage number of the TN794 NetPkt Interface circuit pack must be greater than or equal to 17. The aux value for error code 3841 indicates the vintage of the current TN794 circuit pack installed.				
3999	Any	None	-	-	-
	Indicates that the circuit pack sent a large number of control channel messages to the MCU within a short period of time. If error type 1538 is also present, the circuit pack was taken out of service due to hyperactivity. If error type 1538 is not present, the circuit pack has not been taken out of service, but it has generated 50% of the messages necessary to be considered hyperactive. This may be completely normal during heavy traffic periods. However, if this error type is logged when the circuit pack is being lightly used, it may indicate a problem with the circuit pack of the equipment attached to it.				

DATA-CHL (NetPkt Interface Data Channel)

The TN794 NetPkt Interface circuit pack contains the following objects: the Switch Control (SW-CTL), four Data Channels (DATA-CHLs), the NetPkt Interface Driver (DATA-CON), and the generic hardware that interfaces with the TDM Bus (DATA-BD). The NetPkt Interface Driver (DATA-CON) is the subject of this section. NetPkt Interface Channels (DATA-CHLs) are also described.

Together the four DATA-CHLs and the DATA-CON provide a data communications interface that allows data terminal equipment connected to port circuit packs to communicate with software applications running on the MCU. The DATA-CON represents the interface to the control channel of the TDM Bus. Each DATA-CHL represents a dial-up/dial-out asynchronous communications port that interfaces to the TDM Bus.

The DATA-CON supports the signaling required to establish and tear down a connection between the terminal equipment and a software application. Data is transported between the terminal equipment and the software application on the connection established over the DATA-CHL.

An MCU has a single NetPkt Interface circuit pack. Thus, there is a single DATA-CON. From a user's point of view, the DATA-CON is not directly accessible via a craft command; that is, there is no object command work that represents it. Instead, the DATA-CON is tested using the DATA-CHLs it controls. The **test data-module <ext> [short | long]** command tests the DATA-CON along with the DATA-CHL designated by **<ext>**, but all test results are associated with the DATA-CHL maintenance name.

Alarm Level	Initial Craft Command to Run
Minor*	test data-module l <ext>†
Warning	test data-module sh <ext>

* The **test data-module long** command drops all sessions on all the NetPkt Interface ports. See Data Channel Reset Test (#107).

† To determine the extension of the data module to be tested, enter **list data-module**. The form provides a mapping from the ***1CXXpp*** designation of the data channel to its corresponding extension, where *pp* indicates the data channel that is alarmed (01-04), and *C* indicates the carrier on which the alarmed data channel resides.

NetPkt Interface Data Channels (DATA-CHLs) may be used to:

- Establish a connection over which to log CDR data to a printer or other storage unit. This connection is called PRI-CDR.
- Establish a connection to a system printer. This connection is called the System Printer Link (SYS-PRNT).

- Establish a connection for up to two secondary administration terminals.
- Support maintenance testing of DATA-CHLs and DATA-CON.

From the viewpoint of administration, the four DATA-CHLs on a NetPkt Interface circuit pack are numbered 01 through 04. Each DATA-CHL may be assigned a unique extension using **add data-module <ext>**. These are called active extensions. When assigning an active extension to a DATA-CHL, you must also assign a unique maintenance extension to the standby SPE data channel. The maintenance extension is required even when there are no standby SPEs.

NOTE:
If a DATA-CHL or the DATA-CON becomes defective in an MCU with a single SPE, the NetPkt Interface circuit pack cannot be replaced without first powering down the system.

DATA-CHLs 1 and 2 share a common dual-port RAM (DPR) and TDM Bus interface hardware. DATA-CHLs 3 and 4 share a common DPR and TDM Bus interface hardware. Thus, if DATA-CHL 1 is defective, then it is likely that DATA-CHL 2 is as well, and vise versa.

1. Determine if CDR and the system printer are using the DATA-CHLs and busy out these links before issuing **test netpkt long**.
2. Before executing **test netpkt long**, see Switch Control (SW-CTL) to determine the consequences of running the Switch Control Reset Test (#93).

Status of NetPkt Interface Data Channels

To perform maintenance testing on the DATA-CHLs, they cannot be busy with one of the functions already described. A series of craft commands can be used to determine if the DATA-CHLs are busy and, if so, how to determine the function for which they are being used. This series of craft commands is described below and should be performed before testing the DATA-CHLs.

1. Enter **list data-module** to determine the extensions for the administered DATA-CHLs.

   NOTE:
   A NetPkt Interface Channel (DATA-CHL) is identified by a “type” value of “netpkt.”

2. For each DATA-CHL on the active SPE, determine if the DATA-CHL is busy by issuing **status data-module <ext>**. If the DATA-CHL is busy, the *Service State* field will show in-service/active. However, the form will not indicate why the DATA-CHL is busy; this is determined using other craft commands.

3. If the DATA-CHL is busy with the CDR link, the link must be busied out with **busyout CDR-link**. Do not busy out the link unless instructed to do so while investigating error codes associated with craft-demanded tests. If you do busy out the CDR link, see PRI-CDR when you are ready to restore the link to service.
4. If the DATA-CHL is busy but is not being used for CDR, then it is being used for the secondary administration terminal connection, maintenance testing, or the system printer. If it is being used for the secondary administration terminal connection, the DATA-CHL must be busied out using **busyout data-module <ext>**.

   NOTE:
   The **busyout data-module** command drops the connection over the associated DATA-CHL. Do not issue this command unless instructed to do so.

5. If the DATA-CHL must be busied out to perform maintenance testing, the secondary administration terminal connection must be reestablished by redialing the DATA-CHL.

CDR Links

1. Issue **status CDR-link** to see if a CDR link has been established. If the *Link State* field shows “up,” then the CDR link may be using one of the NetPkt Interface Data Channels (DATA-CHLs).
2. Issue **display system features** and note the values in the *Primary Output Extension* and *Secondary Output Extension* fields. If the values are extensions, then the CDR Link is using one of the DATA-CHLs.
3. For each extension in the *Primary Output Extension* and *Secondary Output Extension* fields, issue **status data-module <ext>**. Note the value in the *Connected Ports* field. If a port value is in the field, then the indicated port is a DATA-CHL.
4. Issue the **list data-module**, locate each port indicated in the *Connected Ports* field, and determine if the port has a “type” value of “netcon.” If so, there is a system printer link over that DATA-CHL.

Hardware Error Log Entries

Refer to the appropriate test description and follow the recommended procedures.

Table 8-82. NetPkt Interface Data Channel Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	none
	Run the short test sequence first. If all tests pass, run the long test sequence. Refer to the appropriate test description and follow the recommendations.				
1	-	#111	Minor	On	none
	The strategy to clear DATA-CON errors and alarms is to first clear all DATA-CHL errors and alarms (since DATA-CON is not directly accessible via the craft command). After the DATA-CHL errors and alarms are cleared, wait one hour for the maintenance software to clear the DATA-CON errors and alarms.				
18	0	#111	Warn	Off	release data-module <ext>
	The DATA-CHL has been busied out.				
130	0	None	WARN ING	ON	test data-module ext sh
	-				
257	Any	#109	Minor	On	None
	The strategy to clear DATA-CON errors and alarms is to first clear all DATA-CHL errors and alarms (since DATA-CON is not directly accessible via the craft command). After the DATA-CHL errors and alarms are cleared, wait one hour for the maintenance software to clear the DATA-CON errors and alarms.				
513	-	#110	Minor	On	none
	The strategy to clear DATA-CON errors and alarms is to first clear all DATA-CHL errors and alarms (since DATA-CON is not directly accessible via the craft command). After the DATA-CHL errors and alarms are cleared, wait one hour for the maintenance software to clear the DATA-CON errors and alarms.				
769	Any	#108	Minor	On	none
	The strategy to clear DATA-CON errors and alarms is to first clear all DATA-CHL errors and alarms (since DATA-CON is not directly accessible via the craft command). After the DATA-CHL errors and alarms are cleared, wait one hour for the maintenance software to clear the DATA-CON errors and alarms.				

Craft-Demanded Tests

Two craft test commands include DATA-CHLs. The **test data-module <ext> short/long** command tests the single DATA-CHL that has the extension specified in the command. The **test network-control a short/long** command tests each administered DATA-CHL that resides on the NetPkt Interface circuit pack.

Always investigate tests in the order presented in the following table when inspecting errors in the system. By clearing error codes associated with the Data Channel Reset Test, for example, you may also clear errors generated by tests later in the sequence.

The first craft test command for DATA-CHL is **test data-module <ext> short/long** which tests the single DATA-CHL

Table 8-83. System Technician-Demanded Tests: DATA-CHL (First Craft Test)

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Data Channel Reset Test (#107) **Determine if CDR or the system printer is using the Date-CHLs and busy out these links if it is necessary to use test network-control a long**.	Long		Yes
Data Channel Dual Port Ram Test (#108) **Determine if CDR or the system printer is using the Date-CHLs and busy out these links if it is necessary to use test network-control a long.**	Long		Yes
Data Channel Remote Maintenance Loop-Around Test (#109)	Short	Long	No
Data Channel Local Loop-Back Test (#111)	Short	Long	No
Data Channel Crosstalk Test (#110)	Short	Long	No

The second craft test (**test network-control)** tests each administered DATA-CHL that resides on the NetPkt Interface circuit pack

Table 8-84. System Technician-Demanded Tests: DATA-CHL (Second Craft Test)

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Control Channel Test (#52) See DATA-BD (NetPkt Interface circuit pack) for a description of this test.	Long		No
NPE Audit Test (#50)*	Short	Long	No
Data Channel Reset Test (#107)	Long		Yes
Data Channel DPR Test (#108)	Long		Yes
Data Channel Maintenance Loop-Around Test (#109)	Short	Long	No
Data Channel Crosstalk Test (#110)	Short	Long	No

Table 8-84. System Technician-Demanded Tests: DATA-CHL (Second Craft Test)

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Data Channel Local Loop-Back Test (#111)	Short	Long	No
Switch Control Reset Test (#93)†	Long		Yes
EPN Maintenance Board Interface Test (#325)†	Long		Yes
Time-of-Day Clock Test (#95)†	Short	Long	No
Control Channel Interface Test (#92) See SW-CTL (Switch Control) for a description of this test	Short	Long	No
Control Channel Transmission Test (#94)†	Short	Long	No
EPN Maintenance Board Interface Test (#324)†	Short	Long	No
12-volt Power Supply Test (#701) See 12V-PWR (12-Volt Power Supply) for a description of this test	Short	Long	No
Memory Card Insertion Test (#695) See CARD-MEM (Memory Card) for a description of this test	Short	Long	No
Memory Card Format and Read Test (#696)§	Short	Long	No
Memory Card Match Test (#697)§	Short	Long	No
Memory Card Write-Protected Test (#698)§	Short	Long	No
Memory Card Directory Recovery Test (#699)§	Short	Long	No
Memory Card Translation Data Integrity test (#694)§	Long		No
Memory Card Erase/Write/Read Test (#693)§	Short		No

Data Channel Reset Test #107

This test is destructive. It resets the entire data communications interface provided by the DATA-CON and four DATA-CHLs. It does this by resetting the hardware and software comprising the DATA-CON and all four DATA-CHLs. All existing connections over the DATA-CHLs are dropped.

Table 8-85. Data Channel Reset Test #107

Error Code	Test Result	Description Recommendation
1000	ABORT	System resources required to run this test are not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2100	ABORT	System resources required to run this test are not available or internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
10704	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
Any	FAIL	The circuit pack failed to reset. 1. Retry the command. 2. If the problem persists, replace the TN794NetPkt Interface circuit pack. 3. After the circuit pack has been replaced, use set time to reset the time-of-day clock.
None	PASS	The circuit pack initializes correctly.

Data Channel Dual-Port RAM Test #108

This test is destructive. It is a coordinated test of the dual-port RAM (DPR) that is shared between the hardware and software comprising the DATA-CON. Control messages and data are passed through this DPR to establish and tear down connections over the DATA-CHLs. This test requests each side to read and write the DPR; first, one at a time, then simultaneously in alternate locations.

This test prevents any control stimuli from being received from or sent to the TDM Bus control channel preventing the establishment of new connections over the DATA-CHLs. However, existing connections are not (and cannot) be dropped.

Table 8-86. Data Channel Dual-Port RAM Test #108

Error Code	Test Result	Description Recommendation
1000	ABORT	System resources required to run this test are not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
None	FAIL	The DATA-CON dual-port RAM is not functioning. Either the software cannot correctly read from it and/or write to it or the hardware cannot correctly read from it and/or write to it. Connections cannot be established over the DATA-CHLs. 1. Execute the command again. 2. If the problem persists, replace the TN794NetPkt Interface circuit pack. 3. After the circuit pack has been replaced, use set time to reset the time-of-day clock.
	PASS	The DATA-CON dual-port RAM is functioning properly. Connections can be established over the DATA-CHLs.

Data Channel Remote Maintenance Loop-Around Test #109

This nondestructive test verifies the integrity of the entire DATA-CHL (that is, the software, DPR, and hardware that comprise it). It confirms that a connection can be established over the DATA-CHL and that the DATA-CHL can correctly send and receive data over the connection (that is, over the TDM Bus). The test actually involves two DATA-CHLs: the DATA-CHL that is the target of the test and a second, arbitrary, not busy DATA-CHL.

A connection is set up by placing a call from the arbitrary DATA-CHL into the target DATA-CHL. Data is looped out over the connection in each direction so that the target DATA-CHL is tested as both a sender and receiver of data. The test checks that the data received by one DATA-CHL is the same as that sent by the other DATA-CHL.

Because it establishes a connection between two NetPkt Interface Data Channels across the TDM Bus, this test not only verifies the integrity of the target DATA-CHL, it also verifies the integrity of the DATA-CON (by establishing the connection) and of the TDM Bus and Tone-Clock circuit pack (by sending and receiving data).

If this test ABORTs or fails, it is impossible to determine from this test alone whether the defective DATA-CHL is the target DATA-CHL or the arbitrary DATA-CHL, or, for that matter, if the problem lies with DATA-CON, TDM Bus, or Tone-Clock circuit pack. The results of running tests #107, #108, #110, and #111 on the DATA-CHL can be used to isolate the problem and determine whether the target DATA-CHL is the cause.

Finally, since DATA-CHLs 1 and 2 share a common DPR and TDM Bus interface hardware and DATA-CHLS 3 and 4 do as well also, if this test finds that DATA-CHL 1 is defective, then it is likely that DATA-CHL 2 is and so forth.

NOTE:
If an error code is encountered recommending that CDR or the system printer be busied out, see PRI-CDR or SYS-PRNT for details on restoring them before concluding work on the problem.

Table 8-87. Data Channel Remote Mtce Loop-Around Test #109

Error Code	Test Result	Description Recommendation
4	ABORT	The target DATA-CHL is busy and not available for use of there is an internal system error. 1. Note the results of tests #110 and #111 in the short test sequence for the target DATA-CHL. If the results are both PASS, the target DATA-CHL is probably not defective. Continue with the following steps only if necessary to completely test the target DATA-CHL. 2. Determine if the target DATA-CHL is in use for some other function (CDR Link, system printer, or secondary administration terminal connection). If so, check for errors on the function in use. If there are none, there is a high probability that the DATA-CHL is not defective. Proceed to the next step only if necessary to completely test the target DATA-CHL. 3. If the target DATA-CHL is in use for some other function, busy out the function (CDR, system printer, or secondary administration terminal connection). 4. Retry the command at one-minute intervals up to five times. 5. If the test continues to ABORT, escalate the problem. 6. Restore the busied-out CDR or system printer to service before moving on to another activity.
30 - 75	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.

Table 8-87. Data Channel Remote Mtce Loop-Around Test #109

Error Code	Test Result	Description Recommendation
1000	ABORT	The target DATA-CHL is busy and not available for use; no other DATA-CHLs are administered and therefore unable to place a call to the target DATA-CHL; system resources are unavailable to run this test; or there is an internal system error. 1. Note the results of tests #110 and #111 in the short test sequence for the target DATA-CHL. If the results are both PASS, the target DATA-CHL is probably not defective. Continue with the following steps only if it is necessary to completely test the target DATA-CHL. 2. Determine if the target DATA-CHL is in use for some other function (CDR Link, system printer, or secondary administration terminal connection). If so, check for errors on the function in use. If there are none, the DATA-CHL is probably not defective. Proceed to the next step only if necessary to completely test the target DATA-CHL. 3. If the target DATA-CHL is in use for some other function, busy out the function (CDR, system printer or secondary administration terminal connection). For CDR, busy out the CDR link; for system printer, busy out the SYS-PRNT link; and for the secondary administration terminal connection, busyout the DATA-CHL. 4. Retry the command at one-minute intervals up to five times. 5. If the test continues to ABORT, escalate the problem. 6. If applicable, restore the busied-out CDR or system printer to service before moving on to another activity.
1006	ABORT	No other DATA-CHLs are administered and are unable to place the call to the target DATA-CHL; all other DATA-CHLs are busy; system resources required for this test are unavailable; or there is an internal system error. 1. Note the results of tests #110 and #111 in the short test sequence for the target DATA-CHL. If the results are both PASS, the target DATA-CHL is probably not defective. Continue with the following steps only if necessary to completely test the target DATA-CHL. 2. Determine if the target DATA-CHL is in use for some other function (CDR link, system printer, or secondary administration terminal connection). If so, check for errors on the function in use. If there are none, the DATA-CHL is probably not defective. Proceed to the next step only if necessary to completely test the target DATA-CHL. 3. If the target DATA-CHL is in use for some other function, busy out the function (CDR, system printer or MCU-ST connection). For CDR, busy out the CDR link; for system printer, busy out the SYS-PRNT link; and for the MCU-ST connection, busy out the DATA-CHL. 4. Retry the command at one-minute intervals up to five times. 5. If the test continues to ABORT, escalate the problem. 6. If applicable, restore the busied-out CDR or system printer to service before moving on to another activity.

Table 8-87. Data Channel Remote Mtce Loop-Around Test #109

Error Code	Test Result	Description Recommendation
1016	ABORT	Resources for this test are not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
1018	ABORT	Test disabled via software patch. Escalate to the next tier level for instructions on enabling the test.
2003 - 2004	ABORT	Internal system error. 1. Check the dial plan to make sure the extensions of the data channel are set up as local extensions rather than remote or UDP extensions. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to ABORT, escalate the problem.

Table 8-87. Data Channel Remote Mtce Loop-Around Test #109

Error Code	Test Result	Description Recommendation
40 - 41	FAIL	Test #109 failed because the data received over the connection did not match the data sent over the connection (data was corrupted). However, since it involves two DATA-CHLS, the test's failure is insufficient to indict either channel as defective. 1. Check the dial plan to make sure the extensions of the data channel are set up as local extensions rather than remote or UDP extensions. 2. See which DATA-CHL is in use for some other function (CDR, system printer or secondary administration terminal connection). 3. Note the test results for tests #110 and #111 in the short test sequence for the target DATA-CHL. Test #109 failed because the data received over the connection did not match the data sent over the connection (data was corrupted). However, since it involves two DATA-CHLS, the test's failure is insufficient to indict either channel as defective. 4. If both tests pass, the arbitrary DATA-CHL is probably defective. 5. If both tests failed, enter remove data-module <ext> for each DATA-CHL that failed. Repeat the test. If they fail again, replace the TN794NetPkt Interface circuit pack and repeat the test. NOTE: Use set time to reset the time of day after you replace the circuit pack. 6. If only test #110 fails, check for TDM-BUS, TONE-BD, or TONE-PT errors. If they exist, see those sections and repeat the test. If there are no errors against these MOs, go to Step 7. 7. If test #111 fails and test #110 either passes or fails for the target DATA-CHL, busy out all functions using DATA-CHLs. CAUTION: All functions must be busied out because test #107 is destructive and terminates established connections over DATA-CHLs. 8. Enter test data-module <ext> long for the target DATA-CHL. Note the results of tests #107 and #108. 9. If only test #107 fails, the TN794NetPkt Interface circuit pack is defective, replace it now then repeat the test. NOTE: Use set time to reset the time of day after you replace the circuit pack. 10. If test #108 fails, the DATA-CON is defective. Replace the TN794NetPkt Interface circuit pack at the customer's convenience then repeat the test. 11. If tests #107 and #108 both pass, the target DATA-CHL is defective. See Step 5. 12. Restore any busied-out function.

Table 8-87. Data Channel Remote Mtce Loop-Around Test #109

Error Code	Test Result	Description Recommendation
2000 , 2003 , 2004	FAIL	Test #109 failed because the data looped over the connection was not received (data was lost). 1. Check the dial plan to make sure the extensions of the data channel are set up as local extensions rather than remote or UDP extensions. 2. See which DATA-CHL is in use for some other function (CDR, system printer, or secondary administration terminal connection). 3. Note the test results for tests #110 and #111 in the short test sequence for the target DATA-CHL. Test #109 failed because the data looped over the connection was not received (data was lost). 4. If both tests pass, the arbitrary DATA-CHL is probably defective. 5. If both tests failed, enter remove data-module <ext> for each DATA-CHL that failed. Repeat the test. If they fail again, replace the TN794 NetPkt Interface circuit pack and repeat the test. NOTE: Use set time to reset the time of day after you replace the circuit pack. 6. If only Test #110 fails, check for TDM-BUS, TONE-BD, or TONE-PT errors. If they exist, see the those sections and repeat the test. If there are no errors against these MOs, go to Step 7. 7. If test #111 fails and test #110 either passes or fails for the target DATA-CHL, busy out all functions using DATA-CHLs. CAUTION: All functions must be busied out because test #107 is destructive and terminates established connections over DATA-CHLs. 8. Enter test data-module <ext> long for the target DATA-CHL. Note the results of tests #107 and #108. 9. If only test #107 fails, the TN794 NetPkt Interface circuit pack is defective, replace it now then repeat the test. NOTE: Use set time to reset the time-of-day after you replace the circuit pack. 10. If test #108 fails, the DATA-CON is defective. Replace the TN794 NetPkt Interface circuit pack at the customer's convenience then repeat the test. 11. If tests #107 and #108 both pass, the target DATA-CHL is defective. See Step 5. 12. Restore any busied-out function.
None	PASS	The target DATA-CHL, DATA-CON,TN794 NetPkt Interface circuit pack, TDM-Bus, and Tone-Clock circuit pack (TONE-BD, TONE-PT and TDM-CLK) are functioning. Connections can be established over the DATA-CHLs.

Data Channel Crosstalk Test #110

This nondestructive test verifies the integrity of the entire DATA-CHL, that is, the software, DPR, and hardware that comprise it. However, unlike the Remote Maintenance Loop-Around test (#109), this test only involves the single DATA-CHL that is the target of the test. A loop-around connection is established over the TDM-Bus from the DATA-CHL back to itself. Data is looped over the connection in each direction, so the DATA-CHL is tested as both a sender and receiver of data. This test checks that the data received by the DATA-CHL is the same as the data sent by the DATA-CHL.

Because it establishes a loop-around connection from the NetPkt Interface DATA-CHL back to itself across the TDM Bus, this test both verifies the integrity of the target DATA-CHL and the integrity of the DATA-CON (by establishing the connection) and the TDM Bus and Tone-Clock circuit pack (by sending and receiving data).

If this test ABORTs or fails, it is impossible to determine from this test alone whether the target DATA-CHL is defective or the problem lies with the DATA-CON, TDM Bus, or Tone-Clock circuit pack. The results of tests #107, #108 and #111 on the DATA-CHL can be used to determine whether the target DATA-CHL is defective.

Finally, since DATA-CHLs 1 and 2 share a common DPR and TDM Bus interface as do DATA CHLs 3 and 4, if the test finds DATA-CHL 1 is defective, then DATA-CHL 2 is likely to be defective also, and so on.

NOTE:
If an error code is encountered that recommends that a CDR or system printer link be busied out, when concluding work on the problem, be sure to restore each busied-out link to service according to the PRI-CDR and SYS-PRNT descriptions, respectively.

Table 8-88. Data Channel Crosstalk Test #110

Error Code	Test Result	Description Recommendation
4	ABORT	The target DATA-CHL is busy and not available for use if there is an internal system error. 1. Determine if the target DATA-CHL is in use for some other function (CDR link, system printer, or secondary administration terminal connection). If so, check for errors on the function in use. If there are none, the DATA-CHL is probably not defective. Proceed to the next step only if it is necessary to completely test the target DATA-CHL. 2. If the target DATA-CHL is in use for some other function, busy out the function (see PRI-CDR for CDR, SYS-PRNT for system printer). For secondary administration terminal connection, busy out the DATA-CHL. 3. Retry the command at one-minute intervals up to five times. 4. If the test continues to ABORT, escalate the problem. 5. Restore the busied-out CDR or system printer to service before moving on to another activity.
40 , 70 , 75	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
1000	ABORT	The target DATA-CHL is busy and not available for use, system resources are unavailable to run this test, or there is an internal system error. 1. Determine if the target DATA-CHL is in use for some other function (CDR link, system printer, or secondary administration terminal connection). If so, check for errors on the function in use. If there are none, the DATA-CHL is probably not defective. Proceed to the next step only if it is necessary to completely test the target DATA-CHL. 2. If the target DATA-CHL is in use for some other function, busy out the function. 3. For CDR, busy out the PRI-CDR link; for system printer, busy out the SYS-PRNT link; and for the MCU-ST connection, busy out the DATA-CHL. 4. Retry the command at one-minute intervals up to five times. 5. If the test continues to ABORT, escalate the problem. 6. If applicable, restore the busied-out CDR or system printer to service before moving on to another activity.
1002	ABORT	System resources required to run this test are not available or there is an internal system error.
1006	ABORT	System resources required to run this test are not available.

Table 8-88. Data Channel Crosstalk Test #110

Error Code	Test Result	Description Recommendation
1016	ABORT	Resources for this test are not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
1018	ABORT	Test disabled via software patch. Escalate to the next tier level for instructions on enabling the test.
2000	ABORT	Resources for this test are not available.
2003	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.

Table 8-88. Data Channel Crosstalk Test #110

Error Code	Test Result	Description Recommendation
14 , 16 , 40	FAIL	Test #110 failed because the data received over the connection did not match the data sent over the connection (data was corrupted). 1. See which DATA-CHL is in use for some other function (CDR, system printer, or secondary administration terminal connection). 2. Note the results of test #111 in the short test sequence for the target DATA-CHL. 3. If test #111 passed, check for TDM BUS or Tone-Clock (TONE-BD, TONE-PT and TDM-CLK) errors. If they exist, correct them and rerun the test. If errors are not logged against these MOs, go to Step 4. 4. If test #111 failed, enter test data-module <ext> long. Note the results of tests #107 and #108. 5. If Test #107 fails, replace the TN794 NetPkt Interface circuit pack and repeat the test. NOTE: Use set time to reset the time of day after you replace the circuit pack. 6. If test #108 fails, replace the TN794 NetPkt Interface circuit pack at the customer's convenience. 7. If both tests pass, enter remove data-module <ext> for the target DATA-CHL. Replace the TN794 NetPkt Interface circuit pack. NOTE: Use set time to reset the time of day after you replace the circuit pack. 8. Restore any busied-out function.

Table 8-88. Data Channel Crosstalk Test #110

Error Code	Test Result	Description Recommendation
2000 , 2003 , 2004	FAIL	Data looped over the connection was not received (data was lost). 1. See which DATA-CHL is in use for some other function (CDR, system printer or secondary administration terminal connection). 2. Note the result of test #111 in the short test sequence for the target DATA-CHL. 3. If test #111 passed, check for TDM BUS or Tone-Clock (TONE-BD, TONE-PT, and TDM-CLK) errors. If they exist, correct them and rerun the test. If errors are not logged against these MOs, go to Step 4. 4. If test #111 failed, enter test data-module <ext> long. Note the results of tests #107 and #108. 5. If test #107 fails, replace the TN794 NetPkt Interface circuit pack and repeat the test. NOTE: Use set time to reset the time of day after you replace the circuit pack. 6. If test #108 fails, replace the TN794 NetPkt Interface circuit pack at the customer's convenience. 7. If both tests pass, enter remove data-module <ext> for the target DATA-CHL. Replace the TN794 NetPkt Interface circuit pack. NOTE: Use set time to reset the time of day after you replace the circuit pack. 8. Restore any busied-out function.
None	PASS	The target DATA-CHL, DATA-CON,TN794 NetPkt Interface circuit pack, TDM-Bus, and Tone-Clock circuit pack (TONE-BD, TONE-PT, and TDM-CLK) are functioning. Connections can be established over the DATA-CHLs.

Data Channel Local Loop-Back Test #111

This test verifies the integrity of the dual-port RAM that is shared between the software and hardware that comprises the DATA-CHL. The DPR is placed in local loop-back mode such that data to be sent by the DATA-CHL is instead looped back to be received by the DATA-CHL. The loop-back is done within the DPR, so the data is never sent over the TDM Bus. The test checks that the data received by the DATA-CHL is the same as the data that was sent by the DATA-CHL.

This test verifies the integrity of the target DATA-CHL, and also tests the integrity of the DATA-CON, since it actually puts the DPR in local loop-back mode and loops the data from the DPR back into the DPR. If this test ABORTs or fails, it is impossible to determine from the results alone whether the target DATA-CHL is defective or if the problem lies with the DATA-CON. The results of tests #107 and #108 on the DATA-CHL can help determine whether the target DATA-CHL is actually defective.

Also, since DATA-CHLs 1 and 2 share a common DPR and TDM Bus interface, as do DATA-CHLs 3 and 4, if one channel is defective, it is likely that the other one is as well.

NOTE:
If an error code is encountered that recommends that the CDR link or system printer link be busied out, after concluding work on the problem, be sure to restore each busied-out link back into service according to PRI-CDR or SYS-PRNT, respectively.

Table 8-89. Data Channel Local Loop-Back Test #111

Error Code	Test Result	Description Recommendation
4	ABORT	The target DATA-CHL is busy and not available for use or there is an internal system error. 1. Determine if the target DATA-CHL is in use for some other function (CDR link, system printer, or MCU-ST). If so, check for errors on the function in use. If there are none, the DATA-CHL is probably not defective. Proceed to the next step only if it is necessary to completely test the target DATA-CHL. 2. If the target DATA-CHL is in use for some other function, busy out the function (see PRI-CDR for CDR, SYS-PRNT for system printer). For the MCU-ST connection, busy out the DATA-CHL. 3. Retry the command at one-minute intervals up to five times. 4. If the test continues to ABORT, escalate the problem. 5. Restore the busied-out CDR or system printer to service before moving on to another activity.
40 , 70 , 75	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.

Table 8-89. Data Channel Local Loop-Back Test #111

Error Code	Test Result	Description Recommendation
1000	ABORT	The target DATA-CHL is busy and not available for use, system resources are unavailable to run this test, or there is an internal system error. 1. Determine if the target DATA-CHL is in use for some other function (CDR link, system printer, or MCU-ST connection). If so, check for errors on the function in use. If there are none, the DATA-CHL is probably not defective. Proceed to the next step only if it is necessary to completely test the target DATA-CHL. 2. If the target DATA-CHL is in use for some other function, busy out the function 3. For CDR, busy out the PRI-CDR link; for system printer, busy out the SYS-PRNT link; and for the secondary administration terminal connection, busy out the DATA-CHL. 4. Retry the command at one-minute intervals up to five times. 5. If the test continues to ABORT, escalate the problem. 6. If applicable, restore the busied-out CDR or system printer to service before moving on to another activity.
1006	ABORT	System resources required to run this test are not available or there is an internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
1016	ABORT	Resources for this test are not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
1018	ABORT	Test disabled via software patch. Escalate to the next tier level for instructions on enabling the test.
2000	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.

Table 8-89. Data Channel Local Loop-Back Test #111

Error Code	Test Result	Description Recommendation
2003	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
40	FAIL	Test #111 failed because the data received over the connection did not match the data sent over the connection (data was corrupted). 1. See which DATA-CHL is in use for some other function (CDR, system printer, or MCU-ST connection). 2. Busy out all functions using the NetPkt Interface Data Channels (DATA-CHLs). CAUTION: All functions must be busied out because test #107 is destructive and terminates all established connections over the DATA-CHLs. 3. If test #107 fails, replace the TN794 NetPkt Interface circuit pack and repeat the test. NOTE: Use set time to reset the time of day after you replace the circuit pack. 4. If test #108 fails, the DATA-CON is defective. Replace the TN794NetPkt Interface circuit pack at the customer's convenience. NOTE: Use set time to reset the time of day after you replace the circuit pack. 5. If both tests pass, the target DATA-CHL is defective. Enter remove data-module <ext> for the target DATA-CHL. Replace the TN794NetPkt Interface circuit pack. NOTE: Use set time to reset the time of day after you replace the circuit pack. 6. Restore any busied-out function.

Table 8-89. Data Channel Local Loop-Back Test #111

Error Code	Test Result	Description Recommendation
2000 , 2003 , 2004	FAIL	Data looped over the connection was not received (data was lost). 1. See which DATA-CHL is in use for some other function (CDR, system printer, or MCU-ST connection). 2. Busy out all functions using the NetPkt Interface Data Channels (DATA-CHLs). CAUTION: All functions must be busied out because test #107 is destructive and terminates all established connections over the DATA-CHLs. 3. If test #107 fails, replace the TN794NetPkt Interface circuit pack and repeat the test. NOTE: Use set time to reset the time of day after you replace the circuit pack. 4. If test #108 fails, the DATA-CON is defective. Replace the TN794NetPkt Interface circuit pack at the customer's convenience. NOTE: Use set time to reset the time of day after you replace the circuit pack. 5. If both tests pass, the target DATA-CHL is defective. Enter remove data-module <ext> for the target DATA-CHL. Replace the TN794NetPkt Interface circuit pack. NOTE: Use set time to reset the time of day after you replace the circuit pack. 6. Restore any busied-out function.
None	PASS	The target DATA-CHL and DATA-CON are functioning. Connections can be established over the DATA-CHLs.

DATA-CON (NetPkt Interface Driver)

The TN794 NetPkt Interface circuit pack contains the following objects: the Switch Control (SW-CTL), four Data Channels (DATA-CHLs), the NetPkt Interface Driver (DATA-CON), and the generic hardware that interfaces with the TDM Bus (DATA-BD). The NetPkt Interface Driver (DATA-CON) is the subject of this section. NetPkt Interface Channels (DATA-CHLs) are also described.

Together the four DATA-CHLs and the DATA-CON provide a data communications interface that allows data terminal equipment connected to port circuit packs to communicate with software applications running on the MCU. The DATA-CON represents the interface to the control channel of the TDM Bus. Each DATA-CHL represents a dial-up/dial-out asynchronous communications port that interfaces to the TDM Bus.

The DATA-CON supports the signaling required to establish and tear down a connection between the terminal equipment and a software application. Data is transported between the terminal equipment and the software application on the connection established over the DATA-CHL.

An MCU has a single NetPkt Interface circuit pack. Thus, there is a single DATA-CON. From a user's point of view, the DATA-CON is not directly accessible via a craft command; that is, no object command word represents it. Instead, the DATA-CON is tested using the DATA-CHLs it controls. The **test data-module <ext> [short | long]** command tests the DATA-CON along with the DATA-CHL designated by **<ext>**, but all test results are associated with the DATA-CHL maintenance name.

From an internal (MCU software) point of view, the DATA-CON uses the same set of tests as the DATA-CHLs. Therefore, the DATA-CON assumes the same *Error Type* and *Aux Data* values as the DATA-CHLs in the Hardware Error Log. It is also alarmed at the same Alarm Level (that is, minor, on-board) in the Alarm Log. In both logs, the maintenance name is DATA-CON.

Alarm Level	Initial Craft Command to Run
Minor	none

DATA-CHLs 1 and 2 share a common DPR and TDM Bus interface hardware, and DATA-CHLs 3 and 4 share a common DPR and TDM Bus interface hardware. Thus, if DATA-CHL 1 is defective, DATA-CHL 2 is likely to be as well, and vise versa. Likewise, if DATA-CHL 3 is defective, DATA-CHL 4 is likely to be, and vise versa.

Hardware Error Log Entries

Refer to the appropriate test description and follow the recommended procedures.

Table 8-90. NetPkt Interface Driver Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	none
	The strategy to clear DATA-CON errors and alarms is to first clear all DATA-CHL errors and alarms (since DATA-CON is not directly accessible via the craft command). After the DATA-CHL errors and alarms are cleared, wait one hour for the maintenance software to clear the DATA-CON errors and alarms.				
1	-	#111	Minor	On	none
	The strategy to clear DATA-CON errors and alarms is to first clear all DATA-CHL errors and alarms (since DATA-CON is not directly accessible via the craft command). After the DATA-CHL errors and alarms are cleared, wait one hour for the maintenance software to clear the DATA-CON errors and alarms.				
257	Any	#109	Minor	On	none
	The strategy to clear DATA-CON errors and alarms is to first clear all DATA-CHL errors and alarms (since DATA-CON is not directly accessible via the craft command). After the DATA-CHL errors and alarms are cleared, wait one hour for the maintenance software to clear the DATA-CON errors and alarms.				
513	-	#110	Minor	On	none
	The strategy to clear DATA-CON errors and alarms is to first clear all DATA-CHL errors and alarms (since DATA-CON is not directly accessible via the craft command). After the DATA-CHL errors and alarms are cleared, wait one hour for the maintenance software to clear the DATA-CON errors and alarms.				
769	Any	#108	Minor	On	none
	The strategy to clear DATA-CON errors and alarms is to first clear all DATA-CHL errors and alarms (since DATA-CON is not directly accessible via the craft command). After the DATA-CHL errors and alarms are cleared, wait one hour for the maintenance software to clear the DATA-CON errors and alarms.				

Craft-Demanded Tests

Since DATA-CON uses the same tests as DATA-CHLs, refer to Craft-Demanded Tests under “DATA-CHL (NetPkt Interface Data Channel)” for a description of the tests and their associated error codes.

DC-POWER (Cabinet Power)

The DC-Power MO represents all the environmental maintenance. It includes an external power unit and all the Carrier Port Power Units in the Port Network.

The external power unit can be either DC or AC. If the external power unit is AC, then the Carrier Port Power Units must be WP-91153 power units. If the external power unit is DC, then the Carrier Port Power Units must be 676B power units.

If the hardware detects a problem with any one of these elements, it reports the information on the MCU software through a single lead. The MCU software cannot differentiate between different environmental failures. All environmental alarms are logged as a major DC-Power alarm.

Therefore, it is possible to get a DC-Power alarm when there is still power to the MCU. The Carrier Port Power Unit has one LED; when the yellow LED is on, power is normal; when it is off, no external power is being supplied or the power unit has a fault.

NOTE:
Physically removing a Carrier Port Power Unit from a carrier does not raise a DC-Power alarm. The removal of the power unit is equivalent to the carrier being physically absent since DC-Power maintenance cannot distinguish between these two situations.

A cabinet powered by an AC external power source has a minimal Nominal Power Holdover (NPH). There is no NPH for a DC-powered cabinet. An AC-powered cabinet provides full powering for a 1⁄4 second and power to the control complex for two additional minutes.

Alarm Level	Initial Craft Command to Run
Major	test environment *P*[*]

* Where *P* is an appropriate port network number determined from the *PORT* field of the alarm log.

Hardware Error Log Entries

Refer to the appropriate test description and follow the recommended procedures.

Table 8-91. Cabinet Power Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Values
0	0	Any	Any	Any	test environment P sh r 1
	A problem has been detected with the external power unit. Either no external power is being supplied or the power unit is defective.				
513	0	#79	Major	On	test environment P r 2
	A problem has been detected with the external power unit. Either no external power is being supplied or the power unit is defective.				

Craft-Demanded Tests

Always investigate tests in the order presented in the following table when inspecting errors in the MCU. By clearing error codes associated with the Cabinet Power Query test, for example, you may also clear errors generated from other tests in the testing sequence. Test descriptions and recommended maintenance procedures follow for all errors that can occur during craft-demanded tests.

Table 8-92. System Technician-Demanded Tests: DC-POWER

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Cabinet Power Query Test (#79)	Short	Long	No
Emergency Transfer Query Test (#124) (a)	Short	Long	No
External Alarm Lead Query Test (#120)	Short	Long	No
Analog Ring Generator Initialization Test (#117) Tests #117 and #118 only show up in the test sequence if there is a TN768 Tone-Clock circuit pack in the port network being tested	Short	Long	No
Analog Ring Generator Query Test (#118) Tests #117 and #118 only show up in the test sequence if there is a TN768 Tone-Clock circuit pack in the port network being tested	Short	Long	No

Cabinet Power Query Test #79

This test queries the maintenance processor about the status of power. This test can detect power problems only in the port network for which the carrier port power unit is physically present.

Table 8-93. Cabinet Power Query Test #79

Error Code	Test Result	Description Recommendation
1000	ABORT	MCU resources are unavailable to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, check for powering problems in the carrier. Look for and resolve all PR-MAINT errors. 3. Repeat the test. 4. If the test continues to ABORT, escalate the problem.
2029	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
1	FAIL	There is currently a problem with the environment of the power system. 1. The power unit has been lost. Verify, and, if necessary, restore power. 2. Rerun the test. If it fails again, go to Step 3. 3. Either the AC or DC power unit could be defective. 4. The PR-MAINT could be incorrectly reporting this error. Resolve all alarms on these MOs and then rerun the test. 5. If many environment tests are failing, the suspect circuit pack should be replaced and the test rerun. 6. If the test still fails, follow normal escalation procedures.
None	PASS	The PR-MAINT has reported no power problems.

DETR-BD (Tone Detector Circuit Pack)

MCU systems that use the mu-law companding mode use TN748D Tone Detector circuit packs. MCU systems that use the A-law companding mode use TN420C (and higher suffixes) Tone Detector circuit packs.

The companding mode of the DETR-BD circuit pack must match that administered for the MCU for proper tone detection. The companding mode is administered using the System-Parameters Country-Options form.

For all DETR-BD circuit pack level errors, refer to XXX-BD (Common Port Board).

Alarm Level	Initial Craft Command to Run
Minor	test board *PCSS*[*]
Warning	test board *PCSS*[*]

* Where *P* is the port number, *C* is the carrier number (A or B), *SS* is the address of the slot in the carrier where the circuit pack is located (such as 02).

DI-BD (Data Interface Circuit Pack)

Alarm Level	Initial Craft Command to Run[*]
Minor	test board PCSS l r#
Warning**	test board PCSS s r#

* Where P is the port network number (only default of 1 applicable); C is the carrier number (A, B, ... etc.); and SS is the address of the slot in the carrier where the circuit pack is located (*01, 02,* ... etc.).

** Refer to XXX-BD (Common Port Board) maintenance.

The TN2236C Data Interface circuit pack supports V.35, RS449, and EIA530 connections to endpoints directly connected to the MCU as well as to endpoints connected behind an encryption device or proprietary inverse multiplexor. These connections allow endpoints to participate in audio, video, and/or data MCU conferences at transfer rates from 112k to 1920k.

Hardware Error Log Entries

Table 8-94. DI-BD Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0*	0	Any	Any	Any	test board PCSS sh r 1
	-				
1	0	busyout board PCSS	Warning	Off	release board PCSS
	This circuit pack has either stopped functioning or was physically removed from the system. NOTE: The alarm is logged approximately 11 minutes after the circuit pack is removed and/or the SAKI Sanity Test (#53) fails. If the circuit pack is not in the system, insert a DI circuit pack into the same slot as the error indicates to resolve this error. Or, if the circuit pack is in the system and the red LED is on, follow the instructions for “Red (alarm)” in the “LED Interpretation” chapter of this document. Also, see the “Handling Port Circuit Packs” section in the “Routine Maintenance Procedure” chapter of this document.				
18	any	busyout board PCSS	Warning	Off	
	This circuit pack has been busied out by the busyout board PCSS command.				
257	Any	#52	Minor	On	test board PCSS r 20
	This error indicates transient communication problems between the switch and this circuit pack. Execute the test board PCSS command and refer to the repair procedures for the Control Channel Loop-Around Test (#52) in the XXX-BD section of this document.				
513	4352 - 4357	uplink error from pack	Minor	On	
	An Angel on-board hardware failure has been detected by the circuit pack.The reported aux data values correspond to the following detected errors: 4352— external RAM error; 4353— internal RAM error; 4355— ROM Checksum error; 4356— Angel Message Corruption. Reset the circuit pack by executing the busyout board PCSS and reset board PCSS commands and then the release board PCSS command. Warning: Resetting the circuit pack drops all calls on the circuit pack When it is reset, the circuit pack executes a set of tests to detect the presence of any of the indicated faults. The detection of one of these errors during initialization causes the circuit pack to lock up and appear insane to the system. See the repair procedure for error type 1.				

Table 8-94. DI-BD Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
1025	Any	#1154	Minor	On	test board PCSS sh r 3
	A failure of the Field-Programmable Gate Array (FPGA) circuit has occurred. Reset the circuit pack via the busyout board PCSS and reset board PCSS commands. Retire the alarm via the test board PCSS long clear command followed by the release board PCSS command. If the reset fails, replace the circuit pack.				
1281	Any	SCOTCH/NPE uplink error from pack	Minor	On	
	A failure of the SCOTCH/NPE circuit has occurred. This is an in-line error condition that uses a leaky bucket strategy. Either one of the following strategies can be used to clear the alarm: ■ Reset the circuit pack via the **busyout board PCSS** and **reset board PCSS** commands. **The reset board PCSS** command reinitializes the SCOTCH/NPE circuit. Issue the **release board PCSS** command and wait approximately 30 minutes for the system to resolve the problem and retire the alarm. If the alarm is still active after 30 minutes, replace the circuit pack. ■ Reseat the circuit pack and reinsert it. This reinitializes the SCOTCH/NPE circuit and resolves any circuit pack and port level alarms. If the error recurs within 10 minutes, replace the circuit pack.				
1537	46082	software-detected error	Minor	On	
	he circuit pack is hyperactive (that is, it is flooding the switch with messages sent over the control channel). The circuit pack is placed out of service whenever a threshold of these errors is reported to the switch. Clear the alarm via the following commands: busyout board PCSS, reset board PCSS, test board PCSS long clear, release board PCSS. If the error recurs within 10 minutes, replace the circuit pack.				
3329	Any	upgrade firm-ware command	Minor	On	
	The circuit pack's Saki could not be reset after the upgrade. 1. Reissue the upgrade firmware di xxx command 2. If the command still fails, escalate the problem.				
3585	Any	upgrade firm-ware command	Minor	On	
	The upgrade firmware command was not successful. 1. Reissue the upgrade firmware di xxx command. 2. If the command still fails, escalate the problem.				

Craft-Demanded Tests

Always investigate tests in the order presented in the following tables when inspecting errors in the system. By clearing error codes associated with the *Control Channel Loop-Around Test,* for example, you may also clear errors generated from other tests in the testing sequence.

NOTE:
The DI circuit pack is an upgradable circuit pack. Error types and error log entries for the associated **upgrade firmware** command are discussed in the "Firmware Download" section in Chapter 5 of this document.

System Technician-Demanded Tests: DI-BD

Table 8-95. System Technician-Demanded Tests: DI-BD

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?	Reset Board Sequence
Control Channel Loop-Around Test (#52)	Short	Long	No	
FPGA Status Query Test (#1154)	Short	Long	No	
SAKI Sanity Test (#53)			Yes	Yes

Control Channel Loop-Around Test #52

Refer to this repair procedure described in the XXX-BD (Common Port Circuit Pack) section of this document.

FPGA Status Query Test #1154

This test checks the health of the DI circuit pack's FPGA circuit. The FPGA circuit is responsible for synchronizing data bits between the DI circuit pack and its connected equipment. Any failure on this circuit drastically affects the service provided by the DI circuit pack

Table 8-96. FPGA Status Query Test #1154

Error Code	Test Result	Description Recommendation
None	ABORT	Internal system error. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.
2000	ABORT	Response to the test was not received from the Tone Detector circuit pack within the allowable time period. 1. If this result occurs repeatedly, attempt to reset the circuit pack if the other ports are not in use. Reset the circuit pack by issuing busyout board PCSS and reset board PCSS followed by release board PCSS. 2. If this result recurs, replace the circuit pack.
2012	ABORT	Internal system error. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.
2100	ABORT	Could not allocate the necessary resources to run this test. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times 2. If the problem persists, follow normal escalation procedures.
None	FAIL	The FPGA circuit has failed. This resource cannot guarantee data integrity. All port resources on the circuit pack will be placed out of service. Replace the circuit pack.
	PASS	The FPGA circuit is functioning normally.

SAKI Sanity Test #53

Refer to this repair procedure described in the XXX-BD (Common Port Circuit Pack) section of the this document.

DI-PT (Data Interface Port)

Alarm Level	Initial Craft Command to Run*
Minor	test board PCSSpp l r#
Warning	test board PCSSpp s r#

* Where P is the port network number (only default of 1 applicable); C is the carrier number (A or B); SS is the address of the slot in the carrier where the circuit pack is located (*01, 02,* ... etc.), and pp is the two-digit port number (for example, 01).

The TN2236C Data Interface circuit pack supports V.35, RS449, and EIA-530 connections to endpoints directly connected to the MCU as well as to endpoints connected behind an encryption device or proprietary inverse multiplexor. These connections allow endpoints to participate in audio, video, and/or data MCU conferences at transfer rates from 112k to 1920k.

A DI port can be used to supply system synchronization. This is done by adding the DI port to the System Synchronization plan. A DI port can be administered as a primary or secondary reference. Whenever the port is administered as a primary reference, the secondary reference must either be administered as a different DI port or left blank. To be a valid synchronization reference, the access endpoint associated with the DI port must have its timing mode set to “DTE” and its bandwidth type set to “fixed.” Refer to chapter 2 of the Administration document for complete details.

Hardware Error Log Entries

Table 8-97. DI-PT Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0*	0	Any	Any	Any	test port PCSS sh r 1
	-				
18	0	busyout port PCSSpp	Warning	Off	release port PCSSpp
	This port has been busied out by the busyout port PCSSpp command.				
257	Any	#1156	Minor	On	test port PCSSpp l r 3
	This error occurs whenever the SCOTCH/NPE Loop-Around Test #1006 fails. Refer to this test for repair procedures.				
513	Any	#1157	Minor	On	test port PCSSpp l r 3
	This error occurs whenever the Data Loop-Around Test #1007 fails. Refer to this test for repair procedures.				
1025	Any	KG Framing error	Warning	Off	
	This error indicates that the MMI port connected to the DI port lost H.221 framing with the far-end codec. Whenever this occurs, a message instructing the DI port to take the appropriate action for KG loss of framing is also sent down to the DI port.				
1281	Any	#1158	Warning /None	On/Off	test port PCSSpp1
	This error occurs whenever the DI port detects a loss of signal or the Loss of Signal Query Test #1008 fails. Refer to this test for repair procedures.				
1537 - 1624	Any	#1159	Warning /None	Off	test port PCSSpp l r 6
	This error occurs whenever the DI port detects slips or the Slip Alarm Query Test #1009 fails. Refer to this test for repair procedures.				
1793	Any	#6	Minor	On	test port PCSSpp l r 3
	This error occurs whenever the SCOTCH/NPE Test #6 fails. Refer to this test for repair procedures.				
2049	Any	None	None	On	
	MO DI-BD has detected a board-level error that affects all DI ports on this circuit pack. This error is sent from DI-BD to DI-PT to place the port out of service.				

Table 8-97. DI-PT Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
2305	Any	None	None	On	
	This error indicates that a loss condition was detected on the primary or secondary sync source. The MCU will automatically switch to a good sync source.				
2561	Any	timing mismatch error	None	On	
	This error occurs whenever the DI port detects that the rate at which the conference is administered and the rate of the sending endpoint are different.				

Craft-Demanded Tests

Always investigate tests in the order presented in the following tables when inspecting errors in the system. By clearing error codes associated with the *SCOTCH/NPE TDM Loop-Around Test,* for example, you may also clear errors generated from other tests in the testing sequence.

System Technician-Demanded Tests: DI-PT

Table 8-98. System Technician-Demanded Tests: DI-PT

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
SCOTCH/NPE TDM Loop-Around Test (#1156)	Long		No
SCOTCH/NPE Crosstalk Test (#6)	Long		No
Data Loop-Around Test (#1157)	Long		Yes
Loss of Signal Query (#1158)	Short	Long	No
Slip Alarm Query (#1159)	Short	Long	No
Translation Audits and Update Test (#36)	Short	Long	No

SCOTCH/NPE Loop-Around Test #1156

For this test, the SCOTCH/NPE for the DI circuit pack is told to listen to a TDM time slot. A digital count tone is looped back in the FPGA and onto another TDM time slot without passing through any resource hardware. A tone detector port then verifies the looped data. If the digital count is correct, the test passes. The test is done for both TDM buses. Failures indicate that the SCOTCH/NPE is unreliable.

Table 8-99. SCOTCH/NPE Loop-Around Test #1156

Error Code	Test Result	Description Recommendation
None	ABORT	Internal system error. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.
1000	ABORT	System resources required to run this test are not available. The port may be busy with a call. This is a normal abort. 1. Retry the command at one-minute intervals up to five times. 2. Issue the status conference command to check if there is a conference that is currently active. If there is an active conference, this test cannot be run until the call terminates. 3. If the problem persists, follow normal escalation procedures.
1002	ABORT	The system could not allocate time slots for the test. The traffic load on the system may be high, or time slots may be out of service due to TDM-BUS errors. 1. See TDM-BUS for any active TDM Bus errors. 2. If there are no TDM Bus errors and the MCU is not handling heavy traffic, repeat the test at one-minute intervals up to five times. 3. If the test continues to abort, follow normal escalation procedures.
1003	ABORT	The system could not allocate a tone detector for the test. The system may be oversized for the number of tone detectors present, or some tone detectors may be out of service. 1. Look for TTR-LEV errors in the error log. If such errors are present, refer to TTR-LEV (TTR Level) documentation. 2. Look for TONE-PT errors in the error log. If such errors are present, refer to the TONE-PT (Tone Generator) Maintenance documentation. 3. If neither condition exists, retry the test at one-minute intervals up to five times. 4. If the test continues to abort, escalate the problem.
2000	ABORT	Response to the test was not received from the Tone Detector circuit pack within the allowable time period. 1. If this result occurs repeatedly, attempt to reset the circuit pack if all ports are not in use. Reset the circuit pack by issuing busyout board PCSS and reset board PCSS followed by release board PCSS. 2. If this result recurs, replace the circuit pack.
2012	ABORT	Internal system error. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.

Table 8-99. SCOTCH/NPE Loop-Around Test #1156

Error Code	Test Result	Description Recommendation
Error Code	**Test Result**	**Description Recommendation**
2100	ABORT	Could not allocate the necessary resources to run this test. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times 2. If the problem persists, follow normal escalation procedures.
None	FAIL	The SCOTCH/NPE was found to be transmitting in error. This causes noisy and unreliable connections. Replace the DI circuit pack.
	PASS	The SCOTCH/NPE is correctly using its allocated time slots. The DI circuit pack is functioning normally.

SCOTCH/NPE Crosstalk Test #6

The SCOTCH/NPE controls connectivity to the TDM Bus. This nondestructive test verifies that the SCOTCH/NPE talks on the TDM Bus and never crosses over to time slots reserved for other connections. If the SCOTCH/NPE is not working properly, one-way and noisy connections may be observed. When the test

passes, the SCOTCH/NPE is able to communicate over the TDM Bus. This test is part of the circuit pack's demand and scheduled test sequence, and it takes approximately 20 to 30 seconds to complete.

Table 8-100. SCOTCH/NPE Crosstalk Test #6

Error Code	Test Result	Description Recommendation
None	ABORT	Internal system error. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.
1000	ABORT	System resources required to run this test are not available. The port may be busy with a call. This is a normal abort. 1. Retry the command at one-minute intervals up to five times. 2. Issue the status conference command to check if there is a conference that is currently active. If there is an active conference, this test cannot be run until the call terminates. 3. If the problem persists and a call is not active, follow normal escalation procedures.
1002	ABORT	The system could not allocate time slots for the test. The traffic load on the system may be high, or time slots may be out of service due to TDM-BUS errors. 1. See TDM-BUS for any active TDM Bus errors. 2. If there are no TDM Bus errors and the MCU is not handling heavy traffic, repeat the test at one-minute intervals up to five times. 3. If the test continues to abort, follow normal escalation procedures.
1003	ABORT	The system could not allocate a tone detector for the test. The system may be oversized for the number of tone detectors present, or some tone detectors may be out of service. 1. Look for TTR-LEV errors in the error log. If such errors are present, refer to TTR-LEV (TTR Level) documentation. 2. Look for TONE-PT errors in the error log. If such errors are present, refer to the TONE-PT (Tone Generator) Maintenance documentation. 3. If neither configuration exists, retry the test at one-minute intervals up to five times. 4. If the test continues to abort, escalate the problem.
2000	ABORT	Response to the test was not received from the Tone Detector circuit pack within the allowable time period. 1. If this result occurs repeatedly, attempt to reset the circuit pack if the port is not in use. Reset the circuit pack by issuing busyout board PCSS and reset board PCSS followed by release board PCSS. 2. If this result recurs, replace the circuit pack.

Table 8-100. SCOTCH/NPE Crosstalk Test #6

Error Code	Test Result	Description Recommendation
2012	ABORT	Internal system error. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.
2100	ABORT	Could not allocate the necessary resources to run this test. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times 2. If the problem persists, follow normal escalation procedures.
None	FAIL	The SCOTCH/NPE was found to be transmitting in error. This causes noisy and unreliable connections. Replace the DI circuit pack.
	PASS	The SCOTCH/NPE is correctly using its allocated time slots. The DI circuit pack is functioning normally.

Data Loop-Around Test #1157

This test is destructive, and it checks the inbound and outbound “first in, first out” (FIFOs) of the circuit packs. In this test, a digital pattern is created by the Field-Programmable Gate Array (FPGA). This pattern is passed through the outbound FIFO of the circuit packs and then looped back through the inbound FIFO. Via the loop-back, the pattern is returned to a detection circuit on the FPGA. The test fails if an error is detected in the pattern. The test passes if no errors are detected.

Table 8-101. Data Loop-Around Test #1157

Error Code	Test Result	Description Recommendation
	ABORT	Internal system error. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.
1000	ABORT	System resources required to run this test are not available. The port may be busy with a call. This is a normal abort. 1. Retry the command at one-minute intervals up to five times. 2. Issue the status conference command to check if there is a conference that is currently active. If there is an active conference, this test cannot be run until the call terminates. 3. If the problem persists and a call is not active, follow normal escalation procedures.
1039	ABORT	The DI port is providing system timing for the MCU. Destructive tests interfere with this function and cause system disruptions. Therefore, this test cannot be run on this port. 1. If the DI circuit pack and DI port need to be tested, set the synchronization reference to another DI port or to the Tone-Clock circuit pack via the following command sequence: disable synchronization-switch, set synchronization PCSS, followed by enable synchronization-switch. 2. Rerun the test. If the test aborts again, a different error code is generated. Follow the procedures for the generated error code.
2000	ABORT	Response to the test was not received from the DI Detector circuit pack within the allowable time period. 1. If this result occurs repeatedly, attempt to reset the circuit pack if the port is not in use. Reset the circuit pack by issuing busyout board PCSS and reset board PCSS followed by release board PCSS. 2. If this result recurs, replace the circuit pack.
2012	ABORT	Internal system error. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.

Table 8-101. Data Loop-Around Test #1157

Error Code	Test Result	Description Recommendation
2100	ABORT	Could not allocate the necessary resources to run this test. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times 2. If the problem persists, follow normal escalation procedures.
None	FAIL	The FPGA detected an error in the looped-back pattern. Replace the DI circuit pack.
	PASS	The FPGA did not detect any errors in the looped-back pattern. The DI circuit pack is functioning normally.

Loss Of Signal Query Test #1158

This test verifies the synchronization status of a DI port. The loss of signal query indicates that the DI port is unable to derive the synchronization clock from the DI facility. Whenever a DI port detects a loss-of-signal condition, it stops providing the synchronization clock for the system

Table 8-102. Loss Of Signal Query Test #1158

Error Code	Test Result	Description Recommendation
None	ABORT	Internal system error. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.
1000	ABORT	System resources required to run this test are not available. The port may be busy with a call. This is a normal abort. 1. Retry the command at one-minute intervals up to five times. 2. Issue the status conference command to check if there is a conference that is currently active. If there is an active conference, this test cannot be run until the call terminates. 3. If the problem persists and a call is not active, follow normal escalation procedures.
1102	ABORT	This is a normal abort. This test is not run due to the configuration of the access endpoint. The DI port is set up with a DCE timing mode.
2000	ABORT	Response to the test was not received from the DI Detector circuit pack within the allowable time period. 1. If this result occurs repeatedly, attempt to reset the circuit pack if the port is not in use. Reset the circuit pack by issuing busyout board PCSS and reset board PCSS followed by release board PCSS. 2. If this result recurs, replace the circuit pack.

Table 8-102. Loss Of Signal Query Test #1158

Error Code	Test Result	Description Recommendation
2012	ABORT	Internal system error. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.
2100	ABORT	Could not allocate the necessary resources to run this test. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times 2. If the problem persists, follow normal escalation procedures.
None	FAIL	The DI circuit pack has detected a loss-of-signal alarm. Either the physical link is broken or the remote endpoint is down. The DI port and its associated access endpoint are out of service. If the DI port is designated as the supplier of the system synchronization source, the system synchronization maintenance adopts a source elsewhere. For details, refer to the SYNC section in this document. 1. Check the physical connection of the DI circuit pack and cable. 2. Verify that the remote endpoint is turned on. 3. Verify that the MCU and the remote endpoint are administered correctly.
	PASS	The DI signal is present and the physical link is healthy.

Slip Alarm Query Test #1159

This test is used to determine the total number of slips that occurred on a DI link. Slips occur whenever the transmitter and receiver are not running at precisely the same clock rate. A DI port can detect both positive and negative slips on a DI facility.

Whenever a DI port detects a slip condition, the circuit pack increases the on-board slip counter by one. A slip count message is spontaneously sent to the system software after the counter reaches a threshold (for example, 88). Whenever the maintenance software receives the slip count message, the Slip Alarm Query test is initiated to query the slip counters on the DI circuit pack and to count the number of slip counts in the maintenance software.

If the count of slips exceeds the threshold, a warning alarm is raised against the DI port. The port and the associated access endpoints are left in an in-service state. If the DI port is used to supply the system synchronization source, a synchronization switch occurs. See the TDM-BUS (TDM Bus) and SYNC (Synchronization) sections in this document for details.

Table 8-103. Slip Alarm Query Test #1159

Error Code	Test Result	Description Recommendation
	ABORT	Internal system error. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.
1000	ABORT	System resources required to run this test are not available. The port may be busy with a call. This is a normal abort. 1. Retry the command at one-minute intervals up to five times. 2. Issue the status conference command to check if there is a conference that is currently active. If there is an active conference, this test cannot be run until the call terminates. 3. If the problem persists and a call is not active, follow normal escalation procedures.
1103	ABORT	This is a normal abort. The firmware indicates that the port is not in a data transfer state; therefore, this test is not run.
2000	ABORT	Response to the test was not received from the DI Detector circuit pack within the allowable time period. 1. If this result occurs repeatedly, attempt to reset the circuit pack if the port is not in use. Reset the circuit pack by issuing busyout board PCSS and reset board PCSS followed by release board PCSS. 2. If this result recurs, replace the circuit pack.
2012	ABORT	Internal system error. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.

Table 8-103. Slip Alarm Query Test #1159

Error Code	Test Result	Description Recommendation
2100	ABORT	Could not allocate the necessary resources to run this test. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times 2. If the problem persists, follow normal escalation procedures.
Any	FAIL	The DI port and the remote endpoint are not synchronized to the same clock rate. The DI port detects a slip alarm. The error code is the count of slips detected by the DI port after the last Slip Alarm Query test. 1. Retry the command at one-minute intervals up to five times. 2. Check the physical connection of the DI circuit pack and cable. 3. Verify that the MCU and the remote endpoint are administered correctly. 4. If the test still fails, escalate the problem.
None	PASS	No slip alarm is detected on the DI port.

Translation Audits and Updates Test (#36)

This test updates the DI port's internal translations (such as slip threshold and loss of signal threshold) with information kept in the software.

Table 8-104. Translation Audits and Updates Test #36

Error Code	Test Result	Description Recommendation
None	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists and the port is not in use, follow normal escalation procedures.
1004	ABORT	System resources required to run this test are not available. The port may be busy with a call. Use the display port UUCSSpp command to determine the station extension. Use the status station command to determine the service state of the port. If the service state indicates that the port is in use, the port is unavailable for certain tests. You must wait until the port is idle before retesting. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists and the port is not in use, follow normal escalation procedures.
1005	ABORT	This code indicates that this test is not applicable in the current configuration. Ignore this error code.

Table 8-104. Translation Audits and Updates Test #36

Error Code	Test Result	Description Recommendation
1006	ABORT	This port has been busied out by command or taken out-of-service by the failure of the NPE Crosstalk Test. 1. Look in the Error Log for Error Type18 (port busied out) for this port. If this error is present, release the port with the release port PCSS command and run the test again. 2. Look in the Error Log for Error Type 1793 (NPE Crosstalk Test failed) for this port. If this error is present, investigate the errors associated with the NPE Crosstalk Test (#6) first. 3. If the test continues to abort, escalate the problem.
2000	ABORT	Response to the test request was not received within the allowable time period. NA
2100	ABORT	Could not allocate the necessary resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.
None	FAIL	This does not indicate a hardware problem, but it may indicate an internal software error. 1. Retry the command at one-minute intervals up to five times. 2. If the test still fails, follow normal escalation procedures.
	PASS	The software and the port processor have the same status. User-reported troubles on this port should be investigated by using other port tests, by examining station wiring, by examining the station, and by ensuring that the terminal is correctly translated as off-premises or on-premises.

DIG-BD (Digital Line Circuit Pack)

Refer to XXX-BD (Common Port Circuit Pack) for circuit pack level errors. See also DIG-LINE (Digital Line) for related line information.

Alarm Level	Initial Craft Command to Run
Minor	test board *PCSS** sh
Warning	test board *PCSS** sh

* Where *P* is the port number, *C* is the carrier number (A or B), *SS* is the address of the slot in the carrier where the circuit pack is located (such as 02).

DIG-LINE (Digital Line)

The Digital Line circuit pack (TN754/TN2224) is used for the maintenance alarm terminal. This terminal is used for alarms, facility access tests, and Automatic Circuit Assurance (ACA).

The Digital Line circuit pack is a port circuit pack that can support up to eight digital ports, each port having two logical information channels (primary and secondary information channel). The maintenance alarm terminal always communicates on the primary information channel.

There can be only one digital alarm terminal per physical port. See the *Avaya MultiPoint Control Unit Installation Guide* for wiring information.

The digital line maintenance is closely related to, and interacts with, the Digital Line circuit pack maintenance in some instances. Some of the results of maintenance testing of the digital line may be affected by the “health” of the Digital Line circuit pack. This interaction should be kept in mind when investigating the cause of reported Digital Line circuit pack problems.

There are instances where the service state of a port is mentioned. It is helpful to understand what is meant by the different service states.

- Out-of-Service: The port has been removed from service. A busyout of a port would cause this to happen.
- Ready-for-Service: Once a port on the circuit pack has been put into service, the maintenance alarm terminal must communicate that it is present. The time between these two events is the time the port is in this state.

- In-Service: Once the MCU has received a message from the maintenance alarm terminal that it is present, it is put into the in-service state. The maintenance alarm terminal can also be forced into this state if it goes off-hook while it is in the ready-for-service state.

Hardware Error Log Entries

Run the short test sequence first. If all tests pass, run the long test sequence. Refer to the appropriate test description and follow the recommended procedures.

Table 8-105. Digital Line Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value
0	0	Any	Any	Any	test port PCSSpp sh r 1
	If all tests pass, run the long test sequence: **test port PCSSpp l r 1.**				
1	1 to 20	None	Warning	Off	
	This *Error Type* and *Aux Data* occur when at least 15 off-board problems are detected with the link to the terminal. When an error with the link is detected, an on-board counter is incremented. Could experience a noisy port or link. 1. Check for defective wiring or a faulty voice terminal. 2. If the problem continues, replace the circuit pack. 3. The alarm is retired a specified time after the problem is resolved.				
18	0		Warning	Off	release port *PCSSpp*
	The port in question is busied out by maintenance personnel. Make sure the port is released via **release port *PCSSpp***.				
130		None	Warning	On	test port *PCSSpp* sh
	The circuit pack has been removed or has been insane for more than 21 minutes. To clear this error, reinsert or replace the circuit pack.				
257	40971	None			
	There are problems transmitting to the alarm terminal. This problem can be caused by defective wiring. Defective wiring causes varying degrees of problems on different types of terminals. This can be ignored if no complaints are received from the user.				
513	0	#17	Warning	Off	test port *PCSSpp* sh r 6
	This circuit pack is overloaded with downlink messages. This may cause the alarm terminal to malfunction (such as ringer doesn't ring, lamp won't light). This message can be ignored or you may redistribute the digital stations to other digital boards.				
767	40964	None			
	This is an in-line event that produces this error type when a favorable response is received from running the Digital Line Electronic Power Feed test (#11). No craft action is necessary. This alarm is resolved with time.				

Table 8-105. Digital Line Error Log Entries — *Continued*

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value
769	40963	None	Warning	Off	
	This is a result of an unfavorable response to the Electronic Power Feed/Positive Temperature Coefficient test (#11). 1. Check for a short in wiring, a damaged jack, an incorrect type of alarm terminal, or a defective alarm terminal. 2. If you suspect the alarm terminal, unplug it for 30 seconds, and then plug it in. 3. If the problem cannot be resolved, replace the circuit pack. 4. Once the problem is resolved, it may take up to one hour for the alarm to clear.				
769	40988	None	Warning	Off	
	The EPF/PTC circuit has been turned off due to an over-current condition. For TN754 Vintage 13 or earlier, the EPF circuit senses an over-current condition at the voice terminal. 1. Check for a short in the wiring, a damaged jack, an incorrect type of voice terminal, or a defective voice terminal. **NOTE:** The PTC opens if there is a short on the power line for 1/2 second or more. The alarm terminal is probably not operating properly. 2. Unplug it for 30 seconds then plug it in. 3. If it does not operate, check for a short in the wiring, a damaged jack, an incorrect type of alarm terminal, or a defective alarm terminal. 4. If the problem cannot be resolved, replace the circuit pack. The alarm may take up to one hour to clear after the problem is corrected.				
1281	Any	#17	Warning	Off	test port *PCSSpp* sh r 4
1537	40968	None	Warning	Off	
	An in-line maintenance error has generated an off-board warning due to some problem with the link to the alarm terminal. If no user complaints are received, ignore this error. 1. Otherwise, check the connections, wiring, and the alarm terminal for defects. 2. Move the alarm terminal to a jack closer to the MCU (in terms of wiring between the MCU and the jack). 3. If the problem continues, replace the circuit pack. 4. Once the problem is resolved, the alarm is retired after a specified time.				
1793		#13	Minor	On	test port *PCSSpp* 1 r 3
	Minor alarms on this MO may be downgraded to warning alarms based on the values used in **set options**.				
2049		#9		On	test port *PCSSpp* 1 r 3
	Minor alarms on this MO may be downgraded to warning alarms based on the values used in **set options**.				

Table 8-105. Digital Line Error Log Entries — *Continued*

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value
2304		None			
	Internal system error. No action is necessary.				
2305	32770	None			
	The alarm terminal went off-hook while it was in the ready-for-service state. 1. Use **status station** to determine the state of the station. The off-hook should have moved the alarm terminal to ready for service. 2. No craft action is necessary.				
2305	40967	None			
	The link between the circuit pack and the alarm terminal is successfully reset. No craft action is required.				
3840	40965	None			
	No terminal is connected to the Digital Line circuit pack. No maintenance required.				
3840	40989	None			
	An uplink message is being logged that the EPF is on with no load on it. No action required.				
3840	41029	None			
	Message buffer in the circuit pack is full.				
3841	41029	None			
	The circuit pack's message buffer is full. No action is necessary.				

Craft-Demanded Tests

Always investigate tests in the order presented in the following table when inspecting errors in the system. By clearing error codes associated with the Voice and Control Channel Local Loop-Around test, for example, you may also clear errors generated from other tests in the testing sequence.

Table 8-106. System Technician-Demanded Tests: DIG-LINE

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Digital Terminal Remote Loop-Around Test (#1201)	Long		Yes
Voice and Control Channel Local Loop-Around Test (#13)	Long		No
Digital Line NPE Crosstalk Test (#9)	Long		No
Digital Line Electronic Power Feed Test (#11)	Long		No
DIG-LINE Station Lamp Updates Test (#16)	Short	Long	No
Station (Digital) Audits Test (#17)	Short	Long	No

Digital Terminal Remote Loop Around Test (#1201)

This test checks the integrity of the connection between the SPE and the attached Digital Terminal and the ability of the terminal and the associated port to send and receive data.

A request is presented to the terminal to go into loopback mode. Then data is sent to the terminal and when received back, checked for consistency. This test is run as a part of the craft command “test long” procedure. It is not included in any error recovery strategy and generates no Error Log entries or alarms. To begin the test, Maintenance will ask Call Processing to make the associated end point and port “Maintenance Busy”. This test will succeed if the endpoint is “idle”. If the reserve request fails then the test will abort. If the request succeeds then the SPE sends a message to loop around both information channels for the digital terminal. First the primary information (voice, Information Channel 1 or I1) channel loop back test is run. The test is performed by sending a digital count from the Tone/Clock circuit pack on the primary information channel time slot and receiving the same digital count with a general purpose tone detector.

If the primary information channel test is successful, the loop-around test for the secondary information (data, Information Channel 2 or I2) channel is then performed. This test is the same as the primary information channel loop-around test and is performed only if a DTDM is administered, which is also the case for a linked DA.

Only one value (Pass. Fail, or Abort) is generated as a result of the two tests run. If any test fails aborts, the sequence is stopped. Upon completion of this test the associated endpoint and port are moved back into the previous service state.

Table 8-107. Digital Terminal Remote Loop Around Test #1201

Error Code	Test Result	Description / Recommendation
None	ABORT	Internal System Error 1. Retry the command at 1-minute intervals a maximum of 5 times.
1000	ABORT	System resources required to run this test are not available. The port may be busy with a valid call. Use the display port PCSSpp command to determine the station extension or attendant number of the port. Use status station or status attendant to determine the service state of the port. If the service state indicates that the port is in use, then the port is unavailable for certain test. (See the commands chapter for details.) You must wait until the port is idle before re-testing. Attendants are always in use (off-hook) if the handset is plugged in and the port is not busied out. 1. If the port status is idle, then retry the command at 1-minute intervals a maximum of 5 times.
1001	ABORT	System resources required to run this test are not available. 1. If the port status is idle, then retry the command at 1-minute intervals a maximum of 5 times.
1002	ABORT	The system could not allocate time slots for the test. The system may be under heavy traffic conditions or it may have time slots out-of-service due to TDM-BUS errors. Refer to TDM-BUS (TDM-Bus) Maintenance to diagnose any active TDM-BUS errors. 1. If the system has no TDM-BUS errors and is not handling heavy traffic, repeat test at 1-minute intervals a maximum of 5 times.
1003	ABORT	The system could not allocate a tone receiver for the test. The system may be oversized for the number of Tone Detectors present or some Tone Detectors may be out of service. 1. Look for TTR-LEV errors in the Error Log. If present refer to TTR-LEV (TTR-Level) Maintenance documentation. 2. Look for TONE-PT errors in the Error Log. If present, refer to TONE-PT (Tone Generator) Maintenance documentation. 3. If neither condition exist, retry the command at 1-minute intervals a maximum of 5 times.

Table 8-107. Digital Terminal Remote Loop Around Test #1201

Error Code	Test Result	Description / Recommendation
1004	ABORT	The port was seized by a valid call during the test. The test has been aborted. Use the display port PCSSpp command to determine the station extension or attendant number of the port. Use status station or status attendant to determine the service state of the port. If the service state indicates that the port is in use, then the port is unavailable for certain test. You must wait until the port is idle before resetting. Attendants are always in use (off-hook) if the handset is plugged in and the port is not busied out. 1. Retry the command at 1-minute intervals a maximum of 5 times. 2. If the test continues to abort and the port is not in use, escalate the problem.
1005	ABORT	The installed circuit pack does not support this operation.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at 1-minute intervals a maximum of 5 times.
2100	ABORT	System resources required to run this test are not available. 1. Make sure terminal is connected and repeat test. 2. If test fails replace terminal and repeat test. 3. Retry the command at 1-minute intervals a maximum of 5 times.
14	FAIL	The primary channel (voice, Information Channel 1 or I1) is not operating properly. User impact may range from noticing nothing to not being able to use the port. Check the results of Voice and Control Channel Local Loop Test (#13). If that test fails, suspect the Digital Line circuit pack. If that test passes then replace the terminal. If both tests fail and component replacement does not change the results, then: 1. Run circuit pack tests to check the tone generator circuit pack and the Tone Detector circuit pack using the test board PCSSpp command. 2. Resolve any problems that are detected on the Tone Generator circuit pack or Tone Detector circuit pack. 3. If the Tone Generator and Tone Detector circuit pack are functioning properly, and the tests still fail, escalate the problem.

Table 8-107. Digital Terminal Remote Loop Around Test #1201

Error Code	Test Result	Description / Recommendation
1015	ABORT	The system will not allow this test to be run because the station is/has not been busied out. Busy out the station with the busyout station command.
16	FAIL	The secondary channel (data Information Channel 2 or I2 is not operating properly. User impact may range from noticing nothing to not being able to use this terminal. Check the results of Voice and Control Channel Local Loop Test (#13). If that test fails, suspect the Digital Line circuit pack. If that test passes then replace the terminal. If both test fail, and component replacement does not change the results, then: 1. Run circuit pack tests to check the tone generator circuit pack and the Tone Detector circuit pack using the test board PCSSpp command. 2. Resolve any problems that are detected on the Tone Generator circuit pack or Tone Detector circuit pack. 3. If the Tone Generator and Tone Detector circuit pack are functioning properly, and the tests still fail, escalate the problem.
None	PASS	Voice and Control Channel Local Loop test passed. All channels are transmitting properly. 1. To be sure that this is not an intermittent problem, repeat this test up to a maximum of ten times to make sure it continues to pass. 2. If complaints persist (noisy connections for voice. corrupted data transfer for data), examine the station, connections, and wiring.

Digital Line NPE Crosstalk Test #9

One or more NPEs reside on each circuit pack with a TDM Bus interface. The NPE controls port connectivity and gain, and provides conferencing functions on a per-port basis. The NPE Crosstalk test verifies that this port's NPE channel talks on the selected time slot and never crosses over to time slots reserved for other connections. If the NPE is not working properly, one-way and noisy connections may be observed. This test is part of a port's long test sequence and takes about 20 to 30 seconds to complete. Crosstalk testing is performed on both the primary information channel (voice) and the secondary information channel (data) associated with each digital station port. If this test fails on either channel, the station and the DTDM are taken out of service.

Table 8-108. Digital Line NPE Crosstalk Test #9

Error Code	Test Result	Description / Recommendation
1	ABORT	During testing of the primary information channel, system resources may not have been available. Also, the port may have been busy during the test. 1. Check the port status using display port PCSSpp to determine the station extension of the port. 2. Use status station to determine the service state of the port. If it is in use, then the port is unavailable. Wait until the port is idle. 3. If the port status is idle, retry the command at one-minute intervals up to five times. 4. If the test continues to ABORT, escalate the problem.
2	ABORT	During testing of DTDM, system resources may not have been available. Also, the port may have been busy during the test. 1. Check to see if the port is in use. 2. If possible, disconnect by toggling the disconnect button on the DTDM. 3. Retry the command after one minute. 4. This action drops the call in progress. 5.. If the test continues to ABORT after five attempts, escalate the problem.
1000	ABORT	System resources required to run this test are unavailable. The port may be busy on a valid call. 1. Use display port PCSSpp to determine the station extension or trunk group/member number of the port. 2. Use status station to determine the status of the port. 3. If the service state indicates the port is in use, it is unavailable for certain tests. 4. Wait until the port is idle before retesting, then retry the command at one-minute intervals up to five times. 5. If the test continues to ABORT, escalate the problem.
1001	ABORT	System resources required to run this test are not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.

Table 8-108. Digital Line NPE Crosstalk Test #9

Error Code	Test Result	Description / Recommendation
1002	ABORT	The system could not allocate time slots for the test. The system may be under heavy traffic conditions or it may have time slots out-of-service due to TDM-Bus errors. 1. See TDM-BUS to diagnose any active TDM-Bus errors. 2. If there are no TDM-Bus errors and the MCU is not handling heavy traffic, repeat the test at one-minute intervals up to five times. 3. If the test continues to ABORT, escalate the problem.
Error Code	**Test Result**	**Description Recommendation**
1003	ABORT	The system could not allocate a tone receiver for the test. The system may be oversized for the number of tone detectors present or some tone detectors may be out of service. 1. Look for TTR-LEV errors in the error log. 2. Look for TONE-PT errors in the error log. 3. If neither condition exists, retry the command at one-minute intervals up to five times. 4. If the test continues to ABORT, escalate the problem.
1004	ABORT	The port was seized by a valid call during the test. The test has been Aborted. 1. Use display port PCSSpp to determine the alarm terminal extension or trunk group/member number of the port. 2. Use status station to determine the service state of the port. 3. If the service state indicates that the port is in use, then the port is unavailable for certain tests. Wait until the port is idle before retesting.
1020	ABORT	Test disabled via background testing. 1. Use status station to determine when the station is available for testing. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to ABORT, escalate the problem.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.

Table 8-108. Digital Line NPE Crosstalk Test #9

Error Code	Test Result	Description / Recommendation
1	FAIL	The NPE of the tested port was found to be transmitting in error. This causes noisy and unreliable connections. The crosstalk test failed on the primary channel. 1. Replace the circuit pack.
2	FAIL	The NPE of the tested port was found to be transmitting in error. This causes noisy and unreliable connections. The crosstalk test failed on the secondary channel. 1. Replace the circuit pack.
None	PASS	The port is correctly using its allocated time slots. 1. To be sure that this is not an intermittent problem, repeat this test up to ten times to make sure it continues to pass. 2. If complaints persist, examine the station, connections, and wiring.

Digital Line Electronic Power Feed/Positive Temperature Coefficient Test #11

For TN754C Digital Line circuit packs, this is a positive temperature coefficient (PTC) restoral test. In this test, the processor requests that the PTC be turned on for a given port and an attempt is made to turn on the power supply to the station. If an over-current condition is sensed, this probably indicates a short on the power line that causes the PTC to open and disconnect the maintenance alarm terminal. Since the PTC does not have a self-restoral capability, the maintenance alarm terminal must be manually unplugged for 30 seconds and then plugged back in to

restore the PTC. Depending on what condition is sensed, a message is returned stating that either the PTC was turned on successfully with no problem or that an overcurrent condition is sensed. This test is repeated again in five seconds.

Table 8-109. Digital Line Electronic Power Feed Test #11

Error Code	Test Result	Description Recommendation
None	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
1000	ABORT	System resources required to run this test are not available. The port may be busy with a valid call. 1. Use display port PCSSpp to determine the station extension or trunk group/member number. 2. Use status station to determine the service state of the port. 3. If the service state of the port is in use, then the port is unavailable for certain tests. Wait until the port is idle before retesting. 4. If the port status is idle, retry the command at one-minute intervals up to five times. 5. If the test continues to ABORT, escalate the problem.
None	FAIL	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
	PASS	EPF Test passed. The message to turn on the power to the station was successfully sent to the port. 1. Although this test never returns a fail result, after running this test, the error log should be checked for any entries with error types 767 or 769 to examine the real results of this test. 2. If error type 767 appears in the error log, this indicates that the test sensed no problems with the power to the station. To verify that the station is powered up, run a self-test on the station, if available, and check that all the feature buttons are operating. 3. If error type 769 appears in the error log, this indicates some problem with power to the station. Check for a short in the wiring, a damaged jack, a defective maintenance alarm terminal, or the incorrect model.

Voice and Control Channel Local Loop Test #13

These tests check the information and control channels between the SPE and the Digital Line port circuit. The SPE sends a message to loop around both the information and control channels for the port. First, the primary information (voice) channel loop-around test is run. The test is performed by sending a digital count from the Tone-Clock circuit pack on the primary information channel time slot and receiving the same digital count with a general-purpose tone detector.

While the primary information channel is still looped around, the Control Channel Loop-Around test is performed. This test consists of sending four different transparent patterns to the on-board microprocessor, receiving them back, and comparing them.

The Loop-Around test for the secondary information (data) channel is then performed. This test is the same as the primary information channel loop-around test and is performed only if a DTDM is administered. A conference test is done next for the primary information channel. This test is the same as Conference Test #6. Only one value (pass, fail or abort) is generated as a result of four tests run. If any test fails or aborts, the sequence is stopped.

Table 8-110. Voice and Control Channel Local Loop Test #13

Error Code	Test Result	Description Recommendation
	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
1000	ABORT	System resources required to run this test are not available. The port may be busy with a valid call. 1. Use display port PCSSpp to determine the station extension or trunk group/member number of the port. 2. Use status station to determine the state of the port. 3. If the service state is in use, then the port is unavailable for certain tests. Wait until it is idle before retesting. 4. If the port status is idle, retry the command at one-minute intervals up to five times. 5. If the test continues to ABORT, escalate the problem.
1001	ABORT	System resources required to run this test are not available. 1. Retry the command at one-minute intervals up to five time. 2. If the test continues to ABORT, escalate the problem.
1002	ABORT	The system could not allocate time slots for the test. The system may be under heavy traffic conditions or it may have time slots out of service due to TDM-Bus errors. 1. See TDM-BUS to diagnose any active TDM-Bus errors. 2. If the MCU has no TDM-Bus errors and is not handling heavy traffic, repeat this test at one-minute intervals up to five times. 3. If the test continues to ABORT, escalate the problem.

Table 8-110. Voice and Control Channel Local Loop Test #13

Error Code	Test Result	Description Recommendation
1003	ABORT	The MCU could not allocate a tone receiver for the test. The system may be oversized for the number of tone detectors present or some tone detectors may be out of service. 1. Look for TTR-LEV errors in the error log. 2. Look for TONE-PT errors in the error log. 3. If neither condition exists, retry the command at one-minute intervals up to five times. 4. If the test continues to ABORT, escalate the problem.
1004	ABORT	The port was seized by a valid call during the test. The test has been ABORTed. 1. Use display port PCSSpp to determine the station extension or trunk group/member number. 2. Use status station to see if the port is in use, if it is, it is unavailable for certain tests. Wait until the port is idle. 3. Retry the command at one-minute intervals up to five times. 4. If the test continues to ABORT and the port is not in use, escalate the problem.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Rerun the test at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Rerun the test at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
7	FAIL	Conference test failed on primary channel. Users may not notice a disruption in service. In extreme cases, MCU may not work at all. 1. Run circuit pack tests to check the tone generator circuit pack and the tone detector circuit pack using test board PCSSs. 2. Resolve any problems detected on either circuit pack. 3. If both circuit packs are functioning and the test still fails, replace the Digital Line circuit pack.
14	FAIL	The primary voice channel is not transmitting properly. User impact may range from noticing nothing to not being able to use this port. 1. Run circuit pack tests to check the tone generator circuit pack and the tone detector circuit pack using test board PCSSs. 2. Resolve any problems detected on either circuit pack. 3. If both circuit packs are functioning and the test still fails, replace the Digital Line circuit pack.

Table 8-110. Voice and Control Channel Local Loop Test #13

Error Code	Test Result	Description Recommendation
15	FAIL	The control channel between the processor and digital circuit pack is not transmitting properly. User impact may range from noticing nothing to not being able to use this port. Could also be disruptive to other users. 1. Run circuit pack tests to check the tone generator circuit pack and the tone detector circuit pack using test board PCSSs. 2. Resolve any problems detected on either circuit pack. 3. If both circuit packs are functioning and the test still fails, replace the Digital Line circuit pack.
16	FAIL	The secondary voice channel is not transmitting properly. User impact may range from noticing nothing to not being able to use this port. 1. Run circuit pack tests to check the tone generator circuit pack and the tone detector circuit pack using test board PCSSs. 2. Resolve any problems detected on either circuit pack. 3. If both circuit packs are functioning and the test still fails, replace the Digital Line circuit pack.
None	PASS	Voice and Control Channel Loop test passed. All channels are transmitting properly. 1. To be sure that this is not an intermittent problem, repeat this test up to ten times to make sure it continues to pass. 2. If complaints still exist, examine the station, connections, and wiring.

DIG-LINE Station Lamp Update Test #16

The lamp updates run only if the station is in service. The status of the maintenance alarm terminal is checked and the lamp updates are blocked from taking place if the station is not in the in-service state.

Table 8-111. DIG-LINE Station Lamp Update Test #16

Error Code	Test Result	Description / Recommendation
	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
1	ABORT	This port may have busied out. 1. Look in the error log for error type 18 (port busied out) for this port. If the error is present, enter **release station <ext>** and run the test again. 2. Make sure the maintenance alarm terminal is connected. 3. Retry the command at one-minute intervals up to five times. 4. If the test continues to ABORT, escalate the problem.
3	ABORT	Station may be in ready-for-service or out-of-service state. 1. Use **status station** to verify the state of the port. 2. Make sure the maintenance alarm terminal is connected. 3. Retry the command at one-minute intervals up to five times. 4. If the test continues to ABORT, escalate the problem.

Table 8-111. DIG-LINE Station Lamp Update Test #16 — *Continued*

Error Code	Test Result	Description / Recommendation
1000	ABORT	System resources required to run this test are not available. The port may be busy with a valid call. 1. Use **display port PCSSpp** to determine the station extension or trunk group/member number. 2. Use status station to determine the service state of the port. 3. If the service state of the port is in use, then the port is unavailable for certain tests. Wait until the port is idle before retesting. 4. If the port status is idle, retry the command at one-minute intervals up to five times. 5. If the test continues to ABORT, escalate the problem.
	FAIL	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
	PASS	The message to light all of the station lamps was sent successfully to the port. 1. Observe the station lamps being lit while running the test. If all lamps do not light successfully, the other digital line test results may indicate related problems that do not allow the lamps to light. 2. Investigate using other digital line port tests and by examining the station, wiring and connections.

Station (Digital) Audits Test #17

This is a series of six tests, which are classified as audits. These audits run only if the station is in service. The SPE sends messages to the on-board microprocessor to perform the following tests.

- **Switchhook Inquiry Test**: This is an update of the SPE records according to the circuit pack's records. This inquiry is sent all the way to the maintenance alarm terminal.
- **Bad Scan Inquiry Test**: A message is sent uplink that contains a count generated from certain events relating to link conditions. This can be an indication of communications problems between the processor and digital port circuit pack.
- **EPF/PTC Inquiry Test:** For a TN754C Digital Line circuit pack, the status of the EPF is sent uplink. Possible conditions are: EPF ON ok, EPF OFF, and EPF no load. For TN754C Digital Line circuit packs, the status of the PTC is sent uplink. Possible conditions are: PTC ON ok, PTC OFF, and PTC no load.
- **ID Request Test:** A request is made to the station for its status. The station sends its configuration information and health information back. This information is checked and a pass/fail result is provided.
- **Ringer Update Test**: This test updates the digital telephone ringer state according to the processor records.
- **DTMF Administration Update Test**: This is a message to the digital station to refresh the default value, which causes the station to send DTMF tones only in the primary information channel. This value is set initially when the station is put in service and every time the station's state changes from other states to in service.

Table 8-112. Station (Digital) Audits Test #17

Error Code	Test Result	Description / Recommendation
1	ABORT	Switchhook audit timed out. 1. Make sure the maintenance alarm terminal is connected and repeat the test. 2. If the test fails, replace the maintenance alarm terminal and repeat the test. 3. If the test continues to ABORT, escalate the problem.
2	ABORT	ID request fails, health bit returned from the maintenance alarm terminal is bad. 1. Make sure the maintenance alarm terminal is connected and repeat the test. 2. If the test fails, replace the maintenance alarm terminal and repeat the test. 3. If the test continues to ABORT, escalate the problem.
3	ABORT	The EPF/PTC has detected an overcurrent condition. 1. For TN754 Digital Line circuit packs, issue **test PCSSpp long**. 2. If test #11 passes, the EPF/PTC condition has been cleared. Rerun the short test sequence. If test #11 ABORTs, see the steps outlined for test #11. 3. Look for error type 769 logged against DIG-LINE and follow the procedures for it. If any additional problems are found, rerun the test. 4. If the test continues to ABORT, escalate the problem.
4	ABORT	Internal system error. 1. Resolve any outstanding circuit pack maintenance problems. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to ABORT, escalate the problem.
5	ABORT	Ringer update ABORTed due to station being in ready-for-service or out-of-service state. 1. Look in the error log for error type 18 (port busied out) for this port. 2. If the error type is present, use **release station <ext>** and run the test again. 3. Make sure the maintenance alarm terminal is connected. 4. Retry the command at one-minute intervals up to five times. 5. If the test continues to ABORT, escalate the problem.

Table 8-112. Station (Digital) Audits Test #17 — *Continued*

Error Code	Test Result	Description / Recommendation
6	ABORT	This port may have been busied out. 1. Look in the error log for error type 18 (port busied out) for this port. 2. If the error type is present, use **release station <ext>** and run the test again. 3. Make sure the maintenance alarm terminal is connected. 4. Retry the command at one-minute intervals up to five times. 5. If the test continues to ABORT, escalate the problem.
1000	ABORT	System resources required to run this test are not available.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
	PASS	Station audits passed. The digital port circuit pack is functioning properly. 1. If complaints persist, investigate by using other port tests and by examining the station, wiring, and connections.

8 DLY-MTCE (MO-DAILY)

MO Name (in Alarm Log)	Alarm Level	Initial Command to Run	Full Name of MO
DLY-MTCE	MINOR	NONE	DLY-MTCE
DLY-MTCE	MAJOR	NONE	DLY-MTCE

The DLY-MTCE maintenance object monitors daily translation saves. If a translation save times out or fails to run, an error is logged against this maintenance object.

If Save Fails	Then System Raises
Three times in a row	MINOR Alarm
Seven times in a row	MAJOR Alarm

Daily Maintenance Interference

All of the actions used in administration commands are listed in the table below. The command actions that, while active, interfere with daily maintenance are also indicated. They are the **add**, **change**, **duplicate**, **remove**, and **set** commands. These commands are frequently used by customer administrators while performing routine administration of the MCU.

Table 8-113. MCU Command Actions

Likely to Disrupt	Less Likely to Disrupt	
add	backup	ping
change	busyout	recycle
duplicate	clear	release
remove	display	reset
set	enable	restore
	format	resume
	get	save
	list	status
	mark	test
	monitor	upgrade
	netstat	

Some other command actions can also interfere with daily maintenance when certain qualifiers are used in the command, or under certain circumstances. For example, certain “test” commands, when used with the modifier “continuously”, could potentially interfere with daily maintenance. However, such command actions are not used typically by customer administrators doing routine administration, and are less likely to disrupt daily maintenance routines than are the **add**, **change**, **duplicate**, **remove**, and **set** command actions.

DS1-BD (DS1 Interface Circuit Pack)

The DS1 Interface circuit pack provides an interface to the DS1 facility and is designed to support either 24 DS0 channels based on a 1.544 link or 31 DS0 channels (plus one framing channel) based on a 2.048 Mbps DS1 link. These DS0 channels can be administered as trunks to the MCU.

Alarm Level	Initial Craft Command to Run
Minor	test board *PCSS l*
Warning	test board *PCSS sh*

The following table indicates the circuit packs and capabilities supported by DS1-BD or UDS1-BD:

Table 8-114. Circuit Packs and Capabilities Supported by DS1-BD or UDS1-BD

Circuit Pack Number	Supported by.....	24-Channel	Tie Trunk Signaling	32-Channel	Cabling
TN767E	DS1-BD	x	x		x
TN2207	UDS1-BD	x	x	x	x

ISDN-PRI trunk signaling (for example, Q.921, Q.931) is provided by the TN765 Processor Interface circuit pack and system software instead of by the TN767E DS1 or TN2207 UDS1-BD Interface circuit pack.

If the TN2207 circuit pack is used, two jumpers located on the side of the circuit pack must be installed correctly. Whenever you configure the circuit pack for a 24- or 32-channel DS1 or for 75 or 120 Ω trunk connections, you must match the parameters administered on the corresponding DS1 Circuit Pack form.

The DS1 (UDS1) configuration for each circuit pack is administered on the DS1 (UDS1) Circuit Pack form. The bit rate is set to 1.544 Mb for 24-channel systems or 2.048 Mbps for 32-channel systems.

The Country Protocol selected is used to drive layer 3 protocol decisions based on PRI specifications specific to a given country (but not on those that are relevant

to specific features). This Country Protocol is independent of the Country parameter administered on the System-parameters Country-options form. Different DS1 circuit packs may be administered with different Country Protocols. Such administration allows the switch to act as a gateway between two incompatible ISDN-PRI implementations (for example, between two different countries). Most systems use country protocol 1 (Avaya PRI). Country protocol 5ESS PRI is administered for a direct connection to 5ESS switches.

The DS1-BD maintenance strategy covers logging the in-line errors reported by the DS1 Interface circuit pack, running tests for error diagnosis and recovery, and raising or clearing maintenance alarms. The signaling over the DS1 link has to be synchronized between the transmitting and receiving ends to ensure error-free communication. Refer to SYNC (Synchronization) for details.

Each trunk and link has its own maintenance strategy. However, all strategies depend on the health of the DS1 Interface circuit pack. Refer to the following sections for details: TIE-DS1 documentation for DS1 Tie Trunk, ISDN-TRK documentation for DS1 ISDN Trunk, and ISDN-LNK documentation for ISDN-PRI Signaling Link Port.

TN2207 Option Settings

The TN2207 circuit pack interfaces between a 24- or 32-channel CO/ISDN or tie trunk and the TDM bus. Set the switches on the circuit pack to the select bit rate and impedance match. See the following table and figure.

Table 8-115. Option Switch Settings on the TN2207

120 Ohms	Twisted pair
75 Ohms	Coaxial requiring 888A adapter
32-Channel	2.048 Mbps
24-Channel	1.544 Mbps

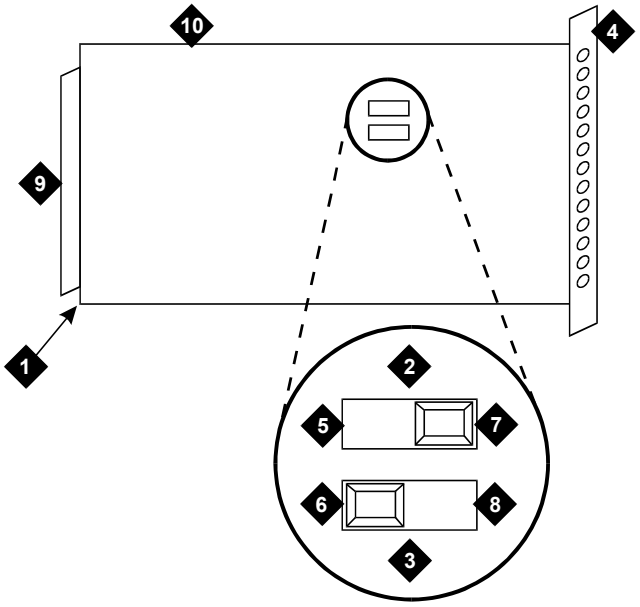


Figure Notes:

1. Backplane Connectors
2. 24/32 Channel Selector
3. 75/120 Ohm Selector
4. Faceplate
5. 32 Channel
6. 120 Ohm (shown selected)
7. 24 Channel (shown selected)
8. 75 Ohm
9. Connector
10. TN2207

Figure 8-20. TN2207 Option Settings

Hardware Error Log Entries

Minor alarms on this MO may be downgraded to warning alarms based on the values used in **set options**.

Table 8-116. DS1-BD Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value
0	Any	Any	Any	Any	test board PCSS
	Run the short test sequence first. If all tests pass, run the long test sequence.				
1	0	#53	Minor/ Warning	On	
	The circuit pack stopped functioning or was not administered completely. The circuit pack should have an entry in the circuit plan (that is, via **change circuit pack**), should have been administered (via **add ds1 PCSS**), and should be inserted into the appropriate slot. A minor alarm is raised when the circuit pack has an entry in the circuit plan and is: — not administered and not inserted in the appropriate slot; — not administered but is inserted in the appropriate slot; — administered but is not inserted in the appropriate slot. Minor alarms may be downgraded to warning based on the setting of **set options.** To resolve the error, meet all conditions or remove the DS1-BD using **remove DS1 PCSS** and **change circuit pack**. If the red LED is still on, go to Chapter 7 and see “Red Alarm.” **NOTE:** The alarm is logged about 11 minutes after the circuit pack is removed or test #53 fails.				
18	0		Warning	Off	release board PCSS
	The port has been busied out by craft.				
23	0		Warning	Off	add ds1 PCSS
	The DS1-BD is not properly administered. A completely administered DS1-BD circuit pack should have an entry in the circuit plan via **change circuit pack,** should have been administered via **add ds1 PCSS**, and should have been inserted into the appropriate port slot.				
125		None	Minor/ Warning	On	
	A wrong circuit pack is inserted in the slot where this circuit pack is logically administered. To resolve this, either remove the wrong circuit pack and insert the logically administered circuit pack or use **change circuit-pack** to re-administer this slot to match the circuit pack inserted. The DS1 channel configuration (24 or 32) of the hardware does not match the bit rate administered on the DS1 form. Check the DS1 administration form to see if the correct bit rate is selected (1.544 Mbps for 24 channels, 32 Mbps for 32 channels). Minor alarms may be downgraded to warning depending on the setting of **set options.**				
257	65535	#52	Minor	On	test board PCSS l r 20

Table 8-116. DS1-BD Error Log Entries — *Continued*

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value
257	Any	None			
	See XXX-BD (Common Port Circuit Pack) for details. This error is associated with Common Port Circuit Pack maintenance.				
513	Any		Minor/ Warning	On	
	The DS1 Interface circuit pack detected a transient hardware problem (for example, an external RAM failure). This error disappears when no faults are detected for 30 minutes. When the *Aux Data* field is in the range of 4352 to 4358, the circuit pack should be replaced. Minor alarms may be downgraded to warning based on **set options.**				
769	4358				
	The DS1 Interface circuit pack has detected a transient hardware logic error (for example, program logic inconsistency). This error disappears when no faults are detected for 100 minutes. The value in *Aux Data* indicates the type of error problem.				
1025	4363	#50			
	See XXX-BD (Common Port Circuit Pack) for details. This error is associated with Common Port Circuit Pack maintenance.				
1281	Any	#138	Minor/ Warning	Off	test board PCSS sh
	Minor alarms may be downgraded to warning based on the value used in **set options.**				
1538	Any		Minor/ Warning	On	
	The hyperactive circuit pack is out of service and may exhibit one or more of the following symptoms: — Common Port Circuit Pack level tests (such as test #51 and/or test #220) are aborting with error code **2000**; — Tests run on the ports of this circuit pack are returning a NO-BOARD. — A busyout/release of the circuit pack has no effect on the test results. — The circuit pack and ports are properly installed according to **list configuration.** The circuit pack is isolated from the system. All trunks are placed out of service and a warning alarm is raised. The MCU tries to restore the circuit pack within 15 minutes. When no faults are detected for 15 minutes, the circuit pack is restored. All trunks are returned to in-service. If the error occurs again within one hour, the warning alarm is escalated to a minor alarm. If this occurs, replace the circuit pack. Minor alarms may be downgraded to warning depending on the setting of **set options**.				

Table 8-116. DS1-BD Error Log Entries — *Continued*

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value
1793	Any	#139	Major/ Minor/ Warning	Off	test board PCSS sh
1794	Any	#139	Major/ Minor/ Warning	Off	test board PCSS
1795	Any	#139	Major/ Minor/ Warning	Off	test board PCSS
2049	Any	#140	Minor/ Warning	Off	test board PCSS sh
	Minor alarms may be downgraded to Warning based on the setting of **set options.**				
2305	Any	#141	Minor/ Warning	Off	test board PCSS sh
	Minor alarms may be downgraded to warning based on the setting of **set options**.				
2306	Any	#141	Minor	Off	test board PCSS
2561	Any	#142	Minor/ Warning	Off	test board PCSS sh
	Minor alarms may be downgraded to warning based on the setting of **set options**.				
2817		#143	Minor/ Warning	Off	test board PCSS sh
	Minor alarms may be downgraded to warning based on the setting of **set options**.				
3073 to 3160	Any	#144	Minor/ Warning	Off	test board PCSS r 6
	Minor alarms may be downgraded to warning based on the setting of **set options**.				
3329 to 3345	Any	#145	Minor/ Warning	Off	test board PCSS r 6
	(TN767E only) Minor alarms may be downgraded to warning based on the setting of **set options**.				
3585 to 3601	Any	#145	Minor/ Warning	Off	test board PCSS r 6
	(TN2207 only) Minor alarms may be downgraded to warning based on the setting of set options.				

Table 8-116. DS1-BD Error Log Entries — *Continued*

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value
3840	Any	None			
	This error is not service-affecting and can be ignored.				
3841	4358				
	(TN2207 only) The DS1 Interface circuit pack has detected a transient hardware logic error (for example, program logic inconsistency). This error disappears when no faults are detected for 100 minutes. The value in Aux Data indicates the type of error problem.				

Craft-Demanded Tests

Always investigate tests in the order they are presented in the table below when inspecting errors in the MCU. By clearing error codes associated with the NPE Connection Audit Test, for example, you may also clear errors generated from other tests in the testing sequence.

Table 8-117. System Technician-Demanded Tests: DS1-BD

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?	Reset Board
NPE Connection Audit Test (#50)	Long		No	
Control Channel Loop Test (#52)	Long		No	
Loss of Signal Alarm Inquiry Test (#138)	Short	Long	No	
Blue Alarm Inquiry Test (#139)	Short	Long	No	
Red Alarm Inquiry Test (#140)	Short	Long	No	
Yellow Alarm Inquiry Test (#141)	Short	Long	No	
Major Alarm Inquiry Test (#142)	Short	Long	No	
Minor Alarm Inquiry Test (#143)	Short	Long	No	
Slip Alarm Inquiry Test (#144)	Short	Long	No	
Misframe Alarm Inquiry Test (#145)	Short	Long	No	
Translation Update Test (#146)	Short	Long	No	
SAKI Sanity Test (#53)			Yes	Reset
Internal Loop-Around Test (#135)			Yes	Reset

NPE Connection Audit Test #50

The MCU sends a message to the on-board microprocessor to update the network connectivity translation for all the NPEs on the circuit pack.

Table 8-118. NPE Connection Audit Test #50

Error Code	Test Result	Description Recommendation
	ABORT	System resources required for this test are not available.
1019	ABORT	Test already in progress. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2100	ABORT	System resources required for this test are not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1019	FAIL	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to fail, escalate the problem.
	PASS	The circuit pack NPEs have been updated with their translation.
0	NO BOARD	The test could not relate the internal ID to the port (no board). This could be due to incorrect translations or because no circuit pack is inserted, an incorrect circuit pack is inserted, or an insane circuit pack is inserted. 1. Check to ensure that the circuit pack translations are correct. Use the add ds1 PCSS command to administer the DS1 interface if it is not already administered. 2. If the circuit pack was already administered correctly, check the error log to determine if the circuit pack is hyperactive. If this is the case, the circuit pack is shut down. Reseating the circuit pack re-initializes the circuit pack. 3. Issue the busyout board command. 4. Issue the reset board command. 5. Issue the release busy board command. 6. Issue the test board long command. This should re-establish the linkage between the internal ID and the port.

Control Channel Loop-Around Test #52

This test queries the circuit pack for its circuit pack code and vintage and verifies its records.

Table 8-119. Control Channel Loop-Around Test #52

Error Code	Test Result	Description Recommendation
	ABORT	System resources required for this test are not available.
2100	ABORT	System resources required for this test are not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2100	FAIL	The circuit pack failed to return the circuit pack code or vintage. 1. Retry the command up to five times. 2. If the problem continues, replace the circuit pack. 3. Retry the command up to five times. 4. If the test continues to fail, escalate the problem.
	PASS	Communication with this circuit pack is successful.
0	NO BOARD	The test could not relate the internal ID to the port (no board). This could be due to incorrect translations or because no circuit pack is inserted, an incorrect circuit pack is inserted, or an insane circuit pack is inserted. 1. Check to ensure that the circuit pack translations are correct. Use the add ds1 PCSS command to administer the DS1 interface if it is not already administered. 2. If the circuit pack was already administered correctly, check the error log to determine if the circuit pack is hyperactive. If this is the case, the circuit pack is shut down. Reseating the circuit pack re-initializes the circuit pack. 3. Issue the busyout board command. 4. Issue the reset board command. 5. Issue the release busy board command. 6. Issue the test board long command. This should re-establish the linkage between the internal ID and the port.

SAKI Sanity Test #53

Refer to the XXX-BD section for a details on this test.

Internal Loop-Around Test #135

This test is destructive. The Internal Loop-Around test is run by looping the transmitted DS1 bit stream back into the DS1 board receiver. The loop occurs just before the DS1 facility interface. The test is highly destructive and can be initiated only by a craft-demanded **reset board PCSS** command.

All trunks on the DS1 Interface circuit pack must be busied out via **busyout board** before running the Internal Loop-Around Test. When this test is initiated, maintenance software sends appropriate messages to the DS1 Interface circuit pack to start the test. The test uses the tone generator and tone detector to exercise a bit pattern consistency test for all ports. If the transmitted and received bit patterns on a trunk are different, the test fails.

When the test is complete, the maintenance software sends a stop loop-around message to the DS1 Interface circuit pack to put the circuit pack back into normal operation mode. All trunks of the DS1 Interface circuit pack are restored to the in-service state after **release board** is entered

.

Table 8-120. Internal Loop-Around Test #135

Error Code	Test Result	Description Recommendation
1002	ABORT	The system could not allocate time slots for the test. The system may be experiencing heavy traffic, or it may have time slots out of service due to TDM Bus errors. Refer to TDM-Bus to diagnose any active TDM-Bus errors. 1. If the system has no TDM-Bus errors and is not handling heavy traffic, repeat this test at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1003	ABORT	The system could not allocate a tone receiver for the test. The MCU may be oversized for the number of tone detectors present or some tone detectors may be out of service. 1. Look for TTR-LEV errors in the Error Log. If present, refer to TTR-LEV for details. 2. Look for TONE-PT errors in the Error Log. If present, refer to TONE-PT for details. 3. If neither condition exists, retry the test at one-minute intervals up to five times. 4. If the test continues to abort, escalate the problem.

Table 8-120. Internal Loop-Around Test #135

Error Code	Test Result	Description Recommendation
1004	ABORT	Received an incoming call originated on a port of the DS1 circuit pack during the test. 1. Enter busyout board PCSS to put all trunks of the DS1 Interface circuit pack to out-of-service state. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to abort, escalate the problem.
1015	ABORT	Ports on the DS1 Interface circuit pack have not been busied out. 1. Enter busyout board PCSS to put all trunks of the DS1 Interface circuit pack into out of service state. 2. Retry the command. 3. If the test continues to abort, escalate the problem.
1039	ABORT	The DS1 Interface circuit pack is providing the timing for the MCU. Therefore, it cannot be reset without major system disruption. 1. If the DS1 Interface circuit pack needs to be tested, set the synchronization reference to another DS1 Interface circuit pack or to the Tone-Clock circuit pack via the following command sequence: 2. Issue disable synchronization-switch. 3. Issue set synchronization PCSS. 4. Issue enable synchronization-switch. 5. Rerun the test. If it aborts again, a different error code is generated. Follow the procedures for that error code.

Table 8-120. Internal Loop-Around Test #135

Error Code	Test Result	Description Recommendation
2000	ABORT	The test was aborted. Response to the test was not received within the allowable time period. This may be due to hyperactivity. Error type 1538 in the error log indicates hyperactivity. The hyperactive circuit pack is out of service and one or more of the following symptoms may be exhibited. ---The DS1-BD tests (such as Test 139 and Test 140) are aborting with error code 2000. ---The tests run on the ports of this circuit pack are returning a no board result. ---A busyout or a release command has no affect on the test results. ---A list config command shows that the circuit pack and the ports are properly installed. When hyperactivity occurs, the circuit pack is isolated from the system, and all of the trunks for this circuit pack are placed into the out-of-service state. The system tries to restore the circuit pack within 15 minutes. When no faults are detected for 15 minutes, the DS1 interface circuit pack is restored to normal operation. All of the trunks for the DS1 interface circuit pack are then returned to the in-service state. Hyperactivity is often caused by the associated facility. In such a case, faults (such as slips, misframes, or blue alarms) would be entered in the error log. In addition, many hardware errors would be logged against the associated trunk circuits. If the facility is OK and the error occurs again after 15 minutes, replace the circuit pack.
2012	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.

Table 8-120. Internal Loop-Around Test #135

Error Code	Test Result	Description Recommendation
None	FAIL	DS1 Interface circuit pack failed in the Internal Loop-Around test. 1. Retry the command at one-minute intervals up to five times. 2. Enter list measurements ds1-log PCSS to read the error seconds measurement. Otherwise, go to Step 3. 3. Verify both endpoints on the DS1 link are administered using the same signaling mode, framing mode, and line encoding. 4. Check the physical connectivity of the DS1 Interface circuit packs and cables. 5. Replace the local DS1 Interface circuit pack and repeat the test. 6. Contact T1 Network Service to diagnose the remote DS1 endpoint. 7. If the test fails, escalate the problem.
	PASS	All administered trunks of the DS1 Interface circuit pack pass the Internal Loop-Around test. The bit pattern consistency test is executed successfully over the path that covers a DS1 port, cable, and external NTCE device.
0	NO BOARD	The test could not relate the internal ID to the port (no board). 1. Check to ensure that the circuit pack translations are correct. Use the add ds1 PCSS command to administer the DS1 interface if it is not already administered.
		This could be due to incorrect translations or because no circuit pack is inserted, an incorrect circuit pack is inserted, or an insane circuit pack is inserted. 2. If the circuit pack was already administered correctly, check the error log to determine if the circuit pack is hyperactive. If this is the case, the circuit pack is shut down. Reseating the circuit pack re-initializes the circuit pack. 3. Issue the busyout board command. 4. Issue the reset board command. 5. Issue the release busy board command. 6. Issue the test board long command. This should re-establish the linkage between the internal ID and the port.

Loss-of-Signal Alarm Inquiry Test #138

This test verifies the synchronization status of the DS1 link. The loss-of-signal alarm indicates that the DS1 Interface circuit pack is unable to derive the synchronization clock from the DS1 facility. When the DS1 Interface circuit pack detects a loss-of-signal alarm, it stops providing the synchronization clock for the system and transmits a yellow alarm to the remote DS1 endpoint.

When the loss-of-signal alarm is confirmed, the maintenance software places all trunks of the DS1 Interface circuit pack into the out-of-service state. The inquiry test runs every ten minutes until the loss of signal has been restored.

The DS1 Interface circuit pack raises a loss-of-signal alarm after the signal has been lost for about three seconds. It does not retire the alarm until the signal has returned for about 16 seconds.

Table 8-121. Loss-of-Signal Alarm Inquiry Test #138

Error Code	Test Result	Description / Recommendation
	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2000	ABORT	The test was aborted. Response to the test was not received within the allowable time period. This may be due to hyperactivity. Error type 1538 in the error log indicates hyperactivity. The hyperactive circuit pack is out of service and one or more of the following symptoms may be exhibited. — The DS1-BD tests (such as Test 139 and Test 140) are aborting with error code 2000. — The tests run on the ports of this circuit pack are returning a no board result. — A **busyout** or a **release** command has no affect on the test results. — A **list config** command shows that the circuit pack and the ports are properly installed. When hyperactivity occurs, the circuit pack is isolated from the system, and all of the trunks for this circuit pack are placed into the out-of-service state. The system tries to restore the circuit pack within 15 minutes. When no faults are detected for 15 minutes, the DS1 interface circuit pack is restored to normal operation. All of the trunks for the DS1 interface circuit pack are then returned to the in-service state. Hyperactivity is often caused by the associated facility. In such a case, faults (such as slips, misframes, or blue alarms) would be entered in the error log. In addition, many hardware errors would be logged against the associated trunk circuits. If the facility is OK and the error occurs again after 15 minutes, replace the circuit pack.

Table 8-121. Loss-of-Signal Alarm Inquiry Test #138 — *Continued*

Error Code	Test Result	Description / Recommendation
2100	ABORT	Could not allocate the necessary system resources to run the test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
	FAIL	DS1 Interface circuit pack detects a loss of signal alarm. The physical link is broken or the remote DS1 endpoint is down. All trunks of this DS1 Interface circuit pack are out of service. If the DS1 Interface circuit pack is designated as the supplier of the system synchronization source, then the system synchronization maintenance adopts a source elsewhere. Refer to SYNC (Synchronization) for details. 1. Check the physical connection of the DS1 Interface circuit pack and the cable. 2. If DS1 Interface circuit pack connects to a T1 facility, call the vendor of the T1 carrier to diagnose the remote DS1 endpoint. 3. If DS1 Interface circuit pack connects directly to a switch, call the system technician of the remote switch to diagnose the DS1 endpoint.
	PASS	DS1 signal is present and the physical link is healthy.
0	NO BOARD	The test could not relate the internal ID to the port (no board). This could be due to incorrect translations or because no circuit pack is inserted, an incorrect circuit pack is inserted, or an insane circuit pack is inserted. 1. Check to ensure that the circuit pack translations are correct. Use the **add ds1 PCSS** command to administer the DS1 interface if it is not already administered. 2. If the circuit pack was already administered correctly, check the error log to determine if the circuit pack is hyperactive. If this is the case, the circuit pack is shut down. Reseating the circuit pack re-initializes the circuit pack. 3. Issue the **busyout board** command. 4. Issue the **reset board** command. 5. Issue the **release busy board** command. 6. Issue the **test board long** command. This should re-establish the linkage between the internal ID and the port.

Blue Alarm Inquiry Test #139

The Blue Alarm is a signal sent by the remote DS1 endpoint when it is out of service. The Blue Alarm Inquiry Test checks the blue alarm status of the remote DS1 endpoint.

When the DS1 Interface circuit pack detects a blue alarm signal from the remote DS1 endpoint, the circuit pack transmits a yellow alarm to the remote DS1 endpoint and sends a blue alarm message to the maintenance software. When the blue alarm is confirmed, the maintenance software places all trunks of the DS1 Interface circuit pack into the out-of-service state. The inquiry test is run every ten minutes until the blue alarm is cleared.

The DS1 Interface circuit pack takes two seconds to recognize and report a blue alarm and 16 seconds to recognize and report the resolution of a blue alarm. When the blue alarm is cleared, the DS1 Interface circuit pack stops transmitting the yellow alarm and places the trunks back into the service state before the blue alarm occurs.

Table 8-122. Blue Alarm Inquiry Test #139

Error Code	Test Result	Description / Recommendation
	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to a maximum of five times. 2. If the test continues to abort, escalate the problem.

Table 8-122. Blue Alarm Inquiry Test #139 — *Continued*

Error Code	Test Result	Description / Recommendation
2000	ABORT	The test was aborted. Response to the test was not received within the allowable time period. This may be due to hyperactivity. Error type 1538 in the error log indicates hyperactivity. The hyperactive circuit pack is out of service and one or more of the following symptoms may be exhibited. — The DS1-BD tests (such as Test 139 and Test 140) are aborting with error code 2000. — The tests run on the ports of this circuit pack are returning a no board result. — A **busyout** or a **release** command has no affect on the test results. — A **list config** command shows that the circuit pack and the ports are properly installed. When hyperactivity occurs, the circuit pack is isolated from the system, and all of the trunks for this circuit pack are placed into the out-of-service state. The system tries to restore the circuit pack within 15 minutes. When no faults are detected for 15 minutes, the DS1 interface circuit pack is restored to normal operation. All of the trunks for the DS1 interface circuit pack are then returned to the in-service state. Hyperactivity is often caused by the associated facility. In such a case, faults (such as slips, misframes, or blue alarms) would be entered in the error log. In addition, many hardware errors would be logged against the associated trunk circuits. If the facility is OK and the error occurs again after 15 minutes, replace the circuit pack.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to a maximum of five times. 2. If the test continues to abort, escalate the problem.
	FAIL	The remote DS1 endpoint is out of service. 1. If the DS1 Interface circuit pack connects to a T1 facility, call the vendor of the T1 carrier to diagnose the remote DS1 endpoint. 2. If the DS1 Interface circuit pack connects directly to a switch, call the system technician of the remote switch to diagnose the DS1 endpoint.
	PASS	Remote DS1 endpoint is in-service. No blue alarm is detected in the DS1 Interface circuit pack.

Table 8-122. Blue Alarm Inquiry Test #139 — *Continued*

Error Code	Test Result	Description / Recommendation
0	NO BOARD	The test could not relate the internal ID to the port (no board). This could be due to incorrect translations or because no circuit pack is inserted, an incorrect circuit pack is inserted, or an insane circuit pack is inserted. 1. Check to ensure that the circuit pack translations are correct. Use the **add ds1 PCSS** command to administer the DS1 interface if it is not already administered. 2. If the circuit pack was already administered correctly, check the error log to determine if the circuit pack is hyperactive. If this is the case, the circuit pack is shut down. Reseating the circuit pack re-initializes the circuit pack. 3. Issue the **busyout board** command. 4. Issue the **reset board** command. 5. Issue the **release busy board** command. 6. Issue the **test board long** command. This should re-establish the linkage between the internal ID and the port.

Red Alarm Inquiry Test #140

The DS1 Interface circuit pack raises a red alarm when the framing pattern of the incoming DS1 bit stream has been lost. The red alarm inquiry test checks the framing status of a DS1 Interface circuit pack. The DS1 Interface circuit pack takes three seconds to recognize and report a red alarm and 12 seconds to recognize and report the resolution.

When the DS1 Interface circuit pack detects a red alarm, the circuit pack transmits a yellow alarm to the remote DS1 endpoint and sends a red alarm message to the maintenance software. After the red alarm is confirmed, the maintenance software places all trunks of the circuit pack into the out-of-service state. The inquiry test is run every ten minutes until the red alarm is cleared.

When the red alarm is cleared, the DS1 Interface circuit pack stops transmitting the yellow alarm to the remote DS1 endpoint. The maintenance software restores all trunks of the DS1 Interface circuit pack to the service state before the red alarm occurs.

Loss of Multiframe Alarm

If the DS1 Interface circuit pack is administered using DMI-BOS signaling, the DS1 Interface circuit pack raises a loss of multiframe alarm (LMA) when it cannot interpret the incoming signaling bits to synchronize to the multiframe pattern received in the 24th channel. Once the DS1 Interface circuit pack detects an LMA,

the circuit pack transmits a remote multiframe alarm (RMA) to the remote DS1 endpoint. Maintenance software handles both red alarms and LMA alarms using the same mechanism.

Table 8-123. Red Alarm Inquiry Test #140

Error Code	Test Result	Description Recommendation
	ABORT	Internal system error. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
2000	ABORT	The test was aborted. Response to the test was not received within the allowable time period. This may be due to hyperactivity. Error type 1538 in the error log indicates hyperactivity. The hyperactive circuit pack is out of service and one or more of the following symptoms may be exhibited. — The DS1-BD tests (such as Test 139 and Test 140) are aborting with error code 2000. — The tests run on the ports of this circuit pack are returning a no board result. — A busyout or a release command has no affect on the test results. — A list config command shows that the circuit pack and the ports are properly installed. When hyperactivity occurs, the circuit pack is isolated from the system, and all of the trunks for this circuit pack are placed into the out-of-service state. The system tries to restore the circuit pack within 15 minutes. When no faults are detected for 15 minutes, the DS1 interface circuit pack is restored to normal operation. All of the trunks for the DS1 interface circuit pack are then returned to the in-service state. Hyperactivity is often caused by the associated facility. In such a case, faults (such as slips, misframes, or blue alarms) would be entered in the error log. In addition, many hardware errors would be logged against the associated trunk circuits. If the facility is OK and the error occurs again after 15 minutes, replace the circuit pack.
2100	ABORT	Could not allocate the necessary system resources to run this test. Retry the command at one-minute intervals a maximum of five times.

Table 8-123. Red Alarm Inquiry Test #140

Error Code	Test Result	Description Recommendation
	FAIL	The DS1 Interface circuit pack detects a red alarm. An out-of-frame condition occurs on the DS1 Interface circuit pack. The DS1 Interface circuit pack transmits a yellow alarm to the remote DS1 endpoint until the red alarm is retired. 1. Verify that both endpoints of the DS1 link are administered using the same DMI-BOS signaling mode, framing mode, and line coding. 2. Check the physical connectivity of the DS1 Interface circuit packs and cable. 3. Replace the local DS1 Interface circuit pack and repeat the test. 4. Contact T1 Network Services to diagnose the remote DS1 endpoint. 5. If the test still fails, escalate the problem.
1	FAIL	The DS1 Interface circuit pack detects an LMA. An out-of-frame condition occurs on the DS1 Interface circuit pack. The DS1 Interface circuit pack transmits a remote multiframe alarm to the remote DS1 endpoint until the LMS is retired. 1. Verify that both endpoints of the DS1 link are administered using the same DMI-BOS signaling mode, framing mode, and line coding. 2. Check the physical connectivity of the DS1 Interface circuit packs and cable. 3. Replace the local DS1 Interface circuit pack and repeat the test. 4. Contact T1 Network Services to diagnose the remote DS1 endpoint. 5. If the test still fails, escalate the problem.
	PASS	No red alarm is detected on the DS1 Interface circuit pack.
0	NO BOARD	The test could not relate the internal ID to the port (no board). This could be due to incorrect translations or because no circuit pack is inserted, an incorrect circuit pack is inserted, or an insane circuit pack is inserted. 1. Check to ensure that the circuit pack translations are correct. Use the add ds1 PCSS command to administer the DS1 interface if it is not already administered. 2. If the circuit pack was already administered correctly, check the error log to determine if the circuit pack is hyperactive. If this is the case, the circuit pack is shut down. Reseating the circuit pack re-initializes the circuit pack. 3. Issue the busyout board command. 4. Issue the reset board command. 5. Issue the release busy board command. 6. Issue the test board long command. This should re-establish the linkage between the internal ID and the port.

Yellow Alarm Inquiry Test #141

A yellow alarm from the remote DS1 endpoint indicates that the remote DS1 endpoint has an out-of-frame condition. The Yellow Alarm Inquiry Test is used to determine whether the remote DS1 endpoint is transmitting a yellow alarm. The DS1 Interface circuit pack takes 500 ms to recognize and report a yellow alarm and 500 ms to recognize and report that a yellow alarm condition is cleared.

When the DS1 Interface circuit pack detects a yellow alarm from the remote DS1 endpoint, it sends a yellow alarm uplink message to the maintenance software. After the maintenance software receives the yellow alarm message, the yellow alarm inquiry test is run to confirm the yellow alarm. Once the yellow alarm is confirmed, the maintenance software places all trunks on the circuit pack into the out-of-service state. The inquiry test is run every ten minutes until the yellow alarm is cleared.

When the yellow alarm is cleared, the maintenance software restores all trunks on the DS1 Interface circuit pack to their service state before the yellow alarm was raised.

Remote Multiframe Alarm

RMA indicates that the remote DS1 endpoint is in an LMA condition while the DS1 Interface circuit pack is administered using DMI-BOS common channel signaling. The RMA is handled as a yellow alarm.

Table 8-124. Yellow Alarm Inquiry Test #141

Error Code	Test Result	Description / Recommendation
	ABORT	Internal system error. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
2000	ABORT	The test was aborted. Response to the test was not received within the allowable time period. This may be due to hyperactivity. Error type 1538 in the error log indicates hyperactivity. The hyperactive circuit pack is out of service and one or more of the following symptoms may be exhibited. — The DS1-BD tests (such as Test 139 and Test 140) are aborting with error code 2000. — The tests run on the ports of this circuit pack are returning a no board result. — A **busyout** or a **release** command has no affect on the test results. — A **list config** command shows that the circuit pack and the ports are properly installed. When hyperactivity occurs, the circuit pack is isolated from the system, and all of the trunks for this circuit pack are placed into the out-of-service state. The system tries to restore the circuit pack within 15 minutes. When no faults are detected for 15 minutes, the DS1 interface circuit pack is restored to normal operation. All of the trunks for the DS1 interface circuit pack are then returned to the in-service state. Hyperactivity is often caused by the associated facility. In such a case, faults (such as slips, misframes, or blue alarms) would be entered in the error log. In addition, many hardware errors would be logged against the associated trunk circuits. If the facility is OK and the error occurs again after 15 minutes, replace the circuit pack.
2100	ABORT	Could not allocate the necessary system resources to run this test. Retry the command at one-minute intervals a maximum of five times.
	FAIL	The DS1 Interface circuit pack detects a yellow alarm sent by the remote DS1 endpoint. An out-of-frame condition occurs on the remote DS1 endpoint. 1. Verify that both endpoints of the DS1 link are administered using the same DMI-BOS signaling mode, framing mode, and line coding. 2. Check the physical connectivity of DS1 Interface circuit packs and cable. 3. Replace the local DS1 Interface circuit pack and repeat the test. 4. Contact T1 Network Services to diagnose the remote DS1 endpoint. 5. If the test still fails, escalate the problem.

Table 8-124. Yellow Alarm Inquiry Test #141 — *Continued*

Error Code	Test Result	Description / Recommendation
1	FAIL	The DS1 Interface circuit pack detects an RMA sent by the remote DS1 endpoint. An out-of-frame condition occurs on the remote DS1 endpoint. 1. Verify that both endpoints of the DS1 link are administered using the same DMI-BOS signaling mode, framing mode, and line coding. 2. Check the physical connectivity of DS1 Interface circuit packs and cables. 3. Replace the local DS1 Interface circuit pack and repeat the test. 4. Contact T1 Network Services to diagnose the remote DS1 endpoint. 5. If the test still fails, escalate the problem.
	PASS	No yellow alarm or RMA is received from the remote DS1 endpoint.
0	NO BOARD	The test could not relate the internal ID to the port (no board). This could be due to incorrect translations or because no circuit pack is inserted, an incorrect circuit pack is inserted, or an insane circuit pack is inserted. 1. Check to ensure that the circuit pack translations are correct. Use the **add ds1 PCSS** command to administer the DS1 interface if it is not already administered. 2. If the circuit pack was already administered correctly, check the error log to determine if the circuit pack is hyperactive. If this is the case, the circuit pack is shut down. Reseating the circuit pack re-initializes the circuit pack. 3. Issue the **busyout board** command. 4. Issue the **reset board** command. 5. Issue the **release busy board** command. 6. Issue the **test board long** command. This should re-establish the linkage between the internal ID and the port.

Major Alarm Inquiry Test #142

The major alarm raised by a DS1 Interface circuit pack indicates that the average bit error rate on the DS1 facility is greater than 10E-3. The Major Alarm Inquiry test is used to determine whether or not the received DS1 bit error rate is greater than 10E-3. When D4 framing mode is selected, the DS1 Interface circuit pack takes 16 seconds to recognize and report that a major alarm condition is cleared. If ESF framing mode is selected, the DS1 Interface circuit pack takes ten seconds to recognize and report a major alarm and ten seconds to recognize and report that the major alarm is cleared.

When the DS1 Interface circuit pack detects a major alarm, it sends a major alarm message to the maintenance software. After the maintenance software receives a major alarm message, the Major Alarm Inquiry test is initiated to confirm the major

alarm on the DS1 Interface circuit pack. The inquiry test is run every ten minutes until the major alarm is cleared. The maintenance software places all trunks on the circuit pack in the out-of-service state if the major alarm persists for more than 20 minutes.

When the major alarm is cleared, the maintenance software restores all trunks on the circuit pack to their service state before a major alarm occurred.

Table 8-125. Major Alarm Inquiry Test #142

Error Code	Test Result	Description Recommendation
	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate problem.
2000	ABORT	The test was aborted. Response to the test was not received within the allowable time period. This may be due to hyperactivity. Error type 1538 in the error log indicates hyperactivity. The hyperactive circuit pack is out of service and one or more of the following symptoms may be exhibited. — The DS1-BD tests (such as Test 139 and Test 140) are aborting with error code 2000. — The tests run on the ports of this circuit pack are returning a no board result. — A busyout or a release command has no affect on the test results. — A list config command shows that the circuit pack and the ports are properly installed. When hyperactivity occurs, the circuit pack is isolated from the system, and all of the trunks for this circuit pack are placed into the out-of-service state. The system tries to restore the circuit pack within 15 minutes. When no faults are detected for 15 minutes, the DS1 interface circuit pack is restored to normal operation. All of the trunks for the DS1 interface circuit pack are then returned to the in-service state. Hyperactivity is often caused by the associated facility. In such a case, faults (such as slips, misframes, or blue alarms) would be entered in the error log. In addition, many hardware errors would be logged against the associated trunk circuits. If the facility is OK and the error occurs again after 15 minutes, replace the circuit pack.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.

Table 8-125. Major Alarm Inquiry Test #142

Error Code	Test Result	Description Recommendation
	FAIL	The DS1 Interface circuit pack detects a major alarm. The DS1 bit error rate is greater than 10E-3. 1. The performance of the DS1 link between DS1 Interface circuit pack and remote DS1 endpoint is very poor. Enter list measurements ds1-log PCSS to read the error seconds measurement. 2. Verify that both endpoints of the DS1 link are administered using the same signaling mode, framing mode, and line coding. 3. Check the physical connectivity of DS1 Interface circuit pack and cable. 4. Replace the local DS1 Interface circuit pack and repeat the test. 5. Contact T1 Network Services to diagnose the remote DS1 endpoint. 6. If the test still fails, escalate the problem.
	PASS	No major alarm is detected in DS1 Interface circuit pack.
0	NO BOARD	The test could not relate the internal ID to the port (no board). This could be due to incorrect translations or because no circuit pack is inserted, an incorrect circuit pack is inserted, or an insane circuit pack is inserted. 1. Check to ensure that the circuit pack translations are correct. Use the add ds1 PCSS command to administer the DS1 interface if it is not already administered. 2. If the circuit pack was already administered correctly, check the error log to determine if the circuit pack is hyperactive. If this is the case, the circuit pack is shut down. Reseating the circuit pack re-initializes the circuit pack. 3. Issue the busyout board command. 4. Issue the reset board command. 5. Issue the release busy board command. 6. Issue the test board long command. This should re-establish the linkage between the internal ID and the port.

Minor Alarm Inquiry Test #143

The minor alarm raised by a DS1 Interface circuit pack indicates that the average bit error rate on the DS1 facility is greater than 10E-6, but less than 10E-3. The Minor Alarm Inquiry test is used to determine whether or not the received DS1 bit error rate is greater than 10E-6 and less that 10E-3.

When D4 framing mode is selected, the DS1 Interface circuit pack takes 41 minutes to recognize and report a minor alarm and 41 minutes to recognize and report that a minor alarm is cleared. If ESF framing mode is selected, the DS1 Interface circuit pack takes ten minutes to recognize and report a minor alarm and ten minutes to recognize and report that a minor alarm condition is cleared.

When the DS1 Interface circuit pack detects a minor alarm condition, it sends a minor alarm message to the maintenance software. After the maintenance software receives a minor alarm message, the Minor Alarm Inquiry test is initiated to confirm the minor alarm. All trunks on the circuit pack are kept in the in-service state after the minor alarm is confirmed. The Minor Alarm Inquiry test is run every ten minutes until the minor alarm is cleared.

Table 8-126. Minor Alarm Inquiry Test #143

Error Code	Test Result	Description Recommendation
	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.

Table 8-126. Minor Alarm Inquiry Test #143

Error Code	Test Result	Description Recommendation
2000	ABORT	The test was aborted. Response to the test was not received within the allowable time period. This may be due to hyperactivity. Error type 1538 in the error log indicates hyperactivity. The hyperactive circuit pack is out of service and one or more of the following symptoms may be exhibited. — The DS1-BD tests (such as Test 139 and Test 140) are aborting with error code 2000. — The tests run on the ports of this circuit pack are returning a no board result. — A busyout or a release command has no affect on the test results. — A list config command shows that the circuit pack and the ports are properly installed. When hyperactivity occurs, the circuit pack is isolated from the system, and all of the trunks for this circuit pack are placed into the out-of-service state. The system tries to restore the circuit pack within 15 minutes. When no faults are detected for 15 minutes, the DS1 interface circuit pack is restored to normal operation. All of the trunks for the DS1 interface circuit pack are then returned to the in-service state. Hyperactivity is often caused by the associated facility. In such a case, faults (such as slips, misframes, or blue alarms) would be entered in the error log. In addition, many hardware errors would be logged against the associated trunk circuits. If the facility is OK and the error occurs again after 15 minutes, replace the circuit pack.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
	FAIL	The DS1 Interface circuit pack detects a minor alarm. The DS1 bit error rate is greater than 10E-6 and less than 10E-3. 1. The performance of DS1 link between DS1 Interface circuit pack and remote DS1 endpoint is poor. Enter list measurement ds1-log PCSS to read the error seconds measurement. 2. Verify that both endpoints of the DS1 link are administered using the same signaling mode, framing mode, and line coding. 3. Check the physical connectivity of DS1 Interface circuit packs and cable. 4. Replace the local DS1 Interface circuit pack and repeat the test. 5. Contact T1 Network Services to diagnose the remote DS1 endpoint. 6. If the test still fails, escalate the problem.
	PASS	No minor alarm is detected in the DS1 Interface circuit pack.

Table 8-126. Minor Alarm Inquiry Test #143

Error Code	Test Result	Description Recommendation
0	NO BOARD	The test could not relate the internal ID to the port (no board). This could be due to incorrect translations or because no circuit pack is inserted, an incorrect circuit pack is inserted, or an insane circuit pack is inserted. 1. Check to ensure that the circuit pack translations are correct. Use the add ds1 PCSS command to administer the DS1 interface if it is not already administered. 2. If the circuit pack was already administered correctly, check the error log to determine if the circuit pack is hyperactive. If this is the case, the circuit pack is shut down. Reseating the circuit pack re-initializes the circuit pack. 3. Issue the busyout board command. 4. Issue the reset board command. 5. Issue the release busy board command. 6. Issue the test board long command. This should re-establish the linkage between the internal ID and the port.

Slip Alarm Inquiry Test #144

Slips occur when the transmitter and receiver are not running at precisely the same clock rate. The DS1 Interface circuit pack can detect both positive and negative slips on the DS1 facility. The Slip Alarm Inquiry test is used to determine the total number of slips that occurred on a DS1 link.

When the DS1 Interface circuit pack detects a slip condition, the circuit pack increases the on-board slip counter by one. A slip count message is spontaneously sent to the system software after the counter reaches a threshold (for example, 88). When the maintenance software receives the slip count message, the Slip Alarm Inquiry test is initiated to query the slip counters on DS1 Interface circuit pack and total the slip counts in the maintenance software.

If the count of slips is over the threshold, a minor alarm is raised against the DS1 Interface circuit pack. All trunks of the DS1 Interface circuit pack are still in the in-service state. If the DS1 Interface circuit pack is used to supply the system

synchronization source, the minor alarm initiates a synchronization source switch. See TDM-BUS (TDM Bus) and SYNC (Synchronization) for details.

Table 8-127. Slip Alarm Inquiry Test #144

Error Code	Test Result	Description Recommendation
	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2000	ABORT	The test was aborted. Response to the test was not received within the allowable time period. This may be due to hyperactivity. Error type 1538 in the error log indicates hyperactivity. The hyperactive circuit pack is out of service and one or more of the following symptoms may be exhibited. — The DS1-BD tests (such as Test 139 and Test 140) are aborting with error code 2000. — The tests run on the ports of this circuit pack are returning a no board result. — A busyout or a release command has no affect on the test results. — A list config command shows that the circuit pack and the ports are properly installed. When hyperactivity occurs, the circuit pack is isolated from the system, and all of the trunks for this circuit pack are placed into the out-of-service state. The system tries to restore the circuit pack within 15 minutes. When no faults are detected for 15 minutes, the DS1 interface circuit pack is restored to normal operation. All of the trunks for the DS1 interface circuit pack are then returned to the in-service state. Hyperactivity is often caused by the associated facility. In such a case, faults (such as slips, misframes, or blue alarms) would be entered in the error log. In addition, many hardware errors would be logged against the associated trunk circuits. If the facility is OK and the error occurs again after 15 minutes, replace the circuit pack.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.

Table 8-127. Slip Alarm Inquiry Test #144

Error Code	Test Result	Description Recommendation
Any	FAIL	The DS1 Interface circuit pack and the remote DS1 endpoint are not synchronized to the same clock rate. The DS1 Interface circuit pack detects a slip alarm. The error code is the count of slips detected by the DS1 Interface circuit pack after the last Slip Alarm Inquiry test. 1. Retry the command at one-minute intervals a maximum of five times. 2. Enter list measurement ds1-log PCSS to read the error seconds measurement. 3. Verify that both endpoints of the DS1 link are administered using the same signaling mode, framing mode, and line coding. 4. Check the physical connectivity of DS1 Interface circuit packs and cable. 5. Replace the local DS1 Interface circuit pack and repeat the test. 6. Contact T1 Network Service to diagnose the remote DS1 endpoint. 7. If the test still fails, escalate the problem.
	PASS	No slip alarm is detected on the DS1 Interface circuit pack.
0	NO BOARD	The test could not relate the internal ID to the port (no board). This could be due to incorrect translations or because no circuit pack is inserted, an incorrect circuit pack is inserted, or an insane circuit pack is inserted. 1. Check to ensure that the circuit pack translations are correct. Use the add ds1 PCSS command to administer the DS1 interface if it is not already administered. 2. If the circuit pack was already administered correctly, check the error log to determine if the circuit pack is hyperactive. If this is the case, the circuit pack is shut down. Reseating the circuit pack re-initializes the circuit pack. 3. Issue the busyout board command. 4. Issue the reset board command. 5. Issue the release busy board command. 6. Issue the test board long command. This should re-establish the linkage between the internal ID and the port.

Misframe Alarm Inquiry Test #145

Misframe Alarm indicates that framing bits observed on a DS1 Interface circuit pack are in error. The Misframe Alarm Inquiry test determines the total number of misframes that have occurred on a DS1 Interface circuit pack since the last inquiry.

When the DS1 Interface circuit pack detects a misframe error, it increases its misframe counter by one. If the counter reaches the threshold, a misframe count message is automatically sent to the MCU maintenance software. After the maintenance software receives the misframe count message, the Misframe Alarm Inquiry test is initiated to collect the misframe counts from the DS1 Interface circuit pack.

When the threshold of misframes is reached, if the DS1 Interface circuit pack is supplying the system synchronization source, then a switching synchronization source message is sent to the TDM Bus clock. See TDM-BUS (TDM-Bus) for details. A minor alarm against the DS1 Interface circuit pack is raised, but all trunks of the DS1 Interface circuit pack are still in the in-service state.

Table 8-128. Misframe Alarm Inquiry Test #145

Error Code	Test Result	Description Recommendation
	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.

Table 8-128. Misframe Alarm Inquiry Test #145

Error Code	Test Result	Description Recommendation
2000	ABORT	The test was aborted. Response to the test was not received within the allowable time period. This may be due to hyperactivity. Error type 1538 in the error log indicates hyperactivity. The hyperactive circuit pack is out of service and one or more of the following symptoms may be exhibited. — The DS1-BD tests (such as Test 139 and Test 140) are aborting with error code 2000. — The tests run on the ports of this circuit pack are returning a no board result. — A busyout or a release command has no affect on the test results. — A list config command shows that the circuit pack and the ports are properly installed. When hyperactivity occurs, the circuit pack is isolated from the system, and all of the trunks for this circuit pack are placed into the out-of-service state. The system tries to restore the circuit pack within 15 minutes. When no faults are detected for 15 minutes, the DS1 interface circuit pack is restored to normal operation. All of the trunks for the DS1 interface circuit pack are then returned to the in-service state. Hyperactivity is often caused by the associated facility. In such a case, faults (such as slips, misframes, or blue alarms) would be entered in the error log. In addition, many hardware errors would be logged against the associated trunk circuits. If the facility is OK and the error occurs again after 15 minutes, replace the circuit pack.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
Any	FAIL	The DS1 Interface circuit pack detects errors in the received framing bits pattern. The error code is the count of misframes detected by the DS1 Interface circuit pack after the last misframe alarm inquiry. 1. Retry the command at one-minute intervals a maximum of five times. 2. Read the error seconds measurement. 3. Verify that both endpoints of the DS1 link are administered using the same signaling mode, framing mode, and line coding. 4. Check the physical connectivity of DS1 Interface circuit packs and cable. 5. Replace the local DS1 Interface circuit pack and repeat the test. 6. Contact the T1 Network Service to diagnose the remote DS1 endpoint. 7. If the test still fails, escalate the problem.
	PASS	No misframe alarm is detected on the DS1 Interface circuit pack.

Table 8-128. Misframe Alarm Inquiry Test #145

Error Code	Test Result	Description Recommendation
0	NO BOARD	The test could not relate the internal ID to the port (no board). This could be due to incorrect translations or because no circuit pack is inserted, an incorrect circuit pack is inserted, or an insane circuit pack is inserted. 1. Check to ensure that the circuit pack translations are correct. Use the add ds1 PCSS command to administer the DS1 interface if it is not already administered. 2. If the circuit pack was already administered correctly, check the error log to determine if the circuit pack is hyperactive. If this is the case, the circuit pack is shut down. Reseating the circuit pack re-initializes the circuit pack. 3. Issue the busyout board command. 4. Issue the reset board command. 5. Issue the release busy board command. 6. Issue the test board long command. This should re-establish the linkage between the internal ID and the port.

Translation Update Test #146

The DS1 Interface circuit pack notifies the appropriate circuit pack level and port level translations administered by system administration. Translation includes the following data administered for a DS1 Interface circuit pack (see output of **display ds1 PCSS**): DS1 link length between two DS1 endpoints, synchronization source control, line coding, framing mode, signaling mode, time slot number of 697-Hz tone, time slot number of 700-Hz tone, etc. The Translation Update test sends the circuit pack level information specified by system administration to the DS1 Interface circuit pack

Table 8-129. Translation Update Test #146

Error Code	Test Result	Description Recommendation
None	ABORT	Internal system error. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
	FAIL	Internal system software error. 1. Enter display ds1 PCSS to verify the DS1 Interface circuit pack translation. 2. If the test continues to fail, escalate the problem.
	PASS	Translation data has been downloaded to the DS1 Interface circuit pack successfully.

Table 8-129. Translation Update Test #146

Error Code	Test Result	Description Recommendation
0	NO BOARD	The test could not relate the internal ID to the port (no board). This could be due to incorrect translations or because no circuit pack is inserted, an incorrect circuit pack is inserted, or an insane circuit pack is inserted. 1. Check to ensure that the circuit pack translations are correct. Use the add ds1 PCSS command to administer the DS1 interface if it is not already administered. 2. If the circuit pack was already administered correctly, check the error log to determine if the circuit pack is hyperactive. If this is the case, the circuit pack is shut down. Reseating the circuit pack re-initializes the circuit pack. 3. Issue the busyout board command. 4. Issue the reset board command. 5. Issue the release busy board command. 6. Issue the test board long command. This should re-establish the linkage between the internal ID and the port.

DTMR-PT (Dual-Tone Multifrequency Receiver Port)

The Dual-Tone Multifrequency Receiver Port (DTMR), also known as the Touch-Tone Receiver (TTR), resides on the TN420C Tone Detector circuit pack. There are four Dual-Tone Multifrequency Receiver (DTMR-PT) ports and two General-Purpose Tone Detector (GPTD-PT) ports on a Tone-Detector circuit pack.

The DTMR port is used to detect touch-tone digits that are placed on the TDM Bus. Examples of touch-tone digits are 0 through 9, #, and *. The ability of the DTMR port to detect touch-tone digits is essential for maintenance of other circuit packs (for example, Tone-Clock circuit pack).

The DTMR-PT maintenance object defines a set of tests to verify that the DTMF digit detection capability of the DTMR port is functioning properly. For all Tone Detector circuit pack level errors (DETR-BD) refer to XXX-BD.

Alarm Level	Initial Craft Command to Run
Major	test port *PCSSpp*[*] sh
Minor	test port *PCSSpp* sh
Warning	release port *PCSSpp*

* Where *P* is the port network number, *C* is the carrier number (A or B), *SS* is the address of the slot in the carrier where the circuit pack is located (such as 02).

Hardware Error Log Entries

The following table shows the error log entries and related information, including test to clear value.

Table 8-130. Dual-Tone Multifrequency Receiver Port Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value
0	0	Any	Any	Any	test port PCSSpp sh r 1
	Run the short test sequence first. If all tests pass, run the long test sequence.				
1	17664	#43	Major	On	test port PCSSpp r 2
	The DTMR port is having problems detecting touch-tone digits. Run the short test sequence against the DTMR port and follow the error code procedures for the individual tests. If this error is constantly logged, the Tone Detector circuit pack containing the defective DTMR port should be replaced. The total number of DTMR ports currently in service is less than or equal to the administered threshold. **NOTE:** The threshold number of DTMR ports for service is administered using **change system-parameters maintenance**.				
1	17664	#43	Minor	On	test port PCSSpp r 2
	The DTMR port is having problems detecting touch-tone digits. If this error is constantly logged, the Tone Detector circuit pack containing the defective DTMR port should be replaced. Run the short test sequence against the DTMR port and then follow the error code procedures for the individual tests.				
18	0		Warning	On	release port PCSSpp
	The port was busied out by craft.				

Table 8-130. Dual-Tone Multifrequency Receiver Port Error Log Entries —

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value
130		None	Warning	On	test port PCSSpp short 2
	This error type indicates that the circuit pack has been removed or has been insane for at least 11 minutes. To clear the error, reinsert or replace the circuit pack.				
257	17666	#43	Major	On	test port PCSSpp r 3
	The DTMR port lost its translation. Testing the DTMR port is sufficient to reload its translation. Run the short test sequence against the DTMR port then follow the error code procedures for the individual tests. If testing the DTMR port does not clear the error, replace the Tone Detector circuit pack containing the defective DTMR port. A major alarm is raised when the total number of DTMR ports is less than or equal to one half of the administered threshold number. **NOTE:** The threshold number of DTMR ports for service is administered using **change system-parameters maintenance**.				
257	17666	#43	Minor	On	test port PCSSpp r 3
	The DTMR port lost its translation. Testing the DTMR port is sufficient to reload its translation. Run the short test sequence against the DTMR port then follow the error code procedures for the individual tests. If testing the DTMR port does not clear the error, replace the Tone Detector circuit pack containing the defective DTMR port.				
513	Any	#42	Major	On	test port PCSSpp r 3
	A major alarm is raised when the total number of DTMR ports is less than or equal to one half of the administered threshold number. Run the short test sequence against the DTMR port then follow the error code procedures for the individual tests. **NOTE:** The threshold number of DTMR ports for service is administered using **change system-parameters maintenance**.				
513	Any	#42	Minor	On	test port PCSSpp r 3
	Run the short test sequence against the DTMR port then follow the error code procedures for the individual tests.				

Craft-Demanded Tests

Always investigate the tests in the order presented in Table 8-66 below when inspecting errors in the system. By clearing error codes associated with the Tone Detection Verification test (#42), you may also clear errors generated by the Tone Detector Audit/Update test (#43).

Table 8-131. System Technician-Demanded Tests: DTMR-PT

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Tone Detection Verification Test (#42)	Short	Long	No
Tone Detector Audit/Update Test (#43)	Short	Long	No

Tone Detection Verification Test #42

This test verifies that the touch-tone digits detection capability of the DTMR port is functioning properly.

Table 8-132. Tone Detection Verification Test #42

Error Code	Test Result	Description Recommendation
None	ABORT	The MCU was unable to allocate all the resources needed for this test or there was an internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1	ABORT	The MCU could not allocate all the resources needed to test the DTMR port. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1001	ABORT	The MCU was unable to put the DTMR port in the appropriate mode to test it. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1002	ABORT	The MCU could not allocate time slots for the test connection. This could happen when the MCU is heavily loaded. 1. If the MCU is not heavily loaded, test the TDM Bus using test tdm. Refer to TDM-BUS for details. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to abort, escalate the problem.

Table 8-132. Tone Detection Verification Test #42

Error Code	Test Result	Description Recommendation
1003	ABORT	The MCU could not allocate a tone generator for the test connection. This can happen when the MCU is heavily loaded or a Tone-Clock circuit pack is not in the port network when this test is executed. 1. Make sure there is a Tone-Clock circuit pack in the same port network. 2. If a Tone-Clock circuit pack is missing, install one. 3. Allow one minute for the tone-clock maintenance to run on the newly installed circuit pack. 4. Retry the command at one-minute intervals up to five times. 5. If the test continues to abort, escalate the problem.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2006	ABORT	DTMR detection failed. This could be caused by the administered companding mode of the MCU not matching that of the Tone Detector circuit pack. 1. Make sure the companding mode of the MCU matches the Tone Detector circuit pack. 2. If the test continues to abort, escalate the problem.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to a maximum of five times. 2. If the test continues to abort, escalate the problem.
1 - 3	FAIL	Hardware audit failed. 1. Run the short test sequence, test port PCSSpp sh r 1. 2. If the problem persists, the MCU is operating properly but system capacity is reduced. To restore system performance, replace the Tone Detector circuit pack containing the defective DTMR port.
None	PASS	The DTMR port is able to detect all the touch-tone digits.

Tone Detector Audit/Update Test #43

The DTMR port is refreshed with all time slot information and sanity audit is performed on the DTMR port.

Table 8-133. Tone Detector Audit/Update Test #43

Error Code	Test Result	Description Recommendation
	ABORT	The MCU was unable to allocate all the resources needed for this test. 1. Wait one minute and try the test again.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
	FAIL	Hardware audit failed. 1. Run the short test sequence, test port PCSSpp sh r 1. 2. If the problem persists, the MCU is operating properly but system capacity is reduced. To restore system performance, replace the Tone Detector circuit pack containing the defective DTMR port.
	PASS	The DTMR port has been successfully refreshed with its translation.

ERR-LOG (Error Log)

The ERR-LOG MO is responsible for the sanity of the alarm log, the hardware error log, and the software error log. If an inconsistency is detected in any one of these logs, all logs are reinitialized and a hardware error is logged against ERR-LOG indicating the time of the inconsistency.

There are no tests and no alarms for the Error Log MO. It exists solely to allow errors to be logged against it.

Hardware Error Log Entries

The following table shows the error log entries and related information.

Table 8-134. ERR-LOG (Error Log) Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value
0	Any	Any	Any	Any	None
510	Any	None	None	None	None
	This error indicates an inconsistency was detected in either the Alarm Log, the Hardware Error Log, or the Software Error Log. To recover from this error, all of the logs were cleared and reinitialized. Any alarms that were active at the time of this error have been cleared. There is no associated test for this error. If this error persists, escalate the problem.				
510	0	None	None	None	None
	The error was found during a periodic audit of the Error Log.				
510	1	None	None	None	None
	The error was found after an extended reboot.				
510	2	None	None	None	None
	The error was found after a reboot.				
510	3	None	None	None	None
	The error was found after a Reset System 3 (Cold_1).				
510	4	None	None	None	None
	The error was found after a Reset System 2 (Cold_2).				
510	16	None	None	None	None
	The error was found after a warm start.				
510	2005	None	None	None	None
	The error was found after an internal software audit.				

ESM (Expansion Services Module)

The following table lists the events and errors that are reported over the ESM/MSM Link to the MSM maintenance code and then logged on the MSM against the ESM MO.

Table 8-135. MSM Event/Error Types for MO ESM

Event /Error Type	Aux Data	Description
513	1	Warm Start
513	2	ESM Reset 2 Performed
513	3	ESM Reset 3 Performed
513	4	ESM Reset 4 Performed
2049		Periodic Reboot Required
2305		Software
2561		Not an ESM MO
2817		Reboot Needed
3329		Frigid Start
3585	EMS Event Type	Log MINOR Alarm
3841	EMS Event Type	Log MAJOR Alarm

These ESM events and errors are similar to events and errors related to other MSM MOs in two important ways.

First, from an MSM maintenance architecture viewpoint, the ESM module is comparable to an individual Port/Control card in the MSM cabinet. The firmware in an MSM cabinet circuit card detects the occurrence of an error on the card either during ongoing operations or while executing a periodic or scheduled test requested by MSM software. The firmware then notifies the MSM maintenance software of the error. (For more details on standard MSM circuit card error and alarm reporting, refer to the “Maintenance Architecture” chapter in this document.) For the ESM, the ESM maintenance software performs a role similar to that of the firmware in the MSM circuit card; that is, it detects errors during ongoing ESM operations or while executing a self-driven periodic or scheduled test. It then reports these errors and events to the MSM maintenance software over the ESM/MSM link.

Secondly, there is a mechanism for escalating recurring error conditions to an alarm condition. However, unlike typical MSM alarm generation, the ESM alarms are controlled by the ESM maintenance software itself, and these alarms are sent directly over the link to the MSM maintenance software. (For typical MSM alarm generation, the MSM maintenance software sets the threshold for each error type, and it then raises an alarm if this threshold is exceeded.) Therefore, as far as the

MSM Maintenance software is concerned, the errors and events associated with the ESM MO have no threshold. An ESM alarm is generated directly from the ESM via Event Types 3585 and 3841 for an ESM MINOR alarm and an ESM MAJOR alarm, respectively.

Included in the previous table are the error type, auxiliary data, and description of each event or error reported by the ESM MO. For each event/error type on the MSM, there is a corresponding event/error type on the ESM. For details on event/error types, refer to the "T.120 Maintenance from the ESM-MT" chapter in this document. Also refer to this source for a discussion of additional ESM maintenance information that is available from the ESM Management Terminal but is not sent over the ESM/MSM link to the MSM maintenance software (and is therefore not available from the MSM Management Terminal).

ESM MO Error and Alarm Strategy

Event/Error Types 513, 2305, 2817, and 3329 are used only for logging errors; no alarms or thresholds are associated with them in the MSM. All alarm thresholds are maintained on the ESM.

Event/Error Types 3585 and 3841 are used to generate MINOR and MAJOR alarms, respectively. The corresponding aux data value indicates the specific ESM event/error type that caused the alarm. Refer to Table 10-1, "Local ESM Event/Error Types," in the "T.120 Maintenance from the ESM-MT" chapter of this document for a complete list of events monitored by the ESM maintenance software.

ETH-PT (Control LAN Ethernet)

MO Name (in Alarm Log)	Alarm Level	Initial Command to Run*	Full Name of MO
ETH-PT	MAJOR	test port UUCSSpp long	MO_ETH_PT
ETH-PT	MINOR	test port UUCSSpp long	MO_ETH_PT
ETH-PT	WARNING	test port UUCSSpp	MO_ETH_PT

* *UU* is the universal cabinet number (1 for PPN, 2 - 44 for EPNs). *C* is the carrier designation (A, B, C, D, or E). *SS* is the number of the slot in which the circuit pack resides (01 to 21). *pp* is the two digit port number (01, 02, ...).

The TN799 Control LAN (C-LAN) packet port circuit pack provides TCP/IP connection to adjuncts applications such as CMS, Intuity, and DCS Networking. The CLAN circuit pack has one 10baseT Ethernet connection and up to 16 DS0 physical interfaces for PPP connections. Multiple CLAN circuit packs in a system gives additional TCP/IP capacity.

A remote socket control link (RSCL) links the CLAN and the SPE to pass call control and other management information. Since one link serves all the ports on the circuit pack, maintenance of the RSCL is part of the CLAN circuit pack maintenance.

NOTE:
The C-LAN TN799 circuit pack replaces the PGATE and PI circuit packs in the G3r and G3si/G3vs systems, respectively. The PGATE or PI can be used with the C-LAN to create an X.25-to-TCP/IP bridge for adjunct and DCS connections.

Control LAN Congestion Controls

The switch activates congestion controls on CLAN when it detects buffers exceeding the threshold. The switch releases the congestion controls when the CLAN reports that its buffer level has returned to normal levels.

If congestion:	Then the switch:
Persists for a 14-minute interval,	Raises MINOR alarm.
Exhausts buffers,	Raises MINOR alarm.
Ceases for 12 minutes,	Retires MINOR alarm.

Error Log Entries and Test to Clear Value

Table 8-136. ETH-PT Error Log Entries

Error Type	Aux Data	Associated Test	Alarm Level	On/Off Board	Test to Clear Value
0	0	Any	Any	Any	test port UUCSSpp s
	Run the Short Test Sequence first. If all tests pass, run the Long Test Sequence. Refer to the appropriate test description and follow the recommended procedures.				
1	0	Ethernet Local Looparound Test (#1278)	MINOR	ON	test port UUCSSpp l r 3
	Ethernet Local Looparound Test (#1278) failed. 1. Test the port (**test port UUCSSpp long).** 2. Refer to repair procedures for Test #1278.				
513	0	Link Integrity Inquiry (#1282)	MINOR	OFF	test port UUCSSpp r 2
	Link Integrity Inquiry Test (#1282) failed or C-LAN port detected loss of Ethernet link integrity. Possible causes: ■ Cabling ■ Ethernet transceiver 1. Test the port (**test port UUCSSpp long).** 2. If the Link Integrity Inquiry Test (#1282) fils, refer to its repair procedure.				
769	0		WNG	OFF	
	Port received invalid frame. Invalid Ethernet frame errors occur when the frame ■ Contains a bad Cyclic Redundancy Check (CRC) ■ Is misaligned 1. Isolate the problem with the Ethernet Local Looparound Test (#1278). 2. Test the port (**test port UUCSSpp long).** 3. Verify the repair with the Ethernet Local Looparound Test (#1278). 4. Clear the alarm (**test port UUCSSpp long clear**).				
1281	0				
	System software received an indication that the far-end has requested a disconnect of a session on this link. This is a log-only error.				

Table 8-136. ETH-PT Error Log Entries

Error Type	Aux Data	Associated Test	Alarm Level	On/Off Board	Test to Clear Value
1537, 1538		Session Status Test (#1286)	MINOR	OFF	
	Some or all sessions on a port are down. If some sessions are down, then the switch raises WARNING alarm on circuit pack. If all sessions are down, then the switch raises MINOR alarm on circuit pack. 1. Test the port (**test port UUCSSpp short**). 2. Refer to Session Status Test (#1286) repair procedure to verify repair.				
1793					
	System software received an indication that a socket was closed due to an error. This Error Type indicates an unused application associated with this socket.				
1794					
	System software received an indication that a socket was closed due to an error. This Error Type indicates a DCS application associated with this socket.				
1795					
	System software received an indication that a socket was closed due to an error. This Error Type indicates an AUDIX application associated with this socket.				
1796					
	System software received an indication that a socket was closed due to an error. This Error Type indicates an CMS application associated with this socket.				
1797					
	System software received an indication that a socket was closed due to an error. This Error Type indicates an ISDN Gateway application associated with this socket.				
1798-1920					
	System software received an indication that a socket was closed due to an error. This Error Type indicates anreserved for future application associated with this socket.				
2305-2560					
	System software detected a session is down. Aux Data indicates the session number. These are log only errors for session numbers 1-256. Error types 2561-2816 are for session numbers 257-512.				
2561-2816					
	System software detected a session is down. Aux Data indicates the session number. These are log only errors for session numbers 257-512.				

Table 8-136. ETH-PT Error Log Entries

Error Type	Aux Data	Associated Test	Alarm Level	On/Off Board	Test to Clear Value
3329		TCP/IP Ping Test (#1281)	WNG	OFF	
	TCP/IP Ping Test failed. 1. Test port (**test port UUCSSpp short**). 2. Refer to TCP/IP Ping Test (#1281) repair procedures.				

System Technician-Demanded Tests: Descriptions and Error Codes

Investigate errors in the order they appear in the table below.

Table 8-137. System Technician-Demanded Tests: ETH-PT

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive
Ethernet Local Loop-Around Test (#1278)	Long		Yes
TCP/IP Ping Test (#1281)	Short	Long	No
Session Status Test (#1286)	Short	Long	No
Link Integrity Inquiry Test (#1282)	Short	Long	No

Ethernet Local Looparound Test (#1278)

This test is destructive.

Use this test to check circuitry in the data path for an Ethernet call (from the on-board processor to the Ethernet Transceiver). This test fails if the data it receives does not match the data it transmits.

Table 8-138. TEST #1278 Ethernet Local Looparound Test

Error Code	Test Result	Description/ Recommendation
1000	ABORT	The port is in use. 1. Determine status of port (**status clan-port UUCSSpp**). 2. Retry the command when the port is idle. The post may be forced to the idle state by executing a **busyout port UUCSS** command. **NOTE**: The busyout port command is destructive, causing all calls and links associated with the port to be torn down.
2000	ABORT	Did not receive circuit pack test response within the allowable time period. 1. If the problem persists, reset the circuit pack (**busyout board UUCSS, reset board UUCSS,** and **release board UUCSS**). 2. If the problem persists, replace the circuit pack.
2012	ABORT	Internal system error. 1. Retry the command at 1-minute intervals, up to 3 times. 2. If the problem persists, escalate the problem.
2100	ABORT	Could not allocate the necessary resources to run test. 1. Retry the command at 1-minute intervals, up to 5 times. 2. If the problem persists, escalate the problem.
1	FAIL	Circuit pack detected failure in the Ethernet Local Looparound Test (#1278). 1. If the problem persists, reset the circuit pack (**busyout board UUCSS, reset board UUCSS,** and **reset board UUCSS**). 2. If the problem persists, replace the circuit pack.
	PASS	The circuitry tests properly.

TCP/IP PING Test (#1281)

This non-destructive test fails if all the endpoints fail to respond. Use this test to check the circuitry in the data path for a peer-to-peer IP layer connection.

Table 8-139. TEST #1281 TCP/IP PING Test

Error Code	Test Result	Description/ Recommendation
1, 2, 11	ABORT	Internal error 1. Retry the command at 1-minute intervals a maximum of 3 times. 2. If the problem persists, escalate the problem.
7	ABORT	Destination unreachable. 1. Verify that there is a destination to ping in the routing table (list ip-route and look for destinations reachable through this ethernet port). 2. If there are no reachable destinations from this port (i.e., no routes administered on ethernet), administer a route and retry. 3. Escalate if the problem persists.
1005	ABORT	Incorrect test configuration. 1. Verify Ethernet link is in service (**status port UUCSSpp** or **status link n**). 2. Verify that Ethernet link is enabled (**status port UUCSSpp** or **status link *n*** or **display data-module**). 3. Verify routing table has reachable destinations. 4. Repeat the test. 5. If problem persists while the Ethernet link is in service and enabled, escalate the problem.
1124	ABORT	Ethernet link is not enabled. 1. Verify that the Ethernet link is enabled (**status port UUCSSpp**, **status link *n***, or **display data-module**). 2. If the link is not enabled, enable the link (**change data-module**). 3. Repeat the test. 4. Escalate if the problem persists.
1125	ABORT	Ethernet link not in service. 1. Verify Ethernet link is in service (**status port UUCSSpp** or **status link n**). 2. If the link is not in service, release the link using (**release link n** or **release port UUCSSpp**). 3. Repeat the test. 4. Escalate if the problem persists.
2000	ABORT	Did not receive circuit pack test response within the allowable time period. 1. Reset the circuit pack (**busyout board UUCSS, reset board UUCSS,** and **release board UUCSS**). 2. If the test fails again, replace the circuit pack.

Table 8-139. TEST #1281 TCP/IP PING Test — *Continued*

Error Code	Test Result	Description/ Recommendation
2012	ABORT	Internal system error. 1. Retry the command at 1-minute intervals, up to 3 times. 2. Escalate if the problem persists.
2100	ABORT	Could not locate the necessary system resources to run this test. 1. Retry the command at 1-minute intervals, up to 5 times. 2. Escalate if the problem persists.
2500	ABORT	Internal system error. 1. Retry the command at 1-minute intervals, up to 3 times. 2. Escalate if the problem persists.
1003	FAIL	Ping to the destination failed due to on-board problem. 1. Retry the command at 1-minute intervals, up to 3 times. 2. If the problem persists, reset the circuit pack (**busyout board UUCSS**, **reset board UUCSS**, and **release board UUCSS**). 3. If the problem persists, re-administer the ethernet connection through a different ethernet port, if available. 4. If the problem still persists, or if there are no other available ethernet ports, replace the circuit pack.
1007	FAIL	Ping to the destination failed due to the destination down. 1. Verify that at least one destination reachable through this port is up. Ping this destination (ping ip-address xxx.xxx.xxx.xxx). 2. If the ping to any destination is successful through this port, the link is up, although some destinations are unreachable. Ignore the failure. 3. If ping to all destinations fail, test this port (**test port UUCSSpp short**) and follow repair procedures for Session Status Test (#1286) failures.
	PASS	TCP/IP Ping Test (#1281) is successful.

Link Integrity Inquiry Test (#1282)

This **non-destructive** test queries the CLAN Ethernet port's physical connections.

If:	Then the test:
C-LAN connection is present,	Passes.
C-LAN connection is absent,	Fails.
There is no response,	Aborts.

Table 8-140. TEST #1282 Link Integrity Inquiry Test

Error Code	Test Result	Description/ Recommendation
1124	ABORT	Ethernet link is not enabled. 1. Verify that the Ethernet link is enabled (**status port UUCSSpp**, **status link *n***, or **display data-module**). 2. If the link is not enabled, enable the link (**change data-module**). 3. Repeat the test. 4. Escalate if the problem persists.
1125	ABORT	Ethernet link not in service. 1. Verify whether Ethernet link is in service (**status port UUCSSpp** or **status link n**). 2. If the Ethernet link is not in service, release the link (**release link n** or **release port UUCSSpp**). 3. Repeat the test. 4. Escalate if the problem persists.
1959	ABORT	Downlink message error. 1. Retry the command at 1-minute intervals, up to 3 times. 2. Escalate if the problem persists.
2012	ABORT	Internal system error. 1. Retry the command at 1-minute intervals, up to 3 times. 2. Escalate if the problem persists.
2100	ABORT	Could not locate the necessary system resources to run this test. 1. Retry the command at 1-minute intervals, up to 5 times. 2. Escalate if the problem persists.

Table 8-140. TEST #1282 Link Integrity Inquiry Test — *Continued*

Error Code	Test Result	Description/ Recommendation
2500	ABORT	Internal system error. 1. Retry the command at 1-minute intervals, up to 3 times. 2. Escalate if the problem persists.
	FAIL	Link integrity lost due to problem with attachment of Ethernet cable to the port. 1. Repeat the test. 2. If the test fails, verify that the cable properly is secured to Ethernet port and to the bus. 3. Verify the CLAN circuit pack link integrity LED is glowing. 4. Retry the test. 5. If problem persists, refer to Ethernet Local Looparound Test (#1278) repair procedures.
	PASS	The Ethernet Link Integrity Test (#1282) detects good connections.

Session Status Test (#1286)

This **non-destructive** test determines the status of all Ethernet port sessions. This test queries the system software on port session status.

If the system software indicates that:	Then the switch:
All port sessions are up (ALL UP)	Raises no alarm, or retires alarm
Some port sessions are up (SOME UP)	Raises WARNING alarm
All port sessions are down (ALL DOWN)	Raises MINOR alarm

Table 8-141. TEST #1286 Session Status Test

Error Code	Test Result	Description/ Recommendation
1124	ABORT	Ethernet link is not enabled. 1. Verify that the Ethernet link is enabled (**status port UUCSSpp**, **status link *n***, or **display data-module**). 2. If the link is not enabled, enable the link (**change data-module**). 3. Repeat the test. 4. Escalate if the problem persists.

Table 8-141. TEST #1286 Session Status Test — *Continued*

Error Code	Test Result	Description/ Recommendation
1125	ABORT	Ethernet link not in service. 1. Verify whether Ethernet link is in service (**status port UUCSSpp** or **status link n**). 2. If the Ethernet link is not in service, release the link (**release link n** or **release port UUCSSpp**). 3. Repeat the test. 4. Escalate if the problem persists.
2000	ABORT	Did not receive circuit pack test response within the allowable time period. 1. If the problem persists, reset the circuit pack (**busyout board UUCSSpp, reset board UUCSS**, and **release board UUCSS**). 2. If the problem persists, replace the circuit pack.
2100	ABORT	Could not locate the necessary system resources to run this test. 1. Retry the command at 1-minute intervals, up to 5 times. 2. Escalate if the problem persists.
2500	ABORT	Internal system error. 1. Retry the command at 1-minute intervals, up to 3 times. 2. Escalate if the problem persists.
1	FAIL	System software indicates at least one Ethernet link session is down (SOME UP). 1. Isolate downed sessions (**status port UUCSSpp** or **status link n**). 2. Follow actions based on session information.
2	FAIL	System software indicates all Ethernet sessions are down (ALL DOWN). 1. Test the port (**test port UUCSSpp**) to verify the Ethernet Local Looparound Test (#1278) result. 2. If test passes, wait for system software to indicate ALL UP. 3. If the test fails, check the destination and other components in the path. 4. If the destination and other components in the path are in-service, take action based on session information.
	PASS	All sessions are up.

ETR-PT (Enhanced Tone Receiver Port)

MO Name (in Alarm Log)	Alarm Level	Initial Command to Run*	Full Name of MO
ETR-PT(a)	MAJOR	test port PCSSpp sh	Enhanced Tone Receiver Port
ETR-PT	MINOR	test port PCSSpp sh	Enhanced Tone Receiver Port
ETR-PT	WARNING	test port PCSSpp sh	Enhanced Tone Receiver Port

* P is the port network number (1). C is the carrier designation (A, B, C, D, or E). SS is the number of the slot in which the circuit pack resides (01 to 21).

NOTE:
Replacing the tone/clock circuit pack requires a special procedure which is described in the documentation for TONE-BD. This section also describes the LED display for this board.

The TN2182 is a combined Tone Generator/Tone Detector board. It provides eight Enhanced Tone receiver (ETR) ports. Each of these ports provides the functions previously found individually on DTMR-PTs, GPTD-PTs and CLAS-PTs ports. Thus each port on the TN2182 may be used for any tone detection function that was previously done by TN748, TN420 or TN744 Tone detection boards.

The TN2182 provides Mu-law or A-law tone detection capability.

Since the TN2182 also provides Tone/Clock function only one (or two if your system is duplicated) TN2182 circuit packs may be present in a port network. Thus if more tone detection resources are needed, the additional resources must be provided by TN748, TN420 or TN744 circuit packs.

Hardware Error Log Entries and Test to Clear Values

Table 8-142. Enhanced Tone Receiver Port (ETR-PT) Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
1	any	Tone Detector Audit/Update Test (#43)	MAJOR/ MINOR (a)	ON	test port PCSSpp r 2
	-				
18		busyout port	WARNING	OFF	release port PCSSpp
	-				
257	17666	Tone Detection Audit Update Test (#43)	MAJOR/ MINOR (a)	ON	test port PCSSpp r 3
	The ETR-PT lost its translation. Testing the ETR-PT is sufficient to reload its translation. If testing the ETR port does not clear the error, then the TN2182 circuit pack containing the defective ETR port should be replaced at a time when it is convenient to remove a clock board from the system. Follow the procedures described in the TONE-BD section for replacing a tone/clock circuit pack.				
513	any	Tone Detection Verification Test (#42)	MAJOR/ MINOR (a)	ON	test port PCSSpp r 3
	This error indicates the (ETR-PT) Enhanced Tone Receiver port is having problems detecting touch tones, call progress or MFC tones. If this error type is persistently logged, then the TN2182 circuit pack containing the defective ETR-PT should be replaced at a time it is convenient to remove a clock board from the system. Follow the procedures described in the TONE-BD section for replacing a tone/clock circuit pack.				

Notes:

a. There are two possible alarm levels for this error type: major alarm and minor alarm. These alarm levels are dependent on the administered thresholds for TTR, CPTR and CCTR. Each ETR port is capable of operating an any of these.

   A major alarm is raised if the total number of ports capable of TTR, CPTR or CCTR detection currently in-service is less than or equal to 1/2 of the administered TTR, CPTR or CCTR threshold number.

   Otherwise, a minor alarm is raised. In either case, run the short test sequence against the port (ETR-PT) and follow the error code procedures for the individual tests.

The threshold number of ports for service is administered using the **change system-parameters maintenance** command. For details, refer to ‘‘Chapter 5, "Routine Maintenance Procedures".

System Technician-Demanded Tests: Descriptions and Error Codes

Always investigate tests in the order presented in the following tables when inspecting errors in the system. By clearing error codes associated with the *Tone Detection Verification Test*, for example, you may also clear errors generated from other tests in the testing sequence.

Table 8-143. System Technician-Demanded Tests: ETR-PT

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Tone Detection Verification Test (#42)	Short	Long	No
Tone Detection Audit/Update Test (#43)	Short	Long	No

Tone Detection Verification Test (#42)

This test checks out a single ETR port in the touch-tone receiver mode MFC tone detection/generation mode and general purpose tone detection mode. During the first portion of the test, the touch-tone receiver mode is tested. Then general purpose call progress and maintenance tones are tested and lastly MFC tones are tested.

Table 8-144. Tone Detection Verification Test #42

Error Code	Test Result	Description / Recommendation
None	ABORT	The system was not able to allocate all the resources needed for this test OR there was an Internal System Error.
1	ABORT	The system could not allocate all the resources needed to test the tones.
1001	ABORT	The system was unable to put the ETR-PT in the appropriate mode to test it.
1002	ABORT	The system could not allocate time slots for the test connection. This situation could occur when the system is heavily loaded. If the system is not heavily loaded, then test the TDM-BUS via the test tdm command. Refer to TDM-BUS for details. 1. Retry the command at 1-minute intervals a maximum of 5 times.

Table 8-144. Tone Detection Verification Test #42

Error Code	Test Result	Description / Recommendation
1003	ABORT	The system could not allocate a Tone-Clock for the test connection. This may be caused by a heavy load on the system or by a faulted Tone-Clock. 1. Check to see if there are any alarms against the Tone-Clock in the port network where the test aborted. If so refer to the recommended procedures for TONE-BD or TONE-PT. 2. If a new Tone-Clock has been inserted, allow about 1 minute for maintenance to run on the newly inserted circuit pack. 3. Retry the command at 1-minute intervals a maximum of 5 times.
2000	ABORT	Circuit Pack's response to the test request was not received within the allowable time period. 1. Retry the command at 1-minute intervals a maximum of 5 times.
2006	ABORT	This abort code indicates that the active Tone-Clock circuit pack or a Tone Detector circuit pack may not be functioning properly. On G3r V2 systems, this abort can also be caused by a mismatch between the companding mode administered for the system and that of the Tone Detector circuit pack. 1. Make sure that the companding mode of the system matches that of the Tone Detector: mu-law for TN748; A-law for TN420. 2. Test the active Tone-Clock circuit pack in the port network with the test tone-clock PC command and refer to the TONE-BD section for failures. 3. Retry the command at 1-minute intervals a maximum of 5 times.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at 1-minute intervals a maximum of 5 times.
1 - 122	FAIL	DTMF digits were not detected correctly. 1. Run the short test sequence via the test port PCSSpp sh r 1 command. 2. If the problem persists, the system is still operating properly but capacity will be reduced. To restore performance to normal, replace the circuit pack containing the defective ETR-PT (Enhanced Tone Receiver Port). Follow the procedures described in the TONE-BD section for replacing a tone/clock circuit pack.

Table 8-144. Tone Detection Verification Test #42

Error Code	Test Result	Description / Recommendation
102	FAIL	2225 Hz Modem Answer Tone was not detected correctly. This will impact call-classification operation. 1. Run the short test sequence via the test port PCSSpp sh r 1 command. 2. If the problem persists, the system can still operate properly but capacity will be reduced. In order to restore performance to normal, replace the circuit pack containing the defective port. Follow the procedures described in the TONE-BD section for replacing a tone/clock circuit pack.
130	FAIL	Forward or Backward MFC signals were not correctly generated or detected. This will impact MFC calls. 1. Run the short test sequence via the test port PCSSpp sh r 1 command. 2. If the problem persists, the system can still operate properly but capacity will be reduced. In order to restore performance to normal, replace the TN2182 circuit pack containing the defective ETR-PT. Follow the procedures described in the TONE-BD section for replacing a tone/clock circuit pack.
None	PASS	Tone Detection Verification is successful. The ETR Port is able to detect/generate all necessary tones.

Tone Detector Audit/Update Test (#43)

A Digital Signal Processor sanity audit is performed on the ETR-PT.

Table 8-145. Tone Detector Audit/Update Test #43

Error Code	Test Result	Description
None	ABORT	The system was not able to allocate all the resources needed for this test. 1. Wait 1 minute, and repeat the command a maximum of 5 times.
2000	ABORT	Response to the test request was not received within the allowable time period.

Table 8-145. Tone Detector Audit/Update Test #43

Error Code	Test Result	Description
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at 1-minute intervals a maximum of 5 times.
None	FAIL	Hardware audit failed. 1. Run the short test sequence via the test port PCSSpp sh r 1 command. 2. If the problem persists, the system is still operating properly but system capacity will be reduced. In order to restore system performance to normal, replace the circuit pack containing the defective ETR-PT. Follow the procedures described in the TONE-BD section for replacing a tone/clock circuit pack.
	PASS	The ETR Port has passed the sanity inquiry.

EXT-DEV (External Alarm)

The External Alarm MO represents the state of relays connected to an external device (often an adjunct). These relays are monitored by the Maintenance Processor circuit pack. The leads may be attached to the same or different devices.

NOTE:
The MCU only recognizes pairs connected to the 1M and 1m (ALARM MONITOR) leads. Pairs connected to the 2M, 2m, 3M, 3m, and 3w are not recognized by the system.

Alarm Level	Initial Craft Command to Run
Major	test environment *P*[*]
Minor	test environment *P*

* Where *P* is an appropriate port network number determined via the *Port* field from the alarm log or error log.

Hardware Error Log Entries

The following table shows the error log entries and related information.

Table 8-146. External Alarm Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	test environment P sh r 1
	Run the short test sequence first. If all tests pass, run the long test sequence. Refer to the appropriate test description for details.				
1 or 5	Any	#120	Major/ Minor	Off	test environment UUr2 or 6

Craft-Demanded Tests

Always investigate tests in the order presented in the following table when inspecting errors in the system. For example, by clearing error codes associated with the System Power Query test (#79), you may also clear errors generated from the other test in the testing sequence.

Table 8-147. System Technician-Demanded Tests: EXT-DEV

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
System Power Query Test (#79)	Short	Long	No
External Alarm Lead Query Test (#120)	Short	Long	No

External Alarm Lead Query Test #120

This test requests the state of the external alarms from the maintenance processor and reports the results. The test has no affect on the external device itself.

Table 8-148. External Alarm Lead Test #120

Error Code	Test Result	Description Recommendation
1000	ABORT	System resources required to run this test are not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT with this error code, check for system powering problems. Look for and resolve all DC-POWER alarms. Repeat the test. 3. If the test continues to ABORT with a 2000 Error Code, check for and resolve PR-MAINT errors. Repeat the test. 4. If the test continues to ABORT with a 2000 Error Code, escalate the problem.
2029	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times.
2319	ABORT	Internal System Error 1. Retry the command at one-minute intervals up to five times
2320	ABORT	Internal System Error 1. Retry the command at one-minute intervals up to five times
2500	ABORT	Internal System Error 1. Retry the command at one-minute intervals up to five times

Table 8-148. External Alarm Lead Test #120

Error Code	Test Result	Description Recommendation
1	FAIL	The external alarm major alarm lead has been activated by the external device. 1. Clear the major alarm problem with the external device and rerun the test. 2. If the test still fails, disconnect the external alarm from the maintenance processor and rerun the test. 3. If the test still fails, there is a problem with the maintenance processor. This circuit pack should be replaced. NOTE: Failures can occur on the Maintenance Processor circuit pack that are not detected by the respective maintenance, but that cause many, if not all, environment tests to fail. If many environment tests fail, the suspect circuit pack, depending on the system configuration, should be replaced and the test rerun. 4. If the test still fails, escalate the problem.
2	FAIL	The external alarm minor alarm lead has been activated by the external device. 1. Clear the minor problem with the external device and rerun the test. 2. If the test still fails, disconnect the external alarm from the maintenance processor. Rerun the test. 3. If the test still fails, there is a problem with the maintenance processor. This circuit pack should be replaced. 4. If it fails again, escalate the problem.
3	FAIL	The external alarm major and minor alarm lead has been activated by the external device. 1. Clear the major alarm problem with the external device by referring to the Recommendation for Error Code 1. 2. Clear the minor alarm problem with the external device by referring to the Recommendation for Error Code 2.
None	PASS	The Maintenance Processor circuit pack is capable of reading the external alarm, and the lead indicates no trouble. If there are problems with the external device, it is either not reporting this problem or the external device is not properly connected to the external alarm.

GPTD-PT (General-Purpose Tone Detector Port)

The General-Purpose Tone Detector (GPTD) port, also known as Call Progress Tone Receiver (CPTR), resides on the Tone Detector circuit pack (TN420C). There are two GPTD ports and four Dual-Tone Multifrequency Receiver (DTMR) ports on the Tone Detector circuit pack. The GPTD port is used to perform level measurements of test tones and to detect call progress tones. The abilities of the GPTD port to perform level measurements of test tones and to detect call progress tones are essential for maintenance of other circuit packs, such as the Tone-Clock circuit pack.

The GPTD maintenance feature defines a set of tests to ensure that the general-purpose tone detection capability of the GPTD port is functioning properly. For all Tone Detector circuit pack errors (DETR-BD), see XXX-BD (Common Port Circuit Pack).

Alarm Level	Initial Craft Command to Run
Major	test port *PCSSpp*[*] sh
Minor	test port *PCSSpp* sh
Warning	release port *PCsspp*

* Where *P* is the port network number, *C* is the carrier designation (for example, A or B), *SS* is the address of the slot in the carrier where the circuit pack is located (for example, 01 or 02), and *pp* is the two-digit port number (for example, 01).

Hardware Error Log Entries

The following table shows the error log entries and related information, including test to clear value.

Table 8-149. General-Purpose Tone Detector Port Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	test port PCSSpp sh r 1
	Run the short test sequence first. If all tests pass, run the long test sequence.				

Table 8-149. General-Purpose Tone Detector Port Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
1	17664	#43	Major	On	test port PCSSpp r 2
	The GPTD port is having problems detecting call progress tones. If this error is constantly logged, the Tone Detector circuit pack containing the defective GPTD port should be replaced. The total number of GPTD ports currently in service is less than or equal to the administered threshold. NOTE: The threshold number of DTMR ports for service is administered using change system-parameters maintenance.				
1	17664	#43	Minor	On	test port PCSSpp r 2
	The GPTD port is having problems detecting call progress tones. If this error is constantly logged, the Tone Detector circuit pack containing the defective GPTD port should be replaced. Run the short test sequence against the GPTD port and then follow the error code procedures for the individual tests.				
18	0		Warning	On	release port PCSSpp
	The port was busied out by craft.				
257	17666	#43	Major	On	test port PCSSpp r 3
	The GPTD port lost its translation. Testing the GPTD port is sufficient to reload its translation. Run the short test sequence against the GPTD port and then follow the error code procedures for the individual tests. If testing the GPTD port does not clear the error, replace the Tone Detector circuit pack containing the defective GPTD port. A major alarm is raised when the total number of GPTD ports is less than or equal to one half of the administered threshold number. NOTE: The threshold number of GPTD ports for service is administered using change system-parameters maintenance.				
257	17666	#43	Minor	On	test port PCSSpp r 3
	The GPTD port lost its translation. Testing the GPTD port is sufficient to reload its translation. Run the short test sequence against the GPTD port and then follow the error code procedures for the individual tests. If testing the GPTD port does not clear the error, replace the Tone Detector circuit pack containing the defective GPTD port.				

Table 8-149. General-Purpose Tone Detector Port Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
513	Any	#42	Major	On	test port PCSSpp r 3
	A major alarm is raised when the total number of GPTD ports is less than or equal to one half of the administered threshold number. Run the short test sequence against the GPTD port then follow the error code procedures for the individual tests. NOTE: The threshold number of GPTD ports for service is administered using change system-parameters maintenance.				
513	Any	#42	Minor	On	test port PCSSpp r 3
	Run the short test sequence against the GPTD port and then follow the error code procedures for the individual tests.				

Craft-Demanded Tests

Always investigate the tests in the order presented in the table below when inspecting errors in the system. By clearing error codes associated with the Tone Detection Verification test (#42), you may also clear errors generated by the Tone Detector Audit/Update test (#43).

Table 8-150. System Technician-Demanded Tests: GPTD-PT

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Tone Detection Verification Test (#42)	Short	Long	No
Tone Detector Audit/Update Test (#43)	Short	Long	No

Tone Detection Verification Test #42

This test verifies that the touch-tone digit detection capability of the GPTD port is functioning properly.

Table 8-151. Tone Detection Verification Test #42

Error Code	Test Result	Description Recommendation
None	ABORT	The MCU was unable to allocate all the resources needed for this test or there was an internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1	ABORT	The MCU could not allocate all the resources needed to test the GPTD port. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1001	ABORT	The MCU was unable to put the GPTD port in the appropriate mode to test it. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1002	ABORT	The MCU could not allocate time slots for the test connection. This could happen when the MCU is heavily loaded. 1. If the MCU is not heavily loaded, test the TDM Bus using test tdm. Refer to TDM-BUS for details. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to abort, escalate the problem.
1003	ABORT	The MCU could not allocate a tone generator for the test connection. This can happen when the MCU is heavily loaded or a Tone-Clock circuit pack is not in the port network when this test is executed. 1. Make sure there is a Tone-Clock circuit pack in the same port network. 2. If a Tone-Clock circuit pack is missing, install one. 3. Allow one minute for the tone-clock maintenance to run on the newly installed circuit pack. 4. Retry the command at one-minute intervals up to five times. 5. If the test continues to abort, escalate the problem.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.

Table 8-151. Tone Detection Verification Test #42

Error Code	Test Result	Description Recommendation
2006	ABORT	GPTD detection failed. This could be caused by the administered companding mode of the MCU not matching that of the Tone Detector circuit pack. 1. Make sure the companding mode of the MCU matches the Tone Detector circuit pack. 2. If the test continues to abort, escalate the problem.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1 - 3	FAIL	Hardware audit failed. 1. Run the short test sequence, test port PCSSpp sh r 1. 2. If the problem persists, the MCU is operating properly but system capacity is reduced. To restore system performance, replace the Tone Detector circuit pack containing the defective GPTD port.
	PASS	The GPTD port is able to detect all the touch-tone digits.

Tone Detector Audit/Update Test #43

The GPTD port is refreshed with all time-slot information, and a sanity audit is performed on the GPTD port.

Table 8-152. Tone Detector Audit/Update Test #43

Error Code	Test Result	Description Recommendation
	ABORT	The MCU was unable to allocate all the resources needed for this test. 1. Wait one minute and try the test again.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.

Table 8-152. Tone Detector Audit/Update Test #43

Error Code	Test Result	Description Recommendation
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
	FAIL	Hardware audit failed. 1. Run the short test sequence, test port PCSSpp sh r 1. 2. If the problem persists, the MCU is operating properly but system capacity is reduced. To restore system performance, replace the Tone Detector circuit pack containing the defective GPTD port.
	PASS	The DTMR port has been successfully refreshed with its translation.

GTKP (Gatekeeper)

The MCU supports one external Gatekeeper for H.323 IP communications. The GTKP MO is designed to help the user troubleshoot Gatekeeper registration problems.

Alarm Level	Initial Craft Command to Run
Minor	test gatekeeper
Warning	test gatekeeper

GTKP Error Log Entries

Table 8-153. GTKP Error log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value
18	any		warning		release gatekeeper
	The MCU requested to be unregistered from the Gatekeeper, using the **busyout gatekeeper** command				

Table 8-153. GTKP Error log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value
257	any	#1183	minor	off	test gatekeeper
	The LRQ Ping test failed. 1. Verify the Gatekeeper is not craft busied out. 2. Verify that the H.323 signaling group which the Gatekeeper is administered on, has not been busied out. 3. Verify, LAN connections to the TN2302 and TN799B circuit packs are connected. 4. Verify the MCU's registration status from the Gatekeeper.				
513	any	#1178	minor	on	test gatekeeper
	The *h.323 signaling group,* that the Gatekeeper is administered on, is out-of-service. 1. Verify, the *h.323 signaling group,* that the Gatekeeper is administered on, is not busied out. 2. See H323-SIG for any active H323-SIG errors.				
1025	any	#1179	minor	on	test gatekeeper
	The MCU is not registered with the Gatekeeper. 1. Verify the Gatekeeper is not busied out. 2. Verify, the *h.323 signaling group,* that the Gatekeeper is administered on, has not been busied out. 3. Verify the MCU's registration status from the Gatekeeper.				
1281	any	none	minor	on	
	This alarm is generated 15 minutes after a Gatekeeper is administered on the *node-names* form, but has not yet been administered on a *h.323 signaling group.* Administering the Gatekeeper on a *h.323 signaling group* will retire this alarm.				

Craft-Demanded Tests

Always investigate tests in the order presented in the following table when inspecting errors in the system For example, clearing error codes associated with the Gatekeeper Signaling Group Query test (#1178), you may also clear errors generated from the other test in the testing sequence.

System Technician-Demanded Tests

Table 8-154. System Technician-Demanded Tests

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive
Gatekeeper Signaling Group Query Test (#1178)	short	short	No
Gatekeeper Registration Query Test (#1179)	short	short	No
Gatekeeper LRQ Ping Test (#1183)	short	short	No

Gatekeeper Signaling Group Query Test #1178

This test provides status of the Gatekeeper H.323 signaling group. This test does not query the Gatekeeper.

Gatekeeper Signaling Group Query Test #1178

Table 8-155. Gatekeeper Signaling Group Query Test #1178

Error Code	Test Result	Description / Recommendation
1007	ABORT	The Gatekeeper is administered on the node-names form but is not administered on a H.323 signaling group. 1. Administer a Gatekeeper to the *Far-end Node Name* field on a H.323 signaling group.
	FAIL	The H.323 signaling group that the Gatekeeper is administered on is out-of-service 1. Verify the H.323 signaling group is not busied out. 2. See H323-SIG for any active H323-SIG errors.
	PASS	The H.323 signaling group that the Gatekeeper is administered on is in-service.

Gatekeeper Registration Query Test #1179

This test provides registration status of the MCU with the Gatekeeper. This test does not query the Gatekeeper.

Table 8-156. Gatekeeper Registration Query Test #1179

Error Code	Test Result	Description Recommendation
1007	ABORT	The Gatekeeper is administered on the node-names form but is not administered on a H.323 signaling group. Administer a Gatekeeper to the *Far-end* *Node Name* field on a H.323 signaling group.
	FAIL	The MCU is not registered with the Gatekeeper Verify the Gatekeeper is not busied out. Verify the H.323 signaling group, that the Gatekeeper is administered on, is not busied out. Verify the MCU's registration status from the Gatekeeper.
	PASS	The MCU is registered with the Gatekeeper

Gatekeeper LRQ (Location Request) Ping Test #1183

This test provides the status of the LRQ request sent to the Gatekeeper by the MCU. If the Gatekeeper responds to this request, the test passes. If the Gatekeeper does not respond, the test fails. After 3 failed LRQ requests and when no calls are active, maintenance will request that the MCU un-register and re-register with the Gatekeeper. If calls are active, maintenance will not request that the MCU un-register and re-register with the Gatekeeper. Instead, a fail cause of "*Calls active: use busy gk override*" will be displayed on the Status Gatekeeper form.

Table 8-157. Gatekeeper LRQ Ping Test #1183

Error Code	Test Result	Description Recommendation
	FAIL	The LRQ Ping test failed. Verify the Gatekeeper is not craft busied out. Verify that the H.323 signaling group which the Gatekeeper is administered on, is not busied out. Verify that the LAN connections to the TN2302 and TN799B circuit packs are connected. Verify the MCU's registration state from the Gatekeeper.
	PASS	The LRQ Ping test passed.

H323-BCH (H.323 B-Channel)

No maintenance diagnostic tests exist for this object.

H.323 signaling is very similar to ISDN Q.931 signaling. In order to take advantage of existing ISDN call processing software, H.323 trunk call processing includes H.323 signaling groups, H.323 D-channels and H.323 B-channels. H.323 Signaling groups are similar in concept to ISDN PRI signaling groups. H.323 D-channels are an artificial fabrication created only to allow maximum re-use of system ISDN code. H.323 B-channels are also an artificial fabrication.

No physical hardware components make up the H.323 B-channel object discussed here. Along with the D-channel, these objects allow existing ISDN call processing to be re-used for H.323 trunking. The H.323 signaling group is not a collection of physical D-channels that exist on one or more DS1 facilities. The H.323 signaling group can be considered to be one D-channel that physically rides on a C-LAN port and the IP network. Unlike ISDN D-channels, the H.323 D-channel may actually come up and down on a call-by-call basis. So the H.323 D-channel is actually a TCP/IP signaling channel. Layer 1 and 2 of this signaling channel can be monitored by IP PING testing.

Performance in terms of voice latency for a signaling group is monitored by background measurements being collected by the Media Processor board.

H.323 B-channels actually use Media Processor ports to carry the actual bearer. The TN2303 is a service circuit. Status information may exist for a specific H.323 B-channel, and an H.323 B-channel may be busied out and released, but no maintenance diagnostic tests will exist for the object.

Errors are logged for *craft* busyout conditions. The system receives service state updates for *craft*-driven busyout/release. Under normal conditions the system automatically places H.323 B-channels into or out of service when it receives an H.323 signaling-group service state update. *Craft* busyout drops active calls.

Error Log Entries and Test to Clear Values

Table 8-158. H323-BCH B-Channel Error Log Entries

Error Type	Aux Data	Associated Test	Alarm Level	On/Off Board	Service State
18	Any	B-channel busied out	Warning	off	*OOS*
	This error indicates that this specific H323 trunk group member has been *craft* busied-out.				

System Technician Commands

The following commands are available to the system technician:

- **busyout port UUCSSpp** – this command on a specific H.323 B-channel drops any active call that may exist on that B-channel and effectively reduces the trunk group capacity by one. No physical piece of hardware is removed from service.
- **release port UUCSSpp** – this command on a specific H.323 B-channel effectively increases the trunk group capacity by one. No physical piece of hardware is actually added to service.
- **status trunk grp/mbr** – this command is used to find the current status of the specific B-channel. Additional status for an H.323 B-channel shows near and far-end IP signaling addresses, near and far-end H.245 addresses, tunneling status, call reference value for an active call and the H.323 conference ID.
- **test port UUCSSpp** – this command results in the message `No tests applicable to this object.`

H323-SGRP (H.323 Signaling Group)

MO Name (in Alarm Log)	Alarm Level	Initial Command to Run	Full Name of MO
H323-SGRP	MINOR	test sig-group *grp#**	H323 Signaling Group
H323-SGRP	WARNING	test sig-group *grp#**	H323 Signaling Group

* *grp#* is the signaling group number (1-166); the test sequence can be either short or long.

The H.323 Signaling Group (H323-SGRP) maintenance object supports a signaling channel for H.323 Trunk connections. The Media Processor (MedPro) TN802B circuit pack provides audio connectivity, working in concert with a C-LAN (TN799B) circuit pack that provides control signaling to support an H.323 connection.

The H.323 signaling group (323-SGRP) is a signaling channel that physically rides on a C-LAN ethernet port (socket) and the IP network. Unlike ISDN D-channels, the H.323 channel may actually come up and down on a call by call basis. The H.323 channel is actually a TCP/IP signaling channel. Layers 1 and 2 of this signaling channel are monitored by IP PING testing.

Error Log Entries and Test to Clear Values

Table 8-159. H323-SGRP Signaling Group Error Log Entries

Error Type	Aux Data	Associated Test	Alarm Level	On/Off Board	Test to Clear Value
0	0	Any	Any		test sig-group *grp#*
1	Any	Ethernet Port Status Test #1386	MINOR	OFF	test sig-group *grp#*
	This error indicates that the C-LAN ethernet port used to carry the signaling for this H.323 signaling group is out of service. To determine which C-LAN had been administered for this signaling group, find the near-end node name on the **signaling group** form; then find the C-LAN with the same node name on the **ip-interfaces form**. Check for errors on this C-LAN board.				
257	Any	H.323 SGRP PING Test #1387	MINOR	OFF	test sig-group *grp#*
	This error tracks failures of the H.323 signaling-group PING test. See H.323 signaling-group PING test failures documented later in this maintenance object.				

Table 8-159. H323-SGRP Signaling Group Error Log Entries

Error Type	Aux Data	Associated Test	Alarm Level	On/Off Board	Test to Clear Value
513	Any	H.323 SGRP PING Test #1387	WARNING	OFF	test sig-group *grp#*
	This error tracks excessive round trip delay of the H.323 signaling-group PING test (if the round-trip delay exceeds 4 seconds).				
769	Any		WARNING	OFF	
	This error indicates that test packets sent from a media processor circuit pack to the far-end ip address specified on the **signaling-group** form have exceeded the IP latency and loss thresholds, as administered on the **system-parameters maintenance** form. Exceeding these thresholds indicates that the IP network may not be providing sufficient quality service for adequate transmission of voice. If the signaling group has been administered to enable BYPASS, then error type 1025 should also occur.				
1025	Any		MINOR	OFF	
	This error indicates that the signaling group has been placed into a BYPASS condition due to IP network congestion. The signaling group accepts incoming calls, but all outgoing calls are denied. The system routes these calls over a secondary route if one has been administered.				
1281	Any	MEDPRO Status Test #1392	NONE		test sig-group *grp#*
	This error implies that no MedPro resources are in-service to provide media connections for the trunk members of the signaling group. Check for errors against the MEDPRO and MEDPROPT maintenance objects. This error causes all H323 B Channels to be in an out-of-service near-end state.				
1537	Any		NONE		
	This error indicates that the far end of the signaling group is not ready to handle audio bearer. If the other end of this signaling group is also an MCU, this error means the MCU on the other end does not have MEDPRO in-service for its signaling group. In the absence of error 1281, this error will place the H323 B Channels into an out-of-service far-end state.				

System Technician-Demanded Tests: Descriptions and Error Codes

Always investigate tests in the order presented in the table below when inspecting errors in the system. By clearing error codes associated with the *CLAN Ethernet Status Test (#1386)*, for example, you may also clear errors generated from other tests in the testing sequence.

Table 8-160. System Technician-Demanded Tests

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
CLAN Ethernet Status Test (#1386)	Short	Long	No
MedPro Status Test (#1392)	Short	Long	No
H.323 Signaling Group Ping Test (#1387)	Short	Long	No

C-LAN Ethernet Status Test (#1386)

This test is non-destructive.

This test checks the status of the C-LAN ethernet port that originated this signaling group. If the C-LAN ethernet port is in-service, the test passes, if it is out of service the test fails.

NOTE:
Failure of this test puts the SIG-GRP in the OOS state.

Table 8-161. TEST #1386 CLAN Ethernet Status Test

Error Code	Test Result	Description/ Recommendation
2500	ABORT	Internal system Error. 1. Retry the command at 1-minute intervals a maximum of 3 times
2800	ABORT	A C-LAN ethernet port that corresponds to the near-end address of the signaling group has not been administered.
	FAIL	The C-LAN ethernet port that corresponds to the near-end address of this signaling group and all trunk members controlled by this signaling group are out of service. 1. Check the system for errors against the out of service C-LAN board.
	PASS	The C-LAN ethernet port that corresponds to the near-end address of this signaling group is in-service.

H.323 Signaling Group Ping Test (#1387)

This test is nondestructive.

This test is only run for those signaling groups that have an administered far-end IP address. If the H.323 signaling group does not have an administered far-end IP address the test aborts.

The test determines the local C-LAN through which the signaling originates and the far-end terminating IP address. It then requests the local C-LAN to execute a PING on the far-end address. If the ping is successful, the test passes, if the PING is not successful, the test fails.

NOTE:
Multiple failures of this test can take the H.323 signaling group out of service.

If the PING is successful, this test looks at the PING round trip delay. If a round trip delay of greater than 4 seconds is reported, a separate error is logged. Excessive round trip delays within the signaling group do not take the signaling group out of service.

Services can execute the standard **ping** command using the C-LAN board address and far-end IP address from the signaling group form to see the actual round-trip delay.

This test checks the circuitry involved in the data path of a peer-to-peer IP layer connection.

This nondestructive test runs due to in-line errors, during periodic and schedule maintenance, and on demand.

Table 8-162. TEST #1387 H.323 Signaling Group Ping Test

Error Code	Test Result	Description/ Recommendation
1005	ABORT	This signaling group has no administered far-end address. The test does not apply to this configuration.
2800	ABORT	A C-LAN ethernet port that corresponds to the near-end address of the signaling group has not been administered.
ANY	ABORT	Refer to ETH-PT, Test #1281, C-LAN port PING test for a more detailed description of the reasons for the abort.
ANY	FAIL	The far-end of the signaling group could not be reached. 1. Refer to ETH-PT, Test #1281, C-LAN port PING test for a more detailed description of the reasons for the failure.
	PASS	The system can PING the administered far-end address of the H323 signaling group.

MedPro Status Test (#1392)

This test is non-destructive.

Voice calls over H.323 signaling groups are carried by media processor resources. If there are no media processor resources in-service for the specified signaling group, the H323 B Channels are placed into out-of-service near-end, so that calls may flow to other trunk groups controlled by different signaling groups.

On the **ip-interfaces form**, the field `Inter-region IP connectivity allowed?` may be set to **y** or **n**. If the field is set to **n**, only media processors in the same region as the signaling group can carry calls.

This test determines if a media processor is in-service in the same region as the C-LAN that carries this signaling group. If the field is set to **y**, any media processor in the system can carry calls. This test determines if a media processor is in-service in any region.

Table 8-163. TEST #1392 MedPro Status Test

Error Code	Test Result	Description/ Recommendation
ANY	ABORT	Internal system Error.
	FAIL	No in-service Medpro ports exist for use by this signalling group. The H323 B Channels are placed into OOS-NE. 1. Check the system for errors against MEDPRO and MEDPROPT maintenance objects.
	PASS	In-service Medpro ports exist for use by this signaling group.

INADS (INADS Link)

The INADS Link MO represents the software and communications link required by the MCU to make a call to the Initialization and Administration System (INADS). The purpose of the INADS Link MO is to check the communications link between the MCU and INADS and to verify that the alarm notification process works correctly. An INADS technician can test the process remotely to verify that alarms are reported to INADS. Alternatively, a systems technician may want to test the connection while he or she is on-site at installation time or during subsequent service calls.

Although the INADS Link MO is never alarmed, the errors are logged. The errors are logged only after the test inads-link command is issued.

Alarm Level	Initial Craft Command to Run
None	test inads-link

Hardware Error Log Entries and Test to Clear Values

The Hardware Error Log entries are described as part of the INADS Link Test description.

Short and Long Test Sequences

The test inads-link command does not have a long or short option, and the test on the INADS Link does not have an associated test number. When the **test inads-link** command is issued, the user immediately sees either the “Command successfully completed” or “Command failed” message.

INADS Link Test (no test number)

The INADS Link Test attempts to place a call to INADS (in the background) to verify the communications link to INADS. When you enter the test inads-link command, you immediately see either “Command successfully completed” or “Command failed.” The “Command failed” message appears when a previously run test inads-link command is in progress, or if the system has active alarms that must be reported to INADS. The “Command successfully completed” command means the switch will attempt to call INADS in two minutes (the test still runs even if Alarm Origination is disabled). The two-minute delay allows a remote INADS technician time enough to hang up the call and, therefore, free up the INADS line so that the switch can call INADS back.

As error conditions are encountered, errors are logged against INADS. Error Codes 1 through 9 can be logged if the test result was “Command successfully completed,” and Error Codes 10 and 11 can be logged if the test result was

"Command failed." An error is also logged against INADS if the call to INADS finally succeeds. The INADS software (Release 3.2 or later) recognizes this special "test inads" type of alarm, and it automatically opens and then closes a trouble ticket indicating that the reason for the trouble ticket is a test inads-link command. The trouble ticket alarm contains a TESTING INADS LINK description field.

Table 8-164. INADS Link Error Log Entries Test #

Error Code	Test Result	Description Recommendation
1	0	The call was successfully placed to INADS. No trouble was found.
2	0	Alarm origination was disabled at the time of the test. The test still runs even if alarm origination is disabled. 1. If you want alarm origination, enable this feature via the Maintenance-Related System Parameters form. 2. Repeat the test.
3	0	The INADS connection is currently in use. 1. Wait 10 minutes. Then retry the command.
4	0	INADS did not answer the alarm origination bell. 1. Verify that INADS is up and running. 2. Verify that the INADS phone number and the switch product ID are correct via the Maintenance-Related System Parameters form. 3. Enable alarm origination via the Maintenance-Related System Parameters form, and test PR-MAINT (Maintenance/Tape Processor) by issuing the test processor a/b command. If PR-MAINT Tests 102 and 103 do not pass, refer to PR-MAINT maintenance documentation. 4. Retry the command.
5	0	No INADS phone number is administered. 1. Administer the INADS phone number via the Maintenance-Related System Parameters form. 2. Retry the command.
6	0	INADS did not send the acknowledgment message to the "test inads alarm" message. 1. Verify that the INADS phone number and the switch product ID are correct via the Maintenance-Related System Parameters form. 2. Verify that INADS is up and running. 3. Retry the command.

Table 8-164. INADS Link Error Log Entries Test #

Error Code	Test Result	Description Recommendation
7	0	INADS sent a negative acknowledgment to the “test inads alarm” message. 1. Verify that the product ID on the switch and in the INADS database are the same. Use the Maintenance-Related System Parameters form to determine the product ID of the switch. 2. Rerun the test.
8	0	INADS sent an unknown acknowledgment to the “test inads alarm” message.
9	0	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
10	0	There is already a test inads-link command in progress. 1. Wait 10 minutes for the command to finish. 2. Review the results of the command by viewing the Error Log and selecting the “Inads-link” category.
11	0	The switch is trying to report alarms to INADS. The test cannot be run at this time. 1. Wait 10 minutes. They retry the command.

ISDN-LNK (ISDN-PRI Signaling Link Port)

MO Name (in Alarm Log)	Alarm Level	Initial Command to Run*	Full Name of MO
ISDN-LNK†	MINOR	test port PCSSpp l	ISDN-PRI Signaling Link Port
ISDN-LNK	WARNING	test port PCSSpp sh	ISDN-PRI Signaling Link Port

* Where 'pp' is '24' for 24-channel interfaces, and '16' for 32-channel interfaces.

† For additional repair information, see also DS1-BD (DS1 Interface Circuit Pack) or UDS1-BD (Universal DS1 Interface Circuit Pack) Maintenance documentation.

NOTE:
Use this Maintenance Object (ISDN-LNK) for maintenance tests, alarms, and hardware errors when the "ISDN-PRI over PACCON" option on the Customer Options form is set to a **n**. When the ISDN PRI over PACCON is set to **y**, use Maintenance Object ISDN-PLK.

When the ISDN-PRI over PACCON option is set to **n**, the ISDN-PRI D-channel call control messages are transmitted over the TDM bus to the Processor Interface circuit pack and you must use this Maintenance Object for PRI Link problems.

An ISDN-PRI Signaling Link is known as a D-channel. D-channels are used to transmit call control signaling for B-channels. The call control signaling for the B-channels is combined and carried over separate ISDN-PRI D-channels. User information (for example, digitized voice, digital data) channels are known as bearer channels (B-channels); DS1 ISDN Trunks are B-channels and they carry the user traffic. PRI endpoint ports are also B-channels that can carry Wideband traffic.

The ISDN-PRI Signaling Link Port (ISDN-LNK) and the associated DS1/UDS1 ISDN Trunk (ISDN-TRK) or PRI endpoint port (PE-BCHL) use ports on a TN767 or TN2207 DS1/UDS1 interface circuit pack (the TN722 cannot be used for this application). The TN767 is used for 24 channel 1.544 Mbps systems. The TN2207 is used for 32 channel 2.048 Mbps systems. The TN2207 can be used for either 24 or 32 channel systems. A description of these circuit packs appears in "DS1-BD" or "UDS1-BD".

In a 24 channel system, the DS1 ISDN Trunk or PRI endpoint port (B-channels) may use any of the first 23 ports. The ISDN-PRI Signaling Link Port must be the 24th port. In certain configurations (NFAS), the 24th port may be used as a B-channel. Refer to "ISDN-PRI Signaling Group" for further details.

In a 32 channel system, the DS1/UDS1 ISDN Trunk or PRI endpoint port (B-channels) may use any of the ports 1-15 or 17-31, but the ISDN-PRI Signaling Link Port must be the 16th port. In certain configurations (NFAS), the 16th port may be used as a B-channel. Refer to the ISDN-PRI Signaling Group (ISDN-SGR) Maintenance documentation for further details.

ISDN-LNK handles maintenance and recovery for the D-channel port on the DS1 carrying the signaling link. A problem with the ISDN-PRI Signaling Link Port (D-channel) has an effect on all of the associated DS1 ISDN Trunks or PRI endpoint ports (B-channels) since no call control information can be conveyed to the far-end side without it. Stable calls may remain operational, but no new calls can be made.

Error Log Entries and Test to Clear Values

Table 8-165. ISDN-PRI Signaling Link Port Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	test port PCSSpp sh r 1
	Run the short test sequence first. If all tests pass, run the long test sequence. Refer to the appropriate test description and follow the recommended procedures 'pp' is '24' for 24-channel interfaces, and '16' for 32-channel interfaces.				
18	0	busyout port PCSSpp	WARNING	OFF	release port PCSSpp
	'pp' is '24' for 24-channel interfaces, and '16' for 32-channel interfaces.				
130		None	WARNING	ON	test port PCSSpp sh
	Indicates that the circuit pack has been removed or has been insane for more than 11 minutes. To clear, reinsert or replace the circuit pack. 'pp' is '24' for 24-channel interfaces, and '16' for 32-channel interfaces.				
1537		NPE Crosstalk Test #6	MINOR	ON	test port PCSSpp l r 3
	The actual alarming level depends on the options chosen via the **set options** command on the Manager terminal. ISDN-PRI Signaling Link Port alarms are treated as Station alarms, and their default alarming option is to downgrade all alarms to Warning. The value shown in the preceding table indicates the normal, unfiltered case (option "**y**" on the Set Options form). 'pp' is '24' for 24-channel interfaces, and '16' for 32-channel interfaces.				

System Technician-Demanded Tests: Descriptions and Error Codes

Always investigate tests in the order presented in the table below. By clearing error codes associated with the *NPE Crosstalk Test*, for example, you may also clear errors generated from other tests in the testing sequence. The command line entry to test the ISDN-LNK MO is: **test port PCSSxx (sh or l)**, where 'xx' is '24' for 24-channel interfaces, and '16' for 32-channel interfaces.

Table 8-166. System Technician-Demanded Tests: ISDN-LNK

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
NPE Crosstalk Test (#6)	Long		No
Signaling Link Board Check (#643)	Short	Long	No

NPE Crosstalk Test (#6)

The NPE Crosstalk Test verifies that this port's NPE channel talks on the selected time slot and never crosses over to time slots reserved for other connections. If the NPE is not working correctly, one-way and noisy connections may be observed. This test is usually only part of a port's Long Test Sequence and takes about 20 to 30 seconds to complete. This test runs only if the Processor Interface

link corresponding to this ISDN-LNK MO is busied out by system technician. The Processor Interface link number can be determined from the Communication-Interface Links form.

Table 8-167. NPE Crosstalk Test #6

Error Code	Test Result	Description / Recommendation
	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at 1-minute intervals a maximum of 5 times.
1000	ABORT	System resources for this test are not available. The ISDN-PRI link may be up and servicing calls. First obtain the ISDN-PRI link number (lnk-no) from the Communication-Interface Links form by issuing the display communication-interfaces links command. Then, determine the status of the ISDN-PRI link via the status link lnk-no command. If the link is in-service, this test aborts. Therefore, to run this test, the link must be busied out. No new ISDN-PRI calls can be made while the link is in the busied-out state. 1. If the test must be run, busyout the link. 2. Retry the command.
1001	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at 1-minute intervals a maximum of 5 times.
1002	ABORT	The system could not allocate time slots for the test. The system may be under heavy traffic conditions or it may have time slots out-of-service due to TDM-BUS errors. Refer to TDM-BUS (TDM Bus) Maintenance to diagnose any active TDM-BUS errors. 1. If the system has no TDM-BUS errors and is not handling heavy traffic, repeat the test at 1-minute intervals a maximum of 5 times.
1003	ABORT	The system could not allocate a tone receiver for the test. The system may be oversized for the number of Tone Detectors present or some Tone Detectors may be out-of-service. 1. Look for TTR-LEV errors in the Error Log. If present, refer to TTR-LEV (TTR Level) Maintenance documentation. 2. Look for TONE-PT errors in the Error Log. If present, refer to TONE-PT (Tone Generator) Maintenance documentation. 3. If neither condition exists, retry the test at 1-minute intervals a maximum of 5 times.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at 1-minute intervals a maximum of 5 times.
2020	ABORT	The test did not run due to an already existing error on the specific port or a more general circuit pack error. 1. Examine Error Log for existing errors against this port or the circuit pack and attempt to diagnose the already existing error.

Table 8-167. NPE Crosstalk Test #6

Error Code	Test Result	Description / Recommendation
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at 1-minute intervals a maximum of 5 times.
Any	FAIL	The NPE of the tested port was found to be transmitting in error. This causes noisy and unreliable connections. 1. Replace the DS1-BD Interface circuit pack.
	PASS	The port is able to communicate over the TDM Bus.

Signaling Link Board Check (#643)

This ISDN-PRI Signaling Link Port D-channel depends on the health of the DS1 Interface circuit pack. This test checks the state of the DS1 Interface circuit pack transporting the ISDN-PRI Signaling Link Port.

Table 8-168. Signaling Link Board Check Test #643

Error Code	Test Result	Description / Recommendation
	ABORT	Internal system error 1. Retry the command at 1-minute intervals a maximum of 5 times.
1700	ABORT	Rollabout video abort. The PRI terminal adapter associated with this D-channel port is detached from the circuit pack. This is a normal abort when the rollabout video feature is enabled. To complete test on this port, either: 1. Re-attach the disconnected PRI terminal adapter and retry test command, or 2. Disable the rollabout video feature on this circuit pack by entering change ds1 PCSS and set the field "Alarm when PRI Endpoint Detached?" to "y."
8	FAIL	The DS1 circuit pack is not in-service. 1. Check the Hardware Error Log for entries logged against DS1-BD and consult the DS1-BD (DS1 Interface Circuit Pack) Maintenance documentation for repair procedures.
	PASS	The DS1 Interface circuit pack transporting the ISDN-PRI Signaling Link Port is in-service.

ISDN-PLK (ISDN-PRI Signaling Link Port)

MO Name (in Alarm Log)	Alarm Level	Initial Command to Run*	Full Name of MO
ISDN-PLK†	MINOR	test port PCSSpp l	ISDN-PRI Signaling Link Port
ISDN-PLK	WARNING	test port PCSSpp sh	ISDN-PRI Signaling Link Port

* Where 'pp' is '24' for 24-channel interfaces, and '16' for 32-channel interfaces.

† For additional repair information, see also PKT-CTRL (Packet Control), DS1-BD (DS1 Interface Circuit Pack) or UDS1-BD (Universal DS1 Interface Circuit Pack).

NOTE:
Use this Maintenance Object (ISDN-PLK) for maintenance tests, alarms, and hardware errors when the "ISDN-PRI over PACCON" option on the *system-parameters customer* form is set to a "**y**" When the ISDN PRI over PACCON is set to "**n**" use Maintenance Object ISDN-LNK.

The ISDN-PRI over PACCON option allows the PRI Links to be carried over the PACCON (Packet Controller TN794 circuit board), increasing the system ISDN-PRI capacity to the possible number of D-channels. An ISDN-PRI Signaling Link is known as a D-channel. The D-channel is used to transmit call-control signaling for the B-channels. B-channels (User information channels) are known as bearer channels (B-channels for example, transmit digitized voice, digital data); DS1 ISDN Trunks are B-channels and they carry the user traffic. PRI endpoint ports are also B-channels that can carry Wideband traffic. The call control signaling for the B-channels is combined and carried over the separate ISDN-PRI Signaling Link Port D-channel.

The ISDN-PRI Signaling Link Port is the port on a TN2207 UDS1 Interface circuit pack that carries D-channel messages to the processor. The ISDN-PRI interface uses out-of-band signaling as opposed to robbed-bit, in-band signaling. For the MCU, this port can be used as an interface to the TDM bus or to the Packet bus. This is controlled by the "ISDN-PRI over PACCON" option. When the option is set to "**y**" the ISDN-PRI D-channel messages are transmitted over the Packet bus to the Packet Control circuit pack. The associated maintenance object name of the UDS1 port used to carry the D-channel over the Packet Bus is ISDN-PLK.

The B-channels associated with a ISDN-PRI D-channel can use ports on the same circuit pack or ports on other TN2207 or TN767 DS1 Interface circuit packs (the TN722 cannot be used for this application).

The TN767 DS1 interfaces is used for 24 channel 1.544 Mbps systems. The TN2207 can be used for either 24 or 32 channel systems. The 32-channel (31 DS0 channels + 1 framing channel on a 2.048 Mbps link) are only supported on

TN2207 series circuit packs. A description of these circuit packs appears in DS1-BD or UDS1-BD maintenance documentation.

In a 24 channel system, the DS1 ISDN Trunk or PRI endpoint port (B-channels) may use any of the first 23 ports. The ISDN-PRI Signaling Link Port must be the 24th port. In certain configurations (NFAS), the 24th port may be used as a B-channel. Refer to the ISDN-PRI Signaling Group (ISDN-SGR) Maintenance documentation for further details.

In a 32 channel system, the DS1 ISDN Trunk or PRI endpoint port (B-channels) may use any of the ports 1-15 or 17-31, but the ISDN-PRI Signaling Link Port must be the 16th port. In certain configurations (NFAS), the 16th port may be used as a B-channel. Refer to the ISDN-PRI Signaling Group (ISDN-SGR) Maintenance documentation for further details.

ISDN-PLK handles maintenance and recovery for the D-channel port on the DS1 carrying the signaling link. A problem with the ISDN-PRI Signaling Link Port (D-channel) has an effect on all of the associated DS1 ISDN Trunks or PRI endpoint ports (B-channels) since no call control information can be conveyed to the far-end side or Terminal Adapter without it. Stable calls may remain operational, but no new calls can be made.

The ISDN-PRI Signaling Link Port (ISDN-PLK) itself depends on two other entities: the UDS1 interface circuit pack (TN2207) it resides on, and the Packet bus which provides the link to the processor. If there are problems with the ISDN-PLK, also investigate the TN2207 UDS1 interface circuit pack (UDS1-BD) and the packet bus (PKT-BUS).

Error Log Entries and Test to Clear Values

Table 8-169. ISDN-PRI Signaling Link Port Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	test port PCSSpp “pp” is 24-channel interfaces and 16 for 32-channel interfaces.
	Run the short test sequence first. If all tests pass, run the long test sequence. Refer to the appropriate test description and follow the recommended procedures. pp is 24-channel interfaces and 16 for 32-channel interfaces				
18	0	busyout port PCSSpp*	WARNING	OFF	release port PCSSpp
	The D-channel is demand busied out. No calls can be made over this D-channel.				

Table 8-169. ISDN-PRI Signaling Link Port Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
130		None	WARNING	ON	test port PCSSpp
	This error type indicates that the circuit pack has been removed or has been insane for more than 11 minutes. To clear the error, reinsert or replace the circuit pack.				
1537	46210		WARNING	OFF	
	"Link error" This error occurs when the port receives an invalid frame over the D-channel. This error normally indicates an off-board problem usually related to transmission errors on the DS1 facility. Execute the **list measurements ds1-log** command for the UDS1 TN2207 circuit pack on which the D-channel resides. If the UDS1 is reporting some errors, then the DS1 facility has experienced transmission problems which could have caused the ISDN-PLK to report a Link Error. If the UDS1 is not reporting errors, execute the long test sequence for the D-channel (ISDN-SGR). Investigate any errors, if there are none execute a long test sequence for the UDS1 circuit pack (UDS1-BD) and investigate any errors. If no errors are reported, the Link Error is probably not affecting service.				
1793					test board PCSSpp 1
	The UDS1 Interface circuit pack is out-of-service. Look for and resolve UDS1-BD errors in the Hardware Error Log.				
3585	46222		MINOR	ON	
	"Transmit FIFO Overflow error" This error indicates that the circuit pack is having problems transmitting data to the Packet Bus, thus affecting the conveyance of signaling information over the D-channel. Specifically, this error occurs when the Packet Bus transmit buffers overflow. This condition probably indicates a hardware problem. The actual alarming level depends on the options chosen via the **set options** command on the G3-MT terminal. ISDN-PRI Signaling Link Port alarms are treated as Station alarms, and their default alarming option is to downgrade all alarms to Warning. The value shown in the preceding table indicates the normal, unfiltered case (option "y" on the *Set Options* form).				
3841	46211				
	"Bad DLCI error" This error occurs when a LAPD frame is received across the DS1 facility which contains a DLCI which does not have a valid entry in the on-board translation memory. This error normally indicates an off-board problem usually related to a broken endpoint or a state mismatch between a remote endpoint and the local call processing software. Maintenance will not start any testing or generate any alarms in response to this error.				
3842	46223				
	"Receive FIFO Overflow error" This error occurs when the circuit pack detects an overflow of its receive buffers. If it occurs frequently, it may indicate a LAPD parameter mismatch between the two end-points of a packet switched connection. LAPD should be able to recover from this problem, but it may degrade the performance of the Packet Bus. Maintenance will not start any testing or generate any alarms in response to this error.				

Table 8-169. ISDN-PRI Signaling Link Port Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
3843		Signaling Port Packet Bus (LAN) Loopback test (#93			test port PCSSpp 1
	This error occurs when the *Signaling Port Packet Bus Loopback Test (#939)* fails. Run the long test sequence and pay particular attention to the results of *Test #939*.				

System Technician-Demanded Tests: Descriptions and Error Codes

Always investigate tests in the order presented in the table below when inspecting errors in the system. REMINDER: The command line entry to test the ISDN-PLK MO is: **test port PCSSpp (sh or l)**, where 'pp' is '24' for 24-channel interfaces, and '16' for 32-channel interfaces.

Table 8-170. System Technician-Demanded Tests: ISDN-PLK

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Signaling Port Bus Loopback Test (#939)	Long		Yes
Signaling Link Board Check (#643)	Short	Long	No

Signaling Link Board Check (#643)

This test checks the state of the UDS1 Interface circuit pack (TN2207) transporting the ISDN-PRI Signaling Link.

Table 8-171. Signaling Link Board Check Test #643

Error Code	Test Result	Description Recommendation
None	ABORT	Internal system error 1. Retry the command at 1-minute intervals a maximum of 5 times.
1700	ABORT	Rollabout video abort. The PRI terminal adapter associated with this D-channel port is detached from the circuit pack. This is a normal abort when the rollabout video feature is enabled. To complete test on this port, either: 1. Re-attach the disconnected PRI terminal adapter and retry test command, or 2. Disable the rollabout video feature on this circuit pack by entering change ds1 PCCSS and set the field "Alarm when PRI Endpoint Detached?" to "y."
8	FAIL	The UDS1 circuit pack (TN2207) is not in-service. 1. Check the Hardware Error Log for entries logged against UDS1-BD and consult the UDS1-BD (UDS1 Interface Circuit Pack) Maintenance documentation for repair procedures.
None	PASS	The UDS1 Interface circuit pack transporting the ISDN-PRI Signaling Link Port is in-service.

Signaling Port Packet Bus Loopback Test (#939)

This test verifies the connectivity of an ISDN-PRI Signaling Port (D-channel) across the Packet Bus, also known as the LAN bus. It will execute only if the port is busied out. Failure of this test indicates a fault associated with the port hardware on the circuit pack.

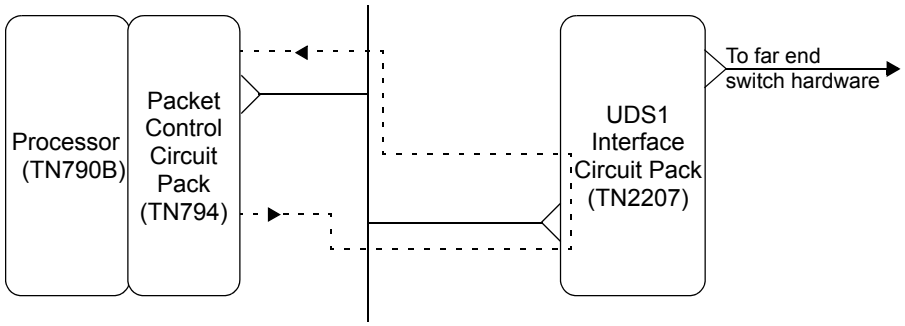


Figure 8-21. Signaling Port Packet Bus (LAN) Loopback

Table 8-172. Signaling Port Packet Bus Loop-Back Test #939

Error Code	Test Result	Description / Recommendation
1015	ABORT	The port is not in the out-of-service state. Use the busyout port PCSSpp command to place it in the out-of-service state and repeat this test **Warning**: The busyout will prevent new call originations on all B-channels in the signaling group until the port is released.
1139	ABORT	The Packet Bus in this port network is out of service. 1. Follow repair procedures for the Packet Bus 2. Enter test port PCSSpp long and check the results of this test (939).
1141	ABORT	The Packet Control circuit pack is out of service. 1. Follow the repair procedures for PKT-CTRL. 2. Enter test port PCSSpp long and check the results of this test (939).
1144	ABORT	The Packet Bus in the PPN is out of service. 1. Follow the repair procedures for the Packet Bus. 2. Enter test port PCSSpp long and check the results of this test (939).
2012	ABORT	Internal system error 1. Retry the command at 1-minute intervals a maximum of 5 times.

Table 8-172. Signaling Port Packet Bus Loop-Back Test #939

Error Code	Test Result	Description / Recommendation
2100	ABORT	Could not allocate the necessary system resources to run this test 1. Retry the command at 1-minute intervals a maximum of 5 times
	FAIL	The Loopback test has failed. 1. If this test fails repeatedly wait until all of the ports on the board are idle (not in use) and reset the circuit pack. To reset the circuit pack enter the commands busyout board PCSS and reset PCSS. 2. Repeat the test, and if the test continues to fail replace the circuit pack.
	PASS	Connectivity of the D-channel over the Packet Bus is operational.

ISDN-SGR (ISDN-PRI Signaling Group)

MO Name (in Alarm Log)	Alarm Level	Initial Command to Run*	Full Name of MO
ISDN-SGR	MINOR	test sig-group <group>	ISDN-PRI Signaling Group
ISDN-SGR	WARNING	test sig-group <group>	ISDN-PRI Signaling Group

* Where <group> is a number 1-8 and the test sequence can be either s (short) or l (long).

An ISDN-PRI Signaling Group is a collection of DS1/UDS1 ISDN Trunks or PRI endpoint ports (B-channels) for which a given ISDN-PRI Signaling Link Port (D-channel) carries signaling information. ISDN-PRI requires the use of one of the following DS1 interface circuit packs:

TN767	24-channel with ISDN-PRI D-channel over PI-BD
TN2207	24- or 32-channel with ISDN-PRI D-channel over PI-BD or PKT-CTRL (PACCON)

See DS1-BD and UDS1-BD Maintenance documentation for a description of these circuit packs. See *DS1/CEPT1/ISDN-PRI Reference*, 555-025-101, for more information on ISDN.

NOTE:
If a ISDN-PRI over PACCON (Packet Control Circuit pack) is to be used then only the TN2207 or later may be used for the D-channel Signaling.

For 24 channel interfaces, the first 23 ports on the circuit pack are used as B-channels. The 24th port may be used as a B-channel or as a D-channel depending on the type of Signaling Group used, as described below.

For 32 channel interfaces, ports 1-15 and 17-31 on the circuit pack are used as B-channels. The 16th port may be used as a B-channel or as a D-channel depending on the type of Signaling Group used, as described below.

There are two types of Signaling Groups:

- Facility Associated Signaling (FAS) (supported by all country protocols)
- Non-Facility Associated Signaling (NFAS) (supported by country protocol 1 only)

The figures following this discussion illustrate each of the configurations.

In an FAS Signaling Group, the 24th port of the DS1 Interface circuit pack (for 24 channel interfaces) or the 16th port of the DS1 Interface circuit pack (for 32 channel interfaces) is always the D-channel that carries signaling information for the other ports (B-channels) on the circuit pack. If a Packet Control circuit pack is used then only the TN2207 circuit pack may be used.

In an NFAS Signaling Group, the 24th port of a DS1 Interface circuit pack (for 24 channel interfaces) or the 16th port of a DS1 Interface circuit pack (for 32 channel interfaces) is administered as a D-channel. The D-channel carries signaling information for the other ports (B-channels) on that circuit pack. That D-channel can also carry signaling information for any of the ports on other DS1 Interface circuit packs in the NFAS Signaling Group. As a result, the 24th port on other 24-channel DS1 Interface circuit packs and the 16th port on other 32-channel DS1 Interface circuit packs can be used as B-channels. A D-channel in an NFAS Group can signal for B-channels on a total of 20 DS1 Interface circuit packs. This configuration is known as NFAS Simplex. If a Packet Control circuit pack is used then only the TN2207 circuit pack may be used to carry the D-channel, however other DS1/UDS1 interface circuit packs may be used to carry only B-channels.

In addition to NFAS Simplex, there is another type of NFAS Group called NFAS Duplex. This provides the user with more reliability, which is desirable because NFAS permits the D-channel to signal for so many B-channels. NFAS Duplex allows the administration of a backup D-channel, which remains in a Standby state until the Active D-channel goes down. If the Active D-channel does go down, the backup D-channel takes over and provides signaling for all the B-channels in the signaling group. In the case that a Packet Control circuit pack is used then only the TN2207 may be used to carry the D-channels. B-channels may be carried by any DS1/UDS1 interfaces.

The ISDN-PRI Signaling Group itself depends on three other entities: the DS1 Interface circuit pack on which the D-channel(s) resides, the ISDN-PRI Signaling Link Port(s), and the interface link that provides connectivity to the processor (the Packet Control circuit pack). If there are any problems with the ISDN-PRI Signaling Group, also investigate the ISDN-PRI Signaling Link Port(s), the DS1 Interface circuit pack(s), and the Packet Control circuit pack.

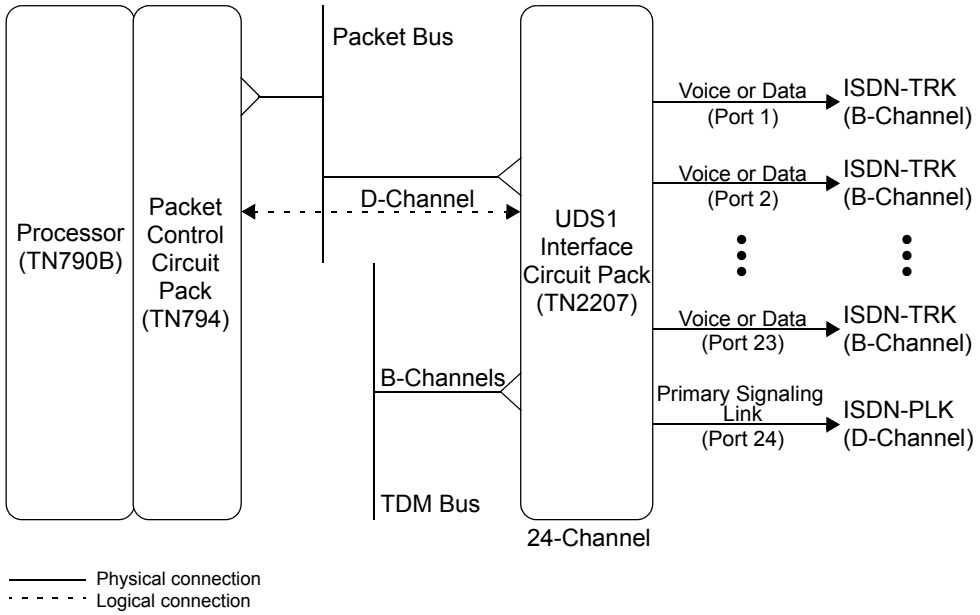


Figure 8-22. FAS ISDN-PRI Over PACCON Signaling Group (24 Channel)

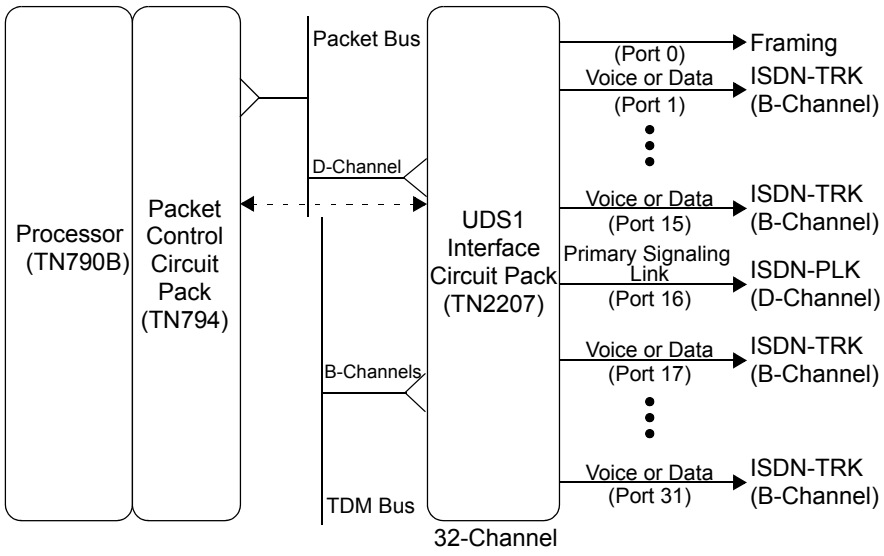


Figure 8-23. FAS ISDN-PRI Over PACCON Signaling Group (32 Channel)

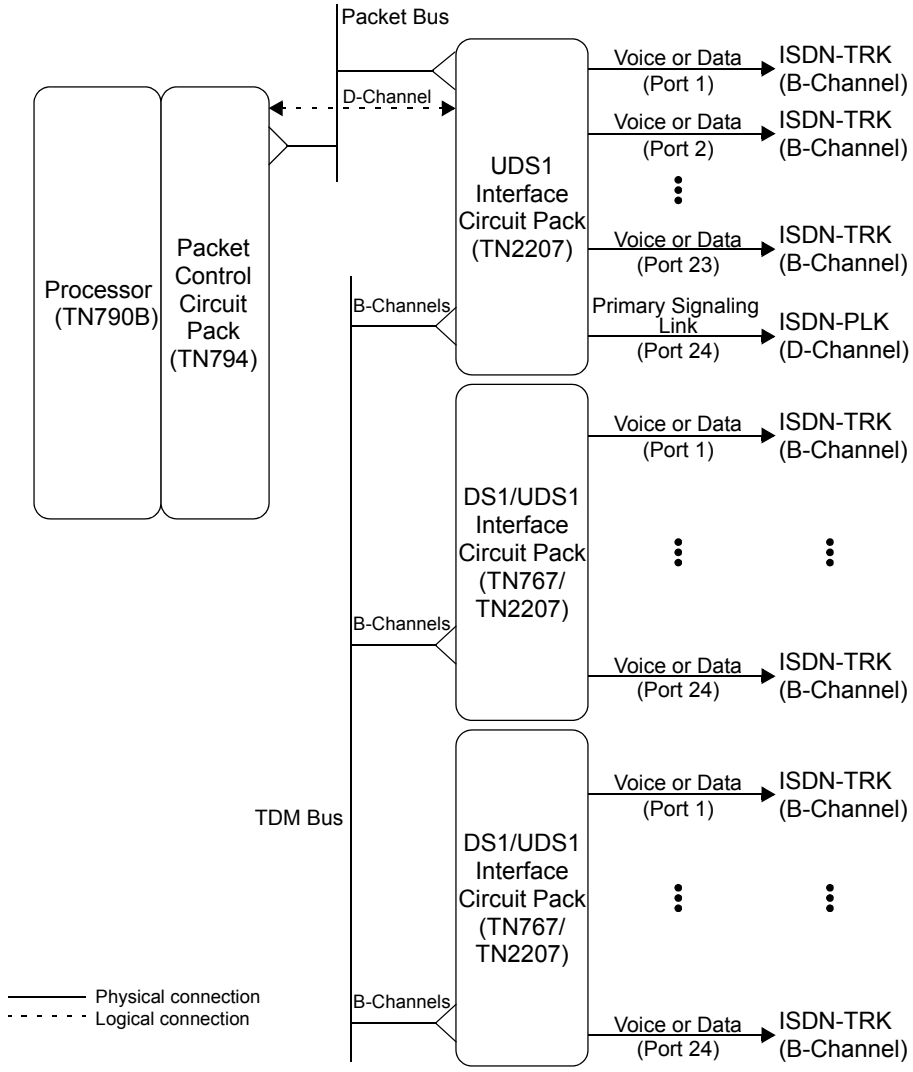


Figure 8-24. NFAS Simplex ISDN-PRI Over PACCON Signaling Group (24 Channel)

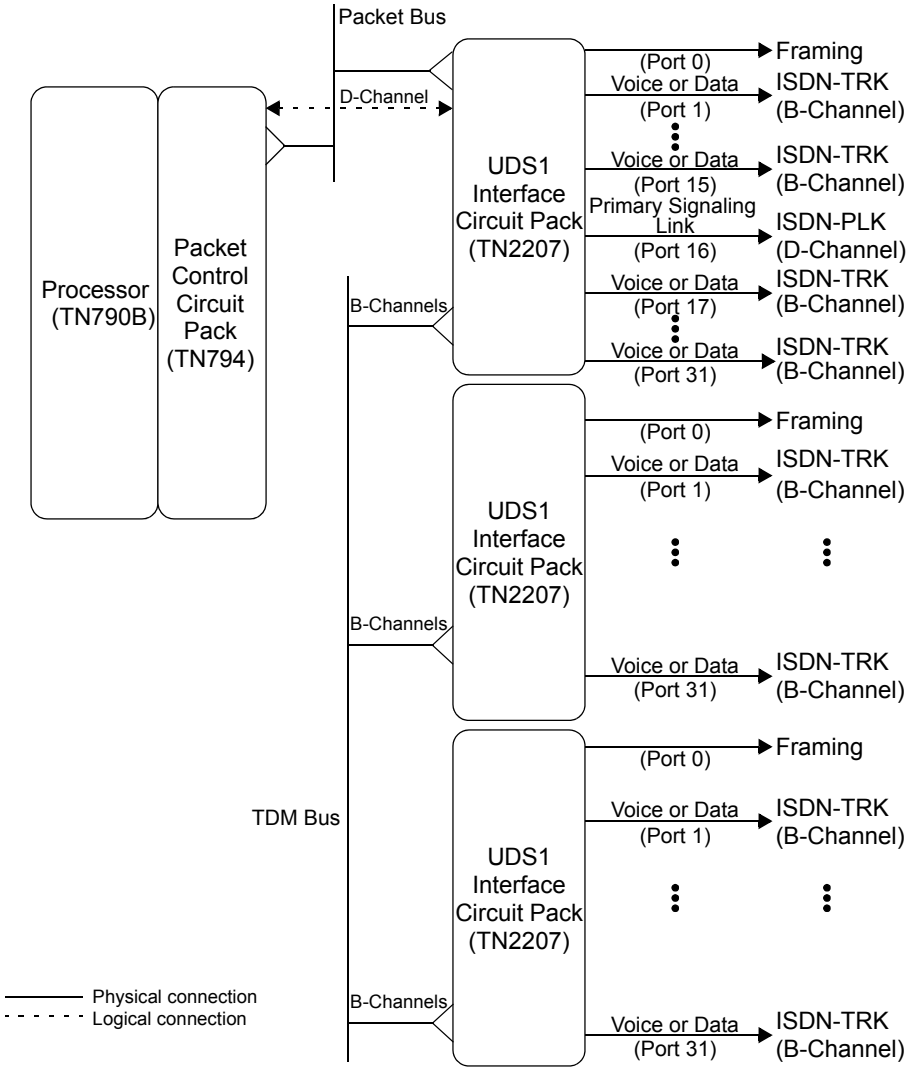


Figure 8-25. NFAS Simplex ISDN-PRI Over PACCON Signaling Group (32 Channel)

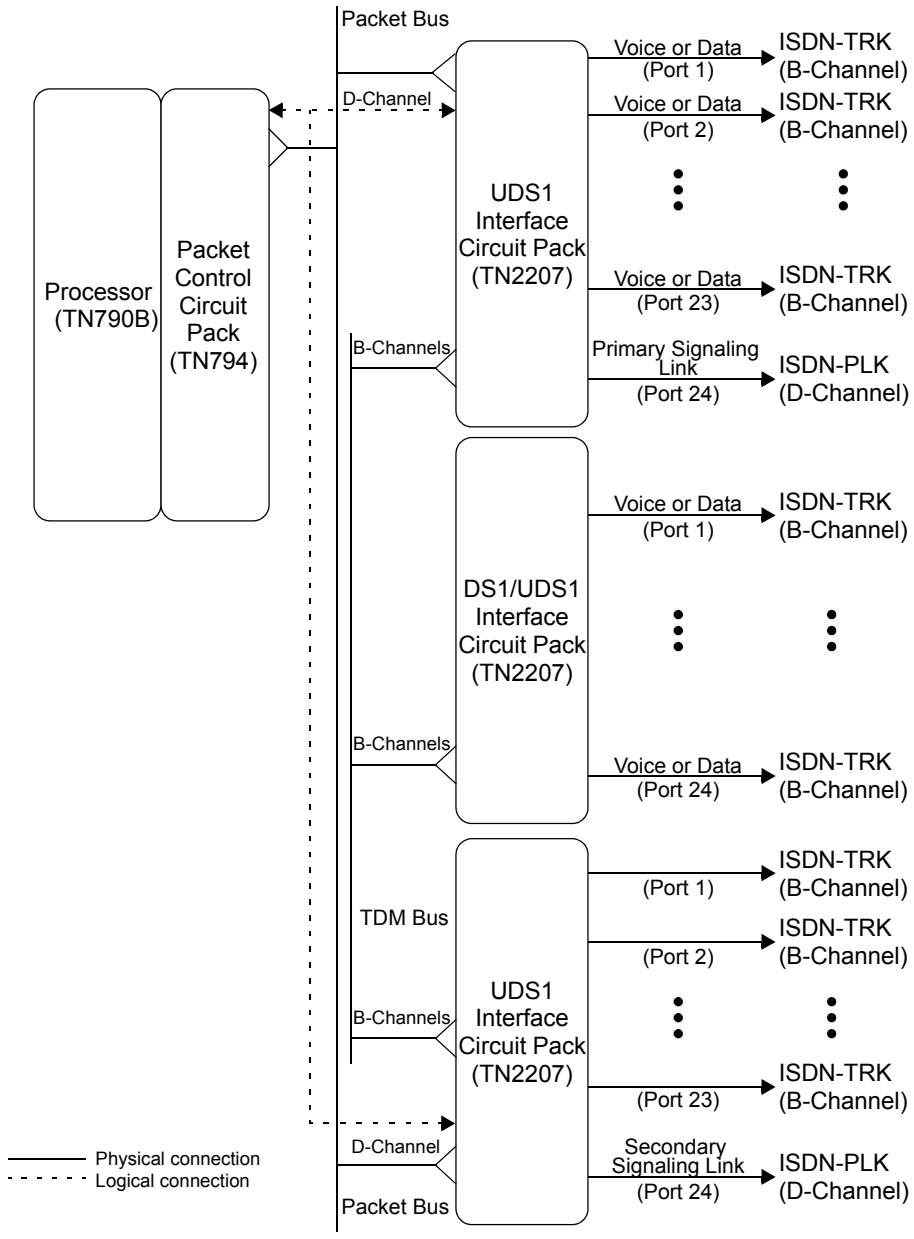


Figure 8-26. NFAS Duplex ISDN-PRI Over PACCON Signaling Group (24 Channel)

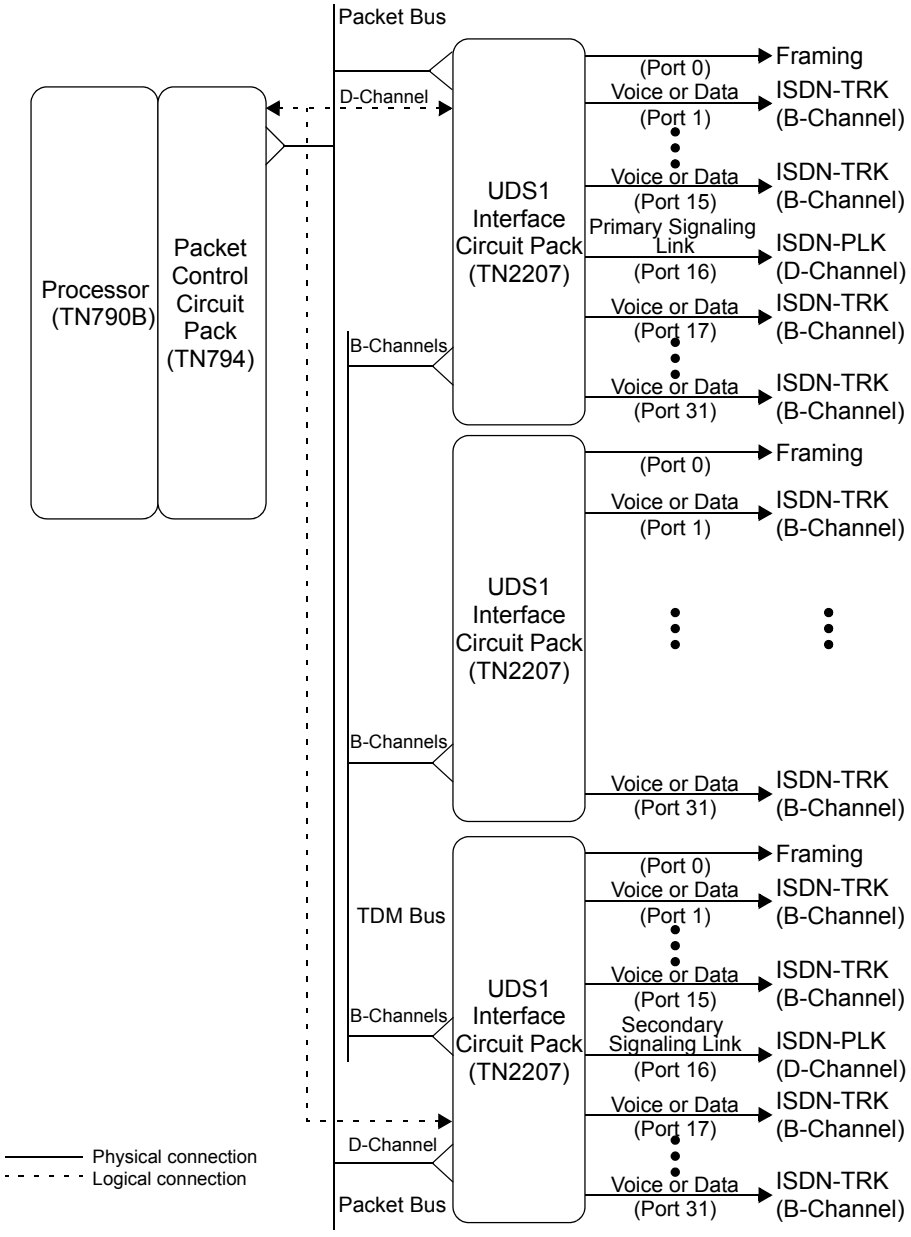


Figure 8-27. NFAS Duplex ISDN-PRI Over PACCON Signaling Group (32 Channel)

Error Log Entries and Test to Clear Values

Table 8-173. ISDN-PRI Signaling Group Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any		test sig-group <group>
	Run the Short or Long Test Sequence. Refer to the appropriate test description and follow the recommended procedures.				
1	Any	none			
	This MCU sent a message to the far-end switch or terminal adapter, and the far-end did not respond in the allotted time. Possible causes include link failure and congestion or outage at the far-end. The Aux Data field contains Layer 3 protocol information used by internal counters. If no other symptoms are not present, no action is required. If Layer 3 communication is down, there should be indications in the form of alarms and errors for link components. Check out other errors against ISDN-SGR, ISDN-TRK, and other hardware components on the link. There is no test to clear these errors. The error counter is decremented by 1 every 15 minutes.				
257	Any	none			test sig-group <group>
	This error indicates that the primary signaling channel connection has been lost for more than 90 seconds. If a secondary signaling channel does not exist or is not in-service, the associated B-channels will be placed in the ISDN Maintenance/Far-End state. The B-channels will not be usable for outgoing calls, although incoming calls will still be accepted. The MCU will automatically attempt to recover the signaling link. Pay particular attention to the results of Test #636 (Primary Signaling Link Hardware Check) in the test sequence. When the link does recover, the B-channels will be negotiated back to the In-Service state and their alarms will be retired. When this error occurs, the state of the Signaling Group is changed to out-of-service (verify using the **status sig-group** command).				
513	Any	none			test sig-group <group>
	This error indicates that the secondary signaling channel connection has been lost for more than 90 seconds. If the primary signaling channel is not in-service, B-channels will be placed in the ISDN Maintenance/Far-End state. The B-channels will not be usable for outgoing calls, although incoming calls will still be accepted. The MCU will automatically attempt to recover the signaling link. Pay particular attention to the results of Test #639 (Secondary Signaling Link Hardware Check) in the test sequence. When the link does recover, the B-channels will be negotiated back to the In-Service state and their alarms will be retired. When this error occurs, the state of the Signaling Group is changed to out-of-service (verify using the **status sig-group** command).				

Table 8-173. ISDN-PRI Signaling Group Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
769	Any	Primary Signaling Link Hardware Check (#636)			test sig-group <group>
1025	Any	Secondary Signaling Link Hardware Check (#639)			test sig-group <group>
1793	Any	Layer 2 Status (Test #647)	WARNING	OFF	test sig-group <group>
	This error indicates a failure of the Layer 2 Status Query Test for the primary signaling channel				
2049	Any	Layer 2 Status (Test #647)	WARNING	OFF	test sig-group <group>
	This error indicates a failure of the Layer 2 Status Query Test for the secondary signaling channel.				
2305	Any	Remote Layer 3 Query (Test #637)	MINOR	OFF	test sig-group <group>
	A specific message was sent to the far-end side, and it did not respond within the allotted time. Investigate elements of the ISDN PRI D-channel(s) (ISDN-LNK, ISDN-PLK, ISDN-SGRP, PI-LINK, PI-PT, PKT-CTRL) for both this MCU and the Far-end side. If Test #637 fails twice in a row, the B-channels will be alarmed and made unavailable for outgoing calls (although incoming calls will still be accepted). When Test #637 succeeds and the Far-end side starts responding properly, the DS1 ISDN Trunk (B-channels) will be placed back into normal operation and their alarms will be retired.				
3585	p, t number	none	-	-	none
	A SERV or SERV ACK ISDN D-channel message has been received by a non-US-type interface (country option other than `1` on the DS1 administration form). However, these messages are used only for duplex NFAS signaling which is supported only by country protocol 1. Thus, there may be a mismatch in administration between the local and far-end switches. Consult with the customer's network provider to determine whether the D-channel is set up correctly on the far-end switch.				

Table 8-173. ISDN-PRI Signaling Group Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
3840	p, t number	-	-	-	none
	This error code is used to report certain error messages received by the ISDN-PRI Signaling Group for one of its associated B-channels. The aux data field shows for which B-channel (port number) the message was received. The error code generated equals 3840+*x*, where *x* is a Cause Value defined by the ISDN PRI Specification. Note that there is no Test to Clear Value for these error types; selected ISDN cause values are placed in the log when they are received, but no direct action or alarming is performed solely in response to receiving them. They provide added data that may prove useful when tracking down obscure networking and routing problems.				
3842	p, t number				none
	A request has been made to use a transit network or common carrier that cannot be accessed. 1. From the circuit pack and port number (in the Aux Data field), determine the trunk group against which the error was reported. 2. Check all routing patterns containing this trunk group for validity of interexchange carriers requested (IXC field).				
3846	p, t number				none
	The far-end switch has indicated that the B-channel (trunk) is not acceptable for use in the call for which it was requested. This could indicate an administration problem (for example, the local switch and the far-end switch have different B-channels administered), or could reflect the occurrence of a normal race condition (for example, the local switch has requested use of a B-channel which the far-end switch had just reserved for use on another call). 1. From the circuit pack and port number (in the Aux Data field), determine the trunk group against which the error was reported. 2. Issue the **status trunk** command for the indicated trunk. 3. Refer to the "DS1 ISDN Trunk Service States" and "ISDN-PRI Trunk Service States" sections of ISDN-TRK for recovery suggestions.				
3858	p, t number				none
	The switch sent an ISDN message to the far-end switch or terminal adapter which did not respond in the allotted time. Possible causes include link failure and congestion or outage at the far-end.				

Table 8-173. ISDN-PRI Signaling Group Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
3878	p, t number				none
	The far-end switch has indicated that the network is not functioning correctly and that the condition may last a relatively long period of time (for example, immediately re-attempting the call may not be successful). 1. From the circuit pack and port number (in the Aux Data field, determine the trunk group against which the error was reported. 2. Consult with the network provider to determine the nature and expected duration of the out of service condition. 3. Consider modifying all routing patterns containing this trunk group, to route calls around the network which is out of service.				
3890	p, t number				none
	A request to use a network service (e.g., SDN) has been denied. Administration somewhere on the network has indicated that the requested service has not been subscribed to or purchased for this trunk. This could be a local administration problem only, or a mismatch between the local administration and that of the network provider. 1. From the circuit pack and port number (in the Aux Data field), determine the trunk group against which the error was reported. 2. Display the trunk group form: If the trunk group is Call-by-Call (Service Type is "cbc"), check all routing pattern forms containing this trunk group to see if the Service/Feature fields contain the correct network services purchased for this trunk. If the trunk group is not Call-by-Call, check that the Service Type field contains the single network service purchased for this trunk. If local administration appears correct, consult with the customer and/or the network provider to determine the services that the customer has subscribed to for this trunk group.				
3892	p, t number				none
	Protocol detail; may offer a clue if customer is having ISDN calls denied with an unexpected intercept tone. If customer is complaining of unexpected intercept tones when accessing ISDN trunks or PRI endpoints and no other cause can be found, provide the next tier with this Error Log information.				
3894	p, t number				none
	Protocol detail; may offer a clue if customer is having ISDN calls denied with an unexpected intercept tone. First, eliminate any transitory state mismatch problems by issuing the **test port PCSSpp** command for the trunk port shown in the aux data field. Test #256 (Service State Audit) is the important test in the sequence. If this passes satisfactorily, yet the customer continues to complain of unexpected intercept tones when accessing ISDN trunks or PRI endpoints and no other cause can be found, provide the next tier with this Error Log information.				

Table 8-173. ISDN-PRI Signaling Group Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
3905	p, t number				none
	Protocol detail; may offer a clue if customer is having ISDN calls denied with an unexpected intercept tone. If customer is complaining of unexpected intercept tones when accessing ISDN trunks or PRI endpoints and no other cause can be found, provide the next tier with this Error Log information.				
3906	p, t number				none
	Protocol detail; may offer a clue if customer is having ISDN calls denied with an unexpected intercept tone. If customer is complaining of unexpected intercept tones when accessing ISDN trunks or PRI endpoints and no other cause can be found, provide the next tier with this Error Log information.				
3909	p, t number				none
	A request to use a network service has been made, but the network has rejected the request because the requested service is not implemented. Follow the recommendations listed for error type 3890.				
3928	p, t number				none
	A call was denied because of a basic incompatibility between the type of call and either the facilities selected by the routing pattern or the called user itself. This error might be helpful as a clue if the customer complains of receiving unexpected intercept tone after accessing ISDN trunks or PRI endpoints. Determine the trunk group from the circuit pack and port number (in the aux data field) and then check the BCC fields of the pertinent routing patterns. Also, investigate whether or not the calling and called endpoints are compatible (for example, some ISDN switches may not allow a voice station to call a data extension).				

System Technician-Demanded Tests: Descriptions and Error Codes

Always investigate tests in the order presented in the table below. By clearing error codes associated with the *Primary Signaling Link Hardware Check*, for example, you may also clear errors generated from other tests in the testing sequence.

Table 8-174. System Technician-Demanded Tests: ISDN-SGR

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Primary Signaling Link Hardware Check (#636)	Short	Long	No
Secondary Signaling Link Hardware Check (#639)	Short	Long	No
Layer 2 Query Test (#647)	Short	Long	No
Remote Layer 3 Query Test (#637)	Short	Long	No

Primary Signaling Link Hardware Check (#636)

The ISDN-PRI Signaling Link Port itself depends on the health of the DS1/UDS1 Interface circuit pack on which it resides. This test will fail if there are problems with either the ISDN-PRI Primary D-channel port or the DS1/UDS1 circuit pack. The ISDN-PRI Primary D-channel also depends on the health of either the Processor Interface Link or the Processor Control circuit pack providing connectivity to the DS1/UDS1 circuit pack.

If there are problems with the ISDN-PRI Signaling Link, also investigate the DS1/UDS1 circuit pack (DS1-BD/UDS1-BD) and the Processor Interface Link or Packet Control (PI-LINK/PACCON) depending upon which is used.

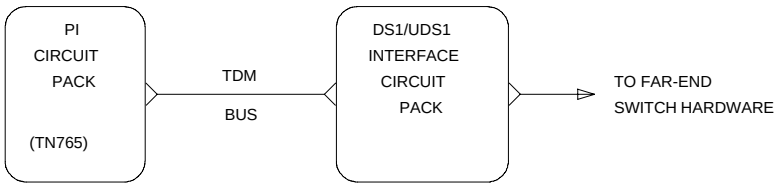


Figure 8-28. Primary Signaling Link Hardware Check (Test #636)

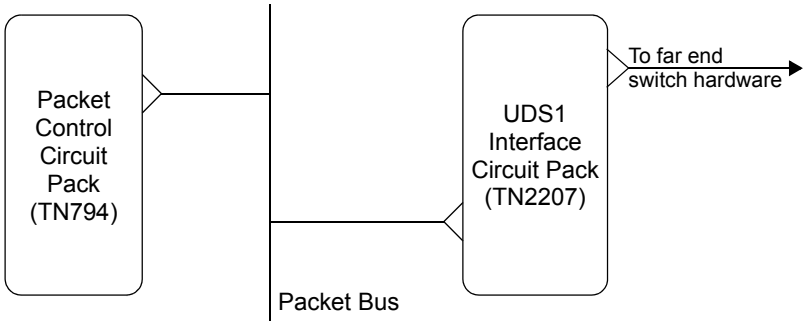


Figure 8-29. PRI over PACCON Primary Signaling Link Hardware Check (Test #636)

Table 8-175. Primary Signaling Link Hardware Check Test #636

Error Code	Test Result	Description / Recommendation
	ABORT	Internal system error 1. Retry the command at 1-minute intervals a maximum of 5 times.
1700	ABORT	Rollabout video abort. The PRI terminal adapter associated with this D-channel port is detached from the circuit pack. This is a normal abort when the rollabout video feature is enabled. To complete test on this port, either: 1. Re-attach the disconnected PRI terminal adapter and retry test command, or 2. Disable the rollabout video feature on this circuit pack by entering change ds1 PCSS and set the field "Alarm when PRI Endpoint Detached?" to "y".

Table 8-175. Primary Signaling Link Hardware Check Test #636

Error Code	Test Result	Description / Recommendation
4	FAIL	There is a problem with the Processor Interface Link. No DS1 ISDN Trunk (B-channel) or wideband PRI Endpoint calls can be made until the problem is resolved. 1. Display the Communication-Interface Links Form to determine which link is down (find the one that matches the DS1 interface circuit pack this ISDN-PRI Signaling Link Port is on) and then consult the procedures for Processor Interface Link.
8	FAIL	There is a problem with the DS1/UDS1 Circuit Pack, or the ISDN-PRI Signaling Channel (D-channel). No DS1 ISDN Trunk (B-channel) or wideband PRI Endpoint calls can be made until the problem is resolved. 1. Consult the procedures for DS1/UDS1 Circuit Pack and the ISDN-PRI Signaling Channel (ISDN-LNK/ISDN-PLK).
	PASS	The basic physical connectivity of the primary D-channel is intact and functional. Try this test repeatedly to ensure the link is up and to uncover any transitory problems.

Remote Layer 3 Query (#637)

This test will query the far-end switch or terminal adapter to determine if the signaling connection is functioning properly at Layer 3. It will select a B-channel in the in-service or maintenance service state and send an ISDN Layer 3 SERVice message, which requires a response from the far end (similar to performing Test #256 on an ISDN trunk. The test will not be performed if there are no B-channels in an appropriate ISDN service state (as when none are administered or they are all out of service).

NOTE:
The service state can be displayed by using the **status trunk <trunk group/trunk member>** or **status pri-endpoint** command.

As is the case with Test #256 for an ISDN trunk, a PASS only indicates that a message was composed and sent to the far-end switch or terminal adapter. The ISDN PRI Specification allows up to 2 minutes for a response. Check the Error Log for ISDN-SGR (ISDN-PRI Signaling Group) errors of type 2305 for evidence of a Remote Layer 3 Query failure.

Tests #639 and #636 check the health of the D-channels and DS1/UDS1 Interface Circuit Packs. As shown in the figures below, Test #637 goes one step further by checking the communication path from the processor, through the Processor Interface or Packet Control circuit pack over the TDM or Packet Bus through the DS1/UDS1 Interface circuit pack, and on to the far-end switch or terminal adapter. A special ISDN message is sent to the far-end switch or terminal adapter, which must respond within a specified amount of time. This test is designed to ensure that the communication path between the switch and the far-end is up and

operational, and that the two endpoints can properly exchange ISDN control messages.

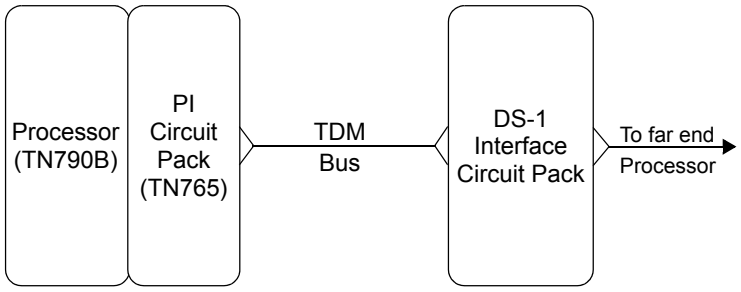


Figure 8-30. Remote Layer 3 Query (Test #637)

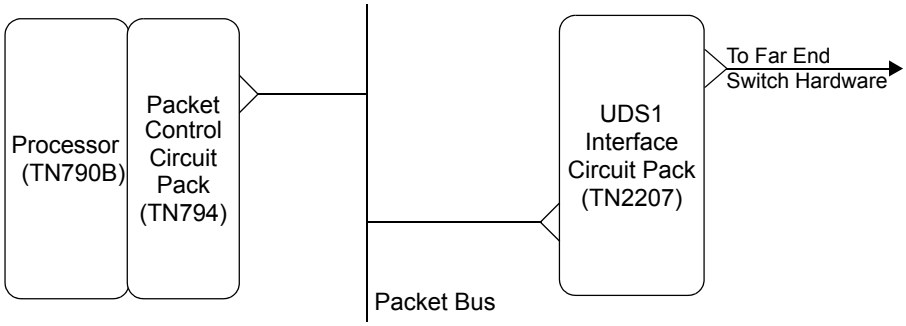


Figure 8-31. PRI Over PACON Remote Layer 3 Query (Test #637)

Table 8-176. Remote Layer 3 Query Test #637

Error Code	Test Result	Description / Recommendation
	ABORT	Internal system error 1. Retry the command at 1-minute intervals a maximum of 5 times.
1006	ABORT	This is a NORMAL ABORT. For country protocol 1 interfaces (including the USA), either there are no B-channels administered in this signaling group, or all B-channels in this signaling group are either out-of-service or are in a "pending" state (PINS or PMTC, indicating that a B-channel maintenance message for that B-channel has been sent and not yet acknowledged). 1. Administer an ISDN Trunk or PRI Endpoint Port (B-channel) in this signaling group, or use the status trunk TRK-GRP/TRK or status pri-endpoint <extension> command to check the state of the ISDN Trunks or PRI Endpoint Ports associated with this signaling group. Refer to ISDN-TRK or PE-BCHL for further details regarding service state definitions and transitions. For systems not using country protocol 1 interfaces, there are no B-channels administered in this signaling group.
1019	ABORT	There is already a Remote Layer 3 Query in progress. This is a normal ABORT. 1. Wait two minutes, then follow the procedures for when this test passes.
1113	ABORT	The Signaling Link is down. Therefore no messages can be sent to the Far-end switch. 1. Examine the results of Tests #636 and #639 and follow recommendations provided there. 2. If either test passes, it may be because the signaling link was disabled by system technician. Verify this by using the display comm link command. Tests #636 and #639 pass if the signaling link is not enabled.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at 1-minute intervals a maximum of 5 times.

Table 8-176. Remote Layer 3 Query Test #637

Error Code	Test Result	Description / Recommendation
2500	ABORT	Same as ABORT with no error code. 1. Follow the recommendations for ABORT with no error code.
2500	FAIL	Same as ABORT with no error code. 1. Follow the recommendations for ABORT with no error code.
	PASS	A message was composed and sent to the Far-end switch. The ISDN PRI specification allows up to two minutes for a reply. 1. Check the Error Log for ISDN-SGR (ISDN-PRI Signaling Group) for errors of type 2305 for evidence of a Remote Layer 3 Query failure. If no new errors were logged since this test was run, then this switch and the Far-end switch processor can exchange call control messages. 2. If there is still a problem with a particular DS1 ISDN Trunk or PRI Endpoint Port (B-channel), busyout the trunk or port and run the long test sequence, paying particular attention to the results of Test #258 (ISDN Test Call).

Secondary Signaling Link Hardware Check (#639)

The ISDN-PRI Signaling Group D-Channel port depends on the health of the DS1/UDS1 Interface circuit pack on which it resides. This test will fail if there are problems with either the ISDN-PRI Primary D-channel port or the DS1/ UDS1 circuit pack. If there are problems with the ISDN-PRI Secondary Signaling Channel port (ISDN-LNK or ISDN-PLK), also investigate the DS1/UDS1 circuit pack.

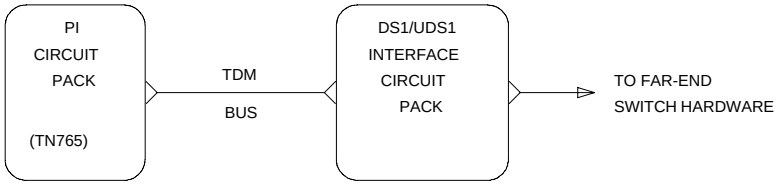


Figure 8-32. Secondary Signaling Link Hardware Check for PRI over PI (Test #639)

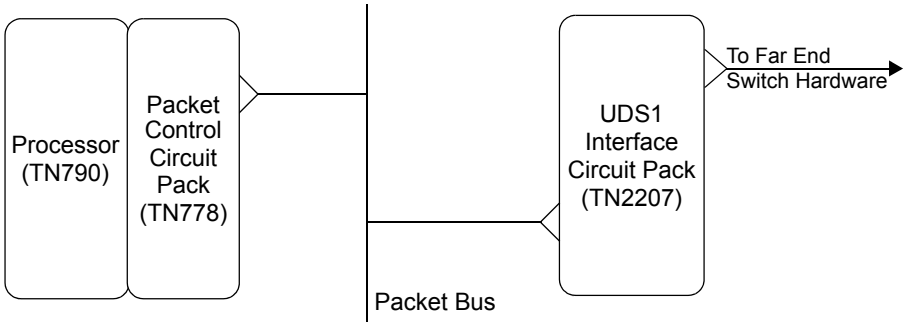


Figure 8-33. Secondary Signaling Link Hardware Check for PRI over PACCON (Test #639)

Table 8-177. Secondary Signaling Link Hardware Check Test #639

Error Code	Test Result	Description / Recommendation
	ABORT	Internal system error 1. Retry the command at 1minute intervals a maximum of 5 times.
1132	ABORT	The Secondary D-channel is not administered for this Signaling Group. This is a NORMAL ABORT. Only a Primary D-channel must be administered for a Signaling Group.
4	FAIL	There is a problem with the Processor Interface Link. No DS1 ISDN Trunk (B-channel) or Wideband PRI Endpoint calls can be made until the problem is resolved. 1. Display the Communication-Interface Links Form via the display communication-interface command to determine which link is down (find the one that matches the DS1 Interface circuit pack on which this ISDN-PRI Signaling Link Port resides) and then refer to the PI-LINK Processor Interface Link Maintenance documentation.
8	FAIL	There is a problem with the DS1/UDS1 Interface circuit pack or the ISDN-PRI Secondary Signaling channel (D-channel). No ISDN Trunk (B-channel) or Wideband PRI Endpoint calls can be made until the problem is resolved. 1. Refer to the DS1/UDS1 circuit pack and the ISDN-PRI Signaling channel (ISDN-LNK/ISDN-PLK) Maintenance documentation.
None	PASS	The basic physical connectivity of the Signaling Group's Secondary D-channel is intact and functional. Try this test repeatedly to ensure the link is up and to uncover any transitory problems.

Layer 2 Status Test (#647)

The Layer 2 Status Test checks the layer 2 status of the ISDN-PRI Signaling Channel (D-channel). This test will fail if there is a hardware failure or a facility problem, or if the primary and secondary ISDN-PRI D-channels are not administered correctly.

The Primary and Secondary Signaling Link Hardware tests (test 636 and 639) and the Remote Layer 3 Query test (test 637) will detect most problems caused by hardware failures or incorrect administration. However, the Layer 3 test (test 637) cannot detect end-to-end transmission problems with the Standby D-channel since Layer 3 messages are not sent on the standby channel.

The PI-LINK Maintenance Object reports Layer 2 ISDN-PRI D-channel problems (if the D-channel is connected to the Processor Interface circuit pack). However, the PI-LINK Maintenance Object does not monitor the Layer 2 status of the ISDN-PRI D-channel when the D-channel is connected to the Packet Control circuit pack for the ISDN-PRI over PACCON feature. The Layer 2 Query test is provided to detect D-Channel Layer 2 failures and generate an associated Warning alarm independent of the hardware configuration used for the D-channels.

Table 8-178. Layer 2 Status Query Test #647

Error Code	Test Result	Description / Recommendation
1132	ABORT	Internal system error The port location for the primary ISDN-PRI D-channel is not known. This condition should not be possible since an administered DS1 circuit pack must be specified when a Signaling Group is administered: 1. Retry the command at 1-minute intervals a maximum of 5 times.
1134	ABORT	Internal system error The associated DS1 circuit pack is not administered. This condition should not be possible since an administered DS1 circuit pack must be specified when a Signaling Group is administered. 1. Retry the command at 1-minute intervals a maximum of 3 times.
2500	ABORT	Internal system error 1. Retry the command at 1-minute intervals a maximum of 5 times.
1	FAIL	Layer 2 of the primary signaling channel is down: 1. Examine the results of the Primary Signaling Link Hardware Test (#636) and follow recommendations provided there. 2. If test #636 passes, the Layer 2 Query test may still fail if the Signaling Channel at the far end has not been administered correctly or if it has been busied out. Verify that the Primary Signaling Channel (D-channel) at the far end has been administered correctly. Verify that the DS1 port used for the Primary D-channel has not been busied out at the far end.

Table 8-178. Layer 2 Status Query Test #647

Error Code	Test Result	Description / Recommendation
2	FAIL	Layer 2 of the secondary signaling channel is down. 1. Examine the results of Secondary Signaling Link Hardware Test (#639) and follow recommendations provided there. 2. If tests #639 passes, the Layer 2 Query test may still fail if the Signaling Channel at the far end has not been administered correctly or if the Signaling Channel has been busied out. Verify that the Secondary Signaling Channel (D-channel) at the far end has been administered correctly. Verify that the DS1 port used for the Secondary D-channel has not been busied out at the far end.
3	FAIL	Both the primary and secondary Channels are down. 1. Examine the results of the Primary and Secondary Signaling Link Hardware Tests (#636 and #639) and follow recommendations provided there. 2. If tests #636 and #639 pass, the Layer 2 Query test may still fail if the Signaling Channels at the far end has not been administered correctly or if the Signaling Channels have been busied out. Verify that the Primary and Secondary Signaling Channel (D-channels) at the far end have been administered correctly. Verify that the DS1 ports used for the Primary and Secondary D-channels have not been busied out at the far end.
None	PASS	The Primary Signaling Channel is up and, if administered the Secondary Channel is up.

ISDN-TRK (DS1 ISDN Trunk)

MO Name (in Alarm Log)	Alarm Level	Initial Command to Run	Full Name of MO
ISDN-TRK*	MAJOR†	test port PCSSpp l	DS1 ISDN Trunk
ISDN-TRK	MINOR	test port PCSSpp l	DS1 ISDN Trunk
ISDN-TRK	WARNING	test port PCSSpp sh	DS1 ISDN Trunk

* For additional repair information, refer to the DS1-BD maintenance object.

† A MAJOR alarm on a trunk indicates that alarms on these trunks are not downgraded by the **set options** command and that at least 75 percent of the trunks in this trunk group are alarmed.

A DS1 ISDN Trunk is known as a B-channel. It is a 64 kbps Bearer channel that can be used to transmit digital traffic, be it voice or data. These trunks use a separate channel for signaling (for example, for call setup); this mode of operation is known as out-of-band signaling, as opposed to in-band, robbed-bit signaling,

where the signaling traffic flows over the same channel as the voice or data traffic. The separate signaling channel is called a D-channel in ISDN terminology, and it carries all the call control signaling messages for the DS1 ISDN Trunk B-channels. The D-channel for these B-channels is an ISDN-PRI (Primary Rate Interface) Signaling Link Port (ISDN-LNK/ISDN-PLK).

On 24-channel interfaces, any of the first 23 ports on the DS1/UDS1 interface circuit pack can be a B-channel. The 24th port may be used as a B-channel or as a D-channel depending on the type of ISDN-PRI Signaling Group (ISDN-SGR) to which it belongs. On 32 channel interfaces, any of ports 1-15 and 17-31 on the DS1 interface circuit pack can be a B-channel. The 16th port may be used as a B-channel or as a D-channel depending on the type of ISDN-PRI Signaling Group (ISDN-SGR) to which it belongs. For more details, refer to the ISDN-SGR and DS1-BD/UDS1-BD Maintenance documentation.

NOTE:
If a Packet Control circuit pack is used instead of a Processor Interface Link as the interface of the PBX SPE to the D-channel, then the signaling link port on the UDS1 circuit pack is referred to as ISDN-PLK and only the TN2207 may be used to carry D-channel Signaling. The B-channels may be carried by any DS1/UDS1 interface circuit pack. If a Processor Interface is used for connectivity then the Signaling Link port is referred to as a ISDN-LNK and the TN767 or TN2207 DS1 interface circuit pack may be used to carry D-channels Signaling.

For interfaces using country protocol 1 on the DS1 Circuit Pack administration form (including US), the signaling protocol used for the maintenance of the B-channel is defined by the AT&T ISDN-PRI Specification.

For interfaces using country protocols other than 1, the signaling protocol used for the maintenance of the B-channel is defined by the CCITT ISDN-PRI Specification.

There are five possible SERVICE STATES for a B-channel. The service state is negotiated with the far-end switch, changes over time, and may have a far-end or near-end component. The service state is initialized to Out-Of-Service/Far-End state and an attempt is made to negotiate it to In-Service.

NOTE:
The service state of a particular DS1 ISDN Trunk B-channel can be displayed by issuing the **status trunk <trunk_group/trunk_member>** system technician command.

If a call is present, the Specification defines the permissible CALL STATES as well. There are tests in the Short and Long Test Sequences for DS1 ISDN Trunk designed to audit these states and ensure agreement between both ends of the PRI connection.

Alarming Based on Service States

A warning alarm is logged against a DS1 ISDN B-channel trunk when it is placed in the Maintenance/Far-End or Out-Of-Service/Far-End states, during which the trunk is unusable for outgoing calls. When a warning alarm is present, use **status trunk group#/member#** command to determine the exact state. Other alarms can be diagnosed by using the short and/or long test sequences. Note that an ISDN B-channel trunk can be placed in a Far-End service state by either action taken by the far-end switch or by failure of the far-end switch to respond. For example, if the far-end does not respond to a Remote Layer 3 Query (Test #637 for ISDN-SGR), the associated DS1 ISDN trunk B-channels will be placed in the Maintenance/Far-End service state.

As a port on a DS1 circuit pack (DS1-BD or UDS1-BD), and as part of a signaling group dependent on a D-channel (ISDN-LNK/ISDN-PLK) for signaling, operation of the ISDN-TRK is dependent on the health of these other maintenance objects. The ISDN D-channel in turn depends on the Packet Bus (PKT-BUS)/Processor Interface Link (PI-LINK) (dependent on setup) for transmission through the system. Keep this hierarchy of dependencies in mind when diagnosing problems.

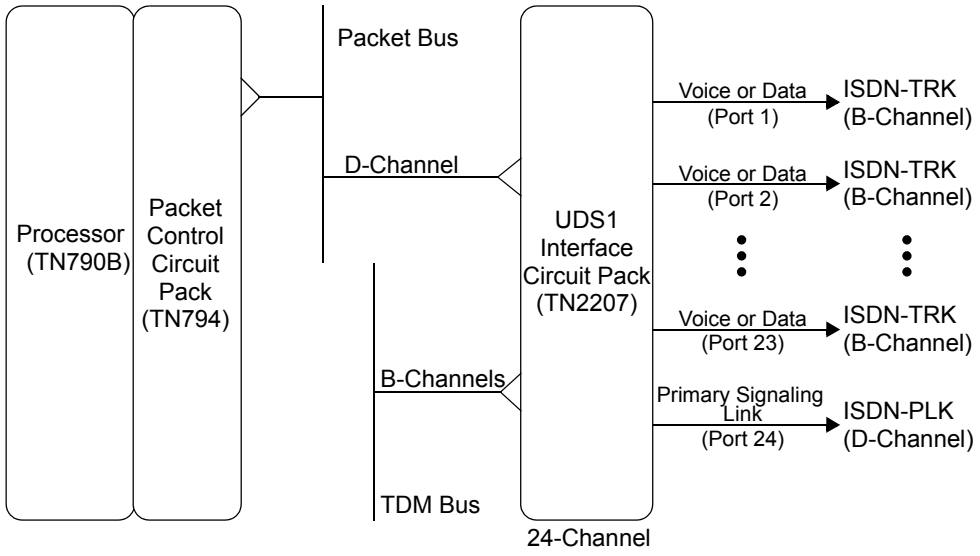


Figure 8-34. DS1 ISDN Trunk Interactions (24-channel interface)

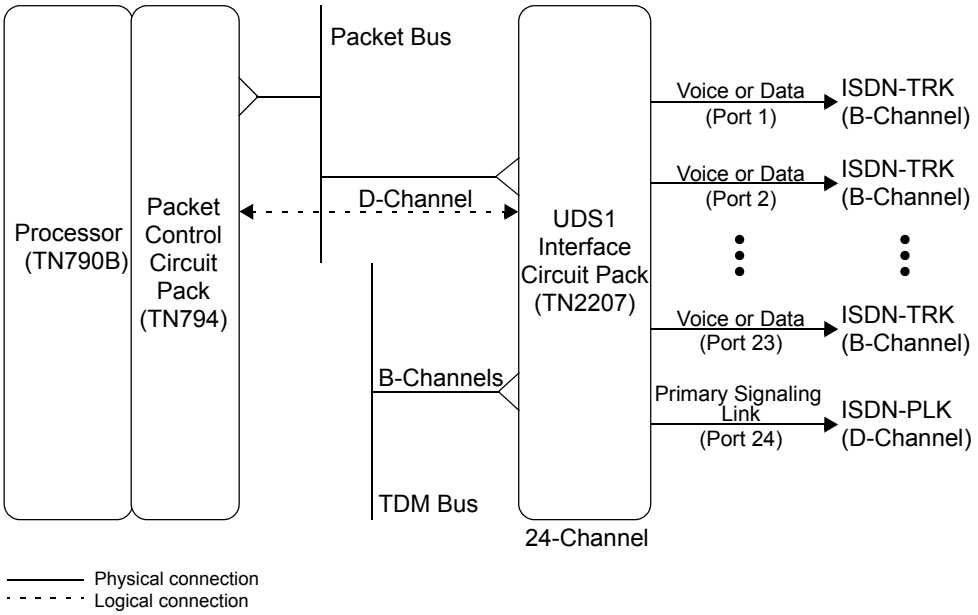


Figure 8-35. PRI Over PACCON DS1 ISDN Trunk Interactions (24-channel interface)

DS1 ISDN Trunk Service States

This section defines the possible service states of a DS1 ISDN trunk, explains the reason for each service state, and provides the recommended recovery procedures (when required).

Service States

- In-Service (INS): The B-channel is in its normal operating state.
- Out-of-Service/Far-End (OOS/FE)**:** A B-channel is initialized to this state when administered and it may be in this state if there is a failure on the B-channel caused by a problem on the far-end. If the far-end does not respond to the messages within a certain time period, then the service state remains out of service and maintenance will periodically re-send the
- messages. The trunk is unusable for outgoing calls. On US interfaces, the trunk is unusable for incoming calls, but on non-US interfaces, incoming calls are accepted.
- Out-of-Service/Near-End (OOS/NE): The state of the trunk when hardware failure exists on the link, the NPE Crosstalk test fails, or when the trunk is busied out by craft. In this state, the trunk is unusable for incoming and outgoing calls. No messages are sent to the far-end until the signaling link comes back into service or the trunk is released by craft.

- Maintenance/Far-End (MTC/FE): The state reached when the far-end does not respond to messages sent over the signaling link for a particular trunk after a certain amount of time. This state is different from OOS/FE since the signaling link must have initially been up and the B-channels in-service. The MCU will periodically send messages to the far-end to try to negotiate the trunk (B-channel) into service. The trunk is unusable for outgoing calls but will service incoming call requests from the far-end. Note that the transitions into MTC/FE do not drop stable calls. Therefore, if the service state changes from in-service to MTC/FE, then stable calls are unaffected.
- Maintenance/Near-End (MTC/NE): The trunk (B-channel) is in this state when the signaling link (PI-LINK) is busied out by craft. The trunk (B-channel) is also temporarily in this state if craft issued **test trunk <trunk_group/trunk_member> long**. This command executes the ISDN-PRI test call. This test changes the state of the trunk member to MTC/NE for the duration of the test unless a call request comes in from the far-end. In that case, the test aborts. Note that transitions into MTC/NE do not drop stable calls. Therefore, craft-demanded **busyout link lnk-no** does not drop stable trunk calls. In this state, the B-channel is not usable for new outgoing calls, but is available for incoming calls and outgoing test calls.
- Pending States: If the near end is expecting a timed response from the far end for a request to change service state of a trunk, then the state of the trunk reflects a pending state:
  - Pending In-Service (PINS) means the near-end has sent a B-channel maintenance message to the far-end, requesting the B-channel service state be transitioned to in-service. The far-end has a certain amount of time to respond to the message. The service state remains PINS until either a response is received or the timer expires.
  - Pending-Maintenance (PMTC) is a state supported only by systems using country protocol 1 (including the US). The near-end has sent a B-channel maintenance message to the far-end, requesting the B-channel service state be transitioned to maintenance. The far-end has a certain amount of time to respond to the message. The service state remains PMTC until either a response is received or the timer expires.
  - Call Activity States reflect the B-channel call activity. If a call is connected over the B-channel, then the state of the trunk reflects the active call state, for example, in-service/active. If there is no call on the B-channel, then the trunk reflects the idle call state, for example, OOS/FE-idle.

The following figure of the DS1 ISDN trunk service states shows the common progression from one service state to another and the event that caused the change of state.

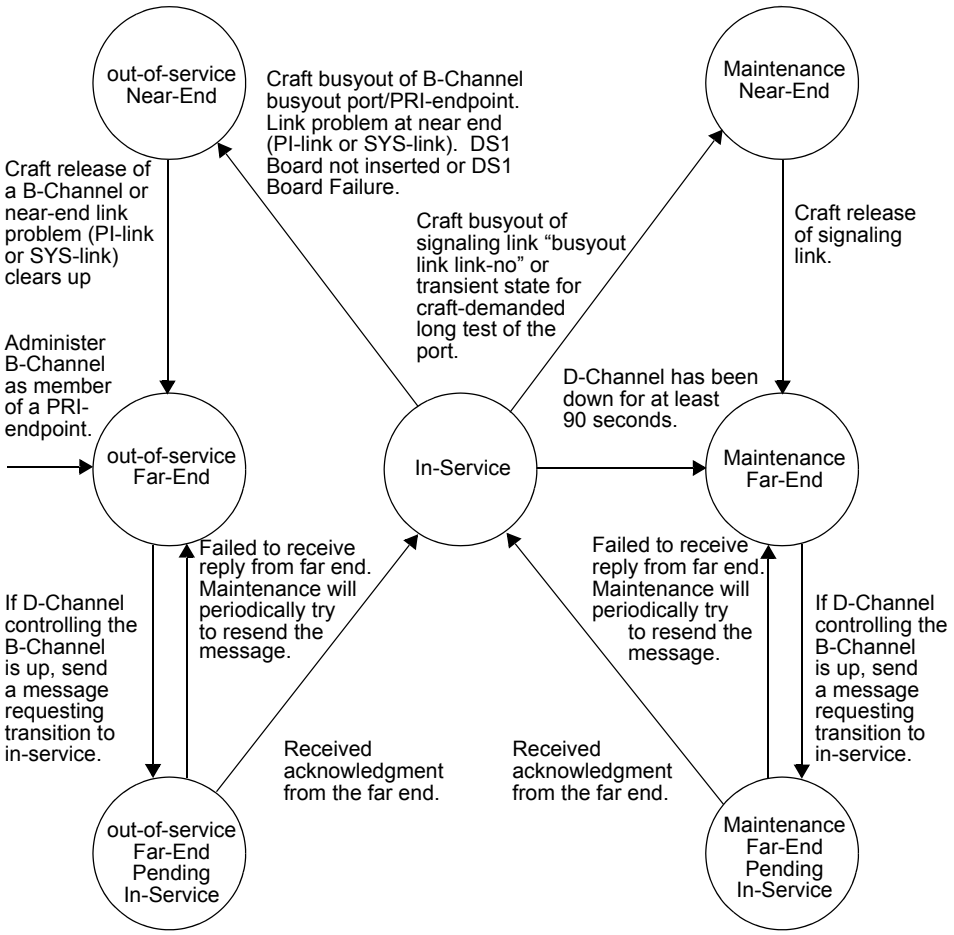


Figure 8-36. Common Progressions in Service States

ISDN-PRI Trunk Service States

The following chart summarizes each DS1 ISDN trunk service state that can result when **status trunk <trunk_group/trunk_member>** is issued. From the results of the status command, match the service state to the corresponding column.

Proceed down the column until an *X* is found. The column indicates possible reasons why the trunk is in this state and the column to the right suggests possible recovery mechanisms. If an alarm against ISDN-TRK is present, it is indicated below the *X*.

Table 8-179. ISDN-PRI Trunk Service States

Possible Problem	OOS /NE	OOS/ FE	OOS/ PINS	maint-NE	maint- FE	maint-FE PINS	INS	Possible Recovery Route
ISDN-PRI calls being completed.							X	Normal operation.
Trunk member busied out by craft.	X Warning alarm							Release trunk via **release trunk <trunk/ member>.**
NPE Crosstalk Test failed.	X Minor alarm							Replace TN767E DS1 Interface circuit pack.
DS1 circuit pack lost signal? Check DS1-BD.	X							DS1 circuit pack removed? DS1 cable dis-connected? CSU problems? Far-end restarting? Faulty DS1 circuit pack? Refer to DS1-BD.
Far-end not administered		X Warning alarm						Administer corresponding trunk on far-end.
Maintenance message sent; waiting for replay (2 mins.).			X			X		Wait several minutes until pending state not present; check service state.
Processor Interface Link busied out by craft? Check link status.				X				Release link via **release link lnk-no.**

Table 8-179. ISDN-PRI Trunk Service States — *Continued*

Possible Problem	OOS /NE	OOS/ FE	OOS/ PINS	maint-NE	maint- FE	maint-FE PINS	INS	Possible Recovery Route
ISDN Testcall in progress? (**test trunk <trk/mbr>** issued by craft)				X				Wait several minutes for test to finish; check status of trunk again.
Signaling link has been down over 90 seconds?					X Warning alarm			See PI-LINK. Is signaling link busied out at far-end? Is far-end currently restarting?
Repeated failure of far-end to respond to messaging ?					X Warning alarm			Periodically maintenance will try to resend message. To speed process, run **test trunk <trk/mbr>** (test #256) and/or **test signaling group <siggrp>** (test #637).
Far-end trunk busied out (OOS/FE). Far-end trunk being tested (MTCE/FE).		X Warning alarm			X Warning alarm			Check status of far-end.

Hardware Error Log Entries

The following table describes the hardware error log entries and the test to clear values

Table 8-180. DS1 ISDN Trunk Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	test port PCSSpp sh r 1
	Run the short test sequence first. If all tests pass, run the long test sequence.				
1	Any	None			test port PCSSpp sh r 1
	These error types indicate a disagreement between the MCU and the other end of the DS1 ISDN trunk. The MCU automatically tries to recover by clearing the call, that is the call is torn down. Use status trunk <trunk_group/trunk_ member> to determine the state of the trunk. When running the short test sequence, pay attention to the results of the Call State Audit test (#257).				
15	Any	#36			
	This is a software audit error that does not indicate any hardware malfunction. Run the short test sequence and investigate associated errors (if any).				
18	0				
	The trunk has been busied out by craft. Use release trunk <grp>/<mbr> to release the trunk.				
129		None	Warning	Off	test port PCSSpp sh r 1
	The far-end changed its ISDN service state to either out of service or maintenance. This may be a temporary condition due to testing of that trunk by the far-end or a hardware problem with the trunk. Outgoing calls are not allowed over the trunk. To investigate the status of the trunk, enter status trunk <trunk_ group/trunk_member>.				
130		None	Warning	Off	test port PCSSpp sh r 1
	This indicates the circuit pack has been removed or has been insane for more than 11 minutes. To clear the error, reinsert or replace the circuit pack.				
257	Any	None			test port PCSSpp sh r 1
	This indicates a disagreement between the MCU and the other end of the trunk connection with regard to the ISDN service state of the DS1 ISDN trunk. The MCU automatically tries to recover by performing a service state audit. Use status trunk <trunk_ group/trunk_member> to determine the state of the trunk. When running the short test sequence, pay attention to the results of test #256.				

Table 8-180. DS1 ISDN Trunk Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
513	Any	None	Warning	Off	test port PCSSpp sh r 1
	This trunk is not recognized by the far-end. Investigate the trunk administration for both the MCU and the far-end and make the necessary changes.				
769	Any	None			test port PCSSpp sh r 1
	This indicates a disagreement between the MCU and the other end of the trunk connection with regard to the ISDN service state of the DS1 ISDN trunk. The MCU automatically tries to recover by performing a service state audit. Use status trunk <trunk_ group/trunk_member> to determine the state of the trunk. When running the short test sequence, pay attention to the results of test #256.				
1281	Any	#7	Major/Minor/Warning	On	test port PCSSpp l r 4
	Minor alarms on this MO may be downgraded to warning alarms based on the values used in the set options command. If the minor alarm is not downgraded, then the minor alarm is upgraded to a major alarm when 75% of the trunks in the trunk group are alarmed.				
1537	Any	#6	Major/Minor/Warning	On	test port PCSSpp l r 3
	Minor alarms on this MO may be downgraded to warning alarms based on the values used in set options. If the minor alarm is not downgraded, then it is upgraded to a major alarm when 75% of the trunks in the trunk group are alarmed.				
1793	Any	None			test port PCSSpp sh r 1
	A failure occurred in the DS1 Interface circuit pack. When running the short test sequence, the results of test #255 are important.				
3073	Any	#256			test port PCSSpp sh r 2
	Two service state audit attempts failed (see test #256). The trunks are not usable for any outgoing calls (although incoming calls are accepted) until the test passes and the trunk state is changed to in-service (use status trunk <trunk_ group/trunk_ member> to investigate trunk status).				

Table 8-180. DS1 ISDN Trunk Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
3585	Any	None			
	The MCU received an ISDN RESTART message for an ISDN trunk that is not idle. Calls are not typically cleared with the RESTART message. This error type may be associated with a dropped call. The following Aux Data values represent the trunk's ISDN call state at the time it received the unexpected request to restart the channel. This can be useful if dropped calls (cutoffs) are reported by users of ISDN-PRI trunks. The following Aux Data values are of concern, all others can be ignored. Aux Data values 10 means a call in a stable, talking state was cleared. This state is called "active." Aux Data values 4, 7, 8, 260, and 263 mean a call was not active, but had reached a ringing state. Aux Data values 1, 3, 6, 9, and 265 mean a call that had not reached the ringing state was cleared. Aux Data values 11, 12, 19, 531, 267, and 268 mean a call in the process of clearing anyway has been cleared. If this occurs frequently, the far-end may be trying to clear trunks it thinks are hung. The RESTART message brings the trunk to an idle condition.				
3841	Any	None			
	An ISDN trunk selected by the MCU has been rejected ten times by the far-end without a successful call. This may indicate a service state mismatch between the MCU and the far-end for this trunk that is affecting the user (the customer receives unexpected intercept tones when accessing ISDN trunks). This may indicate that the ISDN trunk is not administered on the far-end. The *Aux Data* field contains the physical name of the ISDN trunk in decimal. Verify that the far-end has this trunk administered. If problems persists, busyout the ISDN trunk.				

Craft-Demanded Tests

Always investigate tests in the order presented in this table when inspecting errors in the MCU. By clearing error codes associated with the NPE Crosstalk Test, for example, you may also clear errors from other tests lower in the testing sequence.

Table 8-181. System Technician-Demanded Tests: ISDN-TRK

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
NPE Crosstalk Test #6	Long		No
Conference Circuit Test #7	Long		No
Audit and Update Test #36	Short	Long	No

Table 8-181. System Technician-Demanded Tests: ISDN-TRK

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Signaling Link State Check Test #255	Short	Long	No
Service State Audit Test #256	Short	Long	No
Call State Audit Test #257	Short	Long	No
ISDN Test Call Test #258	Long		No

NPE Crosstalk Test #6

One or more NPEs reside on each circuit pack with a TDM Bus interface. The NPE controls port connectivity and gain, and provides conferencing functions on a per-port basis. The NPE Crosstalk test verifies that this port's NPE channel talks on the selected time slot and never crosses over to time slots reserved for other connections.

If the NPE is not working correctly, one-way and noisy connections may be observed. This test is usually only part of a port's long test sequence and takes about 20 to 30 seconds to complete.

Table 8-182. NPE Crosstalk Test #6

Error Code	Test Result	Description Recommendation
None	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1000	ABORT	System resources required to run this test are not available. The port may be in use on a valid call. 1. Use the status trunk command to determine when the port is available for testing. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to abort and the port is not in use, escalate the problem.
1001	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.

Table 8-182. NPE Crosstalk Test #6

Error Code	Test Result	Description Recommendation
1002	ABORT	The system could not allocate time slots for the test. The system may be under heavy traffic conditions or it may have time slots out of service due to TDM Bus errors. Refer to TDM-BUS to diagnose any active TDM-Bus errors. 1. If the system has no TDM-Bus errors and is not handling heavy traffic, repeat the test at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1003	ABORT	The system could not allocate a tone receiver for the test. The system may be oversized for the number of tone detectors present or some tone detectors may be out of service. 1. Look for TTR-LEV errors in the error log. If present, see TTR-LEV. 2. Look for TONE-PT errors in the error log. If present, see TONE-PT. 3. If neither condition exists, retry the test at one-minute intervals up to five times. 4. If the test continues to abort, escalate the problem.
1004	ABORT	The port has been seized by a user for a valid call. 1. Use the status trunk command to determine when the port is available for testing. 2. Retry the command at one-minute intervals a maximum of five times. 3. If the test continues to abort, and the port is not in use, escalate the problem.
1018	ABORT	Maintenance is disabled on this trunk. Enable maintenance by entering value y into the Maintenance Tests field on page 2 of the Trunk Group form.
1117	ABORT	A service state audit message is outstanding. Wait two minutes and try again.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2020	ABORT	The test did not run due to an already existing error on the specific port or a more general circuit pack error. Examine the error log for existing errors against this port or the circuit pack and attempt to diagnose the already existing error.

Table 8-182. NPE Crosstalk Test #6

Error Code	Test Result	Description Recommendation
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
Any	FAIL	The NPE of the tested port was found to be transmitting in error. This causes noisy and unreliable connections. The ISDN-TRK is moved to an out-of-service/near-end state. Replace the circuit pack.
None	PASS	The port is able to communicate over the TDM Bus.

Conference Circuit Test #7

One or more NPEs reside on each circuit pack with a TDM Bus interface. The NPE controls port connectivity and gain, and provides conferencing functions on a per-port basis. The Conference Circuit test verifies that the NPE channel for the port being tested can correctly perform the conferencing function.

The NPE is instructed to listen to several different tones and conference the tones together. The resulting signal is then measured by a tone detector port. If the level of the tone is within a certain range, the test passes.

Table 8-183. Conference Circuit Test #7

Error Code	Test Result	Description Recommendation
None	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1000	ABORT	System resources required to run this test are not available. The port may be in use on a valid call. 1. Use status trunk to determine when the port is available for testing. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to abort and the port is not in use, escalate the problem.
1004	ABORT	The port has been seized by a user for a valid call. 1. Use status trunk to determine when the port is available for testing. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to abort and the port is not in use, escalate the problem.

Table 8-183. Conference Circuit Test #7

Error Code	Test Result	Description Recommendation
1018	ABORT	Maintenance is disabled on this trunk. Enable maintenance by entering ‘‘y’’ in the ‘‘Maintenance Tests?’’ field on page 2 of the change trunk-group form.
1020	ABORT	The test did not run due to an already existing error on the specific port or a more general circuit pack error. Examine error log for existing errors against this port or the circuit pack and attempt to diagnose the already existing error.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2100	ABORT	Could not allocate the necessary system resources to run this test. Retry the command at one-minute intervals up to five times.
Any	FAIL	The NPE of the tested port did not conference the tones correctly. This causes noisy and unreliable connections. Replace the circuit pack.
None	PASS	The port can correctly conference multiple connections. User-reported troubles on this port should be investigated using other port tests and examining trunks or external wiring.

Audit and Update Test #36

This test sends port level translation data from the MCU processor to the DS1 Interface circuit pack to ensure the trunk's translation is correct. The port audit operation verifies the consistency of the current state of the trunk kept in the DS1 Interface circuit pack and in the MCU software

Table 8-184. Audit and Update Test #36

Error Code	Test Result	Description Recommendation
None	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to fail, escalate the problem.
1018	ABORT	Maintenance is disabled on this trunk. Enable maintenance by entering value y into the Maintenance Tests field on page 2 of the Trunk Group form.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to fail, escalate the problem.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to fail, escalate the problem.
2100	FAIL	Test failed due to internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to fail, escalate the problem.
None	PASS	Trunk translation has been updated successfully. The current trunk states kept in the DS1 Interface circuit pack and MCU software are consistent. If the trunk is busied out, the test will not run, but will return a PASS. To verify the trunk is in-service: 1. Enter status-command to verify the trunk is in service. 2. If the trunk is out of service, enter release-trunk. 3. Retry the test command.

Signaling Link State Check Test #255

As noted under the description of DS1 ISDN trunk, it depends on the health of the DS1 Interface circuit pack for proper operation. This test checks the status of those critical elements.

Table 8-185. Signaling Link State Check Test #255

Error Code	Test Result	Description Recommendation
None	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1018	ABORT	Maintenance is disabled on this trunk. Enable maintenance by entering value y into the Maintenance Tests field on page 2 of the Trunk Group form.
1114	ABORT	The signaling link is in a transitional state. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
4	FAIL	There is a problem with the Processor Interface Link. Consult the procedures for PI-LINK.
8	FAIL	There is a problem with the DS1 Interface circuit pack. Consult the procedures for DS1-BD.
None	PASS	The signaling link hardware is operational.

Service State Audit #256

These trunks may be in one of several service states (see DS1 ISDN trunk). This test performs a Service State Audit with the far-end.

For interfaces using country protocol 1 (including the US), the Service State Audit executes in all trunk service states. A message is sent to the far-end to ensure that both sides agree on the service state. A PASS for this test simply means the message has been successfully sent.

Two minutes are allowed for a reply. If no reply is received within that time frame, the message is resent. If that attempt fails, an error is logged (error code 3073) and the MCU attempts another Service State Audit every 15 minutes. If the trunk was initially INS (in-service), it is then placed in the MTC/FE (maintenance state/far-end problem) state.

No outgoing calls can be placed over this trunk, but incoming calls are accepted. If an incoming call is presented while in this state, a Service State Audit attempt will immediately be tried (that is, the MCU will not wait 15 minutes, but will try to recover immediately).

For interfaces not using country protocol 1, the Service State Audit executes only if the trunk is in the OOS/FE (out of service/far-end problem) state. A message is sent to the far-end to attempt to bring the trunk back into service. A PASS for this test simply means the message was sent successfully. Two minutes are allowed for a reply. If no reply is received, the message is resent. If no response is received in the next two minute window, then the trunk remains in the OOS/FE state. The MCU will attempt another Service State Audit in another hour.

To investigate the service state of the DS1 ISDN trunk, issue **status trunk <trunk_group/trunk_member>**.

Table 8-186. Service State Audit Test #256

Error Code	Test Result	Description Recommendation
1000	ABORT	System resources required to run this test are not available. The port may be on a valid call. 1. Use status trunk to determine when the trunk is available for testing. 2. Check the results of test #255.
1018	ABORT	Maintenance is disabled on this trunk. Enable maintenance by entering value y into the Maintenance Tests field on page 2 of the Trunk Group form.
1113	ABORT	The signaling link has failed, so the system cannot send any messages on behalf of this trunk. Check the results of test #255.
1114	ABORT	The signaling link is in a transitional state. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1116	ABORT	The trunk is not in a service state that is appropriate for running this test. This test is only performed in the OOS/FE state.
1117	ABORT	A service state audit message is outstanding. Wait two minutes and then try again.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.

Table 8-186. Service State Audit Test #256

Error Code	Test Result	Description Recommendation
1113	FAIL	The signaling link has failed, so the system cannot send any messages on behalf of this trunk. Consult the procedures for ISDN-LNK and PI-LINK.
None	FAIL	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
	PASS	1. Wait four minutes and then check the error log for any new errors of type 3073. 2. Check the service state of the B-channel by entering status trunk <trunk_group/trunk_member>. 3. See DS1 ISDN and ISDN-PRI for recovery suggestions.

Call State Audit Test #257

If a call is active on a trunk, the MCU and far-end should agree on the ISDN state of the call, as defined in the ISDN protocol specification. This test audits internal call state data by querying the far-end as to the ISDN state of the call. It can be helpful when trying to clear a hung call. If the internal call state data on the MCU is different than that of the far-end, then the call will be torn down.

Table 8-187. Call State Audit Test #257

Error Code	Test Result	Description Recommendation
1018	ABORT	Maintenance is disabled on this trunk. Enable maintenance by entering value y into the Maintenance Tests field on page 2 of the Trunk Group form.
1019	ABORT	An audit is in progress. Wait two minutes and try again.
1113	ABORT	The signaling link has failed, so the MCU cannot send any messages on behalf of this trunk. Check the results of test #255.
1114	ABORT	The signaling link is in a transitional state. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.

Table 8-187. Call State Audit Test #257

Error Code	Test Result	Description Recommendation
1116	ABORT	The trunk is in an out-of-service ISDN service state. A call cannot be present if the trunk is in an ISDN out of service state, so a call state audit would be inappropriate. No action is necessary. Use status trunk <trunk_ group/trunk_member> to investigate the ISDN state of the trunk.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
	FAIL	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
	PASS	The MCU sent a call state auditing message to the far-end to verify the state of the call active on this trunk. If a call state mismatch is found, then the call will be torn down within two minutes. If no call is active, then no message is sent.

ISDN Test Call Test #258

This test is valid only for systems using country protocol 1 (including the US) or when the far-end has loop-around capability.

This test performs a far-end loop-around test on the DS1 ISDN trunk if it is in an appropriate ISDN service state (INS, MTC/NE, or OOS/NE), and if no call is active on the trunk. A test pattern is sent over the DS1 ISDN trunk and echoed back from the far-end; the received pattern is compared against the pattern sent to check for errors that indicate a loss of integrity on the communications path.

If a test call is running when scheduled maintenance starts, the green LED is turned off. To determine if a test call is still running, the system technician should use **list isdn-testcall** and **status isdn-testcall**. The test call connection is established over the TDM Bus of the transmit and receive sides of the ISDN-PRI trunk to a data channel.

Synchronous Commands

You can demand a synchronous outgoing test call by using the following maintenance commands:

- **test trunk <trunk_group/trunk_member> long [repeat number]**
- **test board <board_location> long [repeat number]**
- **test port <port_location> long [repeat number]**

Whenever a circuit translates to an ISDN-PRI trunk during a long test sequence, an outgoing test call is invoked. If the B-channel is unrestricted (B8ZS or HDB3) the default duration of the test call is 8.6 seconds. Otherwise, if the B-channel is restricted (ZCS), the default duration of the test call is 9.4 seconds. Once the test call completes, the bit error rate greater than zero is reported as a failure to the MCU-MT. A failure indicates the need to run further diagnostics, such as **test isdn-testcall**.

The outgoing ISDN-PRI test call is established over a high-speed data channel on the Netpkt Interface circuit pack (DATA-BD).

Table 8-188. ISDN Test Call Test #258

Error Code	Test Result	Description Recommendation
4	ABORT	There is a problem with the Processor Interface Link. Refer to PI-LINK.
8	ABORT	There is a problem with the DS1 Interface circuit pack. Refer to DS1-BD.
1004	ABORT	B-channel in use. 1. Determine if a call is active on this DS1 ISDN trunk via status trunk <trunk_group/trunk_member>. 2. When the service state returns to in-service, idle, retry the test.
1005	ABORT	Bad configuration (that is, no Maintenance/test circuit pack). Issue test trunk <trunk_group/trunk_ member> and make sure a DATA-CHL (Netpkt Interface channel) is administered.
1018	ABORT	Test call is disabled. Enable maintenance on the trunk group form.
1019	ABORT	Another test call is in progress. 1. Issue list isdn-testcall to locate the test call. 2. Issue status isdn-testcall to find out the duration and start time of the test call. 3. Issue clear isdn-testcall to stop the test call from running.
1020	ABORT	There is a problem with DS1 Interface circuit pack. Refer to DS1-BD.
1024	ABORT	Maintenance/Test Digital Port in use. 1. Wait until yellow and green LEDs are turned off on the Maintenance/Test circuit pack. 2. Retry the test.

Table 8-188. ISDN Test Call Test #258

Error Code	Test Result	Description Recommendation
1113	ABORT	The signaling link has failed. Therefore, the system cannot send any messages on behalf of this trunk. Check the results of Test #255.
1114	ABORT	The signaling link is in a transitional state. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
1116	ABORT	The MCU could not appropriately change the ISDN service state. 1. Determine if a call is active on this DS1 ISDN trunk (use status trunk <trunk_group/trunk_member>). If so, proceed as shown under error code 1119. 2. If not, check the error and alarm logs for problems with this ISDN-TRK (DS1 ISDN trunk) MO.
1117	ABORT	ISDN B-channel maintenance message is already outstanding. Wait two minutes then try again.
1118	ABORT	Far-end of ISDN trunk is not administered. 1. Check the administration of the far-end ISDN trunk. 2. Issue status trunk <trunk_group/ trunk_member>. 3. Retry the test.
1119	ABORT	The test call was aborted due to a normal call attempt on this trunk. The test call is performed only if the trunk is idle. Either wait for the normal call to terminate normally or force it to be dropped by using busyout trunk <trunk_group/trunk_member> to busy out the DS1 ISDN trunk. When the trunk is idle, retry the test.
1120	ABORT	The DS1 ISDN trunk is in the ISDN out-of-service/far-end state. Try to change the service state via test #256 then retry the test. However, the trunk may be in the out-of-service/far-end state due to problems at the far-end. If that is the case, no remedial action can be taken at this end.
1122	ABORT	There is no test line number for the far-end. Check the trunk group administration form.
1123	ABORT	There is no Feature Access Code administration for this facility test. Check the dial plan and the feature administration forms.
2000	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.

Table 8-188. ISDN Test Call Test #258

Error Code	Test Result	Description Recommendation
2012	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2035	ABORT	The call has timed out, perhaps because of a lack of system resources. 1. Wait one minute and try again. 2. If the test continues to abort, escalate the problem.
2036	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2037	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2038	ABORT	A problem occurred while trying to read the test data. 1. Wait one minute then retry the test. 2. If the test aborts again in the same manner, there is a serious internal problem; escalate it.
2039	ABORT	A problem occurred while trying to read the test data. 1. Wait one minute then retry the test. 2. If the test aborts again in the same manner, there is a serious internal problem, escalate it.
2040	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2041	ABORT	The call has timed out, perhaps because of a lack of system resources. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2066	ABORT	Could not establish test call. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2067	ABORT	The call has timed out, perhaps because of a lack of system resources. 1. Wait one minute and try again. 2. If the test continues to abort, escalate the problem.

Table 8-188. ISDN Test Call Test #258

Error Code	Test Result	Description Recommendation
2075	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2104	ABORT	Call dropped or could not be originated. 1. Make sure service is provisioned by the network. 2. Check the administration of the far-end test line extension on the trunk group administration form. 3. Check the administration of the test call BCC (Bearer Capability Class) on the trunk group administration form. 4. Check the reason for termination with status isdn-testcall. 5. For further instructions see "Troubleshooting ISDN-PRI Test Call Problems" in Chapter 5 “Routine Maintenance Procedures” 6. Try the test again.
2201 - 2205	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2206	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2208	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2209	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2210	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.

Table 8-188. ISDN Test Call Test #258

Error Code	Test Result	Description Recommendation
2211	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2212	ABORT	Call terminated by unexpected disconnect. Wait one minute and try again.
2213	ABORT	The call has timed out, perhaps because of a lack of system resources. 1. Wait one minute and try again. 2. If the test continues to abort, escalate the problem.
2214	ABORT	Call terminated by unexpected disconnect. Wait one minute then try again.
2215 - 2219	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2220	ABORT	Call terminated prematurely. Wait one minute and try again.
2221 - 2226	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to f five times. 2. If the test continues to abort, escalate the problem.
2227	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2042	FAIL	This is the main purpose of the test. The comparison of the data sent with the data received indicates a loss of integrity on the communications path. The trunk should be taken out of service and the quality of the DS1 line should be investigated. The investigation should include an in-depth analysis of the DS1 facility, including the transmission facility and any external equipment, such as DACs, CSUs, etc. If test isdn-testcall is invoked, then the investigation should include getting the bit and block error rates by invoking status isdn-testcall.

Table 8-188. ISDN Test Call Test #258

Error Code	Test Result	Description Recommendation
None	PASS	The call worked. A test pattern was sent and received properly; the communications path is OK if synchronous test call was issued. If test isdn-test call was issued, a PASS indicates the test call was established. A status isdn-testcall command must be invoked to query the bit and block error rates to determine if the test call passed. An in-depth analysis of the DS1 facility, including the transmission facility and any external equipment such as DACs, CSUs, etc., should take place if the bit and block error rates are not acceptable.

LOG-SVN (Login Security Violation)

MO Name (in Alarm Log)	Alarm Level	Initial Command to Run*	Full Name of MO
LOG-SVN	MAJOR	enable login <login ID>	Login Security Violation

* Where <login ID> is the Avaya services login ID for which the security violation was detected. The *Alt Name* field indicates the login ID associated with the security violation and the major alarm.

The Security Violation Notification (SVN) feature provides notification when the number of failed attempts to access the system administration/maintenance interface meets or exceeds customer administered threshold parameters.

A major alarm is logged whenever a security violation is detected involving an Avaya services login ID and that login ID has been disabled as a result of the security violation. The capability to disable a login ID following detection of a security violation involving that login ID is administrable on a per login ID basis.

Refer to *DEFINITY Communications System Generic 3 Version 5 Implementation*, Issue 1 (555-230-656) for information on administration required for the Security Violation Notification feature and the option to disable a login ID following detection of a security violation involving the affected login ID.

Hardware Error Log Entries and Test to Clear Values

Table 8-189. SVN Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
1 - 15	None	None	Major	OFF	enable login <login ID>

General Information about log-svn Error Log Entries

a. The number (1 - 15), that appears in the error type field, corresponds to the location the login in the internal login data structure.

b. The *Alt Name* field on the alarm report indicates the login ID associated with the security violation and major alarm.

c. These errors/alarms are associated with a number of failed attempts to access the system management/maintenance interface using an AT&T services login ID that meet or exceed the customer administered threshold parameters. The associated alarm is immediately raised as a major alarm.

d. The affected login ID will be disabled as a result of detection of the security violation, unless it is the last enabled INADS type login on the system. The provision to disable a login ID following detection of a security violation involving that login ID is administrable on a login ID basis.

e. The *enable login* command is used to both enable a login that has been disabled, and to retire any login security violation alarms associated with the login ID.

f. Use of the *enable login* command to enable a login and/or retire alarms must be executed using a login ID with greater service level hierarchy permissions.

g. Access to the *enable login* command is controlled through the Administer Permissions field on the Command Permission Categories form. This field (Administer Permissions) must be set to "y" to access the enable login command.

h. The *Port* alarm report field will set to the port where the final invalid login attempt, involving the alarmed login ID, was detected. Valid port values include:

- EPN — EPN maintenance EIA port
- EIA — Other EIA port
- INADS — INADS port
- MAINT — Maintenance port

— MGR1 — Dedicated manager 1 or G3 management terminal connection

— NET-n — Network controller dial up port

— SYS_PORT —

— SYSAM_LOC — Local administration port

— YSAM_RMT — Remote administration port

i. The *Svc State* alarm report field will be set to OUT if the login ID is in the disabled state as a result of detection of a security violation involving the login ID. Once the login ID has been enabled, the field will be set to IN.

j. The source or reason of the failed login attempts should be identified and the cause corrected prior to re-enabling a login ID and/or retiring any alarms associated with the login ID. The cause may be something as innocuous as the failure of Avaya services automatic login software, to something as insidious as a hacker attempting to gain access to the switch system management interface.

The login ID associated with that alarm is displayed in the *Alt Name* field of the alarm report.

Prior to retiring an SVN alarm and enabling the associated login ID, the *monitor security-violations login* command can be used to access information about the invalid login attempts that caused the security violation. This information can be useful in determining the source of the invalid attempts and analyzing why they occurred.

The *list logins* command provides status information about logins on the system. If a login has been disabled as a result of a security violation, the status will be "svn-disabled."

Retiring an SVN Alarm

To retire a SVN alarm:

1. Enter the command **enable login <login ID>.**

   The login ID associated with that alarm is displayed in the *Alt Name* field of the alarm report and the alarm is retired.

Medpro (Media Processor Circuit Pack)

MO Name (in Alarm Log)	Alarm Level	Initial Command to Run*	Full Name of MO
Medpro	MAJOR	test board UUCSS sh	Media Processor Circuit Pack
Medpro	MINOR	test board UUCSS l	Media Processor Circuit Pack
Medpro	WARNING	test board UUCSS sh	Media Processor Circuit Pack

* UU is the universal cabinet number (1 for PPN, 2 - 44 for EPNs). C is the carrier designation (A, B, C, D, or E). SS is the number of the slot in which the circuit pack resides (01 to 21).

The TN2303 Media Processor (MEDPRO) circuit pack is the next generation H.323 platform. The TN2303 includes a 10/100 BaseT Ethernet interface to support H.323 endpoints for MCU IP (Internet Protocol) trunks.

The TN2303 Media Processor circuit pack is used by the MCU to provide voice over IP and video over IP connectivity. The TN2303 acts as a service circuit to terminate generic RTP streams used to carry packetized audio and video over an IP network. As part of the overall H.323 implementation, the TN2303 circuit pack handles the audio and video streams while the TN799 C-LAN handles the TCP/IP signaling channels

Error Log Entries and Test to Clear Values

Table 8-190. MEDPRO Circuit Pack Maintenance Error Log Entries

Error Type	Aux Data	Associated Test	Alarm Level	On/Off Board	Test to Clear Value
0	0	Any	Any	Any	test board UUCSS
1	0	Circuit pack removed or SAKI Test (#53)	MIN/WRN	OFF	
	This error indicates that the circuit pack has been removed from the system or is not fully administered. The alarm is logged about 15 minutes after the circuit pack has been removed, or 11-minutes after the SAKI Test (#53) fails.To be fully administered, a Medpro circuit pack must meet *all of these 4 conditions*: 1. Have an entry in the circuit pack form (**change circuit pack**) 2. Have the MedPro ip address administered (**change node-names**) 3. Be enabled (**change ip-interface**) 4. Be physically inserted into the correct slot If the circuit pack has an entry in the circuit pack form and either of the other two conditions are *not* met, a MINOR alarm is logged. To resolve the error: 1. Make sure all conditions for administration are met and that a functioning MedPro circuit pack is inserted in the correct slot OR 2. Completely remove the Medpro from the system using the following steps: a. Remove the administered IP-Interface associated with the circuit pack. b. Physically remove the circuit pack from the slot. c. Execute the **remove medpro UUCSS** and **change circuit pack UUCSS** commands.				
18	0	busyout board UUCSS	WARNING	OFF	release board UUCSS
	The Medpro Interface circuit pack has been busied out by a **busyout board UUCSS** command. 1. Release the circuit pack (**release board UUCSS**).				

Table 8-190. MEDPRO Circuit Pack Maintenance Error Log Entries

Error Type	Aux Data	Associated Test	Alarm Level	On/Off Board	Test to Clear Value
23	0	Board administered but not inserted	WARNING	OFF	add ds1 UUCSS
	The Medpro circuit pack is not completely administered. To be fully administered, a Medpro circuit pack must meet *all of these 4 conditions*: 1. Have an entry in the circuit plan (**change circuit pack**) 1. Have the Medpro IP address administered (**change node-names**) 1. Be enabled (**change ip-interface**) 1. Be physically inserted into the correct slot. A DS1 (MEDPRO, UDS1-BD and DS1-BD) differs from most circuit packs in that inserting the circuit pack into the switch is not enough to make the board usable. It must also be administered.				
125	none 3	Wrong board	MINOR	ON	
	No Aux Data: The wrong circuit pack is inserted in the slot where this circuit pack is logically administered. 1. Remove the wrong circuit pack and insert the logically administered circuit pack OR 2. Re-administer this slot to match the circuit pack inserted (**change circuit-pack**).				
257	6553 5	Control Channel Loop Test (#52)	MINOR	ON	test board UUCSS l r 20
	This error is associated with a failure of the Control Channel Test #52. Refer to Control Channel Test #52 Maintenance documentation for details.				
513	4352 4353 4355 4356 4358	TN2303 On board hardware errors	MINOR	ON	
	This error indicates different hardware device problems on the board. They include an external RAM failure, and internal RAM failure, a ROM checksum failure, message corruption, and a program logic inconsistency. The counter can be alarmed if it goes over threshold. There are really no good associated tests for these inline errors, if they continue to happen, an alarm will occur, otherwise the counter will be decremented via the leaky bucket.				
769	Any	Medpro Synchronization Status Test (#1141)	None		
	This Medpro circuit pack reported a loss of Universal Synchronization. Refer to test #1141 for repair procedures.				

Table 8-190. MEDPRO Circuit Pack Maintenance Error Log Entries

Error Type	Aux Data	Associated Test	Alarm Level	On/Off Board	Test to Clear Value
1025	Any	FPGA Query Test (#xxxx)	MINOR		
	FPGA failure. This failure indicates a problem on the FPGA device located on the TN2303. The last byte of the inline error gives a hint as to the problem with the FPGA. The diagnostic strategy for this inline error is to take the switch resources associated with all of the DSPs out of service, and then to reset the FPGA. The reset of the FPGA will cause an uplink response as to whether the reset passed or not. There are several error conditions that can be sent up in the error message for the FPGA, they will all be treated as the same failure by switch software.				
1281	Any	TSI Health Query Test (#xxxx)			
	TSI failures. There are potentially 2 different TSI failures that can occur, one is a TSI DSP failure and the other is a TSI FPGA failure. Both of these failures will be looked for by switch software, but, they will both cause the same response by software. The diagnostic strategy for this inline error is to take the switch resources associated with all of the DSPs out of service, and then to reset the TSI (the reset downlink is slightly different depending on whether the TSI DSP or the TSI FPGA is to be reset). The reset of the TSI will cause an uplink response as to whether the reset passed or not. There are several error conditions that can be sent up in the error message for the TSI, they will all be treated as the same failure by switch software.				
1538	Any	Circuit pack is hyperactive	MINOR	ON	
	This error is used to indicate hyperactivity on the board. Hyperactivity on a circuit pack is when the angel is sending too many CCMS messages uplink, 400 per ten seconds for the TN2303, to switch software. The circuit pack will be taken out of service. See error Type 3999.				
1793	Any	Medpro Synchronization Status Test (#1141)	MINOR	MINOR	
	This Medpro circuit pack cannot find or establish Universal Synchronization. Run the test board long command and wait one minute after the board level tests complete. If the error continues, first busy out the board. Then reset it via the reset board command. Finally, release it. If the error continues, replace the TN2303 circuit.				
2049	Any	PPC Sanity Query Test (#xxxx)			
	This error indicates that the processor, specifically the Power PC, 860T hardware is failing. The PPC provides the Angle functionality as well as the UDP/IP interface; an attempt is made to reset the board automatically. If the reset fails, the board is probably bad and should be replaced.				
2305	Any	IP Address Update			
	This error indicates an IP address inconsistency between switch software and the Medpro board. If this error occurs, an attempt will be made to download the IP address again. If the board still refuses the IP address, the board will be reset.				

Table 8-190. MEDPRO Circuit Pack Maintenance Error Log Entries

Error Type	Aux Data	Associated Test	Alarm Level	On/Off Board	Test to Clear Value
2561		Ping error			
	This error indicates that the ping test has failed. The diagnostics that are run by this failure start up analysis testing and rerun the test again, this testing will continue until the problem is cleared. However, once the counter reaches threshold, an attempt will be made to refresh the IP address to the board.				
2817	Any	Ethernet Hardware Query Test (#xxxx)			
	This error indicates an Ethernet hardware failure on the TN2303 circuit pack. The diagnostic strategy for this inline error is to take the switch resources associated with all of the DSPs out of service, and then to reset the Ethernet hardware. The reset of the Ethernet hardware will cause an uplink response as to whether the reset passed or not. There are several error conditions that can be sent up in the error message for this problem, they will all be treated as the same failure by switch software.				
3073	Any	Circuit pack reset Test (#xxxx)			
	This error is associated with a circuit board reset. The diagnostic strategy for these inline errors is to take the switch resources associated with all of the DSPs out of service, and then to reset the board as the failure of the Scotch is severe enough to warrant a board reset. After the board reset a query can be made again for the health of the Scotch devices to verify whether they are OK, if they are the alarm and counters will be cleared, if not, the alarm will be left up, all DSPs will be left out of service, and maintenance diagnostics will stop. If the board continues to fail with this error type replace the TN2303.				
3329	Any	Upgrade firmware command	MINOR	ON	
	The circuit pack's SAKI could not be reset after the upgrade. 1. Reissue the **upgrade firmware medpro xxxx** command. 2. If the command still fails, escalate the problem.				
3585	Any	Upgrade firmware command	MINOR	ON	
	The firmware upgrade command was not successful. 1. Reissue the **upgrade firmware medpro xxxx** command. 2. If the command still fails, escalate the problem.				
3840, 3841		Inconsistent downlink or board error			
	Inconsistent downlink message. These errors are not service-affecting. No action is required.				

Table 8-190. MEDPRO Circuit Pack Maintenance Error Log Entries

Error Type	Aux Data	Associated Test	Alarm Level	On/Off Board	Test to Clear Value
3999	Any	None			
This error indicates that the circuit pack sent a large number of control channel messages to the switch within a short period of time. If Error Type 1538 is also present, then the circuit pack was taken out-of-service due to hyperactivity. If Error Type 1538 is not present, then the circuit pack has not been taken out-of-service, but it has generated 50% of the messages necessary to be considered hyperactive. This may be completely normal during heavy traffic periods. However, if this error type is logged when the circuit pack is being lightly used, it may indicate a problem with the circuit pack or the equipment attached to it.					

System Technician-Demanded Tests: Descriptions and Error Codes

Investigate tests in the order they are presented in Table 8-191. By clearing error codes associated with the *Control Channel Loop Test,* for example, you may also clear errors generated from other tests in the testing sequence.

NOTE:
The Medpro circuit pack is an upgradable circuit pack. Error types and error log entries for the associated **upgrade firmware** command are discussed in "Firmware Upgrade" on page 5-26.

Table 8-191. System Technician-Demanded Tests

Order of Investigation	First Test Sequence	Second Test Sequence	Reset Board Sequence	Is Test Destructive ?
Control Channel Loop Test (#52)	Short	Long		No
SAKI Sanity Test (#53)	Long		Yes	Yes
Medpro Synchronization Status Test (#1133)	Short	Short	Yes	No
Medpro Synchronization Status Test (#1141)	Short	Short	Yes	No
IP Address Query (#1371)	Short	Long		Yes
Local Ping Test (#1379)	Short	Long		No
MP Diagnostic Test (#1406)	Long		Yes	Yes

Control Channel Looparound Test (#52)

This test queries the circuit pack for its circuit pack code and vintage and verifies its records.

Table 8-192. TEST #52 Control Channel Looparound Test

Error Code	Test Result	Description/ Recommendation
None 2100	ABORT	System resources required for this test are not available. 1. Retry the command at 1-minute intervals a maximum of 5 times.
	FAIL	The circuit pack failed to return the circuit pack code or vintage. 1. Retry the command a maximum of 5 times. 2. If the problem continues, and if the circuit pack is one of the Port circuit packs, replace the circuit pack. Otherwise, if the circuit pack is part of the SPE, use the procedure described in *Replacing SPE Circuit Packs* in Chapter 5. 3. Retry the command a maximum of 5 times.
	PASS	Communication with this circuit pack is successful.
0	NO BOARD	The test could not relate the internal ID to the port (no board). This could be due to incorrect translations, no board is inserted, an incorrect board is inserted, or an insane board is inserted. 1. Ensure that the board translations are correct. Administer the MedPro interface if it is not already administered. 2. If the board was already administered correctly, check the error log to determine whether the board is hyperactive. If this is the case, the board is shut down. Reseating the board re-initializes the board. 3. If the board was found to be correctly inserted in step 1, then issue the **busyout board UUCSS** command. 4. Issue the **reset board UUCSS** command. 5. Issue the **release board UUCSS** command. 6. Issue the **test board UUCSS long** command. This should re-establish the linkage between the internal ID and the port.

SAKI Sanity Test (#53)

This is a destructive test.

This test is only run as a part of a reset board procedure. For the Media Processor, it is necessary to use the **change ip-interfaces** form to disable the Media Processor IP interface before performing this reset board procedure. Other common circuit packs can be reset with the **reset board UUCSS** command which also executes this test.

A reset of this circuit pack will take about 3 1/2 minutes.

Table 8-193. TEST #53 SAKI Sanity Test

Error Code	Test Result	Description/ Recommendation
None	ABORT	System resources required for this test are not available. 1.Retry the command at 1-minute intervals a maximum of 5 times.
1015	ABORT	Port is not out-of-service. 1. Busy out the circuit pack. 2. Execute command again.
2100	ABORT	System resources required for this test are not available. 1. Retry the command at 1-minute intervals a maximum of 5 times.
2803	ABORT	It is necessary to reset the board. 1. Use the change ip-interfaces form to disable the Media Processor IP interface. 2. Execute the command again.
1	FAIL	The circuit pack failed to reset.
2, 2000	FAIL	The circuit pack failed to restart. 1. Execute command again. 2. If the problem persists, replace the circuit pack.
	PASS	The circuit pack initializes correctly. 1. Run the short test sequence.
Any	NO BOARD	This is normal if the test is being done when (a) the board is not physically in the system or (b) the system is booting up. Otherwise, there is some inconsistency between the physical configuration and the data kept in the system. 1. Verify that the board is physically in the system. 2. Verify that the system is not in a stage of booting up. 3. Retry the command at 1-minute intervals for a maximum of 5 times.

Medpro Universal Synchronization Status Test #1133 and #1141

This test is nondestructive.

To support H.323 conferences, that span multiple Medpro circuit packs, the circuit packs must be synchronized with each other. One circuit pack, either an MMI or a Medpro is designated, by the system, as the Universal Sync provider. The *provider* provides the synchronization signaling onto the TDM bus. To become synchronized, other MMI, Medpro, and VPP circuit packs in the system *listen* to

this signal on the TDM bus. This test monitors the synchronization state of the individual Medpro circuit packs in the system.

This test passes with an auxiliary code of 1100 if the Medpro circuit pack is providing Universal Sync. This Test passes with an auxiliary code of 1101 if the Medpro circuit pack is listening to Universal Sync. The test fails if the Medpro circuit pack cannot find Universal Sync. Medpro circuit packs do not usually lose synchronization unless the synchronization provider is either pulled out of the system or is reset via a craft command.

Two Test numbers are associated with this test. Test #1133, which is run when you enter the “long” option of the test board command. Test #1141 runs when you enter the “short” or default option of the test board command. The “short” option test gives only the status of the synchronization, while the “long” option initiates the recovery. You need not necessarily run the long option since synchronization should be taking place within software in the background. You should use the long option only if synchronization is not established within five minutes of investigating a problem.

Table 8-194. Medpro Synchronization Status Tests #1133 and #1141

Error Code	Test Result	Description/Recommendation
2000	ABORT	A response to the test was not received from the Medpro circuit pack within the allowable time period. 1. If this result occurs repeatedly, and if the Medpro circuit pack is idle, try resetting the circuit pack by issuing these commands in the order specified: busyout board PCSS, reset board PCSS, and release board PCSS. 2. Retest the Medpro circuit pack. If the same result occurs again, replace the Medpro circuit pack.
2012	ABORT	Internal system error. This is an abnormal Abort 1. Retry the command at one-minute intervals up to five times 2. If the test continues to ABORT, escalate the problem.
2100	ABORT	Could not allocate the necessary resources to run this test. This as an abnormal ABORT. 1. Retry the command at one-minute intervals up to five times 2. If the test continues to ABORT, escalate the problem.

Table 8-194. Medpro Synchronization Status Tests #1133 and #1141

Error Code	Test Result	Description/Recommendation
	FAIL	The Medpro circuit pack is out synchronization. Run the "long" option of the test board command. Then wait up to five minutest. 1. If the test continues to fail, reset the Medpro circuit pack via the reset board command. Wait up to five minutes. 2. Replace the circuit pack 3. If the test continues to FAIL, escalate the problem.
1100	PASS	The Medpro circuit pack is providing the synchronization signal for the MCU correctly (it is in sync).
1101	PASS	The Medpro circuit pack is listening to the synchronization signal provided by another MMI or Medpro circuit pack in the MCU (it is in sync).

IP Address Query Test #1371

This test is destructive.

This test sends the Media processor the IP address, subnet mask, and gateway translation (IP parameters). If the parameters do not match MCU translation, the maintenance sub-system reboots the board. The board goes through a physical board removal and insertion.

When this test fails, it is an indication that an illegal change was made and the customer should be notified.

Table 8-195. TEST #1371 IP Address Query Test

Error Code	Test Result	Description/ Recommendation
	ABORT	Internal system error 1. Retry the command at 1-minute intervals a maximum of 5 times.
2100	ABORT	Insufficient system resources to run this test. 1. Retry the command at 1-minute intervals a maximum of 5 times.
2801	ABORT	Unable to find IP address data for this location. Verify that the board is administered.

Table 8-195. TEST #1371 IP Address Query Test

Error Code	Test Result	Description/ Recommendation
2807	ABORT	The board is administered, but not enabled in the **change ip-interfaces** form.
	FAIL	The IP address, subnet mask, and gateway translation parameters do not match MCU translations. The board goes through a physical board removal and insertion. 1. If the problem persists, replace the circuit pack.
	PASS	Translation data matches.

Ping Test (#1379)

This test is non-destructive

This test verifies that the MedPro circuit pack can communicate to other nodes on the LAN.

This test pings the gateway IP address as defined on the IP Interface form.

If the PING is successful, this test looks at the PING round trip delay. If a round trip delay of greater than 4 seconds is reported, a separate error is logged. Excessive round trip delays do not take the MedPro out of service.

Services can execute the standard PING command using the C-LAN board address and MedPro IP address to see the actual round-trip delay. (See **ping** commands).

This test is a nondestructive test. It runs due to in-line errors, during periodic and schedule maintenance, and on demand.

Table 8-196. TEST #1379 Ping Test

Error Code	Test Result	Description/ Recommendation
1, 2	ABORT	Internal Error. 1. Retry the command at 1-minute intervals a maximum of 3 times.
7	ABORT	Destination unreachable. 1. Verify that at least one destination reachable through this port is up. 2. Repeat the test. 3. If the test still aborts, escalate the problem.
2000	ABORT	Response to the test was not received from the Media Processor circuit pack within the allowable time period. 1. If this result occurs repeatedly, attempt to reset the circuit pack. Reset the circuit pack by issuing the **busyout board UUCSS** and the **reset board UUCSS** commands. 2. If this result occurs again, replace the circuit pack.
2012	ABORT	Internal system error. 1. Retry the command at 1-minute intervals a maximum of 3 times.
2100	ABORT	The necessary system resources to execute the test could not be allocated. 1. Retry the command at 1-minute intervals a maximum of 5 times.
2500	ABORT	Internal system error. 1. Retry the command at 1-minute intervals a maximum of 3 times.
2801	ABORT	No IP address defined. Verify IP Interfaces translations and retest.
2802	ABORT	Different IP address pinged than software had allocated for the test. 1. Retry the command at 1-minute intervals a maximum of 3 times.
2805	FAIL	The number of pings received did not match the number sent (normally one ping sent). This means that no ping responses were received from the gateway defined on the ip-interfaces form for the Media Processor. 1. Retry the command at 1-minute intervals a maximum of 3 times.
2807	ABORT	The board is administered but not enabled in the **change ip-interfaces** form.
7, 89, 1007	FAIL	A Ping to the destination failed through this port. This failure is because the destination is down. 1. Verify that at least one destination is reachable through this port. 2. Once verified, execute the **test port UUCSSpp** command to verify that the H.323 Signaling Group Ping Test (#1387) passes.
	PASS	Ping through this port successful.

MP Diagnostic Test (#1406)

This test is destructive.

The MP Diagnostic Test #1406 runs all of the diagnostic tests listed below and in the order listed, but only if each successive test passes:

1. FPGA Query
2. TSI Query
3. ETHERNET Query
4. SCOTCH Sanity

FPGA Query

This test passes if the FPGA device on the TN2303 test ok. Otherwise it fails with no fail code or AUX data.

This test is to verify the status of the FPGA device on the TN2303 circuit pack. If the device is bad, software will set an appropriate counter, post an error and alarm, and take all DSPs out of service (all DSPs are controlled by the one FPGA). Software will then attempt to reset the FPGA. If the reset passes or the original test passes, the DSPs will be placed into service.

TSI DSP Query

This test passes if the TSI device on the TN2303 test ok. Otherwise it fails with no fail code or AUX data.

This test is to verify the status of the TSI device on the TN2303 circuit pack. If the device is bad, software will set an appropriate counter, post an error and alarm, and take all DSPs out of service (all DSPs are controlled by the one TSI). Software will then attempt to reset the TSI. If the reset passes or the original test passes, the DSPs will be placed into service.

Ethernet Query

This test passes if the TN2303 hardware test ok and the Ethernet port is connected. Otherwise it fails with no fail code or AUX data.

SCOTCH Sanity

The Scotch device on a board contains the functionality on the board to communicate with switch software via the TDM bus for conferencing and gain adjustment. This is done by setting up connections on TDM bus time slots.

There are 3 different inline errors that can be generated due to the Scotch devices on the board. They are NPE scotch device 0, NPE scotch 1, and NCE scotch. If any of these errors are reported from the board, the DSPs will be taken from service and the a circuit pack reset will be done by running the SAKI test.

Table 8-197. TEST #1406 MP Diagnostic Test

Error Code	Test Result	Description/ Recommendation
2012	ABORT	System error: 1. Retry the command at 1-minute intervals a maximum of 5 times.
2100	ABORT	System resources required for this test are not available. 1. Retry the command at 1-minute intervals a maximum of 5 times.
	FAIL	The MP Diagnostic test has failed for this TN2303 and the board is in the OOS state. 1. Issue the **busyout board UUCSS** command. 2. Issue the **reset board UUCSS** command. 3. Issue the **release board UUCSS** command. 4. Issue the **test board UUCSS long** command. If the board continues to fail replace the board.
8192 to 8328	FAIL	The FPGA DSP test failed: 1. Issue the **busyout board UUCSS** command. 2. Issue the **reset board UUCSS** command. 3. Issue the **release board UUCSS** command. 4. Issue the **test board UUCSS long** command. If the board continues to fail replace the board.
8448 to 8584	FAIL	The TSI FPGS test failed: 1. Issue the **busyout board UUCSS** command. 2. Issue the **reset board UUCSS** command. 3. Issue the **release board UUCSS** command. 4. Issue the **test board UUCSS long** command. If the board continues to fail replace the board.
12288 to 12424	FAIL	The TSI DSP test failed: 1. Issue the **busyout board UUCSS** command. 2. Issue the **reset board UUCSS** command. 3. Issue the **release board UUCSS** command. 4. Issue the **test board UUCSS long** command. If the board continues to fail replace the board.

Table 8-197. TEST #1406 MP Diagnostic Test

Error Code	Test Result	Description/ Recommendation
16384 to 16900	FAIL	A SCOTCH device failed: 1. Issue the **busyout board UUCSS** command. 2. Issue the **reset board UUCSS** command. 3. Issue the **release board UUCSS** command. 4. Issue the **test board UUCSS long** command. If the board continues to fail replace the board.
24576 to 24580	FAIL	A ETHERNET device failed: 1. Issue the **busyout board UUCSS** command. 2. Issue the **reset board UUCSS** command. 3. Issue the **release board UUCSS** command. 4. Issue the **test board UUCSS long** command. If the board continues to fail replace the board.
	PASS	The FPGA device on this TN2303 is operating correctly
0	NO BOARD	The test could not relate the internal ID to the port (no board). This could be due to incorrect translations, no board is inserted, an incorrect board is inserted, or an insane board is inserted. 1. Ensure that the board translations are correct. Administer the Medpro interface if it is not already administered. 2. If the board was already administered correctly, check the error log to determine whether the board is hyperactive. If this is the case, the board is shut down. Reseating the board re-initializes the board. 3. If the board was found to be correctly inserted in step 1, then issue the **busyout board UUCSS** command. 4. Issue the **reset board UUCSS** command. 5. Issue the **release board UUCSS** command. 6. Issue the **test board UUCSS long** command. This should re-establish the linkage between the internal ID and the port.

MEDPROPT (TN2303 MED PRO DSP PORT)

MO Name (in Alarm Log)	Alarm Level	Initial Command to Run	Full Name of MO
MEDPROPT	MINOR/WARNING	test port UUCSS or PCSS [short/long] [repeat#] | [clear]	TN2303 MED PRO DSP PT

The MEDPROPT maintenance object monitors the health of the MEDPRO digital signal processors (DSPs).

The Media Processor circuit pack provides the audio bearer channels for H.323 video over IP and voice over IP calls. One TN2303 circuit pack has eight MEDPROPT media processing resources.

The MEDPROPT is a service circuit used by H.323 trunk channels. An idle channel is allocated to an H.323 trunk on a call-by-call basis.

Error Log Entries and Test to Clear Values

Table 8-198. MEDPROPT Error Log Entries

Error Type	Aux Data	Associated Test	Alarm Level	On/Off Board	Test to Clear Value
0	0	Any	Any	Any	test board UUCCSS
	Run the Short Test Sequence first. If all tests pass, run the Long Test Sequence. Refer to the appropriate test description and follow the recommended procedures.				
1	ANY	DSP Capacity Test (#1382)		ON	test board UUCCSS l r5
	The Aux Data field contains the number of DSPs that are Out of Service (OOS).				
18	0	busyout port UUCSS	WARNING	OFF	release port UUCCSS
	the MEDPRO has been busied out by a **busyout port UUCSS** command. 1. Release the port (**release port UUCSS**).				
258	ANY	DSP Capacity Test (#1382)	WARNING	ON	test board UUCCSS l r5
	The Aux Data field contains the number of DSPs that are Out Of Service (OOS).				

Table 8-198. MEDPROPT Error Log Entries

Error Type	Aux Data	Associated Test	Alarm Level	On/Off Board	Test to Clear Value
513		DSP Capacity Test (#1382)	MINOR	ON	test port UUCCSSpp
	For the TN2303 only. The port is out of service (OOS) due to an associated DSP that is bad.				
515	ANY	DSP Capacity Query Test (##1382)	MINOR	ON	test board UUCCSS l r5
	The Aux Data field contains the number of DSPs that are Out Of Service (OOS).				
769	Any	TDM NIC Looparound Test (#1380)	MIN	ON	test port UUCCSS l r10
1025	Any				
	This port is out of service (OOS) due to a board level failure. Check for errors/alarms against the board, in particular, ping problems or IP address inconsistency, or board sanity problems.				

System Technician-Demanded Tests: Descriptions and Error Codes

Investigate tests in the order they are presented in Table 8-199. By clearing error codes associated with the *DSP Capacity Query Test,* for example, you may also clear errors generated from the other test in the testing sequence.

Table 8-199. System Technician-Demanded Tests

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
DSP Capacity Query (#1382)	Long		No
TDM NIC Looparound Test (#1380)	Long		No
Port Status Test (#1407)	Short	Long	No

DSP Capacity Query Test (#1382)

This test is non-destructive

When using the TN2303 this test polls the circuit pack for the state of health of a specific DSP. If the DSP is bad an error will be logged and the board will be polled again. If the circuit pack is still failing, the DSP will be taken out of service and a MINOR alarm will be raised.

Table 8-200. DSP Capacity Query Test (#1382)

Error Code	Test Result	Description/ Recommendation
2000	ABORT	Response to the test was not received within the allowable time period.
2100	ABORT	Could not allocate the necessary system resources to run this test.
2500	ABORT	Internal system error 1. Retry the command at 1-minute intervals a maximum of 3 times.
1-11	FAIL	Some DSPs on the circuit pack have failed.
	FAIL	The DSP failed. If it continues to fail, it will be taken out of service.
	PASS	All 11 DSPs are functioning and in-service.
0	NO BOARD	No board was detected by the test. 1. Check the Error Log for wrong board (Error Type 125) or no board (Error Type 131). Resolve either of these issues, if applicable. 2. Check that the board is properly translated and inserted. If so, check for hyperactivity. If hyperactive, use the **reset board UUCSS** command. 3. Run the test again. If it fails, the circuit pack may be bad. Replace the circuit pack and retest.

TDM NIC Looparound Test (#1380)

This test is non-destructive

This test sets up a loopback path from the TDM bus out to the NIC edge of the Media processor and back to the TDM bus. The loopback is established by setting up the outbound IP connection to send IP packets to the MedPro's own IP address. The tone generator places a test tone (440Hz) onto a timeslot. The timeslot is listened to by the Media processor board. The tone is routed through the TAP2303 DSP farm, where it may undergo transcoding to G.723, etc. The tone is looped back at the Network interface and back through the TAP2303 where it is converted back into standard PCM. The tone is placed onto a TDM timeslot and detected by a tone detector port. The test passes if 440Hz is reported by the tone detector.

Table 8-201. TDM NIC Looparound Test (#1380)

Error Code	Test Result	Description/ Recommendation
1002	ABORT	The system could not allocate timeslots for the test. The system may be under heavy traffic conditions or it may have timeslots out of service due to TDM-BUS errors. 1. If system has no TDM-BUS errors and is not handling heavy traffic, retry the command at 1-minute intervals a maximum of 3 times. 2. If system has TDM-BUS errors, clear any errors, and retry the command at 1-minute intervals a maximum of 3 times. 3. If the command continues to abort, escalate the problem.
1003	ABORT	The system could not allocate a tone receiver for the test. The system may be oversized for the number of Tone Detectors present or some Tone Detectors may be out of service. 1. Resolve any TTR-LEV errors. Even if there are no TTR-LEV errors, there may not be a Tone Detector available on the network that contains the circuit pack being tested. Verify that there is at least one Tone Detector on this network. This does not harm the system. 2. Resolve any TONE-PT errors. 3. If neither condition exists, retry the command at 1-minute intervals a maximum of 3 times.
2000	ABORT	Response to the test was not received in the allowable time period. 1. Retry the command at 1-minute intervals a maximum of 3 times.
2100	ABORT	Could not allocate the necessary system resources to run this test.
2500	ABORT	Internal system error. 1. Retry the command at 1-minute intervals a maximum of 3 times.
2801	ABORT	The TN2303 Media Processor board has not been administered on the **ip-interfaces** form.

Table 8-201. TDM NIC Looparound Test (#1380)

Error Code	Test Result	Description/ Recommendation
ANY	FAIL	The test did not detect the test tone through the looparound connection. 1. Test the tone-clock in the port network that contains the media processor under test. 2. If the tone-clock is healthy, test the media processor board again. 3. If the test continues to fail, replace the media processor board.
	PASS	The board is functioning properly.
0	NO BOARD	No board was detected by the test. 1. Resolve either wrong board (Error 125) or no board (Error 131) issues, if applicable. 2. Check that the board is properly translated and inserted. If so, check for hyperactivity (Error 1538). If hyperactive, use the **reset board UUCSS** command. 3. Run the test again. If it fails, the NCE chip on board may be bad. Replace the board and retest.

Port Status Query Test (#1407)

This test is non-destructive

This test queries the Port status.

Table 8-202. Port Status Query Test (#1407)

Error Code	Test Result	Description/ Recommendation
1	ABORT	This port is Out of service (OOS) due to: ■ A board level problem, for example no IP address has been translated for this location. ■ A DSP hardware problem (See Test (#1380) and Test (#1382).
2	ABORT	This port has been made maintenance busy
2000	ABORT	Response to the test was not received in the allowable time period. 1. Retry the command at 1-minute intervals a maximum of 3 times.

Table 8-202. Port Status Query Test (#1407)

Error Code	Test Result	Description/ Recommendation
	FAIL	Unable to get status for this port. Verify that this board has been administered correctly, and that there are no alarms against this board.
	PASS	The board is functioning properly and the port is in-service and available.
0	NO BOARD	No board was detected by the test. 1. Resolve either wrong board (Error 125) or no board (Error 131) issues, if applicable. 2. Check that the board is properly translated and inserted. If so, check for hyperactivity (Error 1538). If hyperactive, use the **reset board UUCSS** command. 3. Run the test again. If it fails, replace the board and retest.

MEMORY

MO Name (in Alarm Log)	Alarm Level	Initial Command to Run	Full Name of MO
MEMORY	MAJOR	test memory a/b l c	memory

Refer to MEM-BD (Memory Circuit Pack) for circuit pack level errors.

MMI-BD (Multimedia Interface)

The Multimedia Interface circuit pack (MMI) provides a number of H.221 protocol terminations for bit streams received from the TDM Bus or the DS1 (UDS1) cable interface (if existing). The MMI demultiplexes the H.221 bit stream (audio, video, data, control, and indication signals) and transmits the bit streams onto the TDM Bus so the appropriate circuit packs can process them. In the reverse direction, the MMI receives processed bit streams (conferenced audio, broadcast video, and broadcast data) from the TDM Bus, multiplexes these signals into a single H.221 bit stream and transmits it back to the original port circuit pack.

The MMI circuit pack is commonly referred to as the MMI pack. There are 32 ports (also called resources) on the circuit pack (see MMI-PT). The MMI contains five

digital signal processors (DSP); four DSPs manage the 32 resources and one DSP, the time slot interchanger (TSI), interfaces with the TDM Bus.

Alarm Level	Initial Craft Command to Run
Major	test board PCSS l r#
Minor	test board PCSS l r#
Warning*	test board PCSS s r#

* See XXX-BD (Common Port Board) for details.

Hardware Error Log Entries

The following are the hardware error log entries and the associated test to clear value.

Table 8-203. MMI-BD Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value
0	0	Any	Any	Any	test board PCSS sh r 1
	Run the short test sequence first. If all tests pass, run the long test sequence. Refer to the appropriate test description and follow the recommendations.				
18	0		Warning	Off	release board PCSS
	The circuit pack has been busied out.				
23	0	None	Warning	Off	
	The circuit pack has been logically administered but is not physically installed. The alarm will be cleared when the circuit pack is installed. This error is not service-affecting.				
257	Any	#52	Major	On	test board PCSS r 20
	Transient communication problems between the MCU and this circuit pack. Execute **test board PCSS** and refer to test #52 under XXX-BD for repair procedures.				

Table 8-203. MMI-BD Error Log Entries — *Continued*

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value
513	4352 to 4357				
	Uplink error from circuit pack. An on-board angel hardware failure has been detected by the circuit pack. The *Aux Data* values are as follows: 4352: external RAM error 4353: internal RAM error 4355: ROM checksum error 4357: instruction set error Use **busyout board PCSS** and **reset board PCSS** followed by **release board PCSS** to reset the circuit pack. **WARNING**: *Busying out the circuit pack drops all calls on the circuit pack. When it is reset, the circuit pack executes a set of tests to detect the presence of any of the above faults. Detection of any of these errors during initialization causes the circuit pack to lock up and appear insane to the MCU.*				
769	Any	#1123	None		
	This MMI circuit pack reported a loss of MMI synchronization. Refer to test #1123 for repair procedures.				
1281	Any	#53	Major	On	
	A failure of the time slot interchanger has been detected. Reset the circuit pack using **busyout board PCSS** and **reset board PCSS**. If the reset passes, then the on-board circuitry is healthy. Use **test board PCSS long clear** followed by **release board PCSS** to retire the alarm. If the reset fails, replace the circuit pack.				
1538	Any		Minor	On	
	Software detected an error. The circuit pack is hyperactive, in that it is flooding the MCU with messages sent over the control channel. The circuit pack is taken out of service when a threshold number of these errors is reported to the MCU. Clear the alarm using **busyout board PCSS** followed by **reset board PCSS**. Then perform **test board PCSS long clear** and **release board PCSS.** If the error occurs again within 10 minutes, replace the circuit pack.				
1793	Any	#6	Minor	On	
	TSI Crosstalk test #6 failed. Refer to that test for repair procedures.				
2049	Any	#1108	Major	On	test board PCSS l r 3
	TSI Loop-Around test #1108 failed. Refer to that test for repair procedures.				
2306	Any	#1117	Minor	Off	test board PCSS l r 5
	The MMI circuit pack has detected a loss of the cable signal between itself and the cabled DS-1. Refer to test #1117 for repair procedures.				

Table 8-203. MMI-BD Error Log Entries — *Continued*

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value
2561	Any	#1125	Minor	Off	test board PCSS l r 3
	Refer to the repair procedure for test #1125.				
2817	Any	#1123	Minor	On	
	This MMI cannot find or establish MMI synchronization. Run the test board long command and wait one minute after the board level tests complete. If the error continues, first busy out the board. Then reset it via the reset board command. Finally, release it. If the error continues, replace TN787K.				
3329	Any	upgrade firmware command	Minor	On	
	The circuit pack's SAKI could not be reset after the upgrade. 1. Reissue the **upgrade firmware mmi xx** command. 2. If the command still fails, escalate the problem.				
3585	Any	upgrade firmware command	Minor	On	
	The **firmware upgrade** command was not successful. 1. Reissue the **upgrade firmware mmi xx** command. 2. If the command still fails, escalate the problem.				

Craft-Demanded Tests

Perform these tests in the order shown.

NOTE:
The MMI circuit pack is an upgradable circuit pack. Error types and error log entries for the associated **upgrade firmware** command are discussed in the "Firmware Download" section in Chapter 5 of this document

Table 8-204. System Technician-Demanded Tests: MMI-BD

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?	Reset Board Sequence
Control Channel Loop-Around Test #52	Short	Long	No	
MMI Cable Status Test #1117	Short	Long	No	
MMI Synchronization Status Test #1123	Short		No	

Table 8-204. System Technician-Demanded Tests: MMI-BD

MMI Synchronization Status Test #1122	Long		No	
MMI DS1 Loop-Around Test #1125	Long		No	
TSI Cross Talk Test #6	Long		No	
TSI Loop-Around Test #1108	Long		No	
SAKI Sanity Test #53*			Yes	Reset

* Refer to XXX-BD (Common Port Circuit Pack) for details.

MMI to DS1/DI Cable Status Test #1117

This is a nondestructive test.

The TN787K MMI circuit pack supports a cable interface between itself and a corresponding DS1 or DI circuit pack. Using the cable saves TDM time slots in the MCU. This test monitors the status of the cable between the two circuit packs.

The DS1 or DI circuit pack provides a signal across the cable to the MMI circuit pack. Whenever the MMI circuit pack detects this signal, it uplinks a “Found Cable” message to the MCU software. The cable can then be used for calls.

Software matches the MMI circuit pack to either the specified DS1 circuit pack via the DS1 form or to the specified DI circuit pack via the Access Endpoint form. The address of the MMI circuit pack is included on the appropriate form if the cable interface is to be used. If the MMI circuit pack detects a loss of the signal from the DS1 or DI circuit pack, the MMI circuit pack uplinks a “Cable Lost” message to the MCU software. The cable is then taken out of service and cannot be used until the MMI circuit pack detects the signal from the DS1 or DI circuit pack again. This test monitors this signal.

Table 8-205. MMI to DS1/DI Cable Status Test #1117

Error Code	Test Result	Description Recommendation
	ABORT	Internal system error. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
1049	ABORT	This MMI circuit pack is not administered as being cabled to any DS1 or DI circuit pack. Use the change ds1 PCSS command to ensure this administration.
1050	ABORT	This MMI circuit pack is administered as being cabled to a DS1 or DI circuit pack, but the DS1 or DI circuit pack is not inserted. Insert the DS1 or DI circuit pack and repeat the test.

Table 8-205. MMI to DS1/DI Cable Status Test #1117

Error Code	Test Result	Description Recommendation
2000	ABORT	A response to the test was not received from the MMI circuit pack within the allowable time period. 1. If this result occurs repeatedly, and if the MMI circuit pack is idle, try resetting the circuit pack by issuing these commands in the order specified: busyout board PCSS, reset board PCSS, and release board PCSS. 2. Retest the MMI circuit pack. If the same result occurs again, replace the MMI circuit pack.
2012	ABORT	Internal system error. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2100	ABORT	Could not allocate the necessary resources to run this test. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
	FAIL	The MMI circuit pack has lost the signal from the cabled DS1 or DI circuit pack. 1. Examine the back of the MCU to ensure the cable is connected correctly. 2. If the test still fails, replace the cable. 3. Replace the TN787K circuit pack. If the test still fails, replace the DS1 or DI circuit pack. 4. If the test continues to fail, escalate the problem.
	PASS	The MMI circuit pack is detecting the cable correctly and is usable for call traffic.

MMI Synchronization Status Test #1122 and #1123

This test is nondestructive.

To support H.320 conferences, that span multiple MMI circuit packs, the circuit packs must be synchronized with each other. One circuit pack, either an MMI or a Medpro is designated, by the system, as the Universal Sync provider. The *provider* provides the synchronization signaling onto the TDM bus. To become synchronized, other MMI, Medpro, and VPP circuit packs in the system *listen* to this signal on the TDM bus. This test monitors the synchronization state of the individual MMI circuit packs in the system.

This test passes with an auxiliary code of 1100 if the MMI circuit pack is providing Universal Sync. This Test passes with an auxiliary code of 1101 if the MMI circuit pack is listening to Universal Sync. The test fails if the MMI circuit pack cannot

find Universal Sync. MMI circuit packs do not usually lose synchronization unless the synchronization provider is either pulled out of the system or is reset via a craft command.

Two Test numbers are associated with this test. Test #1122, which is run when you enter the “long” option of the test board command. Test #1123 runs when you enter the “short” or default option of the test board command. The “short” option test gives only the status of the synchronization, while the “long” option initiates the recovery. You need not necessarily run the long option since synchronization should be taking place within software in the background. You should use the long option only if synchronization is not established within five minutes of investigating a problem.

Table 8-206. MMI Synchronization Status Tests #1122 and #1123

Error Code	Test Result	Description / Recommendation
	ABORT	Internal system error. This is an abnormal ABORT. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2000	ABORT	A response to the test was not received from the MMI circuit pack within the allowable time period. 1. If this result occurs repeatedly, and if the MMI circuit pack is idle, try resetting the circuit pack by issuing these commands in the order specified: busyout board PCSS, reset board PCSS, and release board PCSS. 2. Retest the MMI circuit pack. If the same result occurs again, replace the MMI circuit pack.
2012	ABORT	Internal system error. This is an abnormal ABORT. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2100	ABORT	Could not allocate the necessary resources to run this test. This is an abnormal ABORT. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
	FAIL	The MMI circuit pack is out of MMI synchronization. Run the “long” option of the test board command. Then wait up to five minutes. 1. If the test continues to fail, reset the MMI circuit pack via the reset board command. Wait up to five minutes. 2. Replace the MMI circuit pack. 3. If the test continues to FAIL, escalate the problem.
1100	PASS	The MMI circuit pack is providing the synchronization signal for the MCU correctly (it is in sync).

Table 8-206. MMI Synchronization Status Tests #1122 and #1123

Error Code	Test Result	Description / Recommendation
1101	PASS	The MMI circuit pack is listening to the synchronization signal provided by another MMI circuit pack in the MCU (it is in sync).

MMI to DS1/DI Cable Loop-Around Test #1125

This is a nondestructive test.

The TN787K MMI circuit pack supports a cable interface between itself and a corresponding DS1 or DI circuit pack. Using the cable saves TDM time slots in the MCU. Test #1125 tests the integrity of the cable between the two circuit packs. The test executes only if the cable is idle. If a call comes across the cable, the test aborts.

The DS1 or DI circuit pack is told to provide loop-back at the cable. In cable loop-around mode, the DS1 or DI circuit pack loops back all data on the same cable time slot where the data is received. The tone generator is then instructed to provide a digital count on a TDM time slot. The MMI circuit pack's TSI is instructed to connect first to this time slot and then to a cable time slot for the DS1 or DI circuit pack. Since the DS1 or DI circuit pack is in cable loop-back, the MMI circuit pack is instructed to first listen to this same cable time slot and then put it back onto the TDM bus on a time slot to be joined. The tone detector then uplinks regardless of whether or not the digital count was correctly detected.

Table 8-207. MMI to DS1 or DI Cable Loop-Around Test #1125

Error Code	Test Result	Description Recommendation
	ABORT	Internal system error. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
1049	ABORT	The MMI circuit pack is not administered as being cabled to any DS1 or DI circuit pack. Use the change ds1 PCSS command to enable this administration.
1050	ABORT	The MMI circuit pack is administered as being cabled to a DS1 or DI circuit pack, but the DS1 or DI circuit pack is not inserted. Insert the DS1 or DI circuit pack and repeat the test.
1051	ABORT	Currently, the MMI circuit pack has a call active between itself and the DS1 or DI circuit pack. Ensure the cable is idle. Otherwise, the test cannot run.
1052	ABORT	(Test is either not available or not supported in the current software.)

Table 8-207. MMI to DS1 or DI Cable Loop-Around Test #1125

Error Code	Test Result	Description Recommendation
2000	ABORT	A response to the test was not received from the Tone Detector circuit pack within the allowable time period. If this result occurs repeatedly, escalate the problem.
2012	ABORT	Internal system error. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
2100	ABORT	Could not allocate the necessary resources to run this test. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT, escalate the problem.
	FAIL	The cable between the MMI circuit pack and the DS1 or DI circuit pack is faulty. 1. Replace the cable. 2. If the test still fails, replace the MMI circuit pack. 3. If the test still fails, replace the DS1 or DI circuit pack. 4. If the test still fails, escalate the problem.
	PASS	The cable between the MMI circuit pack and the DSI or DI circuit pack is functioning correctly.

TSI Crosstalk Test #6

This nondestructive test verifies that the TSI, which controls connectivity to the TDM Bus, talks on the selected TDM Bus time slot and never crosses over to time slots reserved for other connections. If the TSI is not working properly, one-way and noisy connections may be observed. When the test passes, the TSI is able to

communicate over the TDM Bus. This test is part of the circuit pack's long demand and scheduled test sequence and takes approximately 20 to 30 seconds to complete.

Table 8-208. TSI Crosstalk Test #6

Error Code	Test Result	Description Recommendation
	ABORT	Internal system error. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.
1002	ABORT	The system could not allocate time slots for the test. The traffic load on the system may be high or time slots may be out of service due to TDM-BUS errors. 1. See TDM-BUS for any active TDM-Bus errors. 2. If there are no TDM Bus errors and the MCU is not handling heavy traffic, repeat the test at one-minute intervals up to five times. 3. If the test continues to abort, follow normal escalation procedures.
1003	ABORT	The system could not allocate a tone detector for the test. The system may be oversized for the number of tone detectors present or some tone detectors may be out of service. 1. Look for TTR-LEV errors in the error log. 2. Look for TONE-PT errors in the error log. 3. If neither condition exists, retry the test at one-minute intervals up to five times. 4. If the test continues to abort, escalate the problem.
2000	ABORT	Response to the test was not received from the Tone Detector circuit pack within the allowable time period. 1. If this result occurs repeatedly, attempt to reset the MMI circuit pack if all ports are not in use. 2. Use busyout board PCSS and reset board PCSS followed by release board PCSS. 3. Retest the MMI pack. If this result occurs again, replace it.
2012	ABORT	Internal system error. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.

Table 8-208. TSI Crosstalk Test #6

Error Code	Test Result	Description Recommendation
2100	ABORT	Could not allocate the necessary resources to run this test. This is a normal abort. 1. Retry the command at one-minute intervals up to five times. NOTE: If the green LED on the TN768 Tone-Clock circuit pack is on, wait until it goes off. 2. If the problem persists, follow normal escalation procedures.
	FAIL	The TSI was found to be transmitting in error. This causes noisy and unreliable connections. Replace the MMI circuit pack.
	PASS	The TSI is correctly using its allocated time slots. The MMI is functioning normally.

TSI Loop-Around Test #1108

In this test, the MMI circuit pack's TSI is told to listen to a TDM time slot. A digital count tone is looped back in the TSI and onto another TDM time slot without passing through any resource hardware. A tone detector port verifies the looped data. If the digital count is correct, the test passes. The test is done for both TDM buses. Failures indicate that the TSI is unreliable

.

Table 8-209. TSI Loop-Around Test #1108

Error Code	Test Result	Description Recommendation
None	ABORT	Internal system error. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.
1002	ABORT	The system could not allocate time slots for the test. The traffic load on the system may be high or time slots may be out of service due to TDM-BUS errors. 1. See TDM-BUS for any active TDM Bus errors. 2. If there are no TDM Bus errors and the MCU is not handling heavy traffic, repeat the test at one-minute intervals up to five times. 3. If the test continues to abort, follow normal escalation procedures.
1003	ABORT	The system could not allocate a tone detector for the test. The system may be oversized for the number of tone detectors present or some tone detectors may be out of service. 1. Look for TTR-LEV errors in the error log. 2. Look for TONE-PT errors in the error log.\ 3. If neither condition exists, retry the test at one-minute intervals up to five times. 4. If the test continues to abort, escalate the problem.
2000	ABORT	Response to the test was not received from the Tone Detector circuit pack within the allowable time period. 1. If this result occurs repeatedly, attempt to reset the MMI circuit pack if all ports are not in use. 2. Use busyout board PCSS and reset board PCSS followed by release board PCSS. 3. Retest the MMI pack. If this result recurs, replace it.
2012	ABORT	Internal system error. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.

Table 8-209. TSI Loop-Around Test #1108

Error Code	Test Result	Description Recommendation
2100	ABORT	Could not allocate the necessary resources to run this test. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. NOTE: If the green LED on the TN768 Tone-Clock circuit pack is on, wait until it goes off. 2. If the problem persists, follow normal escalation procedures.
None	FAIL	The TSI was found to be transmitting in error. This causes noisy and unreliable connections. Replace the MMI circuit pack.
	PASS	The TSI is correctly using its allocated time slots. The MMI is functioning normally.

MMI-LEV (Multimedia Interface Resource Level)

The MMI Resource Level MO tracks the number of MMI resources in service in the MCU compared to the number of resources needed for the MCU to run efficiently. This is based on the MCU port capacities (1B, 2B, and H0 ports), which are administrable on the Customer Options form. The algorithm for determining a low level of MMI resources uses this port capacity and the number of in-service ports. Each MMI circuit pack contains a maximum of 32 resources. If the number of in-service MMI ports falls below a percentage of the system port capacity, an MMI-LEV error is logged.

For example, an MCU with 12 2B ports and 4 H0 ports requires 48 MMI ports. If the number of in-service MMI ports falls from 64 (two MMI circuit packs) to 24, an error is logged. If this outage continues for 15 minutes, a major alarm is raised.

Alarm Level	Initial Craft Command to Run
Major	test port PCSS l r#

MMI resources are a key part of the MCU; a loss in the number of resources available for use degrades MCU service. A major alarm is thus raised. If an MMI board or port is craft busied-out via **busyout board** or **busyout port**, then these out-of-service ports are not included in the MMI-LEV calculation. In this way, a technician may busy out an MMI circuit pack and not raise an alarm. However, if a technician does not busy out the circuit pack prior to performing the maintenance, then an alarm may result. Once the problem has been fixed, and the number of MMI resources are restored above this calculated level, then the major alarm is resolved. There is no other way to resolve the alarm.

The best way to diagnose an MMI problem is to check the state of all MMI circuit packs in the MCU. Any alarm raised against these circuit packs should be resolved first. Therefore, check for MMI-BD and/or MMI-PT errors and alarms first. Resolving these alarms may then resolve the MMI-LEV alarm. If an MMI circuit pack is physically removed from the MCU, or if the circuit pack goes bad and is removed logically from the MCU, no error or alarm is logged. Therefore, if an MMI-LEV alarm exists and no errors or alarms exist for either MMI-BD or MMI-PT, then a circuit pack may have been removed.

The MMI is maintained similarly to the Tone Detector circuit packs. MMI, tone detectors, and voice conditioner circuit packs may be removed and inserted in any port board slot without administration. For this reason, no errors are logged for these circuit packs when they are removed.

To determine how many MMI circuit packs are needed for the MCU, find the MCU port capacity on the Customer Options form. Multiply the 2B MCU port capacity by two and the H0 port capacity by 6, and then combine for the total. The MMI circuit pack has a capacity of 32 resources. Thus, if the value calculated is less than or equal to 32, one MMI circuit pack is needed. If the value calculated is greater than 32 but less than 64, then two MMI circuit packs are needed soon.

Use **list configuration** to verify that the number of MMI circuit packs agrees with the number of MMI circuit packs required for the MCU. If these numbers do not agree, an MMI may have been physically or logically removed from the MCU. Restoring the number of MMI circuit packs in the MCU to the correct number may resolve the MMI-LEV alarm.

Hardware Error Log Entries

The following table shows the error log entries along with related information

Table 8-210. MMI-LEV Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
1	Any		Major	Off	
	The number of MMI resources in the MCU that are in service has fallen below the calculated minimum value. This value is determined by the MCU port capacity on the Customer Options form. For a level error to be logged, the number of MMI resources in service must drop to or below half the calculated total port capacity. If the outage continues for 15 minutes, a major alarm is raised. Only by resolving the out of service problems can this level alarm be resolved. See MMI-BD and MMI-PT. Resolving those alarms may also correct MMI-LEV errors or alarms.				

Craft-Demanded Tests

There are no craft-demanded tests for MMI-LEV.

MMI-PT (Multimedia Interface Port)

The Multimedia Interface circuit pack provides a number of H.221 protocol terminations for bit streams received from the TDM Bus. The MMI demultiplexes the H.221 bit stream (audio, video, data, control, and indication signals) and transmits the bit streams onto the TDM Bus so the appropriate circuit packs can process them. In the reverse direction, the MMI receives processed bit steams (conferenced audio, broadcast video, and broadcast data) from the TDM Bus, multiplexes these signals into a single H.221 bit stream, and transmits the data back to the original port circuit pack.

Each MMI contains 32 separately maintained “ports,” more commonly referred to as resources.” MMI-PT represents one of these 32 resources. At system boot or when the circuit pack is inserted, 32 resources are inserted into the system. The MMI contains four digital signal processors (DSP), which manage the 32 resources. There is a direct mapping of resources to DSPs. Resources 1 through 8 map to DSP 1; 9 through 16 map to DSP 2; 17 through 24 map to DSP 3; and 25 through 32 map to DSP 4. A failure of one of these DSPs may result in all eight resources that it controls being placed out of service.

Alarm Level	Initial Craft Command to Run
Minor	test port PCSSpp l r#
Warning	test port PCSSpp l r#

Hardware Error Log Entries

The following table shows the error log entries and related information, including the test to clear values.

Table 8-211. MMI-PT Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value
0	0	Any	Any	Any	test port PCSSpp sh r 1
	Run the short test sequence first. If all tests pass, run the long test sequence. Refer to the appropriate test description and follow the recommended procedures.				
18	0	Busyout port PCSSpp	Wng	Off	release port PCSSpp
	This port has been busied out by the **busyout port PCSSpp** command.				
257	Any		Minor	On	
	One of the four DSPs that manage the 32 resources failed. The DSP is reset by software in the background. If the alarm is still present, only the entire board can be reset by craft. **WARNING:** *All calls on this circuit pack will be dropped if the circuit pack is reset. Use* **busyout board** *followed by* **reset board** *to alleviate the alarm. If the problem persists, replace the MMI.*				
513	Any	#1111	Minor	On	test port PCSSpp l r 3
	Test #1111 failed. Run the long test sequence and pay attention to the results of test #1111.				
1025	Any				
	Either the MMI or Voice Conditioner (VC) circuit packs reported a loss of framing on the service channel between these two circuit packs. When a customer endpoint establishes a call to the MCU, a channel connects the MMI resource and the VC port. If the MMI or VC circuit packs detect that the channel went down, an uplink message is sent. This error is then forwarded to maintenance for both circuit packs. Run the long test sequence for this MMI resource and if any of the tests fails, follow the repair procedure for that test. If all tests pass, the cause of the problem might be the VC circuit pack. See VC-DSPPT for details.				
3841 to 3844	Any				
	These errors are non-MCU related. They could be caused by network problems or from the customer endpoints. They are presented here for logging purposes only. **3841**=CRC4 Error (frame checksum error) **3842**=correctable BAS (control message single or double bit error, but correctable) **3843**=uncorrectable BAS (control message error–three or more bit error, not correctable) **3844**=protocol error (H.221 protocol error from endpoint detected				

Craft-Demanded Tests

The following table shows the craft-demanded test for the MMI-PT.

Table 8-212. System Technician-Demanded Tests: MMI-PT

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Resource Loop-Around Test #1111	Short	Long	No

Resource Loop-Around Test #1111

This test checks the connectivity of the resource within the MMI circuit pack and out to the TDM Bus. The object is to test the circuitry with which an H.221 bit stream comes in contact when the bit stream is demultiplexed, preprocessed, written to the TDM bus and then read back in (actually looped in the TSI), post-processed, multiplexed, and then written back to the TDM bus to be verified.

This test is accomplished in three parts. The video, audio, and data components of the bit stream are separately tested. If any of these tests fails, the resource is taken out of service

Table 8-213. Resource Loop-Around Test #1111

Error Code	Test Result	Description / Recommendation
1001	ABORT	System resources required to run this test are not available. The port may be busy with a call. This is a normal abort. 1. Retry the command at one-minute intervals up to five times. 2. Use status conference to check if a conference is currently active. If so, this test cannot be run until the conference ends. 3. If the problem persists and a conference is not active, follow normal escalation procedures.
1002	ABORT	The system could not allocate time slots for the test. The traffic load on the system may be high or time slots may be out of service due to TDM-BUS errors. 1. See TDM-BUS for any active TDM Bus errors. 2. If there are no TDM-Bus errors and the MCU is not handling heavy traffic, repeat the test at one-minute intervals up to five times. 3. If the test continues to abort, follow normal escalation procedures.
1003	ABORT	The system could not allocate a tone detector for the test. The system may be oversized for the number of tone detectors present or some tone detectors may be out of service. 1. Look for TTR-LEV errors in the error log. 2. Look for TONE-PT errors in the error log. 3. If neither condition exists, retry the test at one-minute intervals up to five times. 4. If the test continues to abort, escalate the problem.
1004	ABORT	The resource has been seized by a user for a valid call. Use the status conference command to verify that there is a conference call active. 1. If there are no conference calls, retry the command at 1-minute intervals a maximum of 5 times.
2000	ABORT	Response to the test was not received from the Tone Detector circuit pack within the allowable time period. 1. If this result occurs repeatedly, attempt to reset the MMI circuit pack if all ports are not in use. 2. Use busyout board PCSS and reset board PCSS followed by release board PCSS. 3. Retest the MMI pack. If this result occurs again, replace it.
2012	ABORT	Internal system error. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.

Table 8-213. Resource Loop-Around Test #1111

Error Code	Test Result	Description / Recommendation
2100	ABORT	Could not allocate the necessary resources to run this test. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. NOTE: If the green LED on the TN768 Tone-Clock circuit pack is on, wait until it goes off. 2. If the problem persists, follow normal escalation procedures.
0 - 2	FAIL	This resource cannot guarantee data integrity and will be placed out of service. 1. Error code indicates the failure of a particular media loop: 0 = video 1 = audio 2 = low-speed data 2. Replace the circuit pack.
None	PASS	The resource is functioning normally.

MODEM-PT (Modem Pool Port)

Alarm Level	Initial Craft Command to Run*
N/A	N/A

* Since the MCU supports Combined Modem Pooling only, the MODEM-PT Maintenance Object Repair Procedures for MODEM-BD (test board) and MODEM-PT (test port, tests #96, #97, #98, and #99) are not applicable (N/A). The only MODEM-PT command applicable for the Combined Modem Pooling solution is **test modem-pool #**. When the Modem Pool group or port being tested with **test modem-pool #** contains Combined Modem Pools, the ports on the associated TN746B Analog Line circuit pack and the TN754C Digital Line circuit pack are tested as a group. The analog port of the Combined Modem port is tested with Analog port tests (including tests #6, #47, #35, #48, and #36), and the Digital Port of the combined Modem port is tested with TDMODULE/PDMODULE tests (including tests #9, #13, #17, and #175). Therefore, use the repair procedures outlined in ANL-LINE, and TDMODULE/PDMODULE Maintenance documentation when interpreting the results of the execution of the **test modem-pool #** command on Combined Modem Pools.

The Modem Pool Port provides an interface for digital and analog communication devices or ports connected to the MCU. In particular, it is used whenever the Conference Reservation and Control System (CRCS) needs to be located distant from the MCU and the OpCenter and ResCenter connections need to be made remotely to the MCU.

A modem pool port can be thought of as a data communications “conversion resource” because it converts analog modem signals typically used in the telephone network into digital signals that are compatible with the internal MCU network, and vise versa. The MCU implements a “Combined Modem Pool” solution. It does not support the “Integrated Modem Pooling,” which is available in the DEFINITY ECS. The reason is that the Combined Modem Pool solution meets the speed requirement (9600 bps) and globalization requirements of the MCU better than does the Integrated Modem Pooling solution.

The Combined Modem Pool conversion resources include a port on a TN746B Analog Line circuit pack, an external modem, a Data Module, and a port on a TN754C Digital Line circuit pack. The tip-and-ring interface of the Analog Line is connected to the modem, the EIA 232C interface of the modem connects to the Data Module, and the DCP interface on the Data Module is connected to the Digital Line port.

Each Modem Pool conversion resource contains two ports. The Analog Line Port is connected (via the MCU network) to the Analog Line that is the source of the modem signal; the digital port is connected (again via the MCU network) to the Digital Line or Trunk port associated with the Data Module in the connection. The analog modem signals enter the analog port of the conversion resource in standard Pulse Code Modulation (PCM) format. Subsequently, they are converted to Data Communications Protocol (DCP) format before going to the Digital Line or trunk in the connection.

A number of modem pool conversion resources may be available in the MCU. Each such resource is assigned to one of five available Modem Pool Groups. Only one conversion resource is used per data connection. Whenever a local data call originates from an analog port normally used for voice service only and terminates on a digital port, a Data Origination access code must be dialed before the extension number for the Modem Pool conversion resource to be included in the connection.

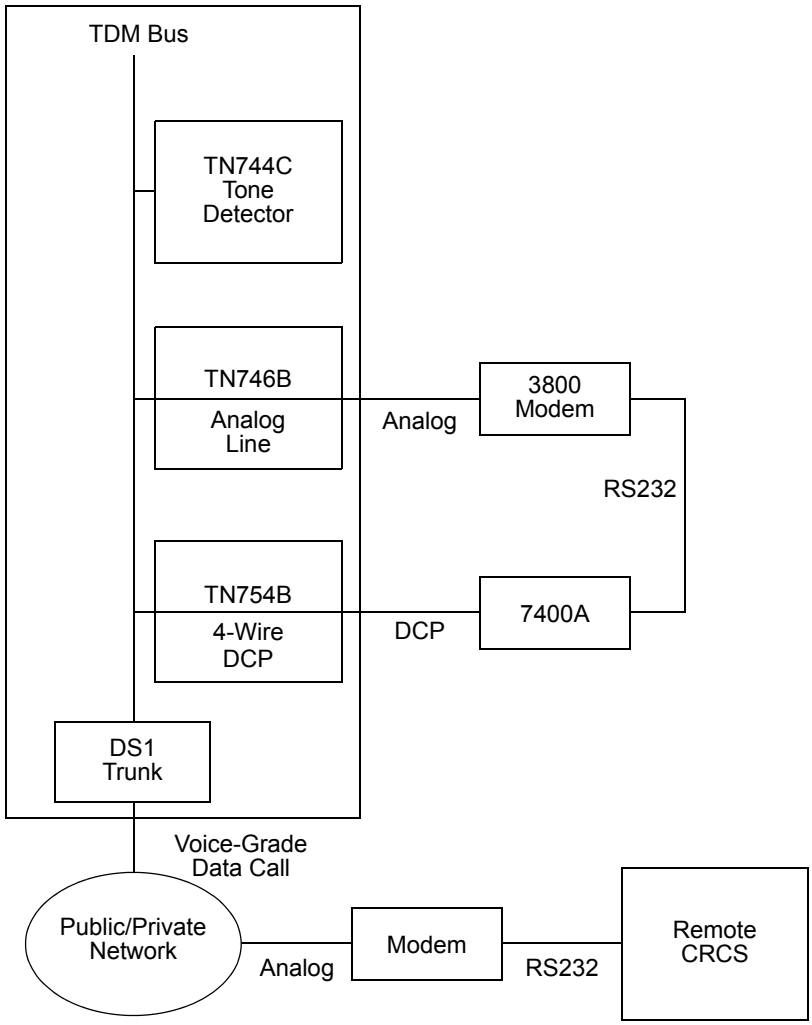


Figure 8-37. MCU/CRCS Combined Modem Pool Configuration

M/T-BD (Maintenance/Test Circuit Pack)

Alarm Level	Initial Craft Command to Run*
Minor	test board PCSS I
Warning	release board PCSS

* Where P is *1*; C is the carrier designation (*A, B, C, D,* or *E*); and SS is the address of the slot in the carrier where the circuit pack is located (*01, 02,* ... etc.).

Refer to XXX-BD (Common Port Circuit Pack) Maintenance documentation for circuit pack level errors. See also M/T-DIG (Maintenance/Test Digital Port) and M/T-PKT (Maintenance/Test Packet Bus Port) Maintenance documentation for related digital port and Packet Bus port information, respectively.

M/T-DIG (Maintenance/Test Digital Port)

Alarm Level	Initial Craft Command to Run*
Minor	test board PCSS I
Warning	release board PCSS

* Where P is *1*; C is the carrier designation (*A, B, C, D,* or *E*); and SS is the address of the slot in the carrier where the circuit pack is located (*01, 02,* ... etc.).

The Maintenance/Test Digital Port is a port on the TN771D (or later vintage) Maintenance/Test circuit pack. Ports 2 and 3 are Digital Ports. The Maintenance/Test Digital Port provides the ability to perform digital (that is, ISDN-PRI) trunk testing via the TDM Bus. For an ISDN-PRI test call, connections are set up in the system as shown in the following figure.

When the Maintenance/Test Digital Port is participating in an ISDN-PRI test call, the port sends a stream of pseudo-random data along the connected B-channel. The far end loops back this data, and the Maintenance/Test Digital Port compares the data to that which was sent. Errors are recorded on a bit and block basis. Refer to ISDN-TRK (DS1 ISDN Trunk) Maintenance documentation for more information on ISDN-PRI test calls.

The Maintenance/Test Digital Port maintenance ensures that the digital trunk testing function is operating correctly. The Maintenance/Test Digital Port is alarmed if maintenance determines that the digital port is operating incorrectly.

NOTE:
An alarm on the Maintenance/Test Digital Port reduces service, but it does not block service since the ISDN-TRK has other means to determine the health of the ISDN-PRI trunk facility. However, to measure the error performance accurately and to ensure accuracy of the health of the ISDN-PRI trunk, the Maintenance/Test circuit pack should be replaced when a new circuit pack is available.

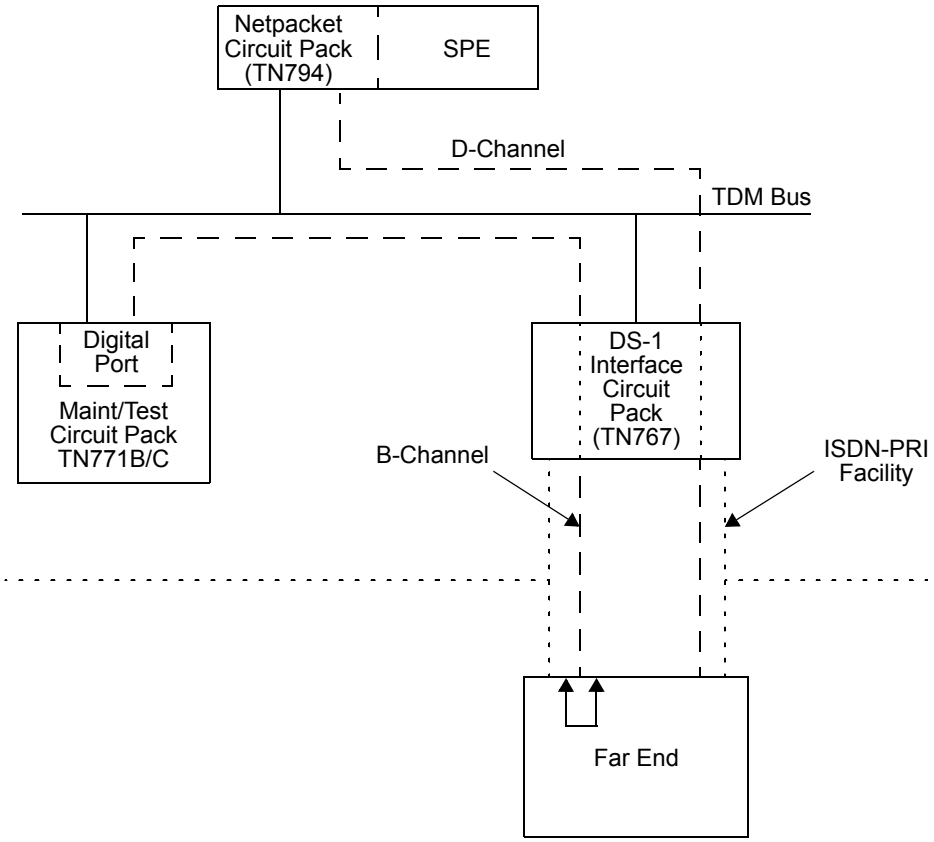


Figure 8-38. ISDN-PRI Outgoing Test Call

Hardware Error Log Entries

Table 8-214. M/T-DIG Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	test port PCSSpp
	Run the Short Test Sequence first. If all tests pass, run the Long Test Sequence. Refer to the appropriate test description and follow the recommended procedures.				
1	41018	None	Minor	On	test port PCSSpp l r 3
	This error indicates a hardware failure on the Digital Port circuitry. Replace the Maintenance/Test circuit pack if the alarm is not resolved by the command indicated.				
18	0		Warning	Off	release port PCSSpp
	The port has been busied out via the busyout port PCSSpp command.				
257	Any	#9	Minor	On	test port PCSSpp l r 3
	This error indicates that Maintenance/Test Digital Port is talking on more than just its assigned time slot. Replace the Maintenance/Test circuit pack.				
513	Any	#565	Minor	On	test port PCSS02 r 2
	This error indicates that the Maintenance/Test Digital Port has failed its self-test. Since the Digital Port Sanity Test runs only on Port 2, but tests both Ports 2 and 3, both ports are alarmed when the test fails. Note that the command indicates to test Port 2, even if the error is logged against Port 3.				
769	Any	#13	Minor	On	test port PCSSpp r 3
	This error indicates that the Maintenance/Test Digital Port has been unable to loop data from a tone generator to a tone detector.				
3840	Any	#566			
	This error indicated that call processing records did not agree with on-board records for the hook state (on-/off-hook) of the Maintenance/Test Digital Port. This error is not service-affecting and no action is required.				

Craft-Demanded Tests

Always investigate tests in the order presented in the following tables when inspecting errors in the system. By clearing error codes associated with the *Digital Port Sanity Test*, for example, you may also clear errors generated from other tests in the testing sequence.

Table 8-215. System Technician-Demanded Tests: M/T-DIG

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Digital Port Sanity Test (#565)	Short	Long	No
Digital Port Loop-Around Test (#13)	Short	Long	No
NPE Crosstalk Test (#9)	Long		No
Hook State Inquiry (#566)	Short	Long	No
Clear Error Counters (#270)	Long		No

NPE Crosstalk Test (#9)

This test is a modified version of the Digital Line NPE Crosstalk Test used by DIG-LINE maintenance.

One or more NPE reside on each circuit pack with a TDM Bus interface. The NPE controls port connectivity, gain, and provides conferencing functions on a per-port basis. The NPE Crosstalk Test verifies that this port's NPE channel talks on the selected time slot and never crosses over to time slots reserved for other connections. If the NPE is not working correctly, one-way and/or noisy connections may be observed. This test is part of a port's long test sequence and takes approximately 10 to 20 seconds to complete. This test is a modified version of the Digital Line NPE Crosstalk Test used by DIG-LINE maintenance.

Table 8-216. NPE Crosstalk Test # 9

Error Code	Test Result	Description Recommendation
1000	ABORT	System resources required to run this test are not available. The port may be in use on a valid ISDN-PRI test call. Use the list isdn-testcall command to determine if the port is in use (if the port is listed in the M/T Port column). If it is in use, either wait for the test call to complete (as indicated in the Start Time and Duration fields in the above display), or abort the test call with the clear isdn-testcall tg/mem command, where tg/mem is determined from the B-channel field of the above display. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort and the port is not in use, escalate the problem.
1001	ABORT	System resources required to run this test are not available. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
1002	ABORT	The system could not allocate time slots for the test. The system may be under heavy traffic conditions or it may have time slots out of service due to TDM-BUS errors. Refer to TDM-BUS Maintenance documentation to diagnose any active TDM-BUS errors. 1. If system has no TDM-BUS errors and is not handling heavy traffic, repeat test at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
1003	ABORT	The system could not allocate a tone receiver for the test. The system may be oversized for the number of tone detectors present or some tone detectors may be out of service. 1. Look for TTR-LEV errors in the Error Log. If present, refer to TTR-LEV Maintenance documentation. 2. Look for TONE-PT errors in the Error Log. If present, refer to TONE-PT Maintenance documentation. 3. If neither condition exists, retry the test at one-minute intervals a maximum of five times. 4. If the test continues to abort, escalate the problem.
1004	ABORT	The port has been seized by a valid ISDN-PRI test call. Use the list isdn-testcall command to determine which call is using the port (from the M/T Port column). Either wait for the test call to complete (as indicated in the Start Time and Duration fields of the above display), or abort the test call with the clear isdn-testcall tg/mem command, where tg/mem is determined from the B-channel field of the above display. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort and the port is not in use, escalate the problem.

Table 8-216. NPE Crosstalk Test # 9

Error Code	Test Result	Description Recommendation
2000	ABORT	Response to the test request was not received within the allowable time period.
2100	ABORT	System resources required to run this test are not available. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
Any	FAIL	The NPE of the tested port was found to be transmitting in error. This causes noisy and unreliable connections. 1. If the remaining ports are currently not in use (yellow LED is off), try to reset the circuit pack. Then repeat the test. 2. If the test fails again, replace the circuit pack.
	PASS	The port is correctly using its allocated time slots. User-reported troubles on this port should be investigated using other port tests and by examining station, trunk, or external wiring.

Digital Port Loop-Around Test (#13)

This test is a modification of the Voice and Control Channel Local Loop Test used by Digital Station (DIG-LINE) maintenance. This test does not perform the control channel and secondary information channel loop-around tests as described for DIG-LINE, as these data paths do not exist for the Maintenance/Test Digital Port. The primary information channel is tested by first looping back the data channel onto the TDM Bus, and then sending a digital count from the Tone-Clock circuit pack and receiving the same digital count with a general-purpose tone detector. A conference test is done next for the primary information channel. This test is the same as Conference Test #6.

Only one value (PASS, FAIL, or ABORT) is generated as a result of the two tests. If either fails or aborts, the sequence is stopped.

Table 8-217. Digital Port Loop-Around Test #13

Error Code	Test Result	Description Recommendation
None	ABORT	Internal system error. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
1000	ABORT	The port is in use on a valid ISDN-PRI Test Call. Use the list isdn-testcall command to determine which call is using the port (from the M/T Port column). Either wait for the test call to complete (as indicated in the Start Time and Duration fields in the above display) or abort the test call with the clear isdn-testcall tg/mem command, where tg/mem is determined from the B-channel field of the above display. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort and the port is not in use, escalate the problem.
1001	ABORT	System resources required to run this test are not available. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
1002	ABORT	The system could not allocate time slots for the test. The system may be under heavy traffic conditions or it may have time slots out of service due to TDM-BUS errors. Refer to TDM-BUS Maintenance documentation to diagnose any active TDM-BUS errors. 1. If system has no TDM-BUS errors and is not handling heavy traffic, repeat test at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
1003	ABORT	The system could not allocate a tone receiver for the test. The system may be oversized for the number of tone detectors present or some tone detectors may be out of service. 1. Look for TTR-LEV errors in the Error Log. If present, refer to TTR-LEV Maintenance documentation. 2. Look for TONE-PT errors in the Error Log. If present, refer to TONE-PT Maintenance documentation. 3. If neither condition exists, retry the test at one-minute intervals a maximum of five times. 4. If the test continues to abort, escalate the problem.

Table 8-217. Digital Port Loop-Around Test #13

Error Code	Test Result	Description Recommendation
1004	ABORT	The port has been seized by a valid ISDN-PRI test call. Use the list isdn-testcall command to determine which call is using the port (from the M/T Port column). Either wait for the test call to complete (as indicated in the Start Time and Duration fields of the above display), or abort the test call with the clear isdn-testcall tg/mem command, where tg/mem is determined form the B-channel field of the above display. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort and the port is not in use, escalate the problem.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
2100	ABORT	System resources required to run this test are not available.
7	FAIL	Conference test failed on the primary information channel. In most cases, the user may not notice a disruption in service. 1. Run the circuit pack tests to check the Tone Generator circuit pack and the Tone Detector circuit pack via the test board PCSS command. 2. Resolve any problems that are detected on the Tone Generator circuit pack or Tone Detector circuit pack. 3. If the Tone Generator and Tone Detector circuit packs are functioning properly, and the test still fails, replace the Maintenance/Test circuit pack.
14	FAIL	The primary information channel is not transmitting properly. User impact may range from nothing to not being able to use this port. 1. Run the circuit pack tests to check the Tone Generator circuit pack and the Tone Detector circuit pack using test board PCSS. 2. Resolve any problems that are detected on the Tone Generator circuit pack or Tone Detector circuit pack. 3. If the Tone Generator and Tone Detector circuit packs are functioning properly, and the test still fails, replace the Maintenance/Test Circuit Pack.
None	PASS	The Maintenance/Test Digital Port digital trunk testing capability is operating correctly.

Clear Error Counters Test (#270)

This test is not an actual test in the strict sense of the word. Many circuit packs have counters in the Angel firmware. These counters are used so that Control Channel Message Set (CCMS) messages are not continuously sent uplink. Using this method, the message is sent once when the counter reaches some preset threshold, and then not sent again until the counter is cleared.

The ports on the Maintenance/Test circuit pack continually run self-tests whenever the port is idle. The Angel uses a counter so that the Background Maintenance Failure message is sent uplink only once (this keeps a failed port/circuit pack from flooding the SPE with a string of messages). This test is used to clear the counter, so that if the port continues to fail during or after SPE-demanded testing, the Angel sends a message to indicate that fact.

This test is only used to send a message to the Angel on the Maintenance/Test Circuit Pack. Therefore, this test should never abort or fail

Table 8-218. Clear Error Counters Test #270

Error Code	Test Result	Description Recommendation
Any	ABORT	This test should never abort. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
	FAIL	This test should never fail. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to fail, escalate the problem.
None	PASS	The message to clear the Maintenance/Test circuit pack's counter for Background Maintenance Failures has been sent.

Digital Port Sanity Test (#565)

This test verifies that the port circuitry involved in the digital trunk testing on the Maintenance/Test Digital Port is functioning properly. This circuitry is common to both Maintenance/Test Digital Ports on the Maintenance/Test circuit pack. Therefore, this test is run only for Port 2. The test aborts when run on Port 3, as described in the following table.

This test operates by connecting the two Maintenance/Test Digital Ports on the TDM Bus so that they talk and listen to each other. Then four self-tests are attempted: (a) sending data from Port 2 to Port 3 in asynchronous mode; (b) sending data from Port 3 to Port 2 in asynchronous mode; (c) sending data from Port 2 to Port 3 in synchronous mode; and (d) sending data from Port 3 to Port 2 in synchronous mode. The test passes if all four of these self-tests are successful. The test stops as soon as any one of these self-tests fails.

This test aborts if an ISDN Test Call is in progress on either Maintenance/Test Digital Port when the test is requested, or if an ISDN Test Call is initiated while the Digital Port Sanity Test is in progress.

Table 8-219. Digital Port Sanity Test #565

Error Code	Test Result	Description Recommendation
1000	ABORT	One of the Maintenance/Test Digital Ports is busy with background maintenance. 1. Either wait for the port to become idle, or busy out both Maintenance/Test Digital Ports on the Maintenance/Test circuit pack via the busyout port PCSS02 and busyout port PCSS03 commands, respectively. 2. Release the ports (if they were busied out) via the release port PCSS02 and release port PCSS03 commands, respectively. 3. Retry the command at one-minute intervals a maximum of five times. 4. If the test continues to abort, escalate the problem.
1002	ABORT	The system could not allocate time slots for the test. The system may be under heavy traffic conditions, or it may have time slots out of service due to TDM-BUS errors. Refer to the TDM-BUS Maintenance documentation to diagnose any active TDM Bus errors. 1. If the system has no TDM-BUS errors, and if not handling heavy traffic, repeat the test at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
1004	ABORT	The port was seized by a valid ISDN-PRI Test Call. Use the list isdn-testcall command to determine which call is using the port (from the M/T Port column). Either wait for the test call to complete (as indicated in the Start Time and Duration fields of the above display), or abort the test call with the clear isdn-testcall tg/mem command, where tg/mem is determined from the B-channel field of the above display.
1019	ABORT	An ISDN Test Call is in progress using this Maintenance/Test circuit pack. The Maintenance/Test circuit pack cannot perform a self-test on one of its Digital Ports while an ISDN Test Call is using either of the Digital Ports. Use the list isdn-testcall command to determine which call is using the port (form the M/T Port column). Either wait for the test call to complete (as indicated in the Start Time and Duration fields of the above display), or abort the test call with the clear isdn-testcall tg/mem command, where tg/mem is determined from the B-channel field of the above display. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort and the port is not in use, escalate the problem.

Table 8-219. Digital Port Sanity Test #565

Error Code	Test Result	Description Recommendation
1138	ABORT	This test does not run on Port 3 of the Maintenance/Test circuit pack. This test runs only on Port 2. Look at the results of the Digital Port Sanity Test for Port 2. 1. Run the command again for Port 2 via the test port PCSS02 or test port PCSS02 l command.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
2100	ABORT	System resources required to run this test are not available.
2500	ABORT	An internal operation failed; the test could not be completed.
50	FAIL	The switch was unable to communicate with the port circuitry used for digital trunk testing. 1. Reset the circuit pack via the busyout board PCSS, reset board PCSS, release board PCSS command sequence. 2. Test the port again via the test port PCSS02 l command. 3. If the test fails again, replace the circuit pack.
100	FAIL	Data was not sent from Port 2 to Port 3 successfully in asynchronous mode.
101	FAIL	Data was not sent from Port 3 to Port 2 successfully in asynchronous mode.
102	FAIL	Data was not sent from Port 2 to Port 3 successfully in synchronous mode.
103	FAIL	Data was not sent from Port 3 to Port 2 successfully in synchronous mode.
None	PASS	The Maintenance/Test Digital Port digital trunk testing capability is operating correctly.

Hook State Inquiry Test (#566)

This test ensures that the Maintenance/Test Digital Port maintenance software and call processing agree on the on-/off-hook status of the Maintenance/Test Digital Port.

Table 8-220. Hook State Inquiry Test #566

Error Code	Test Result	Description Recommendation
1	ABORT	Switch hook audit timed out. No response was received from the circuit pack for information about the switch hook state. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, replace the circuit pack and repeat the test. 3. If the test continues to abort, escalate the problem.
2100	ABORT	System resources required to run this test are not available. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
Any	FAIL	Internal system error. This test should never return a failure. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to fail, reset the circuit pack via the busyout board PCSS, reset board PCSS, release board PCSS command sequence. 3. Retry the command at one-minute intervals a maximum of five times. 4. If the test continues to fail, escalate the problem.
None	PASS	Call processing and Maintenance/Test Digital Port maintenance software agree on the Maintenance/Test Digital Port hook state.

M/T-PKT (Maintenance/Test Packet Bus Port)

Alarm Level	Initial Craft Command to Run*
Minor	test board PCSSpp l
Warning	release port PCSSpp

* Where P is *1*; C is the carrier designation (*A, B, C, D,* or *E*); and SS is the address of the slot in the carrier where the circuit pack is located (*01, 02,* ... etc.); and pp is the 2-digit port number (for example, *01*).

The Maintenance/Test Packet Bus Port is a port (always Port #4) on the TN771D (or later vintage) Maintenance/Test circuit pack. The Packet Bus port provides the following Packet Bus maintenance functions:

- Packet Bus fault detection— the ability to detect faults (for example, shorts, open leads) on the Packet Bus autonomously (that is, without SPE involvement).
- Packet Bus reconfiguration—the ability to swap faulty leads with spare leads autonomously so that the Packet Bus remains operational. This is accomplished by sending messages to all Packet circuit packs [for example, ISDN-BRI (TN556)] telling them which spare leads to use on the Packet Bus.

Maintenance/Test Packet Bus Port maintenance ensures that these maintenance functions are operating correctly. The Maintenance/Test Packet Bus Port is alarmed if maintenance determines that the port's maintenance functions are operating incorrectly.

When Maintenance/Test Packet Bus Port maintenance determines that the Packet Bus Port is defective, the Packet Bus fault detection and Packet Bus reconfiguration functions provided by the port are turned off.

Maintenance/Test Packet Bus Port maintenance interacts with Packet Bus maintenance. Therefore, there may be alarms on the Packet Bus when there is a fault on the Maintenance/Test Packet Bus Port. Refer to PKT-BUS (Packet Bus) Maintenance documentation for further information.

Hardware Error Log Entries

Table 8-221. M/T-PKT Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	test port PCSSpp
	Run the Short Test Sequence first. If all tests pass, run the Long Test Sequence. Refer to the appropriate test description and follow the recommended procedures.				
1	41018	None	Minor	On	test port PCSSpp l r 3
	This error indicates a hardware failure on the Digital Port circuitry. Replace the Maintenance/Test circuit pack if the alarm is not resolved by the command indicated.				
18	0		Warning	Off	release port PCSSpp
	The port has been busied out via the busyout port PCSSpp command.				

Table 8-221. M/T-PKT Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
257	Any	None	Minor	On	test port PCSSppl r 3
	This error indicates that the Maintenance/Test Packet Bus Port has reconfigured the Packet Bus (that is, swapped a bad lead to a spare). Note that this error is sent up whenever the Maintenance/Test Packet Bus Port is initialized (since the Packet Bus Port reconfigures the Packet Bus to whatever state it determines the Packet Bus is in). This occurs if the circuit pack is inserted, if the system is restarted, or if the port is released from a busyout state. Therefore, it is normal for this error to be present in the error log. If the Maintenance/Test Packet Bus Port reconfigures the Packet Bus 12 times within 15 minutes, a Minor alarm is raised. When the Minor alarm is raised, this is an indication that the Packet Bus maintenance functions are not operating correctly, or that many changes are taking place on the Packet Bus (that is, circuit pack insertion or removal). If the system has been in a stable state for more than 15 minutes, try the following procedures: 1. Reset the Maintenance/Test circuit pack from the MCU-MT, as follows: ■ Enter the **busyout board PCSS** command. ■ Enter the **reset board PCSS** command. ■ Enter the **release board PCSS** command. 2. Wait 15 minutes. 3. If the error recurs, replace the Maintenance/Test circuit pack. When this alarm is active, the yellow LED is in one of three states: ■ If there is no activity on the Maintenance/Test circuit pack, the yellow LED is off. It is okay to replace the Maintenance/Test circuit pack. ■ If there is an indication of an uncorrectable fault on the Packet Bus, the yellow LED will be blinking at a rate of 1 Hz. It is okay to replace the Maintenance/Test circuit pack. Ignore the Packet Bus error indication, since the Maintenance/Test circuit pack has been determined to be defective. ■ If there is other activity on the Maintenance/Test circuit pack (that is, ISDN Test Call), or if there is an indication of a correctable fault on the Packet Bus, the yellow LED will be on steady. If there is an ISDN Test Call in progress, it must be halted via the **clear isdn-testcall grp/member** command prior to replacing the circuit pack. Ignore the Packet Bus error indication since the Maintenance/Test circuit pack has been determined to be defective.				
513	Any	#567	Minor	On	test port PCSSppr 3
	This error indicates a failure of the Packet Bus Port Health Inquiry Test. Either the Packet Bus Port has reported a self-test failure, or the SPE is able to communicate with the Maintenance/Test Circuit Pack but not with the Maintenance/Test Circuit Pack Packet Bus Port. Refer to the description of the Packet Bus Port Health Inquiry Test, and follow the instructions indicated for the failure code that matches the Aux Data field.				

Craft-Demanded Tests

Always investigate tests in the order presented in the following tables when inspecting errors in the system. By clearing error codes associated with the *Packet Bus Port Health Inquiry Test,* for example, you may also clear errors generated from other tests in the testing sequence.

Table 8-222. System Technician-Demanded Tests: M/T-PKT

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Packet Bus Port Health Inquiry Test (#567)	Short	Long	No
Clear Error Counters (#270)	Long		No

Clear Error Counters Test (#270)

This test is not an actual test in the strict sense of the word. Many circuit packs have counters in the Angel firmware. These counters are used so that CCMS (Control Channel Message Set) messages are not continuously sent uplink. Using this method, the messages are sent once, when the counter reaches some preset threshold, and then not sent again until the counter is cleared.

The ports on the Maintenance/Test circuit pack continually run self-tests, whenever the port is idle. The Angel uses a counter so that the Background Maintenance Failure message is only sent uplink once (this keeps a failed port/circuit pack from flooding the SPE with a string of messages). This test is used to clear the counter, so that if the port continues to fail during or after SPE-demanded testing, the Angel sends a message to indicate that fact.

This test is only used to send a message to the Angel on the Maintenance/Test circuit pack. Therefore, this test should never abort or fail.

Table 8-223. Clear Error Counters Test #270

Error Code	Test Result	Description Recommendation
Any	ABORT	This test should never abort. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
	FAIL	This test should never fail. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to fail, escalate the problem.
None	PASS	The message to clear the Maintenance/Test circuit pack's counter for Background Maintenance Failures has been sent.

Packet Bus Port Health Inquiry Test (#567)

This test verifies that the Packet Bus fault detection maintenance function of the Maintenance/Test Packet Bus Port is functioning properly. This is done by having the Maintenance/Test Packet Bus Port perform a self-test. If this self-test passes, the Packet Bus Port Health Inquiry Test passes. If the self-test fails, or the SPE cannot communicate with the Maintenance/Test Packet Bus Port, the test fails.

Table 8-224. Packet Bus Port Inquiry Test #567

Error Code	Test Result	Description Recommendation
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
2100	ABORT	System resources necessary to run this test are not available.
2500	ABORT	An internal operation failed; the test could not be completed.
2059	FAIL	The Maintenance/Test Packet Bus Port has reported a failure of the on-board self-test. 1. Retry the command. 2. If the test continues to fail, replace the Maintenance/Test circuit pack and retry the command. 3. If the test continues to fail, refer to PKT-BUS Maintenance documentation to determine if the M/T-PKT failure is being caused by a Packet Bus fault.
2060	FAIL	The Maintenance/Test Packet Bus Port has reported an invalid state for the Packet Bus.
2061	FAIL	The SPE cannot communicate with the Maintenance/Test Packet Bus Port but is able to communicate with the Maintenance/Test Circuit Pack.
None	PASS	The Maintenance/Test Packet Bus Port Packet Bus fault detection capability is operating correctly.

8 PDMODULE (Processor Data Module)

Data modules provide an interface between the system TN754C Digital Line circuit pack and data equipment, such as terminals, host computers, and modems. Data modules are used for both dial-up and permanent circuit-switched data calls.

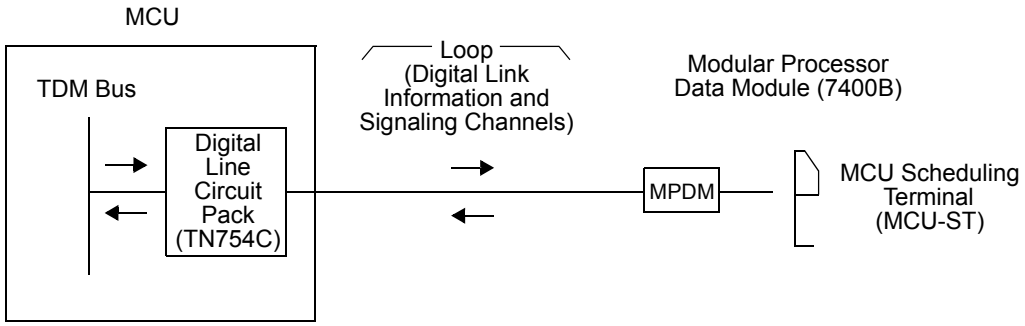


Figure 8-39. Typical Data Module Application

The MPDM provides an interface for data terminal equipment (terminals).

NOTE:
Early versions of these data modules were referred to as PDMs. Later models are designed to provide various customer interfaces through the use of interchangeable interface modules and, therefore, are called modular data modules.

The digital link between a data module and the digital line port supports two logical information channels and one signaling channel. MPDMs use the primary information channel for data communications and the signaling channel for dialing and call supervision. The secondary information channel is not used.

Data modules are not only used for data calls between terminals, computers, and data communications equipment, but are also used as interfaces to equipment associated with system features such as system administration and CDR.

Maintenance tests for data modules associated with those services are covered by tests other than those described here.

Alarm Level	Initial Craft Command to Run
Minor	test port PCSSpp l
Warning	test port PCSSpp sh

NOTE:
Some of the alarms that are logged due to PDMODULE test failures may be related to circuit pack problems reported during the common port circuit pack testing phase. Refer to XXX-BD (Common Port Circuit Pack) about testing the Digital Line circuit pack.

Maintenance of MPDMs is closely related to, and interacts with, Digital Line circuit pack maintenance in some instances. Some of the results of testing MPDMs may be affected by the health of the Digital Line circuit pack. This interaction should be kept in mind when investigating the cause of reported data module problems.

Data modules provide a variety of option switches to allow the customer to select data rates, parity, keyboard dialing, local, remote loop-back, etc. An incorrect setting of those switches does not affect error and alarm information or test results described in this section, but may result in an inoperable condition. Refer to the installation manual provided with the data module for more information about those options.

The DA data module provides an AT (Hayes) type interface that allows the customer to select data rates, parity, local interface mode (linked to digital phone or stand-alone), remote loop-back, etc. An incorrect selection does not affect error and alarm information or test results described in this section, but may result in an inoperable condition.

There are instances in this document where the service state of a data module is mentioned. It is helpful to understand what is meant by the different service states that may exist. An explanation of these service states follows:

- Out-of-Service: The port, and thus the data module, has been removed from service. A busyout of a port or removal of the associated Digital Line circuit pack causes the data module to be placed in the out-of-service state. Failure of the NPE Crosstalk Test #9 also takes a port out of service.
- Disconnected: The port is administered but the associated digital link does not respond. An administered port is put in a diisconnected state after system booting or circuit pack insertion, until a link reset pass message is received from firmware on the associated circuit pack.

- In-Service: Once the MCU software has received a link reset pass message from the digital line port, the port is placed in the in-service state. In case the link reset pass message is missed, and an off-hook message is received while the port is in the disconnected state, maintenance software runs an ID request test and the port is put back in service if a correct response is received.

If the link is disconnected, the port returns to the disconnect state. Note that it takes a few minutes (less than five) for the state of a data module port to change from in-service to disconnected after the data module is disconnected from the local MCU loop.

Hardware Error Log Entries

The following table provides the error log entries and related information, including test to clear values.

Table 8-225. PDMODULE Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	test port PCSSpp sh r 1
	Run the short test sequence first. If all tests pass, run the long test sequence. Refer to the appropriate test description and follow the recommended procedures.				
1	40987	None	Warning	Off	
	Could experience a noisy port or link. This is an off-board problem detected by the port circuit. 1. Check for faulty wiring, a defective data module, or reduce the cabling distance between the data module and the MCU (5000 feet for 24-gauge wire and 4000 feet for 26-gauge wire). 2. If the problem persists, replace the circuit pack. Once the problem has been resolved, the alarm is retired automatically within 60 minutes. The DA module is not phantom-powered from the port; its range is limited by the Italtel digital phone limit (0.7 km, 2300 feet on 26-gauge wire or 1.8 km, 5900 feet on 22-gauge, 0.6 mm. wire) if in linked mode, or by the maximum length of loop allowed from the digital line interface (DLI) component (up to 3.5 km, about two miles, with 22-gauge, 0.6 mm. wire) if in stand-alone mode.				

Table 8-225. PDMODULE Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
1	1 - 20	None	Warning	Off	-
	This Error Type and Aux Data occur when at least 15 off-board problems have been detected with the link to the data module. When an error with the link is detected, an on-board counter is incremented. The user could experience a noisy port or link. This is an off-board problem detected by the port circuit. 1. Check for faulty wiring, a faulty data module, or reduce the cabling distance between the data module and the MCU (5000 feet for 24-gauge wire and 4000 feet for 26-gauge wire). 2. If the problem persists, replace the circuit pack. Once the problem is resolved, the alarm is retired automatically within 60 minutes.				
15	Any				
	This is an internal type error that occurs when an audit request fails.				
18	0	-	Warning	Off	release port PCSSpp
	This port has been busied out by craft.				
257	40971				
	There are problems with transmitting to the data module. This is usually an on-board problem that can be ignored if no user complaints are received. Otherwise, check for faulty wiring.				
513	0	#17	Warning	Off	test port PCSSpp sh r 6
	This alarm occurs when it appears to the MCU that a DCP alarm terminal has been disconnected.				
769	40988		Warning	Off	
	This error indicates that EPF has been turned off due to the over-current condition at the data module. Make sure the data module is connected. Look for faulty wiring, a defective data module, or reduce the cabling distance between the data module and the MCU (5000 feet for 24-gauge wire and 4000 feet for 26-gauge wire). If the problem persists, the PTC may be in the tripped position due to a short on the power line. If so, remove the short, unplug the data module from the wall for about 30 seconds, and plug it back in. If the problem persists, replace the Digital Line circuit pack. Once the problem is resolved, the alarm is retired since this counter uses a leaky bucket strategy. The DA module is not phantom-powered from the port; its range is limited by the Italtel digital phone's limit (0.7 km, 2300 feet, on 26-gauge wire or 1.8 km, 5900 feet, on 22-gauge, 0.6 mm. wire) if in linked mode, or by the maximum length of loop allowed from the digital link interface (DLI) component (up to 3.5 km, about two miles, with 22-gauge, 0.6 mm. wire) if in stand-alone mode.				
1281	Any	#17	Warning	Off	test port PCSSpp sh r 4
	-				

Table 8-225. PDMODULE Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
1537	40968		Warning	Off	
	An in-line maintenance error has generated an off-board warning due to some problem with the link to the data module. This can be ignored if no user complaints are received. Otherwise, make sure the data module is connected, check for faulty wiring, a defective data module, or reduce the cabling distance between the data module and the MCU. If the problem persists, replace the circuit pack. Once the problem is resolved, the alarm is retired automatically in 90 minutes. The DA module is not phantom-powered from the port; its range is limited by the Italtel digital phone's limit (0.7 km, 2300 feet, on 26-gauge wire or 1.8 km, 5900 feet, on 22-gauge, 0.6 mm. wire) if in linked mode, or by the maximum length of loop allowed from the digital line interface (DLI) component if in stand-alone mode.				
1793		#13	Minor	On	test port PCSSpp l r 3
2049		#9	Minor	On	test port PCSSpp l r 3
2305	32770				
	This indicates the data equipment went off-hook while the associated link was being initialized (in a disconnected state). Use status data-module to determine the state of the data module. The off-hook should have changed the service state to in-service. No craft action is necessary.				
2305	40967				
	This is the resulting code generated when the link between the circuit pack and the data module is successfully reset. The link is normally reset when the circuit pack associated with an administered port is first plugged in (assuming the associated circuit pack is plugged in and the data module is connected to the associated port) or when a data module is first connected to an administered port. No craft action is necessary.				
2561		#175	Warning	Off	test port PCSSpp l r 5
	-				
2817		Link GPP Loop (183) Against Links	Major	On	
	A DCP endpoint may have been disconnected.				

Craft-Demanded Tests

Investigate the tests in the following table in the order presented.

Table 8-226. System Technician-Demanded Tests: PDMODULE

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Data Module Internal Loop-Around Test #175	Long		No
Network Processing Element Crosstalk Test #9	Long		No
Information and Control Channel Loop-Around Test #13	Long		No
Data Module Audits Test #17	Short	Long	No

NPE Crosstalk Test #9

One or more NPEs reside on each circuit pack with a TDM Bus interface. The NPE controls port connectivity and gain, and provides conferencing functions on a per-port basis. The NPE Crosstalk test verifies that this port's NPE channel talks on the selected time slot and never crosses over to time slots reserved for other connections.

If the NPE is not working correctly, one-way and noisy connections may result. This test is usually only part of a port's long test sequence and takes about 20 to 30 seconds to complete. If this test fails, the data module is taken out of service.

Table 8-227. NPE Crosstalk Test #9

Error Code	Test Result	Description Recommendation
1	ABORT	During testing of the primary information channel, system resources may not have been available. 1. Check the port status. Use display port PCSSpp to determine the extension of the port. Use status data-module to determine the service state of the port. If the service state indicates the port is in use, then the port is unavailable for this test. Wait until the port is idle. 2. If the port status is idle, then retry the command at one-minute intervals up to five times. 3. If the test continues to abort, escalate the problem.

Table 8-227. NPE Crosstalk Test #9

Error Code	Test Result	Description Recommendation
1000	ABORT	System resources required to run this test are not available. The port may be busy with a valid call. 1. Use display port PCSSpp to determine the extension of the data module port. Use status data-module to determine the service state of the port. If the service state indicates the port is in use, then the port is unavailable for certain tests. Wait until the port is idle before retesting. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to abort, escalate the problem.
1001	ABORT	System resources required to run this test are not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1002	ABORT	The system could not allocate time slots for the test. The system may be under heavy traffic conditions or it may have time slots out of service due to TDM Bus errors. See TDM-BUS. 1. If the MCU has no TDM Bus errors and is not handling heavy traffic, repeat the test at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1003	ABORT	The system could not allocate a tone receiver for the test. The system may be oversized for the number of tone detectors present or some tone detectors may be out of service. 1. Look for TTR-LEV errors in the error log. If present, see TTR-LEV. 2. Look for TONE-PT errors in the error log. If present, refer to TONE-PT. 3. If neither condition exists, retry the test at one-minute intervals up to five times. 4. If the test continues to abort, escalate the problem.
1004	ABORT	The port may be busy with a valid call. 1. Use display port PCSSpp to determine the extension of the data module port. Use status data-module to determine the service state of the port. If the service state indicates the port is in use, the port is unavailable for certain tests. Wait until the port is idle before retesting. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to abort and the port is not in use, escalate the problem.
1020	ABORT	Test disabled via background testing. 1. Use status data-module to determine when the data module is available for testing. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to abort, escalate the problem.

Table 8-227. NPE Crosstalk Test #9

Error Code	Test Result	Description Recommendation
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2020	ABORT	The test did not run due to a previously existing error on the specific port or a more general circuit pack error. Examine the error log for existing errors against this port or the circuit pack and attempt to diagnose the previously existing error.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2500	ABORT	Internal system error 1. Retry the command at 1-minute intervals a maximum of 5 times
1	FAIL	The NPE Crosstalk test failed on the primary channel. The NPE of the tested port was found to be transmitting in error. This causes noisy and unreliable connections. Replace the circuit pack.
2	FAIL	The NPE Crosstalk test failed on the secondary channel. The NPE of the tested port was found to be transmitting in error. This causes noisy and unreliable connections. Replace the circuit pack.
None	PASS	The port is correctly using its allocated time slots. 1. Be sure this is not an intermittent problem; repeat this test up to ten times, and verify that it continues to pass. 2. If complaints still exist, examine the data module, connections, and wiring.

Information and Control Channel Local Loop Test #13

This is a set of four tests that check the operation of the information and control channels used between the SPE and the digital line port circuit. This is an Internal Loop-Around test only and does not check building wiring. Use test #175 for external loop-around tests to the data module.

1. The SPE first sends a message to the on-board microprocessor to loop around both the information and control channels for the port. Then, the primary information channel loop-back test is run. The test is performed by sending a digital count from the Tone-Clock circuit pack on the primary channel time slot and receiving the same digital count with a GPTD. The digital count looks like transparent data to the on-board microprocessor.

2. With the port still in loop-around mode, the S-channel loop-around test is performed next. This test consists of sending four different transparent patterns to the on-board microprocessor, receiving them back, and comparing them.
3. The third test is a loop-around test for the secondary (alternate) channel. It is not performed for data modules since this channel is not used by MPDMs.
4. A conference test is done next for the primary channel. This test is the same as Analog Line Terminal/Port Conference test #6.

Only one value (PASS, FAIL, or ABORT) is generated as a result of four tests run. If any test fails or aborts, the sequence is stopped

Table 8-228. Information and Control Channel Local Loop Test #13

Error Code	Test Result	Description Recommendation
	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1000	ABORT	System resources required to run this test are not available. The port may be busy on a valid call. 1. Use display port PCSSpp to determine the data module extension. Use status data module with the extension number to determine the service state of the data module. If the service state indicates the data module is in use, then the port is unavailable for certain tests. Wait until the port is idle before retesting. 2. If the port status is idle, retry the command at one-minute intervals up to five times. 3. If the test continues to abort, escalate the problem.
1001	ABORT	System resources required to run this test are not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1002	ABORT	The MCU could not allocate time slots for the test. It may be under heavy traffic conditions or time slots could be out of service due to TDM Bus errors. (See TDM-BUS.) 1. If the MCU has no TDM Bus errors and is not handling heavy traffic, repeat the test at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.

Table 8-228. Information and Control Channel Local Loop Test #13

Error Code	Test Result	Description Recommendation
1003	ABORT	The MCU could not allocate a tone receiver for this test. The system may be oversized for the number of tone detectors present or some tone detectors may be out of service. 1. Look for TTR-LEV errors in the error log. If present, see TTR-LEV. 2. Look for TONE-PT errors in the error log. If present, see TONE-PT. 3. If neither condition exists, retry the command at one-minute intervals up to five times. 4. If the test continues to abort, escalate the problem.
1004	ABORT	The port was seized by a valid call during the test. The test has been aborted. 1. Use display port PCSSpp to determine the data module extension. Use status data module with the extension number to determine the service state of the data module. If the service state indicates the data module is in use, then the port is unavailable for certain tests. Wait for the port to be idle before retesting. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to abort, escalate the problem.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2001	ABORT	System resources required to run this test are not available. 1. Retry the test at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Rerun the test at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2500	ABORT	Internal system error. Retry the command at one-minute intervals up to five times.
7	FAIL	Conference test failed on the primary information channel. In some cases, the user may not notice disruption in service. In extreme cases, conferencing feature may not work. 1. Use test board PCSS short to check the Tone Generator and the Tone Detector circuit pack. 2. Resolve any problems that are detected. 3. If the circuit packs are functioning, and the test still fails, replace the Digital Line circuit pack.

Table 8-228. Information and Control Channel Local Loop Test #13

Error Code	Test Result	Description Recommendation
14	FAIL	The primary information channel is not transmitting properly. User impact may range from noticing nothing to not being able to use this port. 1. Use test board PCSS short to check the Tone Generator circuit pack and the Tone Detector circuit pack. 2. Resolve any problems that are detected. 3. If the circuit packs are functioning, and the test still fails, replace the Digital Line circuit pack.
15	FAIL	The control channel between the processor and digital line circuit pack is not transmitting properly. User may notice nothing or not be able to use the port. Could also be disruptive to other users. 1. Use the test board PCSS short command to check the Tone Generator circuit pack and the Tone Detector circuit pack. 2. Resolve any problems that are detected. 3. If the circuit packs are functioning, and the test still fails, replace the Digital Line circuit pack.
16	FAIL	The secondary information channel is not transmitting properly. This can cause a wide range of effects. The user may notice nothing, or the port may be totally unusable. 1. To be sure that this is not an intermittent problem, repeat this test up to a maximum of 10 times to ensure it continues to pass. 2. If the complaints continue (regarding data transmission), examine the data module, connections, and wiring.
	PASS	Information and Control Channel Local Loop Test passed. All channels are transmitting properly. 1. To be sure this is not an intermittent problem, repeat this test up to 10 times to make sure it continues to pass. 2. If the complaints continue, examine the data module, connections, and wiring.

Data Module Audits Test #17

This is a series of six tests that are classified as hardware audits. The processor sends messages to the on-board microprocessor to perform the following tests:

- Switchhook Inquiry: This is an update of the processor's software records based on the on-/off-hook status of the data module.
- Bad Scan Inquiry: A message is sent uplink that contains a count generated by certain events relating to the digital loop's (link) conditions. This could be an indication of communication problems between the processor and digital port circuit pack.

- EPF Inquiry: The status of the EPF is sent uplink. EPF is not used for data modules.
- ID Request: A request is made to the data module for its status. The data module sends its configuration information and health information back. This information is checked and a pass/fail result is provided.
- Ringer Update: This updates the data module's ringer state according to the processor records.
- Translation Update: This message is normally used with digital stations to refresh the default value that causes the station to send touch-tones only in the primary information channel. This test is not used with data modules.

Table 8-229. Data Module Audits Test #17

Error Code	Test Result	Description Recommendation
1	ABORT	Switchhook audit times out. 1. Verify the data module is connected to the MCU and repeat the test. 2. If the test aborts, replace the data module and repeat the test. 3. If the test continues to abort, replace the Digital Line circuit pack and repeat the test. 4. If the test continues to abort, escalate the problem.
2	ABORT	ID request fails, health bit is defective, or no response from on-board microprocessor. 1. Verify the correct data module type (MPDM) is administered. 2. If the test aborts, replace the data module and repeat the test. 3. If the test aborts again, replace the Digital Line circuit pack and repeat the test. 4. If the test continues to abort, escalate the problem.
3	ABORT	No response from EPF audit. 1. Resolve any outstanding Digital Line circuit pack maintenance problems. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to abort, escalate the problem.
4	ABORT	Internal system error. 1. Resolve any outstanding Digital Line circuit pack maintenance problems. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to abort, escalate the problem.

Table 8-229. Data Module Audits Test #17

Error Code	Test Result	Description Recommendation
5	ABORT	Ringer update aborted (data module not in the in-service state). 1. Verify that the data module is powered (power LED on). 2. Make sure the data module is connected to the building wiring, check for faulty wiring, check for faulty data module. 3. Retry the command at one-minute intervals up to five times. 4. If the test continues to abort, replace the data module and repeat the test. 5. If it aborts again, replace the digital line circuit pack and repeat the test. 6. If it aborts again, escalate the problem.
6	ABORT	Data module translation update aborted. 1. Verify the data module is connected to the MCU. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to abort, escalate the problem.
1000	ABORT	System resources required to run this test are not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to fail, escalate the problem.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to fail, escalate the problem.
	FAIL	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to fail, escalate the problem.
	PASS	Data Module Audits test passed. The port circuit pack is functioning properly. If complaints continue, investigate by using other port tests and by examining the data module options, wiring, and connections.

Data Module Internal Loop-Around Test #175

This test verifies that a data message can be sent from the MCU, through the building wiring, through an internal loop-around path in the data module under test, and back to the MCU. The following figure shows the hardware configuration used for this test.

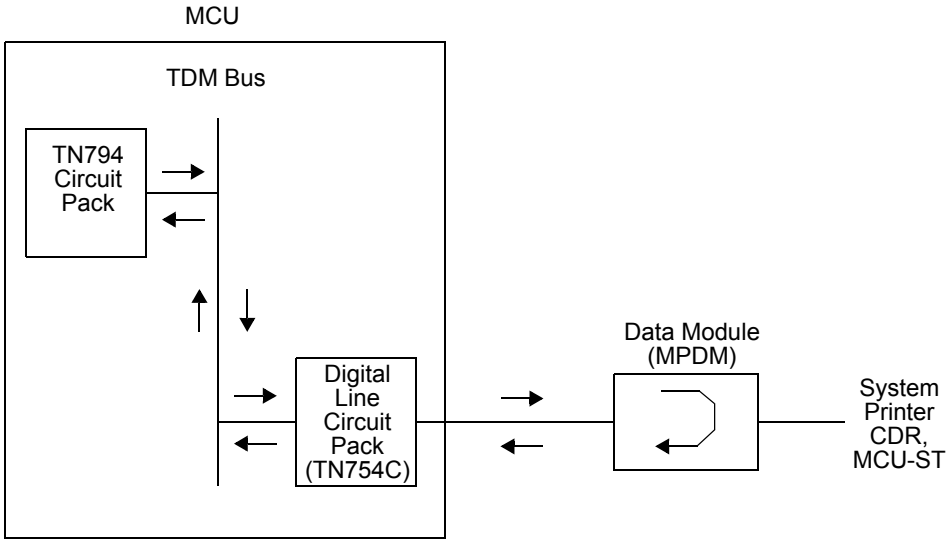


Figure 8-40. Internal Loop-Around Test

A signaling message is sent through the Digital Line circuit pack to the data module under test to request it to enter loop-around mode. A test pattern is then sent from the SPE through the Netpkt Interface circuit pack (Netpkt Interface), over the TDM Bus, through the Digital Line circuit pack, to the data module where the message is looped around, and sent back through the Digital Line circuit pack, the TDM Bus, the Netpkt Interface circuit pack, and to the SPE where it is checked for consistency.

This test aborts if no terminal or communications equipment is connected to the data module. It also aborts if a number of local resources are not available. These resources include a Netpkt Interface channel from the Netpkt Interface circuit pack (up to four channels are administered as Netpkt Interface-type data modules), two TDM time slots (one for each direction of the loop-around message), and an idle digital port circuit associated with the data module under test. Failure to allocate any of these resources causes the test to abort with a specific error code for that resource.

A “yes/no” parameter on each data module (MPDM) administration form is required to specify if the Data Module Remote Loop-Around test is supported by the data module endpoint. If the parameter is “no,” the test does not run.

Table 8-230. Data Module Internal Loop-Around Test #175

Error Code	Test Result	Description Recommendation
1000	ABORT	Could not get translation information for port. 1. Verify the port circuit is administered. 2. Wait one minute and attempt the test again. 3. If the test continues to abort, and the port is not in use, escalate the problem.
1005	ABORT	This test is not applicable to the given hardware configuration. This abort message can be ignored.
1020	ABORT	Internal software error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1030	ABORT	Internal software group identifier for data module is not valid. 1. Verify the port circuit is administered correctly. 2. If administration data is correct, escalate the problem.
1031	ABORT	Extension number invalid. 1. Verify that the data module extension is administered correctly. 2. If the administration data is correct, escalate the problem.
1032	ABORT	Extension number not correct length. 1. Verify that the data module extension is administered correctly. 2. If the administration data is correct, escalate the problem.
1071	ABORT	No auxiliary port on NETCON circuit pack available to test with. 1. Check to see if the NETCON data channels are administered. The list data-modules command should show at least one NETCON-type data module. 2. Test the Netpkt Interface (NETCON) circuit pack using test data-module. 3. If the administration data is correct, escalate the problem.
2000	ABORT	Data module is disconnected. 1. Verify that the data module is powered (power LED on). 2. Make sure the data module is connected to the building wiring, check for faulty wiring and faulty data module. 3. Retry the command at one-minute intervals up to five times. 4. If the test aborts again, replace the data module and repeat the test. 5. If the test continues to abort, escalate the problem.

Table 8-230. Data Module Internal Loop-Around Test #175

Error Code	Test Result	Description Recommendation
2500	ABORT	Internal system error. Retry the command at one-minute intervals up to five times.
3004	ABORT	This error could be caused by the switch setting of the MPDM (see Step 1), the Netpkt Interface Data Channel (see Step 2), no data equipment connected to the data module (see Step 3), or if the baud rate of the data module is set to 19.2k (see Step 4). 1. Verify that the switch on the MPDM is set to the “remote loop” position. When the remote loop-around test is completed, return the switch to the off position. 2. Look in the error log for DATA-CHL errors. 3. Verify that the data equipment is properly connected to the data module and that power is available to the data equipment and the equipment is turned on. 4. The Netpkt Interface circuit pack used by this test does not support baud rates higher than 9600k. Set the baud rate on the data module to 9600k or less.
1040	FAIL	Data received from the remote loop-back does not match the data sent. 1. Check for faulty wiring. 2. Replace the data module and repeat the test. 3. If the test fails, replace the Digital Line circuit pack associated with the data module and repeat the test. 4. If the test fails again, escalate the problem.
1070	FAIL	Internal software response. 1. Wait one minute and attempt the test up to five times. 2. If the same error occurs, escalate the problem.
1072	FAIL	Poor response from auxiliary channel. 1. Test the Netpkt Interface (NETCON) circuit pack using test data-module. 2. If the test fails, replace the Digital Line circuit pack. 3. If the test continues to fail, escalate the problem.
1073	FAIL	Internal system error. 1. Wait one minute and attempt the test up to up to five times. 2. If the same error occurs, escalate the problem.

Table 8-230. Data Module Internal Loop-Around Test #175

Error Code	Test Result	Description Recommendation
1074	FAIL	Internal system error. 1. Make sure the data equipment that is connected to the data module is powered on. 2. For an MPDM, verify the Data Terminal Ready LED is on. If not, check the cable from the data equipment to the data module. 3. If the test continues to fail, escalate the problem.
1075	FAIL	Unknown message received during test. 1. Reattempt the test. 2. If the same error occurs, test the Netpkt Interface Data Channel with test data-module and a known working data module. 3. Replace the Digital Line circuit pack and repeat the test. 4. If the test continues to fail, escalate the problem.
2040	FAIL	Internal system error. 1. Repeat the test. 2. If the test continues to fail, escalate the problem.
2095	FAIL	Internal system error. 1. Repeat the test. 2. If the test continues to fail, escalate the problem.
None	PASS	Data Module Loop-Around Test passed, the digital port circuit pack is functioning properly. If the problem persists, investigate using other port tests, and by examining the data module options, wiring, and connections.

PE-BCHL (PRI Endpoint Port)

MO Name (in Alarm Log)	Alarm Level	Initial Command to Run	Full Name of MO
PE-BCHL*	MINOR	test port PCSSpp l	PRI Endpoint Port
PE-BCHL	WARNING	test port PCSSpp sh	PRI Endpoint Port

* For additional repair information, see also UDS1-BD (UDS1 Interface Circuit Pack) maintenance documentation and the “Troubleshooting PRI Endpoint Problems” section in Chapter 5.

A PRI Endpoint provides ISDN-PRI (Primary Rate Interface) connections for customers with application equipment or terminal adapters that terminate ISDN-PRI. The equipment or terminal adapters are connected to the switch via the UDS1 interface circuit pack. PRI Endpoint Port (PE-BCHL) maintenance provides a strategy to maintain PRI Endpoint Port hardware circuitry on the UDS1 circuit pack. The maintenance strategy involves logging PRI Endpoint Port hardware errors, running tests for port initialization, periodic and scheduled maintenance, system technician-demanded tests, and alarm escalation and resolution.

Wideband Switching

The Wideband Switching capability supports end-to-end connectivity between customer endpoints at data rates from 128 to 1536 kbps over T1 facilities and to 1984 kbps over E1 facilities. DEFINITY switching capabilities are extended to support wideband calls comprised of multiple DS0s that are switched end-to-end as a single entity.

The Wideband Switching capability is designed for ISDN application equipment (for example, ISDN video codecs), but it retains provisions for non-ISDN application equipment by using PRI terminal adapters. In the same sense that an MCU data module acts as a DCP or BRI terminal adapter between endpoint data (for example, V.35) and dialing (for example, RS-366) interfaces and a DCP interface, a PRI terminal adapter acts as a wideband terminal adapter between endpoint data and dialing interfaces and the MCU’s line-side ISDN PRI interface.

The Wideband Switching capability introduces PRI Endpoints on DEFINITY line-side interfaces. A PRI Endpoint consists of one or more contiguous B-channels on a line-side T1 or E1 ISDN PRI facility, and it has an extension number. Endpoints initiate and receive calls using ISDN SETUP messages that indicate the data rate and specific B-channels to be used, and they communicate all other call status information via standard ISDN messages. Any MCU ISDN signaling set (for example, AT&T, CCITT, ECMA) may be used for a line-side ISDN PRI facility.

Multiple PRI Endpoints on a one line-side facility are separate and distinct within the facility. Non-overlapping contiguous sets of B-channels are associated with each PRI Endpoint, and the endpoint equipment is expected to initiate calls within these boundaries.

The endpoint application equipment must be able to do the following: use standard ISDN-PRI signaling, adhere to the PRI Endpoint boundaries as administered on the MCU when initiating calls, and handle incoming calls appropriately based on the PRI Endpoint.

Signaling and B-Channel States

These ports use a separate channel for signaling (for example, for call setup). This mode of operation is known as out-of-band signaling. The separate signaling channel is called a D-channel in ISDN terminology, and it carries all the call control signaling messages for the PRI Endpoint Port B-channels. The D-channel for these B-channels is an ISDN-PRI Signaling Link Port (ISDN-LNK). The signaling protocol used on the ISDN-PRI Signaling Link Port D-channel is defined by one of the four selectable ISDN-PRI Specifications: AT&T, CCITT, ECMA, and ANSI.

The ISDN-PRI Specification defines the possible SERVICE STATES for a B-channel. The service state is negotiated with the far-end terminal adapter, and it changes over time. Also, the service state may have a far-end or near-end component, and it is initialized to the Out-Of-Service/Far-End state. An attempt is made to negotiate the service state to In-Service.

NOTE:
The service state of a particular PRI Endpoint Port B-channel can be displayed by issuing the **status pri-endpoint <extension>** system technician command.

If a call is present, the ISDN-PRI Specification defines the permissible CALL STATES as well. There are tests in the short and long test sequences for PRI Endpoint Port that are designed to audit these states and to ensure agreement between both ends of the PRI wideband connection.

Alarming based on Service States:

A PRI Endpoint Port B-channel is alarmed with a WARNING if it is placed into a Maintenance/Far-End or Out-Of-Service/Far-End state. While in such a state, the port is unusable for calls to the terminal adapter. However, the user can still use the other remaining ports in the PRI Endpoint to make calls to and from the terminal adapter. When a WARNING alarm is raised, the **status pri-endpoint <extension>** command should be used to determine the exact state of the port. Other alarms can be diagnosed by using the short and/or long test sequences. Note that a PRI Endpoint Port B-channel can be placed into a Far-End Service State either by direct action of the far-end terminal adapter or by inaction of the

far-end terminal adapter. For example, if they do not respond to a Remote Layer 3 Query (see Test #260 for ISDN-PRI Signaling Link Port), the associated PRI Endpoint Port B-channels are placed into the Maintenance/Far-End service state.

A PRI Endpoint Port is a port on a UDS1 interface circuit pack. Therefore, this port depends on the health of the UDS1 interface circuit pack for proper operation (see the following figure). As noted earlier, a PRI Endpoint Port B-channel also depends on an ISDN-PRI Signaling Link Port D-channel (ISDN-LNK) to carry the signaling traffic. If there is a problem with the ISDN-PRI Signaling Link Port, the PRI Endpoint Port is affected. The ISDN-PRI Signaling Link Port, in turn, depends on the PI-LINK (Processor Interface Link). Processor Interface Link problems affect the ISDN-PRI Signaling Link Port. Keep this hierarchy of dependencies in mind when diagnosing problems.

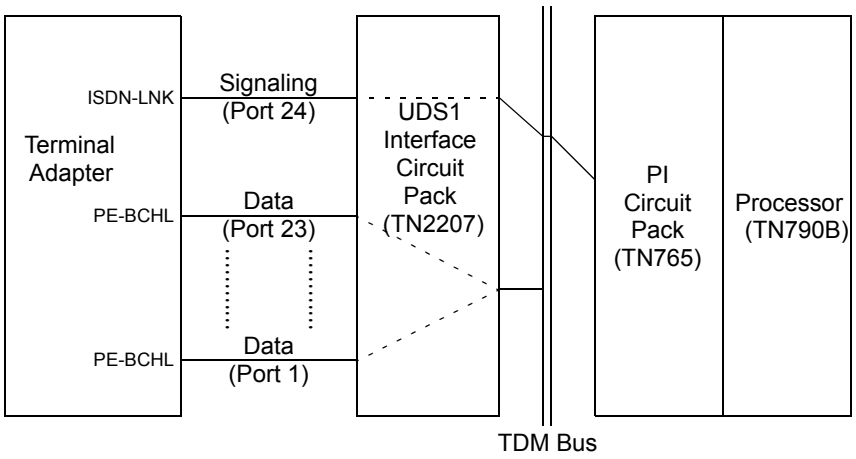


Figure 8-41. PRI Endpoint Port Interactions [INTEL]

PRI Endpoint Port Service States

This section defines the possible service states of a PRI Endpoint Port, and it explains the reason for each service state. This section also provides the recommended recovery procedures (when required).

Service States

- In-Service (INS)

  The B-channel is in its normal operating state.

- Out-of-Service/Far-end (OOS/FE)

  A B-channel is initialized to this state when administered. The switch sends messages to the far-end terminal adapter to negotiate the B-channel into service. If the far-end terminal adapter does not respond to the messages within a certain time period, the service state remains out-of-service, and maintenance periodically resends the messages. The port is unusable for calls incoming to the switch and outgoing to the terminal adapter (although other ports in the PRI Endpoint can still be used for incoming and outgoing calls).

- Out-of-Service/Near-end (OOS/NE)

  This is the state of the port whenever one of the following is true: a hardware failure exists on the signaling link, the NPE Crosstalk Test fails, or the port is busied out by system technician. In this state, the port is unusable for calls incoming to the switch or outgoing to the terminal adapter (although other ports in the PRI Endpoint can still be used for incoming and outgoing calls). No messages are sent to the far-end terminal adapter until the signaling link comes back into service or until the port is released by system technician.

- Maintenance/Far-end (MTC/FE)

  This state is reached when the far-end terminal adapter does not respond to messages sent over the signaling link for a particular port after a certain amount of time. This state is different from OOS/FE inasmuch as the signaling link must be up initially and the B-channels must be in-service. The switch periodically sends messages to the far-end terminal adapter in an attempt to negotiate the port (B-channel) into service. The port is unusable for calls outgoing to the terminal adapter. However, the port services incoming call requests from the far-end (although other ports of the PRI Endpoint can still be used to answer calls incoming to the switch or to place outgoing calls to the terminal adapter). Note that transitions into MTC/FE do not drop stable calls. Therefore, if the service state changes from in-service to MTC/FE, stable calls are unaffected.

- Maintenance/Near-end (MTC/NE)

  The port (B-channel) is in this state if the signaling link (PI-LINK) is busied out by system technician. The port (B-channel) is also temporarily in this state if the system technician has issued a **test port PCSSpp l** or a **test pri-endpoint <extension> l** command. Note that transitions into MTC/NE do not drop stable calls. Therefore, a system technician-demanded **busyout link lnk-no** command does not drop stable wideband calls. In this state, the B-channel is not usable either for new calls incoming to the switch or for new calls outgoing to the terminal adapter.

- Pending States (PEND)

  If the near-end is expecting a timed response from the far-end for a request to change the service state of a port, the state of the port reflects a Pending state. For example, if the port is out-of-service/far-end and if an in-service message is sent to the far-end, the service state of the port is OOS/FE-PEND/INS (that is, out-of-service/far-end-Pending/in-service). The far-end has a certain amount of time to respond to the message. The service state reflects this pending state until the timer expires.

The following diagram of the PRI Endpoint Port service states shows the common progression from one service state to another and the event that caused the change of state.

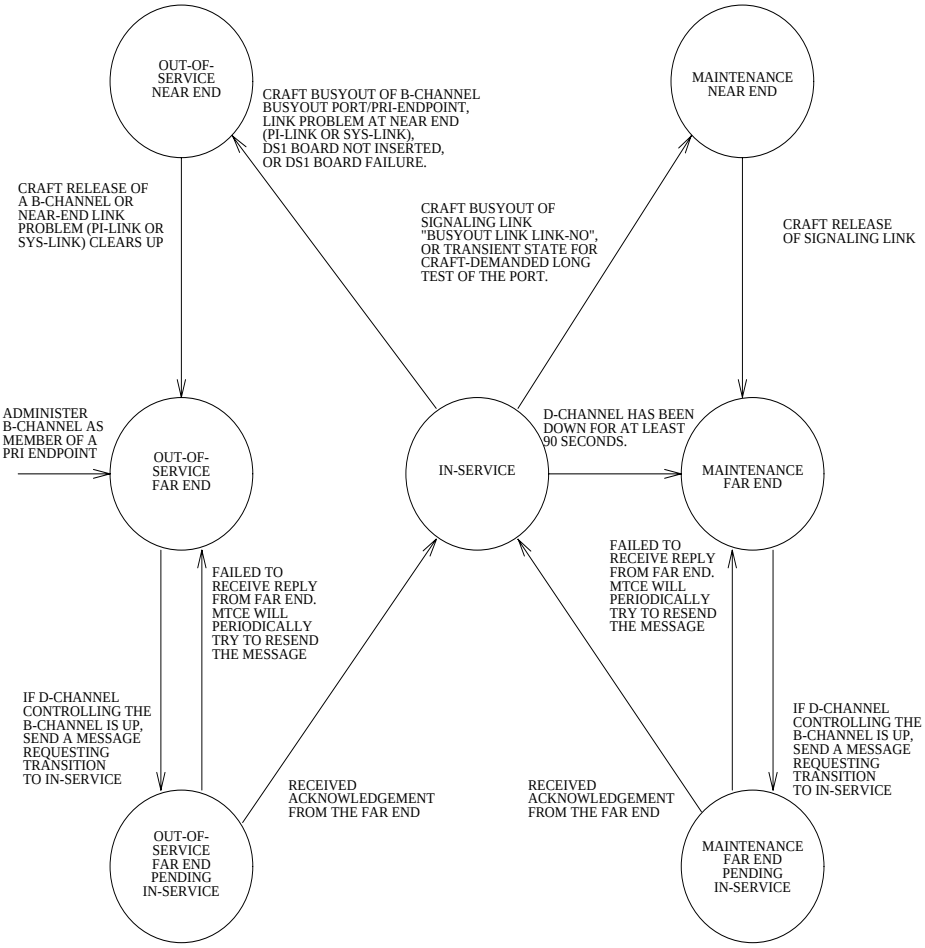


Figure 8-42. Common Progressions in Service States

PRI Endpoint Port Service States

The following table summarizes each of the different PRI Endpoint Port service states that can result when the **status pri-endpoint <extension>** command is issued. From the results of the status command, match the service state to the corresponding column. Proceed down the column until an "X" is found. The left column indicates possible reasons why the port is in this state, and the right column suggests possible recovery mechanisms. If an alarm against PE-BCHL is present, it is indicated below the "X."

NOTE:
Refer to "Troubleshooting PRI Endpoint Problems" in Chapter 5 for a layered approach to the processing of PRI Endpoint problems.

Table 8-231. PRI Endpoint Port Service States

Possible Problem Source	O/S-NE	O/S-FE	O/S-FE Pendins	maint-NE	maint-FE	maint-FE Pendins	INS	Possible Recovery Route
ISDN wideband calls being completed.							X	Normal Operation.
Port busied out by system technician?	X Warn Alarm							Release port by the **release pri-endpoint extension** or **release port PCSSpp**.
NPE Crosstalk Test failed?	X Minor Alarm							Replace UDS1 Interface CP.
DS1 circuit pack lost signal?	X							UDS1 Interface CP removed? DS1 cable disconnected? Terminal adapter problems? Far-end terminal adapter restarting? Faulty UDS1 Interface CP?
Check UDS1-BD.								Refer to UDS1-BD for repair procedures.

Table 8-231. PRI Endpoint Port Service States

Possible Problem Source	O/S-NE	O/S-FE	O/S-FE Pendins	maint-NE	maint-FE	maint-FE Pendins	INS	Possible Recovery Route
Far-end problems?		X Warn Alarm						Check administration and the status of the corresponding port on the far-end terminal adapter.
Service Message sent, waiting for reply from far-end terminal adapter (2 minutes).			X			X		Wait a couple minutes until Pending State not present, check service state.
Processor Interface Link busied out by system technician? Check link status. [MIPS only].				X				Release link by the **release link lnk-no.**

Table 8-231. PRI Endpoint Port Service States

Possible Problem Source	O/S-NE	O/S-FE	O/S-FE Pendins	maint-NE	maint-FE	maint-FE Pendins	INS	Possible Recovery Route
Signaling link has been down for over 90 seconds?					X Warn Alarm			See ISDN-SGRP, ISDN-LNK, PI-LINK and/or SYS-LINK and follow repair procedures. Is far-end terminal adapter currently restarting?
Repeated failure of far-end to respond to messaging?					X Warn Alarm			Periodically Maintenance will try to resend messages. To speed process, run system technician-demanded test **test port PCSSpp** (Test #256).
Far-end port busied out (OOS/FE). Far-end port being tested (MTCE/FE).		X Warn Alarm			X Warn Alarm			Check status of far-end terminal adapter.

Error Log Entries and Test to Clear Values

Table 8-232. PRI Endpoint Port Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	test port PCSSpp sh r 1
	Run the Short Test Sequence first. If all tests pass, run the Long Test Sequence. Refer to the appropriate test description and follow the recommended procedures				
1	Any	None			test port PCSSpp sh r 1
	This error type indicates a disagreement between the MCU and the terminal adapter at the other end of the connection with regard to the ISDN *call* state of the PRI Endpoint Port. This switch automatically tries to recover by clearing the call (that is, the call is torn down). The **status pri-endpoint <extension>** command can be used to determine the state of the port. When running the Short Test Sequence of tests, pay close attention to the results of the Call State Audit Test (#257).				
15	Any	Audit and Update Test (#36)			
	This is a software audit error that does not indicate any hardware malfunction. Run the Short Test Sequence and investigate the associated errors (if any).				
18	0	busyout pri-endpoint <extension> busyout port <PCS	WARNING	OFF	release pri-endpoint <extension> release port <PCS
	The PRI Endpoint Port has been busied out by a **busyout pri-endpoint <extension>** command or by a **busyout port <PCSSpp>** command. No wideband calls can be made to this port (although wideband calls can still be made to other ports within this PRI Endpoint if others ports are in service).				
129		None	WARNING	OFF	test port PCSSpp sh r 1
	The far-end terminal adapter changed its ISDN *service* state to either "out-of-service" or "maintenance." This may be a temporary condition due to the testing of this port by the far-end terminal adapter *or* by a hardware problem with the port. Outgoing calls to the terminal adapter are not allowed over the port (although calls can still be made to other ports that are in service within the same PRI Endpoint). To investigate the status of the port, issue the **status pri-endpoint <extension>** command.				
130		None	WARNING	ON	test port PCSSpp sh
	This error type indicates that the circuit pack has been removed or has been insane for more than 11 minutes. To clear the error, reinsert or replace the circuit pack.				

Table 8-232. PRI Endpoint Port Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
257	Any	None			test port PCSSpp sh r 1
	This error type indicates a disagreement between this MCU and the terminal adapter at the other end of the connection with regard to the ISDN service state of the PRI Endpoint Port. This MCU tries to recover by performing a service state audit. The **status pri-endpoint <extension>** command can be used to determine the state of the port. When running the Short Test Sequence, pay close attention to the results of the Service State Audit Test (#256).				
513	Any	None	WARNING	OFF	test port PCSSpp sh r 1
	This port is not recognized by the far-end terminal adapter. Investigate the PRI Endpoint administration for both the MCU and the terminal adapter and make changes as necessary.				
769	Any	None	WARNING	OFF	test port PCSSpp sh r 1
	This error type indicates a disagreement between this MCU and the terminal adapter at the other end of the connection with regard to the ISDN service state of the PRI Endpoint Port. This MCU tries to recover by performing a service state audit. The **status pri-endpoint <extension>** command can be used to determine the state of the port. When running the Short Test Sequence, pay close attention to the results of the Service State Audit Test (#256).				
1281	Any	Conference Circuit Test (#7)	MINOR	ON	test port PCSSpp l r 4
	The Conference Circuit Test (#7) failed on this port. See Test #7 for the repair procedures.				
1537	Any	NPE Crosstalk Test (#6)	MINOR	ON	test port PCSSpp l r 3
	The NPE Crosstalk Test (#6) failed on this port. See Test #6 for the repair procedures.				
1793	Any	None			test port PCSSpp sh r 1
	This error indicates a failure of the UDS1 Interface circuit pack. When running the Short Test Sequence, the results of the Signaling Link State Check Test (#255) are important.				

Table 8-232. PRI Endpoint Port Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
3073	Any	Service State Audit (#256)			test port PCSSpp sh r 2
	Two Service State Audit attempts have failed (see Test #256). The port is not usable for any outgoing calls to the terminal adapter (although incoming calls from the terminal adapter are accepted over this port, other ports in the PRI Endpoint can still be used for both incoming and outgoing calls to and from the terminal adapter) until the test passes and the port state is changed to in-service (use the **status pri-endpoint <extension>** command to investigate the port status).				
3585	Any	None			None
	This error type appears when the switch receives an ISDN RESTART message for an ISDN port that is not idle. Usually, calls are not cleared via the RESTART message. Therefore, this error type may be associated with a dropped call report from a user. The following Aux Data values for Error Type 3585 represent the port's ISDN call state at the time that the unexpected request to restart the channel is received from the remote terminal adapter. This information can be useful if dropped calls (cutoffs) are being reported by users of the PRI Endpoint.				

The following list contains important Aux values. Any other such values can be ignored.

10	A call in a stable, talking state was cleared unexpectedly by the far-end terminal adapter with an ISDN RESTART message. This state is called the "active" state.
4, 7, 8, 260, 263	A call that did not reach the active state but at least reached a ringing state was cleared unexpectedly by the far-end terminal adapter with an ISDN RESTART message.
1, 3, 6, 9, 265	A call that has not yet reached a ringing state was cleared unexpectedly by the far-end terminal adapter with an ISDN RESTART message.
11, 12, 19, 531, 267,268	A call that was in the process of clearing has been nonetheless cleared by the far-end terminal adapter with an ISDN RESTART message. If this condition occurs frequently, it may mean that the far-end terminal adapter is attempting to clear ports that it thinks are in a "hung" state. The RESTART message brings the port to an idle condition.

System Technician-Demanded Tests: Descriptions and Error Codes

Always investigate tests in the order presented in the table below when inspecting errors in the system. By clearing error codes associated with the *NPE Crosstalk Test*, for example, you may also clear errors generated from other tests in the testing sequence.

Table 8-233. System Technician-Demanded Tests: PE-BCHL

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
NPE Crosstalk Test (#6)	Long		No
Conference Circuit Test (#7)	Long		No
Audit and Update Test (#36)	Short	Long	No
Signaling Link State Check Test (#255)	Short	Long	No
Service State Audit Test (#256)	Short	Long	No
Call State Audit Test (#257)	Short	Long	No

NPE Crosstalk Test (#6)

The NPE Crosstalk Test verifies that this port's NPE channel talks on the selected time slot and that it never crosses over to time slots that are reserved for other connections. If the NPE is not working correctly, one-way and noisy connections may be observed. This test is usually only part of a port's long test sequence, and takes about 20 to 30 seconds to complete.

Table 8-234. NPE Crosstalk Test #6

Error Code	Test Result	Description / Recommendation
	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at 1-minute intervals a maximum of 5 times.
1000	ABORT	System resources required to run this test are not available. The port may be in use on a valid call. Use status pri-endpoint <extension> commands to determine when the port is available for testing. 1. Retry the command at 1-minute intervals a maximum of 5 times.
1001	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at 1-minute intervals a maximum of 5 times.

Table 8-234. NPE Crosstalk Test #6

Error Code	Test Result	Description / Recommendation
1002	ABORT	The system could not allocate time slots for the test. The system may be under heavy traffic conditions or it may have time slots out-of-service due to TDM Bus errors. The status health command can be used to determine if the system is experiencing heavy traffic. Refer to TDM Bus Maintenance to diagnose any active TDM Bus errors. 1. If system has no TDM Bus errors, and if it is not handling heavy traffic, repeat the test at 1-minute intervals a maximum of 5 times.
1003	ABORT	The system could not allocate a tone receiver for the test. The system may be oversized for the number of tone detectors present, or some tone detectors may be out-of-service. The list measurements tone-receiver command displays information on the system's tone receiver. 1. Look for TTR-LEV errors in the Error Log. If errors are present, refer to TTR-LEV. 2. Look for TONE-PT errors in the Error Log. If errors are present, refer to TONE-PT. 3. If neither condition exists, retry the test at 1-minute intervals a maximum of 5 times.
1004	ABORT	The port has been seized by a user for a valid call. Use status pri-endpoint <extension> commands to determine when the port is available for testing. 1. Retry the command at 1-minute intervals a maximum of 5 times.
1117	ABORT	A service state audit message is outstanding. 1. Wait 2 minutes and then try again.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at 1-minute intervals a maximum of 5 times.
2020	ABORT	The test did not run due either to an already existing error on the specific port or to a more general circuit pack error. 1. Examine the Error Log for existing errors against this port or the circuit pack and attempt to diagnose the already existing error.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at 1-minute intervals a maximum of 5 times.
Any	FAIL	The NPE of the tested port was found to be transmitting in error. This causes noisy and unreliable connections. The PE-BCHL is moved to the out-of-service/near-end state. 1. Replace the circuit pack.
	PASS	The port is able to communicate over the TDM Bus.

Conference Circuit Test (#7)

One or more Network Processing Elements (NPEs) reside on each circuit pack with a TDM Bus interface. (The TN2207 UDS1 circuit pack has one SCOTCH-NPE chip instead of several NPE chips.) The NPE controls port connectivity and gain, and it provides conferencing functions on a per port basis. The Conference Circuit test verifies that the NPE channel for the port being tested can correctly perform the conferencing function. The NPE is instructed to listen to several different tones and to conference the tones together. The resulting signal is then measured by a tone detector port. If the level of the tone is within a certain range, the test passes.

Table 8-235. Conference Circuit Test #7

Error Code	Test Result	Description / Recommendation
	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at 1-minute intervals a maximum of 5 times.
1000	ABORT	System resources required to run this test are not available. The port may be in use on a valid call. Use the status pri-endpoint <extension> command to determine when the port is available for testing.
1004	ABORT	The port has been seized by a user for a valid call. Use the status pri-endpoint <extension> command to determine when the port is available for testing. 1. Retry the command at 1-minute intervals a maximum of 5 times.
1020	ABORT	The test did not run due either to an already existing error on the specific port or to a more general circuit pack error. 1. Examine Error Log for existing errors against this port or against the circuit pack, and attempt to diagnose the already existing error.
2000	ABORT	Response to the test request was not received within the allowable time period.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at 1-minute intervals a maximum of 5 times.
Any	FAIL	The NPE of the tested port did not conference the tones correctly. This causes noisy and unreliable connections. 1. Replace the circuit pack. Even though wideband calls do not use the conferencing feature on the NPE, this failure indicates problems with the circuit pack hardware.
	PASS	The port can correctly conference multiple connections. User-reported troubles on this port should be investigated by using the other port tests and by examining the terminal adapter or the external wiring.

Audit and Update Test (#36)

This test sends port level translation data from the switch processor to the UDS1 interface circuit pack to ensure that the port's translation is correct. The port audit operation verifies the consistency of the current state of the port that is kept in the UDS1 interface circuit pack and in the MCU software.

Table 8-236. Audit and Update Test #36

Error Code	Test Result	Description / Recommendation
	ABORT	Internal system error
2000	ABORT	Response to the test request was not received within the allowable time period.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at 1-minute intervals a maximum of 5 times.
	FAIL	The test failed due to Internal system error. 1. Retry the command at 1-minute intervals a maximum of 5 times.
	PASS	The port translation has been updated successfully. The current port states kept in the UDS1 interface circuit pack and in the MCU software are consistent. If the port is busied out, the test does not run, but returns PASS. To verify that the port is in-service: 1. Enter status pri-endpoint <extension> to verify that the port is in-service. If the port is in-service, no further action is necessary. If the port is out-of-service, go to Step 2. 2. Enter the release pri-endpoint <extension> command or the release port <PCSSpp> command to put the port back into in-service. 3. Retry the test command.

Signaling Link State Check Test (#255)

As is noted in the general description for a PRI Endpoint Port, the operation of the PRI Endpoint Port depends on the health of the UDS1 interface circuit pack and of the TN765 Processor Interface Link. This test checks the status of those critical elements.

Table 8-237. Signaling Link State Check Test #255

Error Code	Test Result	Description Recommendation
None	ABORT	Internal system error 1. Retry the command at 1-minute intervals a maximum of 5 times.

Table 8-237. Signaling Link State Check Test #255

Error Code	Test Result	Description Recommendation
1700	ABORT	Rollabout video abort. The PRI terminal adapter associated with this PRI endpoint extension is detached from the circuit pack. This is a normal abort when the rollabout video feature is enabled. To complete the test on this port, do one of the following: 1. Re-attach the disconnected PRI terminal adapter, or 2. Disable the rollabout video feature on this circuit pack by entering the change ds1 PCSS command, and set the field "Alarm when PRI Endpoint Detached?" to "y."
4	FAIL	There is a problem with the Signaling Channel and/or with the Processor Interface Link. 1. Consult the procedure for the ISDN-PRI Signaling Group (ISDN-GRP) and/or the procedures for Processor Interface Link (PI-LINK). Further information may also be obtained by consulting the procedures for the ISDN-PRI Signaling Channel (ISDN-LNK).
8	FAIL	There is a problem with the UDS1 interface circuit pack. 1. Consult the procedures for UDS1 interface circuit pack (UDS1-BD).
None	PASS	The signaling link hardware is okay.

Service State Audit (#256)

As is noted in the general description for PRI Endpoint Port, these ports may be in one of several service states as defined by the ISDN-PRI Specification. This test performs a service state audit with the far-end terminal adapter to ensure that both sides agree on the service state.

A PASS for this test simply means that an audit message was successfully composed and sent out to the far-end terminal adapter. The ISDN Specification allows up to two minutes for a reply. If no reply is received within that two minute window, this switch automatically tries once again. If that attempt fails, an error is logged (Error Type 3073), and the switch attempts a recovery by automatically retrying approximately every 15 minutes. If the port was initially in the INS (in-service) state, it is now placed into the MTC/FE (maintenance state, far-end problem) state. Until a Service State Audit attempt is successful, no outgoing calls are placed over this port, but incoming calls are accepted. The service state of this port does not affect the service state of other ports in the PRI Endpoint. If an incoming call that uses this port is presented while in such a state, a Service State Audit attempt is immediately attempted (that is, the switch does not wait for the 15

minute cycle, but instead tries to recover immediately). To investigate the status of this PRI Endpoint Port, issue the **status pri-endpoint <extension>** command.

Table 8-238. Service State Audit Test #256

Error Code	Test Result	Description
1113	ABORT	The signaling link has failed. As a result, the system cannot send any messages on behalf of this port. 1. Check the results of Test #255 (Signaling Link State Check).
1117	ABORT	A service state audit message is outstanding. 1. Wait two minutes and try again.
1700	ABORT	Rollabout video abort. The PRI terminal adapter associated with this PRI endpoint extension is detached from the circuit pack. This is a normal abort when the rollabout video feature is enabled. To complete the test on this port, do one of the following: 1. Re-attach the disconnected PRI terminal adapter, or 2. Disable the rollabout video feature on this circuit pack by entering the change ds1 PCSS command, and set the field "Alarm when PRI Endpoint Detached?" to "y."
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at 1-minute intervals a maximum of 5 times.
None	FAIL	Internal system error 1. Retry the command at 1-minute intervals a maximum of 5 times.
	PASS	Wait 4 minutes and then check the Error Log for any new occurrences of Errors Type 3073. If there are no occurrences of this error, both sides of the ISDN connection agree on the service state, and the negotiation succeeded. If there is a new occurrence of Error Type 3073, the negotiation failed (that is, the far-end terminal adapter twice failed to respond within the mandatory two minute window). This MCU automatically retries approximately every 15 minutes. If the port was initially in the INS (in-service) state, it is now be placed into the MTC/FE (maintenance, far-end problem) state (refer to the "Service States" section, which precedes the PE-BCHL "Hardware Error Log Entries and Test to Clear Values" table). Incoming calls are accepted, but no outgoing calls are originated from this port. If an incoming call is presented, another Service State Audit is immediately performed in an attempt to bring the PRI Endpoint Port to the proper state.

Call State Audit Test (#257)

If a call is active on the port, both sides of the connection should agree on the ISDN state of the call as defined in the ISDN Protocol Specification. This test audits internal call state data by querying the far-end terminal adapter about the ISDN state of the call. It can be helpful when trying to clear a hung call. If the internal call state data on the near-end side is different than that of the far-end terminal adapter, **the call is torn down.**

As with Test #256 (Service State Audit), a PASS simply means that an appropriate message was composed and sent to the far-end terminal adapter. The ISDN Specification allows up to two minutes for a reply. If a reply is not received within the two minute window, a protocol time-out violation is recorded in the error log against the associated signaling channel (ISDN-PRI Signaling Link Port, which is listed in the Error Log as ISDN-LNK; the Error Type is 1).

Table 8-239. Call State Audit Test #257

Error Code	Test Result	Description / Recommendation
1019	ABORT	An audit is already in progress. 1. Wait two minutes and try again.
1113	ABORT	The signaling link has failed. As a result, the system cannot send any messages on behalf of this port. 1. Check the results of Test #255 (Signaling Link State Check).
1116	ABORT	The port is in an out-of-service ISDN service state. 1. A call cannot be present if the port is in an ISDN out-of-service state. As a result, a call state audit would be inappropriate, and no action is necessary. (Use the status pri-endpoint <extension> command to investigate the ISDN state of the port).
1700	ABORT	Rollabout video abort. The PRI terminal adapter associated with this PRI endpoint extension is detached from the circuit pack. This is a normal abort when the rollabout video feature is enabled. To complete the test on this port, do one of the following: 1. Re-attach the disconnected PRI terminal adapter, or 2. Disable the rollabout video feature on this circuit pack by entering the change ds1 PCSS command, and set the field "Alarm when PRI Endpoint Detached?" to "y."
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at 1-minute intervals a maximum of 5 times.
	FAIL	Internal system error 1. Retry the command at 1-minute intervals for a maximum of 5 times.

Table 8-239. Call State Audit Test #257

Error Code	Test Result	Description / Recommendation
	PASS	This MCU sent a call state auditing message to the far-end terminal adapter to verify the state of the call active on this port. If a call state mismatch is found, the call is torn down within two minutes. If no call was active, no message was sent.

PKT-BUS (Packet Bus)

Alarm Level	Initial Craft Command to Run*
Major	test pkt P l r 2
Minor/Warning	test pkt P l

* Where P is 1.

The Packet Bus consists of a single bus. The Packet Bus is used to carry ISDN-BRI signaling information. The SPE interface to the Packet Bus is in the TN794 Packet Control circuit pack (PKT-CTRL).

Packet Bus maintenance is performed only when the Packet Bus is enabled on the Maintenance-Related System Parameters form. Packet Bus testing is dependent on the Packet Bus port (M/T-PKT) of the TN771 Maintenance/Test circuit pack (M/T-BD), the TN794 Packet Control Circuit Pack (PKT-CTRL), and on the ISDN-BRI circuit packs (BRI-BD). Packet Bus tests may abort if some of this hardware is not present in the system. Also, these tests may yield inconsistent results if some of this hardware is defective.

The interactions between the Packet Bus and the circuit packs that use the bus are complex. For this reason, the Packet Bus can be alarmed due to a circuit pack failure and, conversely, circuit packs can be alarmed due to a Packet Bus failure. Chapter 9, "Packet Bus Fault Isolation and Correction", describes Packet Bus maintenance and also the interactions of the bus with the Packet circuit packs. The chapter discusses fault isolation and correction procedures, and it should be referenced for all procedures and required decisions. The ‘‘Packet Bus Fault Isolation Flowchart’’ section of Chapter 9, "Packet Bus Fault Isolation and Correction" is the normal starting point in the chapter for experienced technicians. However, technicians who are unfamiliar with the Packet Bus and its use should refer to the introductory material. This section on PKT-BUS is limited to a description of the Error and Alarm Log entries for the Packet Bus maintenance object and to a description of the Packet Bus test sequence.

A failure of one or more circuit packs that use the Packet Bus can cause a Packet Bus alarm. In addition, a Packet Bus failure can cause loss of service to one or more such circuit packs, as well as to the ports and endpoints associated with the ISDN-BRI circuit pack (BRI-PORT, BRI-SET, and BRI-DAT). These interactions are discussed in the ‘‘Maintenance Objects That Use The Packet Bus’’ section of Chapter 9Chapter 9, "Packet Bus Fault Isolation and Correction".’

The following list summarizes some of the important points to consider when working with the Packet Bus. For a complete description of these points, refer to the introductory sections of Chapter 9, ‘‘Packet Bus Fault Isolation and Correction.’’

- The Maintenance/Test circuit pack (TN771) is a tool for isolating Packet Bus faults. A determination as to whether a TN771 circuit pack is in the system is made by entering the **list configuration** command. Use of the Maintenance/Test Packet Bus port facilities is described under ‘‘The Maintenance/Test Circuit Pack (TN771)’’ in Chapter 9, "Packet Bus Fault Isolation and Correction". Also, in the same chapter, the section entitled ‘‘A Special Precaution Concerning the TN771’’ describes other circumstances when a TN771 may be taken to the customer site.
- Certain catastrophic Packet Bus failures have an effect on Packet circuit pack, port, and endpoint maintenance. The following list summarizes the impact of such failures in this regard. For further details, refer to the ‘‘Maintenance of the Packet Bus’’ section of Chapter 9, ‘‘Packet Bus Fault Isolation and Correction’’:
  - ISDN-BRI circuit pack (BRI-BD) in-line errors indicating possible Packet Bus failures are placed into the error log, but are not acted upon.
  - ISDN-BRI port (BRI-PORT) in-line errors indicating possible Packet Bus failures **are neither placed into the error log nor acted upon**.
  - ISDN-BRI endpoint (BRI-SET, BRI-DAT) in-line errors **are neither placed into the error log nor acted upon**.
  - Circuit pack and port in-line errors that are not relevant to the Packet Bus or that indicated a circuit pack failure are acted upon in the normal fashion.
  - Normal background maintenance (periodic and scheduled) is not affected.
  - Foreground maintenance (for example, commands executed on the MCU-MT terminal) are not affected.

  The actions in the previous list serve to reduce the system load, which could become excessive if too many maintenance objects are affected by a Packet Bus failure. However, such an excessive load should in no way impede the isolation and the correction of the faults.

When the actions in the list are implemented, Error Type 3329 is logged against PKT-BUS, and a Warning alarm is raised (although other Packet Bus errors in many cases raise more severe alarms, thereby overriding the Warning alarm).

Hardware Error Log Entries

Table 8-240. PKT-BUS Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	test pkt
	Run the Short Test Sequence first. If all tests pass, run the Long Test Sequence. Refer to the appropriate test description and follow the recommended procedures.				
1	1 - 2	#570	Major	On	test pkt P l r 2
	Within the last minute, packet circuit packs have reported errors that indicate a possible Packet Bus failure. The Aux Data value is 1 or 2, indicating that only one or more than one Packet circuit pack (respectively) have reported a possible Packet Bus failure.				
257	Any	#571	Major	On	test pkt P l r 2
	Packet Bus maintenance has been unable to perform loop-around tests from the TN794 Packet Control circuit pack (PKT-CTRL) to itself. This could indicate faults on the Packet Control circuit pack rather than on the Packet Bus. Examine the Error and Alarm Logs for any such errors.				
513	1 - 24	#572	Major	On	test pkt P l r 2
	Maintenance/Test Packet Bus port (M/T-PKT) for this port network has determined that there are more Packet Bus faults than the port can correct. The Aux Data value indicates the number of faulty leads.				
1793	Any	None			
	Packet circuit packs have detected possible Packet Bus failures via in-line error or background test failure. Examine the Error and Alarm logs for more specific PKT-BUS errors.				
2305	1 - 24	#572			test pkt P l
	Maintenance/Test Packet Bus port (M/T-PKT) has detected open leads on the Packet Bus. The Aux Data value indicates the number of open leads.				
3329	1 - 7 , 1000 - 1007	None	Warning	On	test pkt P l
	For PKT-BUS, an ON-BOARD alarm indicates a problem with the Packet Bus itself.				

Table 8-240. PKT-BUS Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
3585	Any	Bibe	Minor	On	test pkt P l
	Packet circuit pack, port, and endpoint maintenance has been disabled due to a Packet Bus failure. The Aux Data value indicates which sources have reported errors that have caused maintenance to be disabled. These sources include the following: ■ In-line errors from Packet circuit packs. ■ Packet Bus Uncorrectable report from the Maintenance/Test Packet Bus port (M/T-PKT). ■ Packet Bus Interface Failure report from the Packet Control (PKT-CTRL).				

The Aux Data values that indicate these sources are identified in the following table:

Aux Data	Packet Circuit Pack	Maint/Test Circuit Pack	Packet Control
1/1001	X		
2/1002		X	
3/1003	X	X	
4/1004			X
5/1005	X		X
6/1006		X	X
7/1007	X	X	X

NOTE:
It is important to remember that problems reported by Packet circuit packs may be caused by **any** circuit pack. However, only Packet circuit packs can detect such problems (inasmuch as TDM-only circuit packs are not affected by these problems).

k. Packet circuit pack, port, and endpoint maintenance has been disabled due to more than one circuit pack reporting in-line errors. If this occurs more than three times in 15 minutes (that is, if maintenance is disabled due to errors and then re-enabled because no more errors are reported), a Minor alarm is raised against the Packet Bus. Note that this error may still be present in the error log even if the "Circuit Pack Audit Test" reports that only one circuit pack has indicated a problem. This occurs if more than one circuit pack reported errors within any one-minute interval since the Packet Bus fault occurred.

Craft-Demanded Tests

Always investigate tests in the order presented in the following tables when you are inspecting errors in the system. By clearing error codes associated with the *Packet Circuit Pack Audit Test,* for example, you may also clear errors generated from other tests in the testing sequence.

Table 8-241. System Technician-Demanded Tests: PKT-BUS

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Packet Circuit Pack Audit Test (#573)	Short	Long	No
Maintenance/Test Circuit Pack Query Test (#572)	Short	Long	No
Packet Control Bus Loop-Around Test (#571)	Short	Long	No

Packet Control Bus Loop-Around Test (#571)

This test uses circuitry on the Packet Control circuit pack (TN794) to look for faults on the Packet Bus. If the Packet Control circuit pack has detected parity errors on the Packet Bus, or if it is unable to loop back data to itself, the test fails. The test passes if no parity errors are detected and if data is successfully looped back.

Table 8-242. Packet Control Bus Loop-Around Test #571

Error Code	Test Result	Description Recommendation
1022	ABORT	There is no Packet Control circuit pack in the network.
1024	ABORT	The Packet Control circuit pack is in use by Packet Control maintenance at this time. The test cannot be completed until the Packet Control circuit pack becomes available. 1. Wait for Packet Control maintenance to finish using the Packet Control circuit pack (the green LED goes out.) 2. Reenter the command
1141	ABORT	The Packet Control circuit pack is out of service. 1. Determine if the Packet Control circuit pack is busied out (this is indicated by an Error Type 18 logged against PKT-CTRL). If the pack is busied out, release the pack by entering the release packet-control command. Then reenter the command. 2. If the Packet Control circuit pack is NOT busied out, refer to PKT-CTRL Maintenance documentation for recommended repair procedures.

Table 8-242. Packet Control Bus Loop-Around Test #571

Error Code	Test Result	Description Recommendation
2000	ABORT	The test timed out while waiting for the packet to be returned from the loop-around. 1. Reenter the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, check for problems with the Packet Control (look for PKT-CTRL errors in the Error and Alarm Logs). 3. If there is no problem with the Packet Control circuit pack, escalate the problem.
2060	ABORT	The link on the Packet Bus that is being used to perform the test has failed. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, check for problems with the Packet Control (look for PKT-CTRL error in the Error and Alarm Logs). 3. If there is no problem with the Packet Control circuit pack, escalate the problem.
2076	ABORT	The parity error check circuitry on the Packet Control circuit pack is not functioning correctly. 1. Run the test again. 2. If the same abort occurs again, refer to PKT-CTRL Maintenance documentation to attempt to correct the fault.
2100	ABORT	Maintenance could not allocate all the necessary system resources to perform this test. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
2500	ABORT	An internal operation failed; the test could not be completed.
1	FAIL	The Packet Control Bus Loop-Around test failed (parity errors were detected from the test packet). 1. Refer to the ‘‘Packet Bus Fault Isolation Flowchart’’ section in Chapter 9 ", ‘‘Packet Bus Fault Isolation and Correction’’ to determine the cause of the test failures.
2	FAIL	The Packet Control Bus Loop-Around test failed (the Packet Control circuit pack could not bring up a loop-around link on the Packet Bus).
	PASS	No faults have been detected on the Packet Bus by the Packet Control circuit pack. This indicates that the Packet Bus is operating correctly.

Maintenance/Test Circuit Pack Query Test (#572)

This test queries the Maintenance/Test Packet Bus port about the state of health of the Packet Bus. If the Maintenance/Test circuit pack indicates that the Packet Bus has faults, the test fails. The corresponding failure code describes the severity, type, and number of faults. The test passes if the Packet Bus is fault-free.

Table 8-243. Maintenance/Test Circuit Pack Query Test #572

Error Code	Test Result	Description Recommendation
1006	ABORT	The Packet Bus port of the Maintenance/Test circuit pack is out of service. 1. Determine if the port is busied out. If so, release the port by entering the release port PCSS04 command. Reenter the test command. 2. If there are alarms active against the Packet Bus port (M/T-PKT), refer to M/T-PKT Maintenance documentation to resolve them. Then reenter the test command.
1142	ABORT	No Maintenance/Test circuit pack Packet Bus port is in service in this port network. The Maintenance/Test Packet Bus Port may not be present. If the port is present, and if it is busied out or has failed, release or replace the circuit pack. If there is no Maintenance/Test circuit pack, ignore the results of this test for this port network.
2000	ABORT	The test timed out while waiting for an uplink CCMS response from the Maintenance/Test Packet Bus port. 1. Reenter the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, check for problems with the Maintenance/Test Packet Bus port (look for M/T-PKT in the Error and Alarm Logs). 3) If there is no problem with the Maintenance/Test Packet Bus port, escalate the problem.
2059	ABORT	The Maintenance/Test Packet Bus port has reported a hardware failure. 1. Refer to M/T-PKT Maintenance documentation to correct the problem. 2. Reenter the test command. 3. If the test continues to abort with this code, escalate the problem.
2077	ABORT	The Maintenance/Test Circuit Pack Query located more than one Maintenance/Test Packet Bus port in the port network. NOTE: The software should not allow this to occur. This is an internal system error. Escalate the problem, but also attempt the corresponding work-around steps. 1. Remove all Maintenance/Test circuit packs from the port network. 2. Insert one Maintenance/Test circuit pack (there should not be more than one in a port network). 3. Reenter the test command.

Table 8-243. Maintenance/Test Circuit Pack Query Test #572

Error Code	Test Result	Description Recommendation
2100	ABORT	Maintenance could not allocate all the necessary system resources to perform this test. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
2500	ABORT	An internal operation failed; the test could not be completed.
XYZZ	FAIL	The Maintenance/Test Packet Bus port has detected faults on the Packet Bus. The error code is encoded as follows: 1. Refer to the ‘‘Packet Bus Fault Isolation Flowchart’’ section in Chapter 9 ", ‘‘Packet Bus Fault Isolation and Correction’’ to determine the cause of the failures.
2xxx	-	The Maintenance/Test packet Bus port is unable to correct all of the Packet Bus faults it has detected.
x0xx	-	None of the Packet Bus faults are open faults.
x1xx	-	At least some of the Packet Bus faults are open faults. Look for Error Type 2305 in the Error Log. The Aux Data value indicates the number of open leads. 1. Refer to the ‘‘Packet Bus Fault Isolation Flowchart’’ section in Chapter 9 ", ‘‘Packet Bus Fault Isolation and Correction’’ to determine the cause of the failures.
xxZZ	-	The last two digits of the error code indicate the total number of faulty Packet Bus leads that the Maintenance/Test Packet Bus port has detected.
	PASS	No faults have been detected on the Packet Bus by the Packet Control circuit pack. This indicates that the Packet Bus is operating correctly. No faults have been detected on the Packet Bus by the Maintenance/Test circuit pack. This indicates that the Packet Bus is operating correctly.

Packet Circuit Pack Audit Test (#573)

This test determines whether Packet circuit packs have reported Packet Bus-related in-line errors within the last minute. If so, the failure code indicates whether one or more circuit packs have reported failures within the last minute.

Due to the one-minute time constraint included as part of this test, the test is designed to delay 15 seconds before returning a result in cases where the test has failed within the last five minutes. This procedure helps ensure that a

repeated sequence of the test does not always yield the same result. If no failure has occurred in the last five minutes, a PASS is returned immediately.

Table 8-244. Packet Circuit Pack Audit Test #573

Error Code	Test Result	Description Recommendation
2500	ABORT	An internal operation failed; the test could not be completed. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
1	FAIL	One Packet circuit pack has reported Packet Bus-related in-line errors within the last minute. 1. Refer to the ‘‘Packet Bus Fault Isolation Flowchart’’ section of Chapter 9, ‘‘Packet Bus Fault Isolation and Correction’’ to determine the cause of the error reports.
2	FAIL	More than one Packet circuit pack has reported Packet Bus-related in-line errors within that last minute.
xxZZ	Fail	The last two digits of the error code indicate the total number of faulty Packet Bus leads that the Maintenance/Test Packet Bus port has detected.
	PASS	No Packet circuit packs have reported Packet Bus-related in-line errors within the last minute. This indicates that the Packet Bus is healthy, or that a Packet Bus fault is transient or is being caused by a faulty Packet circuit pack. If this test passes while there are other signs of a Packet Bus failure (as indicated, for example, in the Error/Alarm Logs or by other test failures), refer to the ‘‘Packet Bus Fault Isolation Flowchart’’ section of Chapter 9, ‘‘Packet Bus Fault Isolation and Correction’’ to isolate the problem.

PKT-CTRL (Packet Control Circuit Pack)

Alarm Level	Initial Craft Command to Run
Major	reset packet-control l
Minor	test packet-control l
Warning	release packet-control

CAUTION:
A detailed flowchart for isolating and resolving Packet Bus faults is included in Chapter 9, "Packet Bus Fault Isolation and Correction". This flowchart, along with the other information presented in the chapter, can help in resolving problems that are not isolated to the Packet Control. Whenever the

repair procedures for this Maintenance Object refer to Packet Bus and/or Packet Control maintenance, be sure to reference Chapter 9, "Packet Bus Fault Isolation and Correction" in addition to the MO documentation for Packet Bus.

The TN794 Packet Control circuit pack is the hardware component that serves as the interface between the SPE and the Packet Bus. It terminates the Link Access Procedure D (LAPD) protocol and provides support for thousands of signaling links. As shown in the figure on the following page, a Packet Control link generally terminates on the Packet Control circuit pack and a packet endpoint that is connected to a Packet circuit pack. A TN556 circuit pack is an example of a Packet circuit pack. The following Packet circuit packs (packs that can connect to the Packet Bus) are available:

- TN556 ISDN-BRI Line Circuit Pack
- TN771 Maintenance/Test Circuit Pack
- TN794 Packet Control Circuit Pack

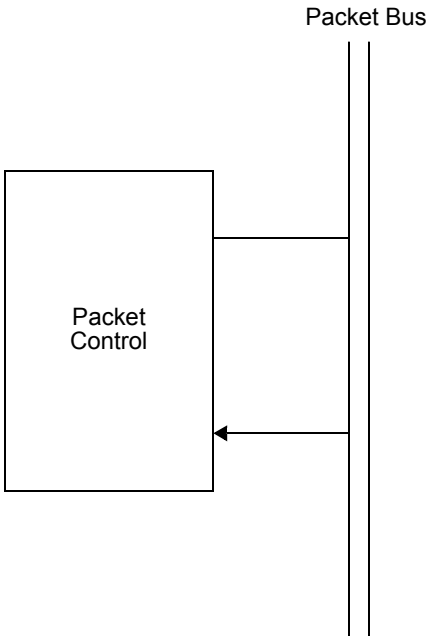


Figure 8-43. Packet Hardware Configuration

The Packet Control circuit pack is not administered in the normal manner; there is no **add** or **remove** command associated with it. However the "Packet Bus Activated?" field on the Maintenance-Related System Parameters Form indicates if the Packet Control circuit pack is "administered." If the "Packet Bus Activated?" field is set to "yes," a Packet Control circuit pack should be installed in the system, since the Packet Control circuit pack is required in systems that use the Packet Bus. If a Packet Control circuit pack is not installed, and the "Packet Bus Activated?" field is set to "yes," a major on-board alarm is raised against the PKT-CTRL MO. This alarm indicates that the Packet Control circuit pack is "missing." Refer to the "Maintenance-Related System Parameters Form" section in Chapter 5, "Routine Maintenance Procedures"for more information on the "Packet Bus Activated?" field.

The **status packet-control C** command provides useful information about the Packet Control circuit pack. This command displays the service state of the circuit pack and various link-related information. The service state "out" indicates that service is not being provided and users are being disrupted. Maintenance takes the Packet Control circuit pack out of service due to certain faults, or as a result of the **busyout packet-control C** command being run.

Hardware Error Log Entries and Test to Clear Values

Table 8-245. Packet Control Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
1	Any	None	Major	On	reset packet-control
	Maintenance software reset the Packet Control circuit pack due to an in-line error or certain test failures. Once a threshold number of these errors occurs, maintenance places the Packet Control circuit pack into an out-of-service state, and a major on-board alarm is raised on the Packet Control circuit pack.				
18	0		Warning	Off	release packet-control
257	Any	None	Major	On	reset packet-control
	This error occurs due to certain in-line errors and test failures. This error is very serious, and when it occurs maintenance software immediately escalates testing to the destructive reset test (#586).				
513	0	None			
	This error indicates that a loss of communication was detected between the SPE software and the Packet Control circuit pack. No alarm is raised. However, if this error occurs repeatedly, software testing escalates to the Reset Test (#586) so that the health of the Packet Control circuit pack can be determined.				

Table 8-245. Packet Control Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
769	Any	#585			
	This error occurs when the Packet Control Loop-Around Test (#585) fails because a link cannot be established or because the Packet Control circuit pack cannot send and receive data correctly. No alarm is raised. However, if this error occurs repeatedly, software testing escalates to the Reset Test (#586) so that the health of the Packet Control circuit pack can be determined.				
1025	1	#584	Minor	On	test packet-control l
	This error occurs when the Packet Control Parity Circuitry Test (#584) fails, thus indicating a possible fault with the parity circuitry in detecting Packet Bus parity errors. If this error occurs a number of times exceeding a defined threshold, a minor on-board alarm is raised.				
1281	0	None			
	This error occurs when a certain circuit pack-level diagnostic test fails, thus indicating a transient fault (which has been recovered) existed on the Packet Control/Packet Bus interface. No alarm is raised because the error does not isolate the fault to the Packet Control circuit pack. However, if the error occurs repeatedly, software testing escalates to the Reset Test (#586) so that the health of the Packet Control circuit pack can be determined.				
1537	0	None			
	This error occurs when a certain circuit pack-level diagnostic test fails, indicating there is a fault on the Packet Control/Packet Bus interface. No alarm is raised because the Packet Bus may be the source of problem. When this error occurs, Packet Bus maintenance is notified, thereby causing appropriate tests to run.				
1793	0	None			
	This error occurs when a parity error is detected by the Packet Control circuit pack, indicating some data sent over the Packet Bus is corrupted. No alarm is raised against the Packet Control circuit pack because the problem may be associated with the Packet Bus. When this error occurs, Packet Bus maintenance is notified, thereby causing appropriate tests to run.				
2049	0	None			
	This error occurs when the Packet Control circuit pack receives a threshold number of frames with invalid address. No alarm is raised because there is no direct indication of a Packet Control fault. The frames may be corrupted by the sending side or by the Packet Bus. No maintenance activity is triggered by this error. No action is required.				
2305	Any	#581	Major	Off	reset packet-control
	This error occurs when the Packet Control Download Test (#581) fails. Once a threshold number of these errors occurs, a major off-board alarm is raised. Maintenance software retries the download test repeatedly until it passes. Since the reset packet-control command causes the firmware to be downloaded and provides additional diagnostics on this error type, this command should be used when a download failure has occurred.				

Craft-Demanded Tests

When inspecting errors in the system and deciding which ones to address, always investigate errors in the order they are presented in the following tables. By clearing error codes associated with the *Packet Control Parity Circuitry Test*, for example, you may also clear errors generated from other tests in the testing sequence

Table 8-246. System Technician-Demanded Tests: PKT-CTRL

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Packet Control Reset Test (#586)			Yes
Packet Control Parity Circuitry Test (#584)	Long		No
Packet Control Loop-Around Test (#585)	Short	Long	No
Packet Control Error Counter Read and Clear Test (#583)	Long		No

Packet Control Error Counter Read and Clear Test (#583)

This test involves reading and clearing the error counters on the Packet Control circuit pack. The test is performed by sending multiple maintenance requests to the Packet Control circuit pack and waiting for the response to each of the ‘‘read and clear’’ commands from the circuit pack

Table 8-247. Packet Control Error Counter Read and Clear Test #583

Error Code	Test Result	Description Recommendation
2500	ABORT	Internal system error. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
1141	FAIL	The Packet Control circuit pack is not operational. A busied-out Packet Control circuit pack can still be operational. 1. Determine if the Packet Control circuit pack has an active major alarm (via the display alarm command). If it does, follow the recommended repair procedures to retire the alarm. Once the alarm is retired, the original command can be retried. 2. If the Packet Control circuit pack does not have an active major alarm, wait one minute and retry the original command. 3. If the original command again aborts with error code 1141, escalate the problem.

Table 8-247. Packet Control Error Counter Read and Clear Test #583

Error Code	Test Result	Description Recommendation
1	FAIL	Software was unable to read and clear the Packet Control circuit pack error counters. 1. Retry the command.
	PASS	The Packet Control circuit pack succeeded in servicing the read and clear error counter requests.

Packet Control Parity Circuitry Test (#584)

This test checks the error detection capability of the Packet Control circuit pack's circuitry by verifying that it correctly identifies frames on the Packet Bus with parity errors.

NOTE:
This test aborts in a system with an alarmed Packet Bus.

Table 8-248. Packet Control Parity Circuitry Test #584

Error Code	Test Result	Description Recommendation
1024	ABORT	The Packet Control circuit pack's parity circuitry is currently being used by another maintenance test. 1. Retry the command at one-minute intervals a maximum of five times.
1139	ABORT	The Packet Bus is alarmed. 1. Try to retire the alarm associated with the PKT-BUS (Packet Bus). Refer to the Alarm log via the display alarm command. 2. Retry the command when the alarm associated with the Packet Bus circuit pack is retired.
1141	ABORT	The Packet Control circuit pack is not operational. NOTE: A busied-out Packet Control circuit pack can still function. 1. Determine if the Packet Control circuit pack has an active major alarm (via the display alarm command). If it does, then follow the recommended repair procedures to retire the alarm. Once the alarm is retired, the original command can be retried. 2. If the Packet Control circuit pack does not have an active major alarm, wait one minute and retry the original command. 3. If the original command again aborts with error code 1141, escalate the problem.
2100	ABORT	Was unable to allocate the necessary resources. 1. Retry the command at one-minute intervals a maximum of five times.

Table 8-248. Packet Control Parity Circuitry Test #584

Error Code	Test Result	Description Recommendation
2500	ABORT	Internal system error. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
1	FAIL	The Packet Control parity circuitry is malfunctioning. 1. Issue test packet-control long command to retry the test. 2. This could be caused by a Packet Bus problem. Refer to Chapter 9, “Packet Bus Fault Isolation and Correction” for the procedures to be followed. 3. The Packet Control circuit pack needs to be replaced. However, it is likely that the Packet Control is providing service, and only its ability to maintain the Packet Bus is affected by the fault. If the Packet Control appears to be providing service (packet endpoints are functioning and/or the status packet-control command indicates that links are established), it is not critical to replace the circuit pack immediately, and a time may be chosen to minimize customer down time.
	PASS	The Packet Control parity circuitry is functioning properly.

Packet Control Loop-Around Test (#585)

This test checks whether the Packet Control circuit pack can send and receive data correctly. The test performs the following major functions:

1. Establishes an LAPD link from the Packet Control circuit pack to itself (see the following figure).
2. Transmits and receives test data over the testing link.

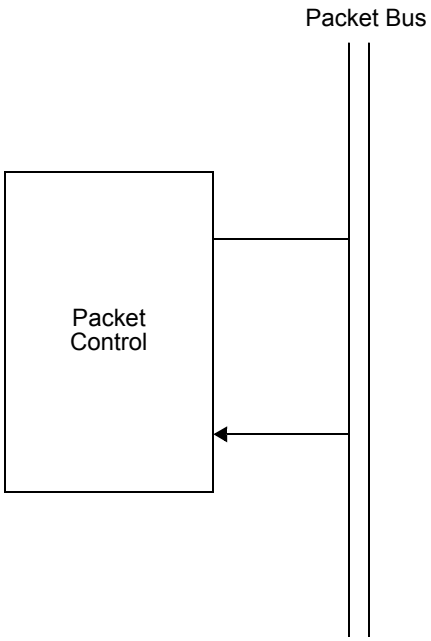


Figure 8-44. Test Configuration

Table 8-249. Packet Control Loop-Around Test #585

Error Code	Test Result	Description / Recommendation
1139	ABORT	The Packet Bus is alarmed. 1. Try to retire the alarm associated with the PKT-BUS (Packet Bus). Refer to the Alarm log via the display alarm command. 2. Retry the command when the alarm associated with the Packet Bus circuit pack is retired.
1141	ABORT	The Packet Control circuit pack is not operational.NOTE: A busied-out Packet Control circuit pack can still function. 1. Determine if the Packet Control circuit pack has an active major alarm (via the display alarm command). If it does, follow the recommended repair procedures to retire the alarm. Once the alarm is retired, the original command can be retried. 2. If the Packet Control circuit pack does not have an active major alarm, wait one minute and retry the original command. 3. If the original command again aborts with error code 1141, escalate the problem.

Table 8-249. Packet Control Loop-Around Test #585

Error Code	Test Result	Description / Recommendation
2500	ABORT	Internal system error. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.
1 - 3	FAIL	Maintenance was unable to establish a loop-around link from the Packet Control circuit pack back to itself, or was unable to receive the data that was sent out over one side of the loop-around link. 1. Issue the test packet-control C short command to retry the test. 2. If the same error code is observed, maintenance software automatically escalates the testing. No specific action is required.
	PASS	The Packet Control circuit pack can send and receive data correctly.

Packet Control Reset Test (#586)

This test resets the Packet Control circuit pack, downloads Packet Control circuit pack firmware, and then causes the Packet Control circuit pack to begin operation.

WARNING:
This test is destructive and disrupts service. You must first execute the "busyout packet-control" command.

Table 8-250. Packet Control Reset Test #586

Error Code	Test Result	Description / Recommendation
1015	ABORT	The Packet Control circuit pack is not busied out. 1. Retry the command after running the busyout packet-control command.
1152	ABORT	The Packet Control circuit pack hardware was successfully reset and the circuit pack was successfully put back into service. However, a new image of Packet Control circuit pack firmware was not able to be downloaded. However, the existing firmware on the circuit pack is valid, and there is no need to repeat this test.
2500	ABORT	Internal system error. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, escalate the problem.

Table 8-250. Packet Control Reset Test #586

Error Code	Test Result	Description / Recommendation
1 - 3	FAIL	The reset test failed. 1. Retry the command. 2. If the command fails again with the same error code, replace the Packet Control circuit pack.
5	FAIL	The SPE could not communicate with the Packet Control circuit pack. This indicates that either the Packet Control circuit pack is not installed or that it has failed. 1. Examine the appropriate carrier to determine if there is a Packet Control circuit pack in the correct slot. If there is, go to the next step. If there isn't, the problem is that the Packet Control circuit pack is administered (that is, the ''Packet Bus Activated?'' field on the Maintenance-Related System Parameters Form is set to ''y'') but the circuit pack isn't installed. If the system is supposed to have a Packet Control circuit pack, the system must be upgraded appropriately (see upgrade documentation). If the system is not supposed to have a Packet Control circuit pack, then the Packet Control circuit pack should be unadministered by setting the ''Packet Bus Activated?'' field on the Maintenance-Related System Parameters Form to ''n.'' Refer to the ''Maintenance-Related System Parameters Form'' section in Chapter 5, ''Routine Maintenance Procedures'' for more information on the ''Packet Bus Activated?'' field. 2. Retry the command. 3. If it fails again with the same error code, replace the Packet Control circuit pack.
2065	FAIL	The tape does not contain valid Packet Control circuit pack firmware. 1. Retry the command. If the same error code is returned, retry the command. If the test continues to fail with this error code, escalate the problem.
2073	FAIL	After being downloaded, the Packet Control circuit pack does not contain valid downloadable firmware in its memory. 1. Retry the command. 2. If the tests fails again with the same error code, retry the command. If the test still fails with this error code, replace the Packet Control circuit pack. If the test continues to fail, escalate the problem.
2500	FAIL	Internal system error. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to fail, escalate the problem.
	PASS	The reset command passed and the Packet Control circuit pack is operational. If the Packet Control circuit pack was busied-out, it needs to be released (via the release packet-control command) before it can be considered in service.

POWER (Battery & Battery Charger) for AC-Powered Systems

MO Name (in Alarm Log)	Alarm Level	Initial Command to Run*	Full Name of MO
POWER	MINOR	test environment P	Battery & Battery Charger

* Where P is an appropriate port network number determined via the PORT field from the Alarm or Error Log.

The MCU offers two basic cabinet type configurations: (1) the multicarrier cabinet system and (2) the single-carrier cabinet system. Both cabinet system configuration may be powered by either an external AC or DC power source.

The environment maintenance strategy to be used depends on both the cabinet configuration and the type of powering. Therefore, refer to the following list to find the appropriate section(s).

- For a single-carrier cabinet system, refer to the DC-POWER (Single-Carrier Cabinet Power) Maintenance documentation for environment maintenance strategy.
- For a multicarrier cabinet system using an external AC power source, refer to one or more of the following Maintenance documentation sections: AC-POWER (AC Power) for AC-Powered Systems, CARR-POW (Carrier Port Power Unit) for AC-Powered Systems, or POWER (Battery & Battery Charger) for AC-Powered Systems.
- For a multicarrier cabinet system using an external DC power source, refer to one or more of the following Maintenance documentation sections: AC-POWER (AC Power) for DC-Powered Systems, CARR-POW (Carrier Port Power Unit) for DC-Powered Systems, or POWER (Battery & Battery Charger) for DC-Powered Systems.

The MCU is equipped with rechargeable batteries that can span short AC power outages.

In a multicarrier cabinet system, the POWER (Battery & Battery Charger) MO represents the battery charger and the battery which are located in the lower left corner of the cabinet. Should anything go wrong with the battery or charger, they must be replaced using the procedure described in the following “Replacing the Battery and Battery Charger” section. The system detects one of the following three problems with the batteries or charger:

1. Reserve Fault—The charger has detected a problem within itself or the batteries and has notified the system.

2. High Charge Rate—The batteries are charging at a high charge rate. This means that batteries with a low charge are being recharged or that a problem may exist with the batteries or the charger.
3. Prepare to Disconnect (Low Battery)—The batteries are in danger of being drained to a point where the batteries would be damaged. This warning often occurs after multiple power failures.

   The batteries take 30 hours to fully charge after being drained. A fully charged battery pack should bridge two power failures without causing a low battery warning to occur.

Replacing the Battery and Battery Charger

Use the procedure below to replace the Battery and Battery Charger:

1. Move the power switch on the battery charger to OFF.

   WARNING:
   Always turn off the battery charger before replacing the batteries. Failure to do so results in damage to the 397B battery charger.

2. Disconnect the cord from the outlet on the front of the battery charger.
3. Remove the screw at the top left of the cover and open the cover to access the charger.
4. Check the battery voltages at the test points. The test points on the CE Distribution Unit check all 3 batteries wired in series (the voltages should read 144 volts, 3X48 volts = 144 volts).

   NOTE:
   An ordinary voltmeter can be used to check battery voltages at the test points, but it may not produce valid results. If the battery voltage readings are below 48 volts (the voltages at test points should read 144 volts, 3X48 volts = 144 volts), the battery is probably defective. However, a normal voltage reading does not necessarily mean the battery is good; under load, a defective battery with a normal reading on the voltmeter may discharge rapidly.

5. Check the battery dates and replace the batteries if they are more than four years old or if a POWER alarm is present.

   NOTE:
   If any defective batteries are found, replace all of them. Batteries are ordered in sets of three and should be replaced as such.

6. If no defective batteries are found, replace the entire charger.
7. Close the cover and secure it with the screw.

8. Reconnect the cord and move the power switch to ON.

Hardware Error Log Entries and Test to Clear Values.

Table 8-251. Battery & Battery Charger Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	test environment P sh r 1
	Run the Short Test Sequence first. If all tests pass, run the Long Test Sequence. Refer to the appropriate test description and follow the recommended procedures Where P is an appropriate port network number determined via the Port field from the Alarm or Error Log.				
1	Any	Battery & Battery Charger Query Test (#5) (Error Code 8)	MINOR	ON	test environment P sh r 1
	Where P is an appropriate port network number determined via the Port field from the Alarm or Error Log.				
257	Any	Battery & Battery Charger Query Test (#5) (Error Code 4)	MINOR	ON	test environment P sh r 1
	Where P is an appropriate port network number determined via the Port field from the Alarm or Error Log.				
769	Any	Battery & Battery Charger Query Test (#5) (Error Code 2)	MINOR	ON	test environment P sh r 1
	Where P is an appropriate port network number determined via the Port field from the Alarm or Error Log.				
3840	1005 , 1028	Battery & Battery Charger Query Test (#5)		ON	test environment P sh r 1
	Where P is an appropriate port network number determined via the Port field from the Alarm or Error Log.				

System Technician-Demanded Tests: Descriptions and Error Codes

Always investigate tests in the order presented in the table below when inspecting errors in the system. By clearing error codes associated with the *Battery & Battery Charger Query Test,* for example, you may also clear errors generated from other tests in the testing sequence. During this test, the status LED on the battery charger is lit and extinguished if the status of the battery charger is reported as normal. This event is a result of checking that the battery charger is connected

Table 8-252. System Technician-Demanded Tests: POWER (AC)

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Battery & Battery Charger Query Test (#5)	Short	Long	No
AC Power Query Test (#78) (a)	Short	Long	No
Power Unit Query Test (carrier E) (#127) (b)	Short	Long	No
Power Unit Query Test (carrier D) (#127) (b)	Short	Long	No
Power Unit Query Test (carrier A) (#127) (b)	Short	Long	No
Power Unit Query Test (carrier B) (#127) (b)	Short	Long	No
Power Unit Query Test (carrier C) (#127) (b)	Short	Long	No
Emergency Transfer Query Test (#124) (c)	Short	Long	No
Cabinet Sensors Query Test (#122) (d)	Short	Long	No
External Alarm Lead Query Test (#120) (e)	Short	Long	No
Analog Ring Generator Initialization Test (#117) (f)	Short	Long	No
Analog Ring Generator Query Test (#118) (f)	Short	Long	No

Notes:

a. Refer to AC-POWER (AC Power) Maintenance documentation for a description of this test.

b. Refer to CARR-POW (Carrier Port Power Unit) Maintenance documentation for a description of this test

c. Refer to EMG-XFER (Emergency Transfer) Maintenance documentation for a description of this test.

d. Refer to CABINET (Cabinet Sensors) Maintenance documentation for a description of this test.

e. Refer to EXT-DEV (External Alarm) Maintenance documentation for a description of this test.

f. Refer to RING-GEN (Analog Ring Generator) Maintenance documentation for a description of this test.

NOTE:
This test only shows up in the test sequence if there is a Tone-Clock circuit pack in the port network being tested.

Battery & Battery Charger Query Test (#5)

This test queries the Maintenance/Tape Processor in a multicarrier cabinet system for the status of the battery pack and battery charger, and reports the result. During this test, the status LED battery charger is lit and extinguished if the status of the battery charger is reported as normal. This event is a result of checking that the battery charger is connected.

Table 8-253. Battery & Battery Charger Query Test #5

Error Code	Test Result	Description / Recommendation
1000	ABORT	System resources required to run this test are not available. 1. Retry the command at one-minute intervals a maximum of 5 times.
1005	ABORT	Battery Charger is not connected. 1. If the system has a UPS supplying the power, ignore this error since the UPS supplies the power, not the battery and battery charger. 2. The batteries probably need charging and may be drained if there were power outages. Reconnect the battery charger to allow the batteries to recharge. If Test #5 is run before the batteries are completely charged, the test fails. 3. Wait 24 hours and rerun the test.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals a maximum of 5 times. 2. If the test continues to ABORT with Error Code 2000, check for system powering problems with the A carrier. Look for and resolve all AC-POWER and CARR-POW alarms in a multicarrier cabinet system or DC-POWER alarms in a single-carrier cabinet system. Repeat the test. 3. If the test continues to ABORT with a 2000 error code, check for and resolve PR-MAINT (Maintenance/Tape Processor) errors. Repeat the test. 4. If the test continues to ABORT with a 2000 error code, escalate the problem.

Table 8-253. Battery & Battery Charger Query Test #5

Error Code	Test Result	Description / Recommendation
2028	ABORT	Internal System Error prevented the extinguishing of the Battery Charger status LED. 1. Retry the command at one-minute intervals a maximum of 5 times.
2029	ABORT	Internal System Error. 1. Retry the command at one-minute intervals a maximum of 5 times.
2	FAIL	The system is in nominal power holdover, and the battery is currently so low that the system disconnects power very shortly. 1. If power returns, the port carriers should power up again. All the circuit packs should be reinserted, and the system should continue to operate normally. There will probably be a Minor alarm against Battery & Battery Charger because the batteries are recharging. 2. If power does not return, the system shuts down to prevent damage to the batteries. If power is restored, the system reboots. No manual intervention is required. 3. Rerun the test. If the test still fails, the PR-MAINT (Maintenance/Tape Processor) in a multicarrier cabinet system could be reporting this condition incorrectly. Resolve all alarms on these MOs and rerun the test. There are failures that can occur on the Maintenance/Tape Processor that ARE NOT be detected by the respective maintenance, but that cause many, if not all, environment tests to fail. If many environment tests are failing, the suspect circuit pack, depending on the system configuration, should be replaced and the test rerun. If the test still fails, follow normal escalation procedures.

Table 8-253. Battery & Battery Charger Query Test #5

Error Code	Test Result	Description / Recommendation
4	FAIL	The battery is currently being charged at the high charge rate. 1. After 30 hours, the battery should be fully charged, and this error should disappear. 2. If after 30 hours the battery is still in the high charge rate, an alarm is raised. Display the Error Log with the display errors command and select the category "environ" to display only environment-related errors. Look for POWER errors of type 257. The FIRST OCCURRENCE of this error indicates the time when the battery started charging. Use this time as the starting point to determine if the battery has been charging for 30 hours. If the battery has been charging for 30 hours, then replace the battery. Read the “Replacing the Battery and Battery Charger” section before proceeding. 3. If the batteries were replaced, it can take up to 24 hours for the new batteries to be charged (new batteries are shipped uncharged). If Test #5 is run again before the batteries are completely charged, the test fails. If the charger was replaced, some time must be allowed for the new charger to recharge the batteries. Therefore, in either case, wait at least 24 hours and rerun the test. If the test still fails, the PR-MAINT (Maintenance/Tape Processor) in a multicarrier cabinet system could be reporting this condition incorrectly. There are failures that can occur on the Maintenance/Tape Processor that ARE NOT be detected by the respective maintenance, but that cause many, if not all, environment tests to fail. If many environment tests are failing, the suspect circuit pack, depending on the system configuration, should be replaced and the test rerun. Resolve all alarms on these MOs, and rerun the test. If the test still fails, escalate the problem.
6	FAIL	This indicates that Error Codes 2 and 4 have occurred. Refer to these descriptions. Also, refer to the description for Error Code 14 for this test.

Table 8-253. Battery & Battery Charger Query Test #5

Error Code	Test Result	Description / Recommendation
8	FAIL	For a Global AC MCC (J58890CH) use the procedures outlined in step 3. There is a reserve power fault. A problem exists with the battery charger (more probable) or the battery (less probable). 1. Replace the battery charger or the battery. The fault should disappear. However, the test fails with Error Code 4 if the battery is charging. Always turn off the battery charger before replacing the batteries. 2. Rerun the test. If the test still fails with an error code other than 4 (that is, there is something wrong besides the battery needing charging), the PR-MAINT (Maintenance/Tape Processor) in a multicarrier cabinet system could be reporting this condition incorrectly. Resolve all alarms on these MOs and rerun the test. There are failures that can occur on the Maintenance/Tape Processor that ARE NOT be detected by the respective maintenance, but that cause many, if not all, environment tests to fail. If many environment tests are failing, the suspect circuit pack, depending on the system configuration, should be replaced and the test rerun. If the test still fails, then follow normal escalation procedures 3. Procedures for a Global MCC (J58890CH): a. Look to see if any “red” LEDs are “on” on any of the rectifier modules or the BIU (Battery Interface Unit) located in the Power Distribution Unit (J58890CH). b. If the BTW (Battery Temp Warning) LED on the BIU is “on” check the batteries for a over temp condition(a) if temp is normal(a) replace the BIU, If the test still fails replace the battery in a small battery system. For a large battery system escalate the problem. c. If the BIF (Battery Interface Unit) LED is “on” replace the battery interface unit. d. If the BNA (Battery Not Available) LED is “on” check the battery connections including connector J20. e. If you have an alarm and all LEDs are ok (PWR OK and BOK) on the rectifier modules, and the BIU (Battery Interface Unit), make sure the BIU and the RM0850 rectifiers are seated properly (plugged in). If the BOK LED on the BIU is ok use the following information to check the number of rectifiers serving this cabinet: Number of carriers — Number of rectifiers per cabinet per cabinet - 1 — 2 2 — 3 3 — 3 4 — 4 5 — 4 If the number of rectifiers is correct replace the maintenance circuit pack in the network. 4. If the test still fails, then follow normal escalation procedures.

Table 8-253. Battery & Battery Charger Query Test #5

Error Code	Test Result	Description / Recommendation
10	FAIL	This indicates that Error Codes 2 and 8 have occurred. Refer to these descriptions. Also, refer to the description for Error Code 14 for this test.
12	FAIL	This indicates that Error Codes 4 and 8 have occurred. Refer to these descriptions. Also, refer to the description for Error Code 14 for this test.
14	FAIL	This indicates that Error Codes 2, 4, and 8 have occurred. Refer to these descriptions. Note: This could also indicate that the detection logic on the PR-MAINT (Maintenance/Tape Processor) is defective. Such an error will not be detected by the respective maintenance. If many environment tests are failing, replace the suspect circuit pack (depending on system configuration).
	PASS	The Maintenance/Tape Processor in a multicarrier cabinet system has reported that the status of Battery & Battery Charger is good.

POWER (Battery) for DC Systems

The MCU can be powered by either an external AC or DC power source. See DC-POWER for environmental maintenance strategy.

Alarm Level	Initial Craft Command to Run
Minor	test environment *P*[*]

* Where *P* is an appropriate port network number determined via the *Port* field on the alarm or error log.

Hardware Error Log Entries

The following table shows the error log entries and related information

Table 8-254. POWER (DC) Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	test environment P sh r 1
	Run the short test sequence first. If all tests pass, run the long test sequence. Refer to the appropriate test description and follow the recommendations.				
1	Any	#5	Minor	On	test environment P sh r 1
	Error code 8				

Table 8-254. POWER (DC) Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
257	Any	#5	Minor	On	test environment P sh r 1
	Error code 4				
769	Any	#5	Minor	On	test environment P sh r 1
	Error code 2				
3840	1005 , 1028	#5		On	test environment P sh r 1
	This error occurs in a multicarrier cabinet and can be ignored, but not cleared, for DC-powered systems.				

Craft-Demanded Tests

Always investigate tests in the order presented in the table below when inspecting errors in the system. By clearing error codes associated with the Battery and Battery Charger Query test, for example, you may also clear errors generated from other tests in the sequence.

Table 8-255. System Technician-Demanded Tests: POWER (DC)

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Battery and Battery Charger Query Test #5	Short	Long	No
AC Power Query Test #78	Short	Long	No
Power Unit Query Test #127	Short	Long	No
Cabinet Sensors Query Test #122	Short	Long	No
External Alarm Lead Query Test #120	Short	Long	No

NOTE:
For a description of Test #120, refer to EXT-DEV maintenance documentation.

Battery and Battery Charger Query Test #5

This test queries the maintenance processor for the status of the battery pack and battery charger, and reports the result. In a DC-powered system, this test should never fail.

During this test, the status LED on the battery charger is lit and extinguished if the status of the battery charger is reported as normal. This event is a result of checking that the battery charger is connected.

Table 8-256. Battery and Battery Charger Query Test #5

Error Code	Test Result	Description Recommendation
1000	ABORT	System resources required to run this test are not available.
1005	ABORT	Battery charger is not connected. Ignore this error in DC-powered systems.
2000	ABORT	Response to the test request was not received within the allowable time period.
2028	ABORT	Internal system error prevented the extinguishing of the battery charger status LED. Although this test is irrelevant to DC-powered systems, this error should trigger close monitoring of the MCU as it means that internal system problems exist.
2029	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
Any	FAIL	The problem is with the circuit pack and not with POWER. 1. The suspect circuit pack, depending on the system configuration, should be replaced and the test rerun. 2. If the test fails again, escalate the problem.
	PASS	All that can be inferred is that the PR-MAINT (Maintenance Processor) is working properly.

AC Power Query Test #78

This test queries the Maintenance/Tape Processor for the status of AC power to the switch. In a DC-powered system, this test should never fail.

Table 8-257. AC Power Query Test #78

Error Code	Test Result	Description Recommendation
1000	ABORT	System resources required to run this test are not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.

Table 8-257. AC Power Query Test #78

Error Code	Test Result	Description Recommendation
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2029	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
Any	FAIL	The Maintenance/Tape Processor is incorrectly reporting a problem with AC power. The problem is with the circuit pack and not with AC-POWER. 1. Replace the suspect circuit pack (which varies according to the system configurations) and rerun the test. 2. If the test still fails, escalate the problem.
	PASS	PR-MAINT is working properly.

Power Unit Query Test #127

This test queries the Maintenance/Tape Processor for the status of the pair of port carrier power units in the specified carrier. If both port carrier units are on and are functioning, the test passes. If both are not on and are not functioning, the test fails.

Table 8-258. Power Unit Query Test #127

Error Code	Test Result	Description	Recommendation
1000	ABORT	System resources required to run this test are not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.	
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.	
202	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.	

Table 8-258. Power Unit Query Test #127

Error Code	Test Result	Description	Recommendation
	FAIL	There is a problem with one or both port carrier power units on the tested carrier. 1. For each port carrier power unit that has all status LEDs OFF, check the DC input to the port carrier unit at the port carrier unit outlet. If there is no DC input, check the appropriate circuit breakers for the affected port carrier power unit. If the circuit breaker has tripped (that is, is in the “down” position), reset the circuit breaker. If the circuit breaker trips again, or if DC input is not present at the port carrier power unit outlet, there is probably a power wiring problem in the cabinet. In such a case, escalate the problem. 2. At this point, DC input should be present at the port carrier power supply outlet. If the carrier being tested is the 1A or 2A carrier, refer to “Troubleshooting Control Carrier Power Units” in Chapter 5, “Routine Maintenance Procedures.” Otherwise, use the recycle carrier PC command (where “PC” is the appropriate port network and carrier) in an attempt to bring back the power units for this carrier. If the test passes, the trouble is cleared. If the test does not pass, one or both carrier power units are defective. If only one port carrier power unit is defective, the status LEDs on the healthy port carrier power unit light green for a moment. When the recycle test determines that both port carrier power units are defective, the software turns off power to both the good and defective port carrier power units. This causes the status LED(s) on the good port carrier power unit to light red. 3. If the replaced port carrier power unit(s) still do (does) not operate properly, either a circuit pack or a defective telephone connected to a circuit pack in the affected carrier could be causing an electrical load that is preventing the port carrier power unit from operating properly. a. If the recycle passes, the port carrier power units are healthy, and the problem is with one of the circuit packs. Reinsert the circuit packs one at a time. If the status LED shows red after you insert a circuit pack, replace the defective circuit pack. If the status LED still shows red, remove the Amphenol connector on the back of the slot containing this circuit pack, and reissue the recycle carrier command. If the status LED shows green, the problem is either with one of the telephones or the wiring to one of the telephones on this slot. If the status LED still shows red, escalate the problem. b. If either port carrier power unit still shows a red status LED, check for bent pins and cable placement in the affected carrier. There are failures that can occur on the Maintenance/Tape Processor, Duplication Interface, and EPN Maintenance circuit packs that are not detected by the respective maintenance but nonetheless cause many, if not all, environment tests to fail. If many environment tests are failing, the suspect circuit pack should be replaced and the test rerun. If no other problems can be found, escalate the problem.	

Table 8-258. Power Unit Query Test #127

Error Code	Test Result	Description	Recommendation
None	PASS	There is a problem with one or both port carrier power units on the tested carrier. Both port carrier power units in the tested carrier were found to be healthy by the Maintenance/Tape Processor. If the status LEDs on both port carrier power units are not showing green, PR-MAINT (Maintenance/Tape Processor) may have incorrectly reported the state of the port carrier power units. Look for and resolve any alarms for these MOs.	

Cabinet Temperature Query Test #122 [for Non-Variable Speed Fans]

This test queries the Maintenance/Tape Processor for the status of the cabinet sensors in the cabinet that contains non-variable speed fans.

NOTE:
The descriptions for Error Codes 1 and 2 (FAIL) in the following table are reversed for pre-Generic 1 systems (that is, Error Code 1 indicates an “over-temperature” problem, while Error Code 2 indicates an “air flow”

problem). If you are servicing a pre-Generic 1 system, be sure to follow the proper service strategy.

Table 8-259. Cabinet Temperature Query Test #122 [N-V Speed Fans]

Error Code	Test Result	Description Recommendation
1000	ABORT	System resources required to run this test are not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT with error code 2000, check for system powering problems with the A carrier. Look for and resolve all DC-POWER alarms. Then repeat the test. 3. If the test continues to ABORT with error code 2000, check for and resolve all PR-MAINT (Maintenance/Tape Processor) errors in a standard PPN. Then repeat the test. 4. If the test continues to ABORT with error code 2000, escalate the problem.
2029	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.

Table 8-259. Cabinet Temperature Query Test #122 [N-V Speed Fans]

Error Code	Test Result	Description Recommendation
1	FAIL	The AHD1 circuit pack has reported an air flow problem. The temperature difference between the air intake and the air exhaust is at least 15° C (27° F), and the absolute temperature at the top of the cabinet is at least 50° C (122° F) (referred to as the 15° C/50° C criteria). The fans should be running at a high speed. 1. If none of the fans are currently running, verify -48 volt DC power is available to the fan units. Check the fan unit wiring harness connector. Check that there is -48 volt DC between pins 3, 9, 11 and 2, 8, 10. If there is -48 volt DC power at the connector, there should be power to the fans. If the fans are not running, replace the AHD1 circuit pack. If the fans still do not run, escalate the problem. On the other hand, if there is no -48 volt DC power at the connector, the current limiter card (982LS) is probably defective. Therefore, replace the current limiter card. If the fans still do not run, escalate the problem. 2. If only a few of the fans are not running, replace the defective fans. 3. If all the fans can be started, wait five minutes and rerun the test. If the test fails again, go to Step 4. 4. If the fans are not at high speed, measure the cabinet temperature at the air intake and the air exhaust at the top of the cabinet. a. If the 15° C/50° C criteria is met, there is a problem with either the AHD1 circuit pack or the fans that are preventing the fans from operating at a high speed. Replace the AHD1 circuit pack and/or the fans. If this succeeds in getting the fans to run at a high speed, wait five minutes to give the cabinet time to cool down. Thereafter, rerun the test, and repeat this repair procedure. If the problem persists, escalate the problem. b. If the 15° C/50° C criteria is not met, the PR-MAINT (Maintenance/Tape Processor) is incorrectly reporting this condition. Look for and resolve all errors on these maintenance objects first, then rerun the test. If the test still fails, escalate the problem. 5. If the fans are running at a high speed, perform the following activities to ensure that the air flow within the cabinet is not being restricted or redirected. a. Check both filters. If a filter is dirty or clogged, it should be cleaned or replaced. The filters can either be washed with soap and water or vacuumed. b. Ensure there is nothing (other than the circuit packs) in the carrier slots that could be restricting the air flow. c. Ensure there are no missing (blank) circuit pack or carrier faceplates. Install and/or replace them as necessary. d. Ensure the cabinet door is properly closed. The door must be closed for the fans to be able to cool the cabinet properly. Wait five minutes to give the fans a chance to cool the cabinet. Then rerun the test. If the test still fails, go to Step 6.

Table 8-259. Cabinet Temperature Query Test #122 [N-V Speed Fans]

Error Code	Test Result	Description Recommendation
1	FAIL	6. At this point, there should be nothing impeding the air flow, and the fans should be running at a high speed. Check the temperatures for the 15° C/50° C criteria. a. If the 15° C/50° C criteria exists, a temperature problem exists, and the fans (at high speed) should cool down the switch. Wait five minutes and rerun the test. If the test still fails, the ambient room temperature is probably too high, and the room should be cooled. b. If the 15° C/50° C criteria does not exist, either the AHD1 circuit pack, the fans, or the S3 or S4 sensors are defective. Replace these items one at a time (in the order listed). Rerun the test between each replacement. Failures may not be detected. Failures that are not detected by respective maintenance but that cause many, if not all, environment tests to fail can occur on the Maintenance/Tape Processor circuit pack. If many environment tests are failing, the suspect circuit pack should be replaced and the test rerun. If the test still fails, escalate the problem.
2	FAIL	The PR-MAINT (Maintenance/Tape Processor) circuit pack has reported a temperature problem because the S1 sensor has detected a temperature of at least 65° C (149° F). The entire cabinet is in danger of being powered down if the temperature reaches 70° C (158° F). 1. If none of the fans are currently running, verify that -48 volt DC power is available to the fan units. Check the fan unit wiring harness connector. Verify that there is -48 volt DC between pins 3, 9, 11 and 2, 8, 10. If there is -48 volt DC power at the connector, there should be power to the fans. If the fans are not running, replace the AHD1 circuit pack. If the fans still do not run, escalate the problem. On the other hand, if there is no -48 volt DC power at the connector, the current limiter card (982LS) is probably defective. Therefore, replace the current limiter card. If the fans still do not run, escalate the problem. 2. If only a few of the fans are not running, replace the defective fans. 3. If all the fans can be started, wait five minutes and rerun the test. 4. If the test fails again, go to Step 5. 5. Check the temperature at the top of the cabinet. If the temperature is at least 65° C (149° F), the ambient room temperature is too high, and the fans cannot cool the system. Unless the room temperature is reduced, the system is going to shut down soon. If the temperature is less than 65° C: a. The PR-MAINT (Maintenance/Tape Processor) circuit pack may be incorrectly reporting this condition. First, look for and resolve all errors for these MOs. Then rerun the test. If this test fails again, return to Step 1. Otherwise, continue. b. The S1 sensor may be incorrectly reporting the temperature at the top of the cabinet. Replace this sensor, and rerun the test. If the test still fails, escalate the problem.

Table 8-259. Cabinet Temperature Query Test #122 [N-V Speed Fans]

Error Code	Test Result	Description Recommendation
3	FAIL	The AHD1 circuit pack has not reported any temperature or air flow problems. Resolve the airflow error first. Then correct the temperature error as described previously.
	PASS	The AHD1 circuit pack has not reported any temperature or air flow problems. The temperatures at the air exhaust at the top of the cabinet and the air intake at the bottom of the cabinet can be measured and the results compared against the criteria described previously. If a problem has been reported, troubleshoot this problem by using the procedures for the FAIL cases described previously.

Cabinet Temperature Query Test [for Variable Speed Fans]

This test queries the Maintenance/Tape Processor for the status of the cabinet sensors in the cabinet that contains variable speed fans.

NOTE:
The descriptions for Error Codes 1 and 2 (FAIL) in the following table are reversed for pre-Generic 1 systems (that is, Error Code 1 indicates an “over temperature” problem, while Error Code 2 indicates an “air flow” problem). If you are servicing a pre-Generic 1 system, be sure to follow the proper service strategy.

Table 8-260. Cabinet Temperature Query Test #122 [V Speed Fans]

Error Code	Test Result	Description Recommendation
1000	ABORT	System resources required to run this test are not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to ABORT with error code 2000, check for system powering problems with the A carrier. Look for and resolve all DC-POWER alarms. Then repeat the test. 3. If the test continues to ABORT with error code 2000, check for and resolve all PR-MAINT (Maintenance/Tape Processor) errors in a standard PPN. Then repeat the test 4. If the test continues to ABORT with error code 2000, escalate the problem.

Table 8-260. Cabinet Temperature Query Test #122 [V Speed Fans]

Error Code	Test Result	Description Recommendation
2029	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1	FAIL	Internal system error. 1. If none of the fans are currently running, verify -48 volt DC power is available to the fan units. Check the fan unit wiring harness connector. Check that there is -48 volt DC between pins 3, 9, 11 and 2, 8, 10. If there is no -48 volt DC power at the connector, the current limiter card (982LS) is probably defective. Replace the current limiter card. If the fans still do not run, escalate the problem. 2. If only a few of the fans are not running, replace the defective fans. 3. If all the fans can be started, wait five minutes and rerun the test. If the test fails again, escalate the problem. 4. If the fans are not at high speed, perform the activities in the following list to ensure that the air flow within the cabinet is not restricted or redirected. a. Check both filters. If a filter is dirty or clogged, it should be cleaned or replaced. The filters can either be washed with soap and water or vacuumed. b. Ensure there is nothing (other than the circuit packs) in the carrier slots that could be restricting the air flow. c. Ensure there are no missing (blank) circuit pack or carrier faceplates. Install and/or replace them as necessary. d. Ensure the cabinet door is properly closed. The door must be closed for the fans to be able to cool the cabinet properly. 5. Wait five minutes to give the fans a chance to cool the cabinet. Then rerun the test. If the test still fails, go to Step 6. 6. At this point, there should be nothing impeding the air flow, and the fans should be running at high speed. Check the temperatures at the exhaust side of the cabinet. a. If the temperature at the exhaust side of the cabinet is greater than 50° C, a temperature problem exists, and the fans (at high speed) should cool down the switch. Wait five minutes and rerun the test. If the test still fails, the ambient room temperature is probably too high, and the room should be cooled. b. If the temperature at the exhaust side of the cabinet is not greater than 50° C, either the fans or the S3 sensors are defective. Replace these items one at a time (in the order listed). Rerun the test between each replacement.

Table 8-260. Cabinet Temperature Query Test #122 [V Speed Fans]

Error Code	Test Result	Description Recommendation
1	FAIL	7. If the fans are running at a high speed, check the items on the list that follows. Any one of the items could be restricting or redirecting the flow of air within the cabinet. a. Check both filters. If a filter is dirty or clogged, it should be cleaned or replaced. The filters can either be washed with soap and water or vacuumed. b. Ensure there is nothing (other than the circuit packs) in the carrier slots that could be restricting the air flow. c. Ensure there are no missing (blank) circuit pack or carrier faceplates. Install and/or replace them as necessary. d. Ensure the cabinet door is properly closed. The door must be closed for the fans to be able to cool the cabinet properly. Wait five minutes to give the fans a chance to cool the cabinet. Then rerun the test. If the test still fails, go to Step 6. 8. At this point, there should be nothing impeding the air flow, and the fans should be running at a high speed. Check the temperatures for the 15° C/50° C criteria. a. If the 15° C/50° C criteria exists, a temperature problem exists, and the fans (at high speed) should cool down the switch. Wait five minutes and rerun the test. If the test still fails, the ambient room temperature is probably too high, and the room should be cooled. b. If the 15° C/50° C criteria does not exist, either the AHD1 circuit pack, the fans, or the S3 or S4 sensors are defective. Replace these items one at a time (in the order listed). Rerun the test between each replacement. Failures that are not detected by respective maintenance but that cause many, if not all, environment tests to fail, can occur on the Maintenance/Tape Processor circuit pack. If many environment tests are failing, the suspect circuit pack should be replaced and the test rerun. If the test still fails, escalate the problem.

Table 8-260. Cabinet Temperature Query Test #122 [V Speed Fans]

Error Code	Test Result	Description Recommendation
2	FAIL	The PR-MAINT (Maintenance/Tape Processor) circuit pack has reported a temperature problem because the S1 sensor has detected a temperature of at least 65° C (149° F). The entire cabinet is in danger of being powered down if the temperature reaches 70° C (158° F). 1. If none of the fans are currently running, verify that -48 volt DC power is available to the fan units. Check the fan unit wiring harness connector. Verify that there is -48 volt DC between pins 3, 9, 11 and 2, 8, 10. If there is -48 volt DC power at the connector, there should be power to the fans. On the other hand, if there is no -48 volt DC power at the connector, the current limiter card (982LS) is probably defective. Therefore, replace the current limiter card. If the fans still do not run, escalate the problem. 2. If only a few of the fans are not running, replace the defective fans. 3. If all the fans can be started, wait five minutes and rerun the test. 4. If the test fails again, go to Step 5. 5. Check the temperature at the top of the cabinet. If the temperature is at least 65° C (149° F), the ambient room temperature is too high, and the fans cannot cool the system. Unless the room temperature is reduced, the system is going to shut down soon. If the temperature is less than 65° C: a. The PR-MAINT (Maintenance/ Tape Processor) circuit pack may be incorrectly reporting this condition. First, look for and resolve all errors for these MOs. Then rerun the test. If this test fails again, return to Step 1. Otherwise, continue. b. The S1 sensor may be incorrectly reporting the temperature at the top of the cabinet. Replace this sensor, and rerun the test. If the test still fails, escalate the problem.

PR-MAINT (Maintenance Processor [TN790B RISC Systems])

MO Name (in Alarm Log)	Alarm Level	Initial Command to Run	Full Name of MO
PR-MAINT	MIN*	test processor a/b sh/l	Maintenance Processor

* Alarms on the PROCR and PR-MAINT maintenance objects are indicated by the red LED on the Processor circuit pack.

The TN790B Processor circuit pack is comprised of the RISC Processor (PROCR), the Maintenance Processor (PR-MAINT), and the Memory (PR-MEM). PR-MAINT is responsible for monitoring the sanity of the RISC Processor.

PR-MAINT (Maintenance Processor [TN790B RISC Systems])

PR-MAINT contains the hardware required for controlling the environmental conditions. The Maintenance/Tape Processor provides the serial interfaces for the administration terminal and DCE port. The Maintenance Processor also provides the communications interface to INADS for alarm reporting and remote maintenance capability. INADS connectivity is through the internal or external modem. The external modem is connected to the DCE port. When the external modem is the administered modem option the internal modem is disabled.

The TN790B has a higher speed 9600 baud internal modem or can support an external modem connected to the DCE port.

Error Log Entries and Test to Clear Values

Table 8-261. PR-MAINT Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	test processor a/b sh r 1
	Run the Short Test Sequence first. If all tests pass, run the Long Test Sequence. Refer to the appropriate test description and follow the recommended procedures.				
1	Any	MTP Reset Test (#101)	MIN	ON	test processor a/b l r 3
	The MTP Reset Test (#101) has failed. The MTP Reset Test (#101) logs you off. The MTP Dual Port Ram Test (#104) can also log you off. Manually repeat the command with the ‘‘long’’ option for the designated number of times when testing from the MCU-MT				
257	Any	MTP Sanity Handshake Test (#106)			test processor a/b r 2
	The MTP Sanity Handshake Test (#106) has failed.				
513	Any	MTP Analog Loop Around Test (#103)	MIN	ON	test processor a/b r 8
	The MTP Analog Loop Around Test (#103) has failed.				
769	Any	MTP Dual Port Ram Test (#104)	MIN	ON	test processor a/b l r 3
	The MTP Dual Port Ram Test (#104) has failed. An error of 769 with an aux data of 5 indicates a hardware problem and testing cannot clear it. Replace the circuit pack.				

Table 8-261. PR-MAINT Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
1025	Any	MTP Out-pulse Relay Test (#102)	MIN	OFF	test processor a/b r 5
	The MTP Outpulse Relay Test (#102) has failed.				
1537	Any	MTP MCU-MT Loop Around Test (#228)	MIN	ON	test processor a/b r 3
	The MTP SAT Loop Around Test (#228) has failed.				
1793	Any	MTP Aux Loop Around Test (#229)	MIN	ON	test processor a/b r 3
	The MTP Aux Loop Around Test (#229) has failed.				
2049	Any	External Modem Present Test (#230)	MIN	OFF	test processor a/b r 2
	The External Modem Present Test (#230) has failed.				

NOTE:
Refer to the FAIL section of each test that fails for further instructions.

System Technician-Demanded Tests: Descriptions and Error Codes

Always investigate tests in the order presented in the table below. By clearing error codes associated with the *MTP Reset Test,* for example, you may also clear errors generated from other tests in the testing sequence. The following table is for the TN790B [RISC] System.

Table 8-262. System Technician-Demanded Tests: PR-MAINT

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Processor Cache Test (#895)(a)	Long		No
Processor Cache Audit (#896)(a)	Short	Long	No
Processor Bus Time-out Exception Test (#82)(a)	Short	Long	No
Processor BOOTPROM Checksum Test (#80)(a)	Short	Long	No
Processor Write Buffer Test (#900)(a)	Short	Long	No
Memory Burst Read Test (#908)(a)	Short	Long	No
Read All Memory Test (#85)(a)	Long		No
Memory Parity Error Detection Test (#87)(a)	Short	Long	No
Flash Memory Checksum Test (#86)(a)	Long		No
Memory Functional Test (#332) (b)(c)	Long		Yes
MTP Outpulse Relay Test (#102)(d)	Short	Long	No
External Modem Present Test (#230)(d)(e)	Short	Long	No
MTP Analog Loop Around Test (#103)(d)	Short	Long	No
MTP Sanity Handshake Test (#106)	Short	Long	No
MTP SAT Loop Around Test (#228)	Short	Long	No
MTP Aux Loop Around Test (#229)	Short	Long	No
MTP Reset Test (#101)	Long		Yes
MTP Dual Port Ram Test (#104)(d)	Long		Yes

Notes:

a. Refer to PROCR (TN790B RISC Processor) for a description of these tests.

b. Refer to PR-MEM (TN790B RISC Memory) for a description of these tests.

c. On the Active SPE, the test is run only via a **reset system 4** command or a **reset system 5** command.

d. This test only runs on the active SPE.

e. This test aborts if an external modem is not administered.

MTP Reset Test (#101)

This test is destructive.

The test resets the Maintenance Processor. The destructive nature of this test causes the following:

- System Access Terminal to log off
- DCE port to terminate data transmission
- Any current memory card access to terminate and also to tear down any remote access INADS connection

Table 8-263. MTP Reset Test #101

Error Code	Test Result	Description / Recommendation
100	ABORT	The requested test did not complete within the allowable time period. 1. Retry the command.
2500	ABORT	Internal system error 1. Retry at 1-minute intervals a maximum of 5 times.
1196	FAIL	The MTP did not respond to being reset. 1. Retry at 1-minute intervals a maximum of 5 times. 2. If the test continues to fail, replace the Processor circuit pack.
1197	FAIL	The Maintenance Processor was reset, but it responded with a NOT PASS status, indicating that it did not pass initialization correctly. The MTP is not functioning correctly. The system continues to function. Environmental monitoring is lost, as is communication with the Standby Processor. 1. Retry at 1-minute intervals a maximum of 5 times. 2. If test continues to fail, replace the Processor circuit pack.
	PASS	The Maintenance Processor was reset, and it passed initialization correctly. The other MTP tests should be examined to verify that the MTP is functioning correctly. 1. Enter test processor a/b and verify that the MTP is functioning correctly.

MTP Outpulse Relay Test (#102)

This test is a nondestructive test. When the internal modem is administered, the test validates the correct operation of the remote access CO trunk used by INADS. The MTP first goes off-hook, then on-hook on this trunk. If the loop current is detected, the test passes. If the external modem is administered the MTP sends an AT command sequence that will cause the external modem to go OFF-HOOK and wait for dial-tone. If the modem detects dial-tone, the test passes. This test is not allowed if the remote access line is in use.

Table 8-264. MTP Outpulse Relay Test #102

Error Code	Test Result	Description / Recommendation
100	ABORT	The test did not complete within the allowable time period. Retry the command.
1018	ABORT	The test has been disabled via administration. To enable the test, issue the change system-parameters maintenance command, and set the test remote access port field to ‘‘y.’’ (If you have an INADS line, set the field to ‘‘y.’’ Rerun the test.
1131	ABORT	INADS port is busy because the system is reporting alarms to INADS, or because INADS is dialed into the system. If INADS is communicating with the switch the INADS trunk is working. There is no need to run this test. Or if required. Wait about ten minutes (until the INADS session is terminated) and then re-enter the command.
1000	ABORT	System software resources required for this test are not available. Retry at 1-minute intervals a maximum of 5 times.
1050	ABORT	System could not determine if the testing of the INADS port is administered. Enter the change system-parameters maintenance command. Verify that the ‘‘Test Remote Access Port?’’ field is set to ‘‘y.’’ Retry the command at 1-minute intervals a maximum of 5 times.
2500		Internal system error Retry at 1-minute intervals a maximum of 5 times
2033		Could not send MTP message. Retry at 1-minute intervals a maximum of 5 times.

Table 8-264. MTP Outpulse Relay Test #102

Error Code	Test Result	Description / Recommendation
2000	ABORT	MTP did not respond to the test request. Repeat the test at 1-minute intervals a maximum of 5 times. If all MTP tests are aborting, execute the test processor a/b long command in order to reset MTP and to examine the results of the MTP Reset Test (#101). Replace the Processor circuit pack. If only the MTP outpulse relay test is aborting, escalate problem.
None	FAIL	MTP reported test failure. No loop current detected. The following steps apply to either an internal or external modem (Some additional steps apply to an external modem only). 1. Retry at 1-minute intervals a maximum of 5 times. 2. For an external modem, if the test continues to fail: a. If Test #230 failed, use the external modem recommendations listed in Test #230. b. If Test #230 passes, the MTP most likely received a NO DIAL TONE response to the ATD command sent from the MTP. This problem is between the modem and the INADS trunk. 3. Examine the INADS trunk for connectivity, and manually check for loop current. 4. If there is no INADS trunk, this test should be disabled. To disable the test, issue the change system-parameters maintenance command, and change the Test Remote Access Port field to ‘‘n.’’ 5. If the INADS trunk checks out okay, but the test still fails, check the backplane connector wiring. 6. If the backplane wiring checks out okay, replace the Processor circuit pack.
	PASS	MTP detected a loop current on the remote access port. 1. If the system cannot call INADS, or INADS cannot contact the system, check with the local Central Office for problems with the INADS trunk, and verify that the INADS number is correct. Approved external modems with factory default settings are expected to work if administered correctly using the change system-parameters command.

MTP Analog Loop Around Test (#103)

This test is a nondestructive test. The test does a loop around by using the MTP INADS channel. Test data is sent through the modem out toward the INADS trunk. The data is looped around before the actual trunk, and it comes back into the on-board modem. The data is then verified for integrity. The internal modem is tested when the internal modem is selected. The external modem is tested when the external modem is selected.

When an external modem is administered in place of the internal modem, the test loops data in the MTP DUART ahead of the connection to the external modem. This test also causes the MTP DUART to verify that **Clear-To-Send (CTS)** is being supplied by the modem.

NOTE:
The test does not send any data onto the INADS trunk. However, to pass, the test does require the trunk to be present

Table 8-265. MTP Analog Loop Around Test #103

Error Code	Test Result	Description / Recommendation
100	ABORT	The test did not complete within the allowable time period. 1. Retry the command.
1000	ABORT	System software resources required for this test are not available. 1. Retry at 1-minute intervals a maximum of 5 times.
1018	ABORT	The test has been disabled via administration. 1. To enable the test, issue the change system-parameters maintenance command, and set the Test Remote Access Port field to ‘‘y.’’ 2. Rerun the test.
1030	ABORT	This test is not run on the Standby SPE.
1050	ABORT	System could not determine if the testing of the INADS port is administered. 1. Enter change system-parameters maintenance command, and verify the entry for the Test Remote Access Port field. 2. Retry at 1-minute intervals a maximum of 5 times.
1131	ABORT	INADS port is busy because the system is reporting alarms to INADS, or because INADS is dialed into the system. 1. If INADS is communicating with the switch the INADS trunk is working. There is no need to run this test. 2. Or if required. Wait about ten minutes (until the INADS session is terminated) and then re-enter the command.
1000	ABORT	System software resources required to run this test are not available.
2033	ABORT	Internal system error
2033	ABORT	1. Retry at 1-minute intervals a maximum of 5 times.

Table 8-265. MTP Analog Loop Around Test #103

Error Code	Test Result	Description / Recommendation
2000	ABORT	MTP did not respond to the test request. Repeat test at 1-minute intervals a maximum of 5 times. If only the MTP Analog Loop Around Test is aborting, escalate the problem. If all MTP tests are aborting, execute the test processor a/b long command in order to reset MTP, and examine the results of the MTP Reset Test (#101).
2500	ABORT	Internal system error Repeat the command at 1-minute intervals a maximum of 5 times.
	FAIL	MTP reported test failure. The system is not able to reliably contact INADS with alarm data. However, the system continues to provide good service. 1. For an internal modem: a. If MTP Outpulse Relay Test (#102) is also failing, check for the presence of the INADS trunk, and resolve any INADS trunk problems. b. If Test #102 passes, the fault is on the Processor circuit pack. The circuit pack should be replaced. 2. For an external modem: a. Check the power to the modem. b. Check the RS-232 cable connections from the DCE terminal on the switch to the DTE connector on the modem. Transmit, Receive, RTS, and CTS signals must be communicating between the MTP DUART hardware and the modem hardware c. The MTP DUART or related circuitry on the processor circuit pack may have failed. The circuit pack should be changed at your convenience.
	PASS	For an internal modem, MTP detected correct data through the loop back connection. For an external modem, the test detected correct data through the loop back in the MTP DUART hardware ahead of the RS232 connection to the modem, and received a CTS signal from the external modem. 1. If the system cannot call INADS, or if INADS cannot contact the system, check with the local Central Office for problems with the INADS trunk, and verify that the INADS number is correct.

MTP Dual Port Ram Test (#104)

This test is destructive.

The test terminates any network MCU-MT session, and it is a coordinated test of the MTP dual port ram (DPR). The DPR is a section of memory that is shared by the MTP and by the RISC Processor circuit pack. Control messages and data are passed through the DPR. The test forces both sides to read and write the DPR simultaneously in alternate locations.

The DPR test causes the network MCU-MT to log off before the test result is displayed. The test result is determined according to the terminal from which the test is run. If the test is run from the network MCU-MT, system technician should log back in and examine the Error Log for an error against PR-MAINT, with Error Type 769, no Aux Data. This error entry indicates that the MTP DPR Test failed and that the Processor circuit pack should be replaced.

NOTE:
If the test is being run from a terminal other than the network MCU-MT (for example, remote access, etc.), the test results are displayed on the screen.

NOTE:
A dial-up (through the INADS port) does not display the results discussed in the previous paragraph. However, a dial-up through data channels does display these results.

Table 8-266. MTP Dual Port Ram Test #104

Error Code	Test Result	Description / Recommendation
100	ABORT	The test did not complete within the allowable time period. 1. Retry the command.
1000	ABORT	System software resources required for this test are not available. 1. Retry at 1-minute intervals a maximum of 5 times.
2000	ABORT	The response to the test request was not received within the allowable time period.
2028	ABORT	System software resources required for this test are not available.
2029	ABORT	Internal system error 1. Retry at 1-minute intervals a maximum of 5 times.
	FAIL	The dual port RAM is not functioning correctly. Communication between the processor and MTP is lost. The system is not able to report environmental alarms or reboot from tape, if necessary. 1. Retry at 1-minute intervals a maximum of 5 times. 2. If the test continues to fail, replace the Processor circuit pack.

Table 8-266. MTP Dual Port Ram Test #104

Error Code	Test Result	Description / Recommendation
	PASS	Dual port RAM is functioning. Communication exists between the Processor circuit pack and the MTP.

MTP Sanity Handshake Test (#106)

This test is a nondestructive test. The MTP Sanity Handshake Test is simply a query from a maintenance process to the MTP. The MTP must reply for the test to pass.

Table 8-267. MTP Sanity Handshake Test #106

Error Code	Test Result	Description / Recommendation
100	ABORT	The test did not complete within the allowable time period. 1. Retry the command.
1000	ABORT	System software resources required for this test are not available. 1. Retry at 1-minute intervals a maximum of 5 times.
2000	ABORT	The response to the test request was not received within the allowable time period.
2033	ABORT	Internal system error. 1. Repeat the command at 1-minute intervals a maximum of 5 times.
None	FAIL	The MTP did not respond to the Sanity Handshake Query. 1. Re-enter command with the ‘‘long’’ option. 2. If the test continues to fail, replace the Processor circuit pack.
	PASS	The MTP responded to the Sanity Handshake Query.

MTP MCU-MT Loop-Around Test (#228)

This test is a nondestructive test. The test places the MCU-MT channel of the MTP into a loop around mode, and it verifies the data integrity of the channel. Although the test is nondestructive, it causes loss of keyboard input from the network MCU-MT.

Table 8-268. MTP MCU-MT Loop-Around Test #228

Error Code	Test Result	Description / Recommendation
100	ABORT	The test did not complete within the allowable time period. 1. Retry the command.
1000	ABORT	System software resources required for this test are not available.
2000	ABORT	The response to the test request was not received within the allowable time period.
2033 - 2034	ABORT	Internal system error 1. Retry at 1-minute intervals a maximum of 5 times.
	FAIL	The MCU-MT channel failed the Loop Back Test. The MCU-MT is probably unusable for administration or maintenance. The network MCU-MT, if available, or remote access can still be used. 1. Retry at 1-minute intervals a maximum of 5 times. 2. If the test continues to fail, replace the Processor circuit pack.
	PASS	The MCU-MT channel passed the Loop Back Test. 1. If the network MCU-MT is not usable, check the MCU-MT itself, along with the cabling.

MTP Auxiliary Loop-Around Test (#229)

This test is a nondestructive test. The test places the Auxiliary channel of the MTP into a loop around mode, and it verifies the data integrity of the channel. The Auxiliary channel is used as the CDR output port

Table 8-269. MTP Auxiliary Loop-Around Test #229

Error Code	Test Result	Description / Recommendation
100	ABORT	The test did not complete within the allowable time period. 1. Retry the command.
1000	ABORT	The system software resources required for this test are not available. 1. Repeat the command at 1-minute intervals a maximum of 5 times.

Table 8-269. MTP Auxiliary Loop-Around Test #229

Error Code	Test Result	Description / Recommendation
1018	ABORT	The test has been disabled via administration. The change system-parameters cdr command needs to administer CDR. (Refer to the Administration document for more information on administering this port.)
2000	ABORT	Response to the test request was not received within the allowable time period
2033		Internal system error
2034		Port busy 1. Repeat the command at 1-minute intervals a maximum of 5 times.
2500	ABORT	The system software resources required for this test are not available. 1. Retry at 1-minute intervals a maximum of 5 times.
1048	ABORT	An External Modem is administered to this port.
None	FAIL	The Auxiliary channel failed the Loop Back Test. The AUX port may not be sending any auxiliary data to the auxiliary collection device. 1. Repeat the command at 1-minute intervals a maximum of 5 times. 2. If test continues to fail, replace the Processor circuit pack.
	PASS	The Auxiliary channel passed the Loop Back Test. The auxiliary port is functioning correctly. 1. If no auxiliary data is being recorded, check the auxiliary collection device, and verify that it has been set up and connected correctly.

MTP External Modem Present Test (#230)

This test is a nondestructive test on the remote access line, and will run only if the channel is idle. The test validates the presence of an external modem with a firmware invoked AT command. The test will pass if the modem responds with “OK” to the AT command.

Table 8-270. External Modem Present Test #230

Error Code	Test Result	Description / Recommendation
100	ABORT	The test did not complete within the allowable time period. 1. Retry the command.
1018	ABORT	The test has been disabled via administration. 1. To enable the test, issue the change system-parameters maintenance command, and set the Test Remote Access Port field to ‘‘y.’’ 2. Rerun the test.

Table 8-270. External Modem Present Test #230

Error Code	Test Result	Description / Recommendation
1131	ABORT	INADS port is busy because the system is reporting alarms to INADS, or because INADS is dialed into the system. 1. If INADS is communicating with the switch the INADS trunk is working. There is no need to run this test. 2. Or if required. Wait about ten minutes (until the INADS session is terminated) and then re-enter the command.
1000	ABORT	System software resources required for this test are not available.
2033		Internal system error 1. Retry at 1-minute intervals a maximum of 5 times.
1049	ABORT	External Modem is not administered.
1050	ABORT	System could not determine if the testing of the INADS port is administered. 1. Enter the change system-parameters maintenance command, and verify the entry for the Test Remote Access Port field. 2. Retry at 1-minute intervals a maximum of 5 times.
2000	ABORT	MTP did not respond to the test request. 1. Repeat test at 1-minute intervals a maximum of 5 times. 2. If all MTP tests are aborting, execute the test processor a/b long command in order to reset MTP, and examine the results of the MTP Reset Test (#101).
2500	ABORT	Internal System software Error 1. Retry at 1-minute intervals a maximum of 5 times.

Table 8-270. External Modem Present Test #230

Error Code	Test Result	Description / Recommendation
	FAIL	MTP reported test failure. The system is not able to reliably contact INADS with alarm data. However, the system continues to provide good service. The MTP did not receive an OK response after sending the AT command to the modem. 1. If test #103 failed, follow the external modem recommendations for that test failure. 2. If Test #103 passes: a. Check the RS-232 connections from the DCE terminal on the switch to the DTE terminal on the modem. RTS and CTS signals are being communicated between the MTP DUART hardware and the modem hardware. Transmit and receive signals may not be communicated correctly. b. Check the modem administration using the change system-parameters maintenance command, especially changes from default parameters. c. Check the modem settings, especially changes from factory defaults. **Caution**: The fault may be on the Processor circuit pack. The circuit pack should be replaced.
	PASS	MTP detected correct data from the external modem. The MTP received an OK response after sending the AT command to the modem. 1. If the system cannot call INADS, or if INADS cannot contact the system, check with the local Central Office for problems with the INADS trunk, and verify that the INADS number is correct. If an external modem is being used instead of the internal MTP modem, modem settings may be wrong. Approved external modems with factory default settings are expected to work if administered correctly using the change system-parameters maintenance command.

PR-MEM (TN790B RISC Memory)

MO Name (in Alarm Log)	Alarm Level	Initial Command to Run	Full Name of MO
PR-MEM*	MAJOR	test memory a/b lo c	TN790B RISC Memory
PR-MEM*	MINOR	test memory a/b sh c	TN790B RISC Memory

* The MO is ‘‘PR-MEM’’ because all of the Memory used by the Processor is on the TN790B Processor circuit pack.

The TN790B RISC Memory contains the MCU software and firmware. The Processor circuit pack is the most critical component in the system.

For testing purposes, the circuit pack is logically separated into PR-MAINT, PROCR, and PR-MEM. This means that a memory problem requires that the Processor be replaced. These systems contain two types of memory: Flash ROM and DRAM. Flash ROM is memory that contains the boot image, part of the low-level maintenance firmware, PI firmware, and PACCON firmware. This type of memory is not erased during circuit pack resets. It can be reprogrammed via the **upgrade software** command or a Reset System 4/5 using a software memory card.

One section of the Flash ROM (BOOTPROM) containing the system initialization functions and the low-level diagnostic programs is programmed at the factory and is not reprogrammed by the **upgrade software** command. DRAM is used for software data storage, and it changes constantly. Both types of memory are present on the Processor circuit pack. The diagnostics run appropriate tests on both memories.

DRAM is replaceable and installed in 3 Single In-line Memory Module (SIMM) sockets on this circuit pack. Replacement of these SIMMs is described in "Install the SIMM on the TN790B Processor Circuit Pack" in Chapter 5.

For all system activity, the Processor must be able to access the Memory. If the Processor cannot do this, the system goes into SPE-down mode. In SPE-down mode, fatal Memory errors may show up as Processor errors. This merely indicates that the Processor and the Memory are very closely linked as a matter of course.

If the initialization diagnostics fail, refer to the "Procedure for SPE-Down Mode" section in Chapter 4.

Error Log Entries and Test to Clear Values

Table 8-271. Memory Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	test memory a/b l r 1
	Run the Short Test Sequence first. If all tests pass, run the Long Test Sequence. Refer to the appropriate test description and follow the recommended procedures				
1	Any	Flash Memory Checksum Test (#86)	MAJOR	ON	test memory a/b l r 5
3	Any	Flash Memory Checksum Test (#86)	MAJOR	ON	test memory a/b l r 5
	This error (3) indicates that a software patch has been applied and either the software patch is bad or was installed incorrectly. 1. Back out the software patch and run the **test memory UUCS long** command to verify that the problem has been cleared.				
1025	Any	Memory Parity Error Detection Test (#87)	MINOR	ON	test memory a/b r 3
1281	Any	Memory Burst Read Test (#908)	MAJOR	ON	test memory a/b l r 2
1793	Any	Read All Memory (#85)	MAJOR	ON	test memory a/b l r 1
	The following Aux Data indicate SIMM Failures 1. SIMM A 2. SIMM B 3. SIMM A & SIMM B 4. SIMM C 5. SIMM A & SIMM C 6. SIMM B & SIMM C 7. SIMM A, SIMM B, & SIMM C Aux Data of 100 is an LMM Flash Checksum initialization failure.				

Table 8-271. Memory Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
2049	Any	Memory Functional Test (#332)	MAJOR	ON	test memory a/b l r 1
	The following Aux Data indicate SIMM Failures 1. SIMM A 2. SIMM B 3. SIMM A & SIMM B 4. SIMM C 5. SIMM A & SIMM C 6. SIMM B & SIMM C 7. SIMM A, SIMM B, & SIMM C There are Functional Memory Test errors against the Processor circuit pack. On the Active SPE, the test is run only via a **reset system 4** command or a **reset system 5** command.				

System Technician-Demanded Tests: Descriptions and Error Codes

Always investigate errors in the order in which they are presented in the table that follows when you are inspecting errors in the system. By clearing error codes associated with the *Read All Memory Test,* for example, you may also clear errors generated from other tests in the testing sequence.

Table 8-272. System Technician-Demanded Tests: PR-MEM

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Processor Cache Test (#895)(a)	Long		No
Processor Cache Audit (#896)(a)	Short	Long	No
Processor Bus Time-out Exception Test (#82)(a)	Short	Long	No
Processor BOOTPROM Checksum Test (#897)(a)	Short	Long	No
Processor Write Buffer Test (#900)(a)	Short	Long	No
Memory Burst Read Test (#908)	Short	Long	No
Read All Memory Test (#85)	Long		No
Memory Parity Error Detection Test (#87)	Short	Long	No
Flash Memory Checksum Test (#86)	Long		No

Table 8-272. System Technician-Demanded Tests: PR-MEM

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Memory Functional Test (#332) (b)	Long		Yes
MTP Outpulse Relay Test (#102) (c)	Short	Long	No
MTP External Modem Present Test (#230) (c)	Short	Long	No
MTP Analog Loop Around Test (#103) (c)	Short	Long	No
MTP Sanity Handshake Test (#106) (c)	Short	Long	No
MTP SAT Loop Around Test (#228) (c)	Short	Long	No
MTP Aux Loop Around Test (#229) (c)	Short	Long	No
MTP Reset Test (#101) (c)	Long		Yes
MTP Dual Port Ram Test (#104) (c)	Long		Yes

Notes:

a. Refer to PROCR (TN790B RISC Processor) Maintenance documentation for a description of these tests.

b. On the Active SPE, the test is run only via a **reset system 4** command or a **reset system 5** command.

c. Refer to PR-MAINT (MainTenance Processor) Maintenance documentation for a description of these tests.

Read All Memory Test (#85)

This test is a nondestructive test. The test reads every memory location in memory. A failure of this test indicates a DRAM failure in the Processor circuit pack. DRAM is replaceable and installed in 3 Single Inline Memory Module (SIMM) sockets on this circuit pack. Replacement of these SIMMs is described in the "Circuit Pack Replacement Procedure" section.

Table 8-273. Read All Memory Test #85

Error Code	Test Result	Description / Recommendation
100	ABORT	The requested test did not complete within the allowable time period. 1. Retry the command.
2500	ABORT	Internal system error 1. Retry the command.

Table 8-273. Read All Memory Test #85

Error Code	Test Result	Description / Recommendation
1 - 7	FAIL	If the system can still provide service, this indicates that the Processor circuit pack has a problem with memory or the RISC processor, but can still function. At the customers convenience run the destructive “reset system 4” command to boot the system and write to all of the memory locations. This will clear transient parity errors and test for permanent parity errors. This complete memory testing during initialization will cause “SPE DOWN” if a parity error is detected and the PROCR circuit pack should be replaced. If parity errors reoccur within several weeks, record the error code information indicating which memory modules failed, together with the extended interval between failures. After recording the information and at the customers convenience replace the PROCR circuit pack.
None	PASS	The Memory is healthy.

Flash Memory Checksum Test (#86)

This test is a nondestructive test. The test computes the checksum of the MCU software and firmware loaded from the Software Memory Card (SOFTWARE MEM-CARD). A failure of this test indicates corruption of the Flash Memory. However, this failure does NOT always indicate a hardware problem. **DO NOT REPLACE** the Processor circuit pack when this is the only error. A system restart via the **reset system 4** command starting with inserting the Software Memory Card for this system followed by re-inserting the Translation Memory Card memory card should be implemented at the customer’s earliest convenience.

Table 8-274. Text Checksum Test #86

Error Code	Test Result	Description / Recommendation
100	ABORT	The test did not complete within the allowable time period. 1. Retry the command.
2500	ABORT	Internal system error 1. Retry the command.
1 - 7	FAIL	The system may or may not continue to operate correctly. The system may fail later when some action requires access to the corrupted area of the Text. 1. The Flash ROM should be reprogrammed via the upgrade software command. The memory card should contain the same vintage software that is currently in the system. Refer to the "Software Upgrade" section in this manual. 2. If the test continues to fail, replace the TN790B Processor circuit pack and repeat step 1.

Table 8-274. Text Checksum Test #86

Error Code	Test Result	Description / Recommendation
	PASS	The checksum is correct.

Memory Parity Error Detection Test (#87)

This test is a nondestructive test. The test is run on a few reserved locations in memory. A failure of this test indicates a failure on the Processor circuit pack.

This test determines if the parity circuitry is working. Accordingly, the test determines if parity errors can be detected. The parity circuitry is used to detect DRAM memory failures.

Table 8-275. Memory Parity Error Detection Test #87

Error Code	Test Result	Description / Recommendation
100	ABORT	The test did not complete within the allowable time period. 1. Retry the command.
2500	ABORT	Internal system error 1. Retry the command.
1 - 7	FAIL	The parity detection circuitry is not working correctly. If the system can still provide service, this indicates that the Processor circuit pack has a problem but can still function. 1. The TN790B Processor circuit pack should be replaced. The failure is identifying the PROCR as being bad and only the PROCR circuit pack needs to be replaced.
	PASS	The parity detection circuitry is working.

Memory Functional Test (#332)

This test is destructive.

This test ensures that every DRAM memory location can be accessed and changed independently. Running this test wipes out all data in DRAM memory. This test is performed during a **reset system 4** or **reset system 5**. If the test fails during a **reset system** command, refer to the "Procedure for SPE-Down Mode" in Chapter 4 for the recommended maintenance strategy.

Table 8-276. Memory Functional Test #332

Error Code	Test Result	Description / Recommendation
100	ABORT	The test did not complete within the allowable time period. 1. Retry the command.
1000	ABORT	System resources required to run this test are not available. 1. Retry the command at 1-minute intervals a maximum of 3 times.

Memory Burst Read Test (#908)

This test verifies that the Memory Burst Read function works properly on the Processor circuit pack.

Table 8-277. Memory Burst Read Test #908

Error Code	Test Result	Description / Recommendation
100	ABORT	The test did not complete within the allowable time period. 1. Retry the command.
1022 , 1335 , 2500	ABORT	Internal system error 1. Retry the command.
1 - 7	FAIL	The Burst Read circuit is not functioning properly. 1. If the test fails, replace the Processor and retry the test.
	PASS	The Burst Read portion of the Processor circuit pack is operating correctly.

PRI-CDR (PRI-CDR Link)

The CDR feature records detailed call information on all incoming calls on specified trunk groups and sends this information to a CDR output device. The physical link can be administered for connecting external CDR output devices to the system. The CDR link can be administered to a data extension or to the EIA port on the system. The TN786B Processor circuit pack provides a standard EIA 232C interface. The external CDR output devices are:

- Avaya Call Detail Recording unit
- Printer
- Customer-provided equipment

CDR link maintenance provides a strategy for maintaining the link between the MCU and an external CDR output device. The strategy includes a set of tests for periodic diagnosis, detection of errors during normal operation, actions for troubleshooting, and raising alarms for serious problems.

CDR link maintenance uses a try-and-wait mechanism for maintaining the link. If the CDR link is torn down because of an error, CDR link maintenance attempts to bring up the CDR link. If the link setup trial fails, CDR link maintenance waits 30 seconds before the next retry. If the number of retries reaches the value of a threshold (two), a minor alarm is raised for service attention.

The following physical configurations are supported for the CDR link:

- From the EIA port of the Processor circuit pack to an CDR output device through the standard EIA 232C interface.
- From a data channel on TN794 Netpkt Interface circuit pack to a data extension where the CDR output device connects via the standard EIA 232C interface. The data extension can be an MPDM. The MPDM connects to a digital line port on a TN754C Digital Line circuit pack.

CDR link maintenance does not cover the maintenance of the elements comprising the CDR physical link, which are as follows:

- External CDR output device
- EIA port on the Processor circuit pack
- Data module (MPDM) and digital line port on a TN754C Digital Line circuit pack
- Data channels on TN794 Netpkt Interface circuit pack

If CDR link maintenance cannot restore the CDR link, then the maintenance tests of these individual components of the CDR link must be executed to diagnose faults.

Restoring the CDR Link

1. Obtain the status of CDR links.
2. Enter **status CDR** to make sure the CDR links are not busied out for maintenance. If the link is down, continue to the next step.
3. Determine the destinations of the CDR links.
4. Enter **display system feature** and find out the destinations. Continue to the next step.
5. Determine if the destination is an extension or EIA port.

6. If the destination is an extension number, enter **status data extension** and verify whether the data extension is in the in-service/idle state. If the data extension is not available, look for the extension number in the *Alt Name* field of the hardware error log and refer to XXX-BD (Common Port Circuit Pack) for details.
7. If the destination is EIA, then look for PR-MAINT errors in the error log (refer to PR-MAINT).
8. Determine if the data channel on the TN794 Netpkt Interface circuit pack is in the in-service/idle state.

   Enter **list data** to find the extension numbers of data channels on TN794 Netpkt Interface circuit pack. Enter **status data extension** and make sure that at least one data channel is in the in-service/idle state. If no data channel is available, then look for DATA-CHL/DATA-CON/DATA-BD errors in the error log. If present, refer to DATA-BD (Netpkt Interface circuit pack); if the problem persists, escalate the error.
9. Determine if the external CDR output device is available.

   Make sure the CDR output device is on-line and ready for service. Check the physical connectivity between data module and the CDR output device or between the EIA port on the backplane of the MCU and the CDR output device.

Busy out the CDR link before executing maintenance tests over the CDR link. If the CDR link is busied out, then all CDR link maintenance actions are deactivated. This eliminates interference to tests of other MOs.

Hardware Error Log Entries

The following table shows the error log entries and related information.

Table 8-278. CDR Link Maintenance Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value
0	0	Any	Any	Any	test CDR primary sh
	Run the short test sequence first. If all tests pass, run the long test sequence. Refer to the appropriate test description and follow the recommended procedures.				
18	0		Warning	Off	release CDR primary
	Port has been busied out by craft.				
257	0, 3 to 6, 9, 99 or 255	#215	Minor/ Warning	Off	test CDR primary l
	Test #215 failed. The *Aux Data* field contains either the channel ID of data channels on the TN777 Netpkt Interface circuit pack (that is, 3 for channel 01; 4 for channel 02; 5 for channel 03; 6 for channel 04; and 9 for EIA port); or an error code of 99 indicating that no data channels are available for setting up the link; or an error type of 255 indicating an internal system error.				
513	0, 3 to 6, or 9				test CDR primary
	The CDR primary link is down due to the following causes: cable to the CDR output device is disconnected; CDR output device is powered off; the data extension where the CDR output device connects to has been busied out; or there is a scheduled daily interchange. The *Aux Data* field contains the channel ID of data channels on the TN777 Netpkt Interface circuit pack (that is, 3 for channel 01, 4 for channel 02, 5 for channel 03, 6 for channel 04, and 9 for EIA port). Check the connectivity of wire and cable among wall jacket, data module, and the CDR output device. Enter **status data extension** and verify the data extension of the CDR output device is in the in-service/idle state. If the data extension is not available, restore the link. Enter **display system-parameters-maintenance** to see the start time of daily maintenance. If the error occurs and is resolved during daily maintenance, it can be ignored.				
1025					
	The CDR output device is in an off-line state, for example, a paper jam or paper out for a printer device. The CDR link is torn down. Check the CDR output device and act promptly to put it online. Enter **test CDR primary** to set up the CDR link.				
1281					
	Software detects an overflow of CDR records generated in the MCU due to the heavy trunk traffic and low-speed CDR output device. No action is necessary.				

Craft-Demanded Tests

Always investigate tests in the order presented in the table below when inspecting errors in the system. By clearing error codes associated with the Link Tear Down Test, for example, you may also clear errors generated from the other test in the testing sequence.

Table 8-279. System Technician-Demanded Tests: PRI-CDR

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Link Tear Down Test #213	Long		Yes
Link Retry Test #215	Short	Long	No

Link Tear Down Test #213

This test is destructive. This test disconnects the existing link between the MCU and the external CDR output device. If the link has been disconnected already, this test just returns PASS. All resources allocated for an CDR link are released after this test.

Table 8-280. Link Tear Down Test #213

Error Code	Test Result	Description Recommendation
40	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
50	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1010	ABORT	The CDR link has been busied out to out of service. 1. Enter release CDR primary to release the CDR link from the busyout state. 2. Retry test CDR primary long to execute the test.
	FAIL	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
	PASS	The CDR link is torn down.

Link Retry Test #215

This test sends a message to the CDR software process to make a data call to the extension where the CDR output device connects to or opens the EIA port to the CDR output device. If the CDR link is already up, this test is passed without making any data call or opening the EIA port.

Table 8-281. Link Retry Test #215

Error Code	Test Result	Description	Recommendation
10	ABORT	Internal system error. 1. Retry the command at one-minute intervals for up to five times. 2. If the test continues to abort, escalate the problem.	
20	ABORT	Internal system error. 1. Retry the command at one-minute intervals for up to five times. 2. If the test continues to abort, escalate the problem.	
30	ABORT	Internal system error. See “Restoring the CDR Link.”	
1010	ABORT	The CDR link has been busied out to the out of service state. 1. Enter release CDR primary to release the CDR link from busyout state. 2. Retry test CDR primary long to execute the test.	
	FAIL	The CDR link cannot be established.	
	PASS	The CDR link is up.	

PROC-SAN (Process Sanity Audits)

The Process Sanity Audits MO is responsible for monitoring the sanity of software processes in the MCU. If the Process Sanity Audits MO detects that a process has gone insane (does not respond to a sanity message within an allotted time period), the process is restarted. If the Process Sanity Audits MO detects that multiple processes (or a single key process) do not respond to sanity messages within an allotted time period, a system recovery action is initiated.

The Process Sanity Audits MO has no alarms and no tests. Certain errors are logged to the error log for information purposes only.

Hardware Error Log Entries

The following table shows the error log entries and related information

Table 8-282. Process Sanity Audits Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	None
	Look for other errors of the same type and deal with them accordingly.				
10	0	None	None	None	None
	A system recovery action has been taken because one or more software processes failed to respond to a sanity audit in a timely fashion. As a result of the recovery action, the system may have temporarily suspended service for a period of time surrounding the error. If these errors persist, escalate the problem immediately.				
204	Any	None	None	None	None
	A system recovery action has been taken because one or more software processes failed to respond to a sanity audit in a timely fashion. As a result of the recovery action, the system may have temporarily suspended service for a period of time surrounding the error. If these errors persist, escalate the problem immediately.				

PROCR (TN790B RISC Processor Circuit Pack)

MO Name (in Alarm Log)	Alarm Level	Initial Command to Run	Full Name of MO
PROCR	MAJOR	test processor a/b lo r/c	TN790B RISC Processor Circuit Pack
PROCR	MINOR	test processor a/b sh r/c	TN790B RISC Processor Circuit Pack

NOTE:
Alarms on the PR-MEM, PROCR and PR-MAINT maintenance objects (MOs) are indicated by the red LED on the Processor circuit pack.

This section applies to the TN790B. The TN790B has a RISC processor (PROCR) that uses on-board Flash ROM and DRAM memory (PR-MEM). This circuit pack also contains the MainTenance Processor (PR-MAINT).

The RISC Processor circuit pack portion is responsible for the execution of the MCU software package. This includes all of the call processing, maintenance, and administration functions. The RISC Processor circuit pack is the most critical component to the correct operation of the system.

The PR-MAINT (MainTenance Processor for RISC systems) is responsible for monitoring the sanity of the RISC Processor circuit pack and the environmental conditions. The PR-MAINT provides the serial interfaces for the MCU-MT and for the Digital Communications Equipment (DCE) ports. The PR-MAINT also provides the communications interface to INADS for alarm reporting and remote maintenance capability.

Error Log Entries and Test to Clear Values

Table 8-283. RISC Processor Circuit Pack Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value	Description
0	0	Any	Any	Any	test processor a/b r 1	
	The MTP Reset Test (#101) logs you off. The MTP Dual Port Ram Test (#104) can also log you off. Run the Short Test Sequence first. If all tests pass, run the Long Test Sequence. Refer to the appropriate test description and follow the recommended procedures.					
1	Any	BOOTPROM Checksum Test (#80)	MAJO R	ON	test processor a/b r 5	
	The MTP Reset Test (#101) logs you off. The MTP Dual Port Ram Test (#104) can also log you off. The BOOTPROM Checksum Test (#80) failed. Refer to the FAIL condition of this test for further action.					
513		Processor Write Buffer Test (#900)	MAJO R	ON	test processor a/b r 1	
	The MTP Reset Test (#101) logs you off. The MTP Dual Port Ram Test (#104) can also log you off.					
1025	Any	Processor Cache Audit (#896)	MINOR	ON	test processor a/b r 2	
	The MTP Reset Test (#101) logs you off. The MTP Dual Port Ram Test (#104) can also log you off. A parity error was detected in the processor's data cache or instruction cache. Aux Data indicates the difference in the number of parity errors since the last report.					
1281	Any	Processor Cache Test(#895)	MAJO R	ON	test pro-cessor a/b r 1	
	The MTP Reset Test (#101) logs you off. The MTP Dual Port Ram Test (#104) can also log you off.					

Table 8-283. RISC Processor Circuit Pack Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value	Description
1793		Processor Bus Time-out Exception Test (#82)	MAJO R	ON	test processor a/b r 2	
	The MTP Reset Test (#101) logs you off. The MTP Dual Port Ram Test (#104) can also log you off. The Processor Bus Time-out Test (#82) failed. Refer to the FAIL condition of this test for further action.					
2049	Any	Processor Sanity Timer Test	MINOR	ON	test processor a/b l c	
	The MTP Reset Test (#101) logs you off. The MTP Dual Port Ram Test (#104) can also log you off. Aux Data of 100 is an LMM initialization failure. The Processor Sanity Timer Test failed during a reset level 4 or 5 initialization. reset system 4 at the customers convenience and if the alarm occurs again, replace the processor circuit pack. The system runs with this failure, but it is not protected if the system software has a sanity problem. The test processor a/b long clear command clears this alarm, but the sanity timer is only tested during initialization so the alarm occurs again and the system is not protected against insane software.					
2305	Any	Address Matcher Test	none	ON	test processor a/b l c	
	The MTP Reset Test (#101) logs you off. The MTP Dual Port Ram Test (#104) can also log you off. Aux Data of 100 is an LMM initialization failure. The Address Matcher Test failed during a reset level 4 or 5 initialization. This is not alarmed because the address matcher is only used for high level debugging. Replace the processor circuit pack if the Address Matcher is needed for troubleshooting.					

System Technician-Demanded Tests: Descriptions and Error Codes

Always investigate tests in the order presented in the table below. By clearing error codes associated with the *Processor Bus Time-out Exception Test,* for example, you may also clear errors generated from other tests in the testing sequence.

Table 8-284. System Technician-Demanded Tests: PROCR

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Processor Cache Test (#895)	Long		No
Processor Cache Audit (#896)	Short	Long	No
Processor Bus Time-out Exception Test (#82)	Short	Long	No
Processor BOOTPROM Checksum Test (#80)	Short	Long	No
Processor Write Buffer Test (#900)	Short	Long	No
Memory Burst Read Test (#908)(a)	Short	Long	No
Read All Memory Test (#85)(a)	Long		No
Memory Parity Error Detection Test (#87)(a)	Short	Long	No
Flash Memory Checksum Test (#86)(a)	Long		No
MTP Outpulse Relay Test (#102) (c)	Short	Long	No
MTP External Modem Present Test (#230) (c)	Short	Long	No
MTP Analog Loop Around Test (#103) (c)	Short	Long	No
MTP Sanity Handshake Test (#106) (c)	Short	Long	No
MTP MCU-MT Loop Around Test (#228) (c)	Short	Long	No
MTP Aux Loop Around Test (#229) (c)	Short	Long	No
MTP Reset Test (#101) (c)	Long		Yes
MTP Dual Port Ram Test (#104) (c)	Long		Yes

Notes:

a. Refer to “PR-MEM” for a description of these tests.

b. There are Functional Memory Test errors against the Processor circuit pack. On the Active SPE, the test is run only via a reset system 4 command or a reset system 5 command.

c. Refer to “PR-MAINT” for a description of these tests.

Processor BOOTPROM Checksum Test (#80)

This test is a nondestructive test. This test computes the checksum of the Processor's bootstrap BOOTPROM. A failure indicates the BOOTPROM is corrupt.

Table 8-285. Processor BOOTPROM Checksum Test #80

Error Code	Test Result	Description / Recommendation
100	ABORT	The test did not complete within the allowable time period. 1. Retry the command.
2500	ABORT	Internal system error 1. Retry the command.
	FAIL	The computed checksum did not match the BOOTPROM checksum. The system may not continue to operate correctly. The system may fail at some future date when the corrupted area the bootstrap BOOTPROM is accessed. 1. Replace the Processor circuit pack.
	PASS	The computed checksum matched the BOOTPROM checksum. This part of the Processor will continue to operate normally.

Processor Bus Time-out Exception Test (#82)

This test is a nondestructive test. The test is used to verify that the RISC Processor can intentionally cause a BUS TIMEOUT EXCEPTION (BTE) and then verifies if it vectors to the correct interrupt routine. This is basically a test of the internal operation of the RISC Processor chip and the bus time-out circuitry.

Table 8-286. Processor Bus Time-out Exception Test #82

Error Code	Test Result	Description / Recommendation
100	ABORT	The test did not complete within the allowable time period. 1. Retry the command.
2500	ABORT	Internal system error 1. Retry the command.
	FAIL	The interrupt was not detected or acted upon. 1. Repeat the command at 1-minute intervals a maximum of 5 times. 2. If the test continues to fail, the Processor circuit pack should be replaced. The replacement must have enough memory for this system. 3. If replacement of the Processor circuit pack still results in test failure, the following circuit packs should be replaced, one at a time in the order provided: TN765 Processor Interface, TN794 Netpkt Interface, and TN794 Packet Control circuit packs. The test should then be repeated.

Table 8-286. Processor Bus Time-out Exception Test #82

Error Code	Test Result	Description / Recommendation
	PASS	The interrupt was correctly detected. The RISC Processor is functioning correctly.

Processor Cache Test (#895)

This test is a nondestructive test. This test overwrites the contents in the Instruction and Data Caches, requiring them to be refilled during normal execution.

This test verifies that the Processor Instruction and Data Caches are functional. Some errors in the caches will simply reduce performance by forcing instructions or data to be read from memory more often than would normally be necessary. In any case, cache problems are serious and the Processor circuit pack must be replaced as soon as possible if they are detected.

Table 8-287. Processor Cache Test #895

Error Code	Test Result	Description / Recommendation
100	ABORT	The test did not complete within the allowable time period. 1. Retry the command.
2500	ABORT	Internal system error 1. Retry the command.
	FAIL	The Processor cache is not functioning correctly. 1. Replace the Processor circuit pack immediately.
	PASS	The cache portion of the Processor circuit pack is operating correctly.

Processor Cache Audit (#896)

This nondestructive audit checks the state of the Cache Parity bit maintained by the RISC CPU. If this bit is set, there may be problems with either the CPU, the Instruction, or Data Cache. An indication of bad cache parity won't itself mean that the system won't operate, but minor to severe performance degradation may be present. For example, a single bad bit in either cache could cause this bit to be set. If the faulty word is seldom accessed, the impact will be small. If the bit is

accessed frequently, there could be serious problems with much, or all, of the cache (stuck data bit) with the only direct indication again being the cache parity error or cache test error.

Table 8-288. Processor Cache Audit Test #896

Error Code	Test Result	Description / Recommendation
100	ABORT	The test did not complete within the allowable time period. 1. Retry the command.
2500	ABORT	Internal system error 1. Retry the command.
	FAIL	The Cache Parity Error bit is set, there may be problems with either the CPU or the Instruction or Data Cache. 1. Retry the command. 2. If the test continues to fail, run test processor a/b long. 3. If the Processor Cache test (#895) or the Processor Cache Audit (#896) fails, replace the Processor circuit pack.
	PASS	The Processor has not detected any parity errors in the Instruction and Data Caches since the last time this audit was run.

Processor Write Buffer Test (#900)

This test is a nondestructive test. This test verifies that the Write Buffer operates properly on the Processor circuit pack. Failure of this test is serious. The Processor circuit pack must be replaced as soon as possible.

Table 8-289. Processor Write Buffer Test #900

Error Code	Test Result	Description / Recommendation
100	ABORT	The test did not complete within the allowable time period. 1. Retry the command.
2500	ABORT	Internal system error 1. Retry the command.
	FAIL	The Processor Write Buffer is not operating correctly. 1. Replace the Processor circuit pack immediately.
	PASS	The Write Buffer portion of the Processor circuit pack is operating correctly.

RING-GEN (Analog Ring Generator)

MO Name (in Alarm Log)	Alarm Level	Initial Command to Run*	Full Name of MO
RING-GEN	MAJOR	test environment P	Analog Ring Generator

* Where P is an appropriate port network number determined via the Port field from the Alarm or Error Log.

All analog phones in MCU cabinets must be provided with a voltage that allows them to ring. The Analog Ring Generator MO represents the device that provides the ringing voltage for analog phones in a multicarrier or single carrier cabinet system. In a multicarrier cabinet system, the Analog Ring Generator resides in the PDU. Figure 8-57 shows the position of the PDU and illustrates that fuse F9 is used for the Analog Ring Generator. Figure 8-58 shows the position of the fuses on the PDU and describes how to replace a fuse. In a single carrier cabinet system, the Analog Ring Generator is part of the WP-91153 power unit, and each carrier in the single carrier cabinet contains its own Analog Ring Generator. A ringing voltage generator failure means that no ringing will occur on analog phones; however, ringing on digital and hybrid phones will still occur.

The ringing voltage is monitored by the Tone-Clock circuit pack. In a port network with duplicated Tone-Clocks, it is the active Tone-Clock that performs this function.

Also, if the TN2182 Tone-Clock is installed in the Processor Interface slot, the ringing voltage is not monitored.

The TN2036 Voltage Range circuit pack provides easy access for testing the various voltages on the backplane pins.

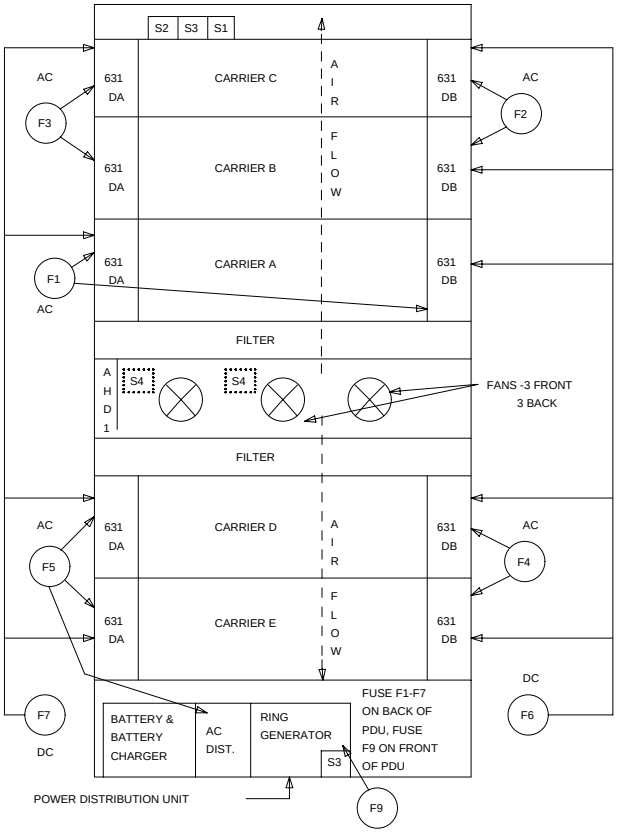


Figure 8-45. Multicarrier Cabinet Environment Components

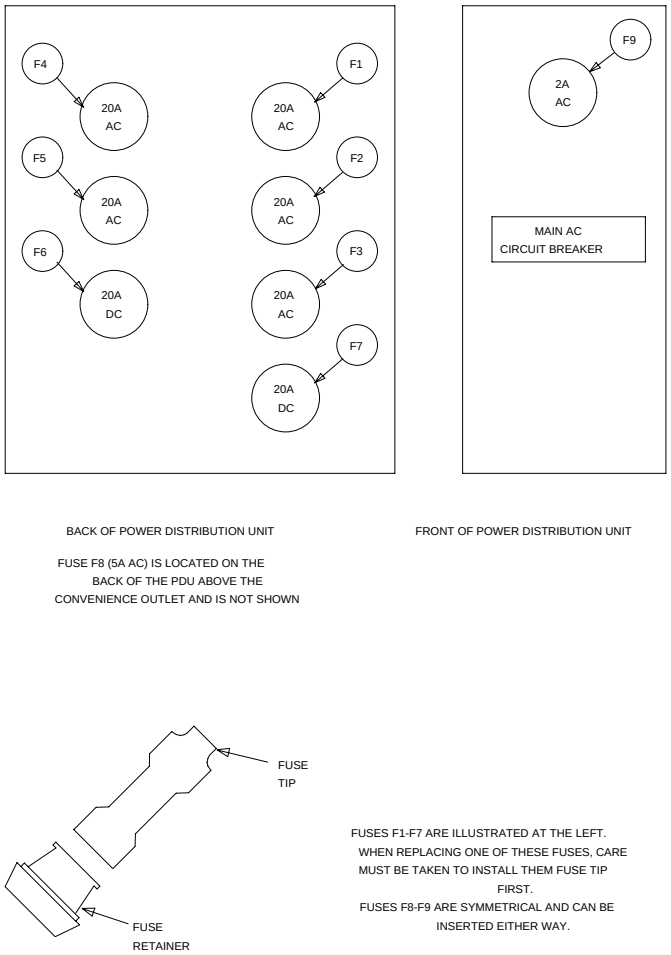


Figure 8-46. Multicarrier Cabinet Fuse Location and Replacement

Hardware Error Log Entries and Test to Clear Value

Table 8-290. Analog Ring Generator Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	test environment UU
	Run the Short Test Sequence first. If all tests pass, run the Long Test Sequence. Refer to the appropriate test description and follow the recommended procedures				
1	0	Analog Ring Generator Query Test (#118)	MAJO R	ON	test environment UU r 3
	-				

System Technician-Demanded Tests: Descriptions and Error Codes

Always investigate tests in the order presented in the following tables when inspecting errors in the system. By clearing error codes associated with the *Analog Ring Generator Initialization Test*, for example, you may also clear errors generated from other tests in the testing sequence.

Table 8-291. System Technician-Demanded Tests: RING-GEN (MCC-MSMs)

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Analog Ring Generator Initialization Test (#117)	Short	Long	No
Analog Ring Generator Query Test (#118)	Short	Long	No
Battery & Battery Charger Query Test (#5) (a)	Short	Long	No
AC Power Query Test (#78) (b)	Short	Long	No
Power Unit Query Test (Carrier E) (#127) (c)	Short	Long	No
Power Unit Query Test (Carrier D) (#127) (c)	Short	Long	No
Power Unit Query Test (Carrier A) (#127) (c)	Short	Long	No
Power Unit Query Test (Carrier B) (#127) (c)	Short	Long	No
Power Unit Query Test (Carrier C) (#127) (c)	Short	Long	No
Emergency Transfer Query Test (#124) (d)	Short	Long	No
Cabinet Sensors Query Test (#122) (e)	Short	Long	No
External Alarm Lead Query Test (#120) (f)	Short	Long	No

Notes

a. Refer to POWER (Battery & Battery Charger) Maintenance documentation for a description of this test.

b. Refer to AC-POWER (AC Power) Maintenance documentation for a description of this test.

c. Refer to CARR-POW (Carrier Port Power Unit) for AC- and DC-Powered Systems Maintenance documentation for a description of this test.

d. Refer to EMG-XFER (Emergency Transfer) Maintenance documentation for a description of this test.

e. Refer to CABINET (Cabinet Sensors) Maintenance documentation for a description of this test.

f. Refer to EXT-DEV (External Alarm) Maintenance documentation for a description of this test.

Table 8-292. System Technician-Demanded Tests: RING-GEN (SCC-MSMs)

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Analog Ring Generator Initialization Test (#117)	Short	Long	No
Analog Ring Generator Query Test (#118)	Short	Long	No
Single-Carrier Power Query Test (#79) (a)	Short	Long	No
Emergency Transfer Query Test (#124) (b)	Short	Long	No
External Alarm Lead Query Test (#120) (c)	Short	Long	No

Notes:

a. Refer to DC-POWER (Power) Maintenance documentation for a description of this test.

b. Refer to EMG-XFER (Emergency Transfer) Maintenance documentation for a description of this test.

c. Refer to EXT-DEV (External Alarm) Maintenance documentation for a description of this test.

Analog Ring Generator Initialization Test (#117)

The TN768, or TN780 will report an error to the system software if the ringing voltage falls to low (only if system software has made a request to the TN768 or TN780 to monitor the voltage). The Analog Ring Generator Initialization Test sends a request to the TN768 or TN780. If there are redundant tone/clock circuit packs in the port network, then the request is sent only to the active tone/clock.

Table 8-293. Analog Ring Generator Initialization Test #117

Error Code	Test Result	Description / Recommendation
1 , 1000 , 1001 , 1003 , 1115 , 2012 , 2100	ABORT	The system software is unable to determine the active tone/clock circuit pack, unable to allocated the resources necessary to run the test, or unable to send a down link message. 1. Wait for the green LED on the active tone/clock to go out; use the status port-network command to determine the active Tone/Clock circuit pack. 2. Rerun the test. If the test aborts again, refer to TDM-CLK Maintenance documentation.
2000	ABORT	Response to the request was not received within the allowable time period. 1. Look for TDM-CLK errors and alarms. Resolve all other Tone/Clock problems first. 2. Rerun the test.
1005	ABORT	The tone/clock is unable to read the analog ringing voltage level when the tone/clock is in the Processor Interface slot. This test is not available for the Processor Port Network in this configuration.
	PASS	The active Tone/Clock has successfully been enabled to monitor the ringing voltage level.

Analog Ring Generator Query Test (#118)

This test requests the Active Tone-Clock circuit pack to check the ringing voltage. The tone/clock circuit pack replies with PASS if the ringing voltage is adequate to ring the analog phones. If not, the active tone/clock circuit pack replies with a FAIL. The Analog Ring Generator Query Test then reports the result.

Table 8-294. Analog Ring Generator Query Test #118

Error Code	Test Result	Description / Recommendation
1 , 1000 , 1001 , 1003 , 1115 , 2012 , 2100	ABORT	Could not seize the resources to run the test. Other maintenance is running on the active tone/clock circuit pack. 1. Wait for the green LED on the active tone/clock circuit pack to go out; (use the status port-network command to determine the Active tone/clock circuit pack). 2. Rerun the test. If the test aborts again, refer to TDM-CLK (TDM Bus Clock) Maintenance documentation.
2000	ABORT	Response to the request was not received within the allowable time period. 1. Look for TDM-CLK errors and alarms. Resolve all other tone/clock problems first. 2. Rerun the test.
1005	ABORT	The tone/clock is unable to read the analog ringing voltage level when the tone/clock is in the Processor Interface slot. This test is not available for the Processor Port Network in this configuration.

Table 8-294. Analog Ring Generator Query Test #118

Error Code	Test Result	Description / Recommendation
	FAIL	Ringing voltage is below acceptable levels. PROCEDURE FOR A MULTI-CARRIER CABINET SYSTEM. 1. Look for and resolve CARR-POW (Carrier Port Power Supply Unit) alarms first, and then rerun the test. 2. Check fuse F9 on the Power Distribution Unit. Replace F9 if it is blown, and rerun the test. If the test still fails, then an Analog Line circuit pack could be defective and causing the Analog Ring Generator and/or fuse F9 to fail. 3. Unseat all Analog circuit packs in the affected cabinet, and replace fuse F9 again if needed. Rerun the test. 4. If the test passes, then the Analog Ring Generator is healthy, and one of the Analog circuit packs is defective. Replace the Analog circuit packs one at a time, and rerun the test to determine which circuit pack is causing the problem. When the defective Analog circuit pack is found, replace it. Rerun the test. If the test still fails, proceed with Step 6. 5. Since the test still fails, the Analog Ring Generator is defective. Replace the Analog Ring Generator as follows: a. Open the PDU compartment door. The door is hinged on the right and has a magnetic latch on the left. b. If the reset button on the Analog Ring Generator is out, press it in. c. Originate calls to several analog stations on different port circuit packs in different carriers in the affected port network. d. If called stations ring, the fault is cleared. Proceed to Step f. If no stations ring, replace the Analog Ring Generator. To replace the Analog Ring Generator, first disconnect the output (P6) and input (P7) connectors from the Analog Ring Generator and then remove the two screws at the base of the Analog Ring Generator. e. Replace the Analog Ring Generator, secure it with the two screws at the base, and replace the P6 and P7 connectors (P6 goes on top). f. Rerun the test. If the test still fails, proceed to Step 7. 6. The active tone/clock may be faulty and incorrectly reporting the level of the ringing voltage. Replace the Active tone/clock and rerun the test. Refer to TONE-BD (Tone-Clock Circuit Pack) Maintenance documentation for details on replacing the tone/clock. Rerun the test. If the test still fails, escalate the problem.

Table 8-294. Analog Ring Generator Query Test #118

Error Code	Test Result	Description / Recommendation
	FAIL	Ringing voltage is below acceptable levels. PROCEDURE FOR A SINGLE-CARRIER CABINET SYSTEM. This failure indicates that there is no ringing voltage in the carrier where the active tone/clock circuit pack resides. Other carriers may or may not have ringing voltage. 1. Unseat all analog circuit packs in the cabinet that contains the Active Tone/Clock circuit pack and rerun the test. 2. If the test passes, then the Analog Ring Generator is healthy and one of the analog circuit packs is defective. Replace the analog circuit packs one at a time, and rerun the test to determine which circuit pack is causing the problem. When the defective analog circuit pack is found, replace it. Rerun the test. If the test still fails, go to Step 4. 3. Replace the WP-91153 power unit for the affected carrier, and rerun the test. If the test still fails, go to Step 5. 4. The active tone/clock may be faulty and incorrectly reporting the level of the ringing voltage. Replace the active tone/clock and rerun the test. Refer to TONE-BD Maintenance documentation for details on replacing the active tone/clock circuit pack. Rerun the test. If the test still fails, escalate the problem.
	PASS	FOR A MULTI-CARRIER CABINET SYSTEM. The analog ringing voltage level is acceptable. FOR A SINGLE-CARRIER CABINET SYSTEM. For a single-carrier cabinet stack, ringing voltage is acceptable in the cabinet containing the active tone/clock circuit pack.

SCH-ADJ (Conference Reservation and Control System)

SCH-ADJ allows the MCU to originate an alarm to the alarm center whenever the Conference Reservation and Control System (CRCS) fails to communicate with the MCU for a given time period. This halt in communication may occur if the user powers down the CRCS, or if a problem occurs within the CRCS PC. If the user has a CRCS connected to the MCU, the CRCS logs into the MCU once every hour to display the time (this represents an attempt to synchronize the data and time for the MCU and CRCS). Once the CRCS logs into the MCU, the MCU knows that the CRCS is active. If, within the hour, the CRCS does not log into the MCU, an error is logged against SCH-ADJ. If the CRCS does not log into the MCU for three consecutive hours, an alarm is raised.

The SCH-ADJ alarming feature is enabled on the System-Parameters Maintenance form. The *SCH-ADJ Alarm Level* field may contain any one of the following entries: **none** (default), **major**, **minor**, or **warning**. Only major or minor alarms automatically notify your technical center.

Table 8-295. SCH-ADJ Error Log Entries

Error	Aux Data	Assoc Test#	Alarm Level	On/OFF Board	Test to Clear Value
1	Any	none	Major/Minor/ Warning	Any	none
	CRCS failed to log into the MCU during the past hour (see the following section for a resolution).				

Resolving the CRCS Alarm

There are no craft-demanded tests for this MO. The most likely cause of the SCH-ADJ alarm is a powered-down CRCS PC. This is the first item you should check. If the CRCS is powered up, verify the following:

1. PC is running and does not require rebooting.
2. CRCS application is up and running.
3. Link between the CRCS and MCU is up.

Refer to the *CRCS User's Guide* for link troubleshooting.

Whenever the CRCS is running in a normal fashion, it logs into the MCU at about five minutes past the hour (for example, 9:05). Once this occurs, the MCU CRCS alarm is resolved. If the CRCS is functioning normally and the CRCS alarm is still present, escalate the problem.

SVC-SLOT (Service Slot)

The Service Slot MO detects when an invalid circuit pack is inserted into a SERVICE slot. The SERVICE slot is the left-most slot in the J58890BB port carrier. It is identified as circuit pack slot location “00” in all commands, field entries, and displays used by the system administrator and the service technician. This slot does not provide tip and ring connectivity to the wall field. Therefore, only the TN748D Tone Detector circuit pack is allowed.

A minor alarm is generated against the service slot maintenance object when a circuit pack of a type other than that included in the previous list is inserted into a SERVICE slot. The SERVICE slot MO is used instead of the maintenance object name for the illegal circuit pack to prevent any attempt to assign a port to an illegal circuit pack that is physically inserted into the SERVICE slot.

Hardware Error Log Entries

The following table shows the error log entries and related information.

Table 8-296. Service Slot Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
600		None	Minor	On	
	A circuit pack type other than a TN748D is in slot 00 (SERVICE slot) of the J58890BB port carrier. 1. Display the code of the invalid circuit pack via list configuration board UUCSS, where UU is the universal cabinet number, C is the carrier number and SS is the slot number (always 00) of the alarmed circuit pack. 2. Remove the circuit pack.				

SW-CTL (Switch Control)

Switch Control resides on the TN794 Netpkt Interface circuit pack. The data channels (DATA-BD and DATA-CHL) also reside on the Netpkt Interface circuit pack. Standard systems have a single Netpkt Interface circuit pack. The Netpkt Interface cannot be replaced without bringing the system down.

Switch Control is used to send control information between port circuit packs and the processor. This control information is sent via the Time Division Multiplex (TDM) Bus. The portion of the TDM Bus used to transmit control messages is called the control channel. The control channel can be on either TDM Bus A or TDM Bus B, but only one bus is used for the control channel at any given time.

Switch Control is critical in the setup and take down of all calls but is not involved in the voice or data transmission that takes place during established calls. Switch Control detects when port circuit packs are plugged into or removed from the cabinet. This information is then sent to the processor. The Switch Control monitors the health of the control channel on the TDM Bus and informs the processor when errors occur.

Switch Control contains the hardware time of Day (TIME-DAY) clock that the system uses for all its date and time information. In addition, Switch Control also contains hardware to monitor critical system timing signals and informs the processor when these signals fail. For example, if the timing signals from a Tone-Clock circuit pack in the cabinet fail, Switch Control informs the processor.

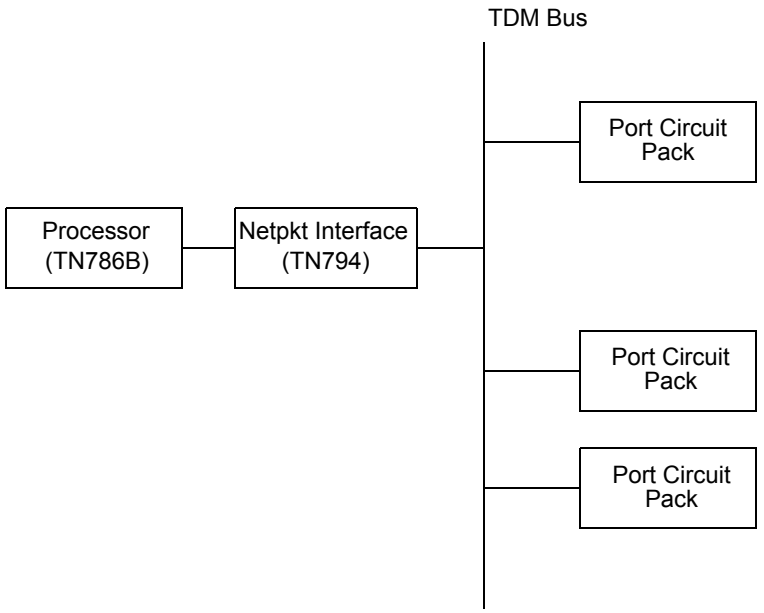


Figure 8-47. Switch Control Connectivity

Hardware Error Log Entries

The following table shows the error log entries and related information

Table 8-297. Switch Control Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	test network-control sh r 1
	Run the short test sequence first. If all tests pass, run the long test sequence. Refer to the appropriate test description and follow the recommendations.				
1	Any	#94	Major	On	test network-control r 3
2		#94	Major	On	test network-control r 3
	This error may not cause a Switch Control alarm if error type 769 is also present since this error may actually be caused by the loss of clock signals not by a Switch Control failure.				

Table 8-297. Switch Control Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
257	0 , 1	None			
	These errors are reported to the processor by Switch Control and indicate possible hardware problems on the Netpkt Interface circuit pack. These errors cause Switch Control maintenance to run specific tests. If there really is a problem, Switch Control tests usually cause other errors to be logged. In rare cases, where no other errors except 257 are logged, and while 257 errors are occurring at a high rate (more than 10 in the last hour), the Netpkt Interface circuit pack should be replaced.				
513		#95	Minor	On	test network-control l r 3
	If the Aux Data field value is less than 100, the test may have been interrupted. 1. Wait one minute and try again. 2. Retry the test up to three times. 3. If the Aux Data field value is more than 100 or fails two out of three times with Aux Data less than 100, the TN794 Netpkt Interface circuit pack needs to be replaced.				
769	Any	None			
	Switch control reported a loss of timing signals to the processor. When this error is present, Switch Control is usually not alarmed since any Switch Control test failures are really the result of faulty signals from the Tone-Clock circuit pack. See TDM-CLK.				
1025		#92	Major	On	test network-control r 3
	-				
1281	Any	None			
	A loss of handshake occurred between Switch Control and the MCU software. Look for and resolve all other SW-CTL errors. In the rare case when no other errors are logged, but error type 1281 is occurring at a high rate (more than 10 in the previous hour), escalate the problem.				
1537		#93	Major	On	test network-control l r 2
	-				
1793	Any	None			
	These in-line errors indicate a possible problem with the interface between Switch Control and the processor. These errors cause Switch Control maintenance to run specific tests. If there is a problem, Switch Control tests usually cause other errors to be logged. In rare cases where no other errors are logged while these errors are occurring at a high rate (more than 10 in the last hour), the Netpkt Interface circuit pack should be replaced.				
2817		#324	Major	On	test network-control r 2
	-				
3073		#325	Major	On	test network-control r 3
	-				

Table 8-297. Switch Control Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
3329		None	Major	On	
	There is bad clock detection circuitry on the TN794 Netpkt Interface circuit pack. Replace it.				

Craft-Demanded Tests

Always investigate tests in the order presented in the table below. By clearing error codes associated with the Switch Control Reset test, for example, you may also clear errors generated by others in the sequence.

Table 8-298. System Technician-Demanded Tests: SW-CTL

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Switch Control Reset Test #93	Long		Yes
Control Channel Interface Test #92	Short	Long	No
Control Channel Transmission Test #94	Short	Long	No
Destructive EPN Maintenance Board Interface Test #325	Long		Yes
EPN Maintenance Board Interface Test #324	Short	Long	No
Time of Day Clock Test #95	Short	Long	No
Control Channel Loop-Around Test #52*	Short	Long	No
NPE Audit Test #50*	Long		No
Data Channel Reset Test #107†	Long		Yes
Data Channel Interface Test #108†	Long		Yes
Maintenance Loop-Around Test #109†	Short	Long	No
Data Channel Crosstalk Test #110†	Short	Long	No
Data Channel Local Loop-Back Test #111†	Short	Long	No

* See DATA-BD for a description of this test.

† See DATA-CHL for a description of this test.

Control Channel Interface Test #92

Loop-back messages are sent to Switch Control via the interface used for control channel messages. The messages are returned to the SPE for verification via the same interface

Table 8-299. Control Channel Interface Test #92

Error Code	Test Result	Description Recommendation
None	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals for up to five times. 2. If the test continues to abort, escalate the problem.
2012	ABORT	Internal system error. 1. Retry the command at one-minute intervals for up to five times. 2. If the test continues to abort, escalate the problem.
2013	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals for up to five times. 2. If the test continues to abort, escalate the problem.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals for up to five times. 2. If the test continues to abort, escalate the problem.
	FAIL	Messages could not be looped back through the control channel interface. MCU is probably not functioning. This failure could be due to either a Netpkt Interface circuit pack hardware failure or the loss of system timing signals. If Switch Control is alarmed, then a Netpkt Interface circuit pack failure should be suspected. If Switch Control is not alarmed, investigate the possibility of the loss of system timing signals before attempting to replace the TN794 Netpkt Interface circuit pack. 1. If test #94 passes, do not suspect the loss of timing signals. If it fails, the timing signals are lost. 2. Run the short test sequence several times to make sure this failure is occurring consistently. 3. Run the long test sequence to reset Switch Control. Sometimes running the long test sequence clears the problem. If the test is still failing, go to Step 4. 4. If the MCU can still take calls, replace the TN794 Netpkt Interface circuit pack at the customer's convenience. 5. If the MCU cannot take calls, replace the TN794 Netpkt Interface circuit pack immediately.

Table 8-299. Control Channel Interface Test #92

Error Code	Test Result	Description Recommendation
	PASS	The control channel interface between the processor and Switch Control is working.

Switch Control Reset Test #93

This test is destructive. It resets Switch Control and determines if it can successfully go through its initialization sequence. There is a possibility of losing some control messages to or from port circuit packs.

Table 8-300. Switch Control Reset Test #93

Error Code	Test Result	Description Recommendation
None	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2012	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2013	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
None	FAIL	Switch control could not be successfully reset. The MCU may not be operating. This failure could be due to either a TN794 Netpkt Interface circuit pack hardware failure or the loss of system timing signals. If Switch Control is alarmed, then suspect a TN794 Netpkt Interface circuit pack failure. If not, investigate the loss of system timing signals. See TDM-CLK. If many port circuit pack LEDs are lit, suspect the TN794 Netpkt Interface circuit pack. If it is at fault, go to Step 1. 1. If the MCU can take calls, replace the TN794 Netpkt Interface circuit pack at the customer's convenience. 2. If the MCU cannot take calls, replace the TN794 Netpkt Interface circuit pack immediately.
	PASS	Switch control initialized correctly. Look at the results of the other tests to see if it is operating correctly.

Control Channel Transmission Test #94

Control channel messages are sent from the SPE to selected port circuit packs and the response from the port circuit packs is checked. This tests the ability of Switch Control to send and receive messages on the control channel of the TDM Bus.

Table 8-301. Control Channel Transmission Test #94

Error Code	Test Result	Description Recommendation
None	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
0	ABORT	The port circuit packs necessary for this test are not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, replace the TN794 Netpkt Interface circuit pack.
2012	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2013	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times 2. If the test continues to abort, escalate the problem.
0	FAIL	Switch control cannot communicate on the TDM Bus control channel. The MCU may not be functioning. 1. Run the short test sequence several times to make sure the failure is occurring consistently. 2. Run the long test sequence to reset Switch Control. NOTE: The long test sequence is destructive. It will affect placing and receiving calls for several seconds. 3. If there are no TDM Bus alarms against the standby TDM Bus, switch the control channel from its current bus to standby bus. If this test passes on the new bus, look for TDM-BUS failures. If the test fails even after the control channel is switched, go to Step 4. 4. If the MCU can process calls, replace the TN794 Netpkt Interface circuit pack at the customer's convenience. 5. If the MCU cannot process calls, replace the TN794 Netpkt Interface circuit pack immediately.

Table 8-301. Control Channel Transmission Test #94

Error Code	Test Result	Description Recommendation
None	PASS	Switch Control can communicate with the port circuit packs over the TDM Bus.

Time of Day Clock Test #95

The short-term accuracy of the time of day (TIME-DAY) clock is tested. The test reads the clock once, waits a short time, then reads it again. The second reading of the clock must be within certain limits relative to the first reading for the test to pass. The **display time** command may be used to display the current setting of the clock.

Table 8-302. Time of Day Clock Test #95

Error Code	Test Result	Description Recommendation
1000	ABORT	The test was interrupted by a higher priority task. 1. Rerun the test at one-minute intervals up to five times. 2. If the test aborts five times, wait until the MCU is less heavily used, and try again. 3. If the test continues to abort, escalate the problem.
2012	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2013	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2001	FAIL	The time of day clock could not be read. 1. Enter set time to set the time. 2. Run the short test sequence several times to determine if setting the time corrected the error. 3. If the error continues, replace the TN794 Netpkt Interface circuit pack.
Other	FAIL	The accuracy of time of day clock is not within limits. 1. Run the short test sequence several times to make sure the error is occurring consistently. 2. Replace the TN794 Netpkt Interface circuit pack.
None	PASS	The time of day clock on Switch Control circuit pack is operating correctly.

SYNC (Synchronization)

The synchronization maintenance includes both hardware and software components. Its purpose is to provide a common reference frequency for reliable digital communication between the MCU and other endpoints. Synchronization is achieved via the use of several DS1 Interface circuit packs (TN767).

Depending on the network synchronization plan and the status of synchronization sources, the system timing reference may be a Tone-Clock circuit pack or DS1 Interface circuit packs. Stratum 4 synchronization extracts timing information directly from a DS1 reference or from a tone clock.

Stratum 4 Synchronization

The MCU can be configured with primary and secondary synchronization references (DS1 Interface circuit packs) when using Stratum 4 synchronization. Both references are optional (since the local oscillator can be used), and the secondary reference is optional if a primary is provided. If this system is the master for the network, then its local oscillator would be used and no DS1 would be used as references.

If the primary synchronization reference is not providing a valid timing signal, the system automatically switches to the secondary synchronization reference. If the secondary reference does not provide a valid timing signal or is not administered as a synchronization reference, a Tone-Clock circuit pack provides the system timing source. The system does not revert to the primary if the current reference is the secondary and is failing; however, the system switches from the local oscillator to another reference when the new reference becomes available.

If the primary synchronization reference is providing a valid timing signal, then the flow of system synchronization would travel from the DS1 Interface circuit pack. The DS1 Interface circuit pack provides a timing signal for the Tone-Clock circuit pack and the Tone-Clock circuit pack provides timing for all circuit packs. If the primary synchronization reference does not provide a valid timing signal, synchronization maintenance switches to the secondary reference.

Two kinds of Stratum 4 synchronization are supported:

- Type I: This is more stable than Type II and provides some switching capability at the hardware level.
- Type II: This is the only synchronization strata provided.

Both types are possible with TN768 Tone-Clock circuit packs.

Synchronization Troubleshooting

Major and minor alarms indicate a problem with the system synchronization references. These alarms are resolved when the alarmed synchronization reference is restored.

The **status synchronization** and **display synchronization** commands are used to determine the current system synchronization reference and the primary and secondary references that are administered, respectively.

Other commands associated with synchronization maintenance are **disable synchronization-switch** and **enable synchronization-switch**. These commands are used to disable the ability of synchronization maintenance to switch between synchronization references and to enable this switching ability, respectively.

The **set synchronization** command is executed only after synchronization has been disabled and is used to manually switch to a specific synchronization reference. This command is useful to diagnose synchronization problems by forcing a specific reference (DS1 or Tone-Clock) to be the system synchronization reference to determine if a specific reference is providing a valid timing signal.

The system synchronization planner must avoid creating a timing loop when administering the primary and secondary synchronization references in a system. A timing loop exists whenever a system receives timing from another system whose timing reference is directly or indirectly derived from itself. Timing loops can lead to loss of digital data between systems that are exchanging data with any system within the loop. An invalid timing signal is also generated by any system within the loop, thus propagating the invalid timing signal to any systems using a system within the loop as a synchronization reference.

CAUTION:

A correctly designed network has no loops. It is strongly recommended that the network administrator be consulted before administering any synchronization changes.

The yellow LEDs on the TN768, TN780, or TN2182 Tone-Clock circuit pack flash in a specific pattern to indicate the status of the circuit pack. These flashing LED patterns are used to indicate if a Tone-Clock circuit pack is deriving timing from an external source or whether the Tone-Clock circuit pack is providing the timing signal for the port network. The yellow LED patterns for the TN768, TN780, or TN2182 Tone-Clock circuit packs are as follows:

- Yellow LED is on 2.7 seconds and off 0.3 seconds: Indicates an external timing source is being used as a synchronization reference and the circuit pack is in Active mode.

- Yellow LED is on 0.3 seconds and off 2.7 seconds: Indicates the local oscillator on the Tone-Clock circuit pack is being used as the synchronization reference and the circuit pack is in Active mode.
- Yellow LED stays on: Indicates the circuit pack has been reset but no translation has been downloaded. This also indicates the circuit pack is providing clocks and is in Active mode. To determine the mode of the circuit pack, use **status system**. Green and yellow flashing indicate that maintenance is running on the active circuit pack.

Hardware Error Log Entries

The following table shows the error log entries and related information.

Table 8-303. Synchronization Maintenance Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	test synchronization
	Run the short test sequence first. If all tests pass, run the long test sequence. Refer to the appropriate test procedures.				
1	Any	None	Warning/ Minor	Off	None
	Noise on the DS1 line can cause transient alarms on synchronization. Therefore, when a synchronization problem causes error type 1, 257, or 513, a warning alarm is raised for 15 to 20 minutes before it is upgraded to major or minor. This initially raises a warning alarm, but if the alarms are not downgraded with set options, a minor or major alarm is raised. It indicates a problem with the primary DS1 reference. It is cleared when the primary reference is restored. 1. Use list configuration board PCSS to check if the primary DS1 Interface circuit pack is inserted. 2. Check the cable supplying the external timing source to the primary DS1 Interface circuit pack 3. Use test board PCSS long to test the primary DS1 Interface circuit pack. 4. Check the error log for DS1-BD errors 5. If no DS1-BD errors are logged, use test tone/clock PC long to test the Tone-Clock circuit pack. 6. Check the error log for TDM-CLK errors and verify that test #148 passes. If not, and it fails with an error code 2 through 32, see TDM-CLK. 7. Use disable/enable synchronization-switch to switch the system synchronization reference to the primary DS1 Interface circuit pack. 8. Check the error log and enter status synchronization to verify the primary DS1 Interface circuit pack is still the synchronization reference.				

Table 8-303. Synchronization Maintenance Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
18	0		Warning	Off	enable sync
	The synchronization maintenance has been disabled via disable synchronization-switch. Use enable synchronization-switch to enable switching.				
257	Any	None	Warning/ Minor	Off	None
	Noise on the DS1 line can cause transient alarms on synchronization. Therefore, when a synchronization problem causes error type 1, 257, or 513, a warning alarm is raised for 15 to 20 minutes before it is upgraded to major or minor. This initially raises a warning alarm, but if alarms are not downgraded with set options, a minor or major alarm is raised. There is a problem with the secondary DS1 reference. It is cleared when the secondary reference is restored. Use the recommendation for error type 1, but substitute secondary for primary.				
513	Any	None	Warning/ Major	Off	None
	Noise on the DS1 line can cause transient alarms on synchronization. Therefore, when a synchronization problem causes error type 1, 257, or 513, a warning alarm is raised for 15 to 20 minutes before it is upgraded to major or minor. This initially raises a warning alarm, but if alarms are not downgraded with set options, a minor or major alarm is raised. It indicates that the Tone-Clock circuit pack is providing the timing source for the MCU. The primary and secondary are not providing a valid timing signal. Investigate errors 1 and 257 to resolve.				
769		None	Major/ Warning	Off	None
	Major alarms may be downgraded to warning based on the setting under set options. This error should not occur, escalate it.				

Table 8-303. Synchronization Maintenance Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
1793	0 - 50	None	Major/ Warning	Off	enable sync
	It may take up to one hour for this alarm to clear due to the leaky bucket strategy. This indicates excessive switching of system synchronization references has occurred. When this happens, synchronization is disabled and the Tone-Clock circuit pack becomes the synchronization reference. To resolve the error: 1. Check for timing loops. 2. Use test tone/clock PC long to test the Tone-Clock circuit pack. 3. Check the error log for TDM-CLK errors and verify that TDM Bus Clock Test #148 passes. If it fails with error code 2 through 32, see TDM-CLK. 4. Replace the primary and secondary DS1 Interface circuit pack. 5. Check for errors logged against the primary or secondary DS1 board. See DS1-BD to resolve. 6. If there are no DS1-BD errors, enter enable sync and wait for two to five minutes for the primary sync source to come on-line. 7. If the problem persists, escalate it.				
2049	0	None	Warning	Off	None
	1. Check for timing loops. 2. Use test tone/clock P long to test the Tone-Clock circuit pack. 3. Check the error log for TDM-CLK errors and verify that the TDM Bus clock test passes. If it fails with error codes 2 through 32, refer to TDM-CLK. 4. If the synchronization reference is a Tone-Clock circuit pack and TDM Bus Clock test #150 fails, see TDM-CLK to replace the Tone-Clock circuit pack. 5. If the system synchronization reference is a DS1 Interface circuit pack, and TDM Bus Clock test #150 fails, the primary or secondary synchronization references are not providing valid timing signals. Check the system synchronization references administered and follow the steps under error type 1 (for primary) or error type 257 (for secondary). 6. If the problem persists, replace the Tone-Clock circuit pack. See TDM-CLK. 7. If the problem continues after you replace the circuit pack, escalate it.				
2305	0	None	Warning	Off	None
	The slave Tone-Clock circuit pack is experiencing loss of signal. See error type 2305 for resolution.				

Craft-Demanded Tests

The following test helps inspect errors in the system

Table 8-304. System Technician-Demanded Tests: SYS-LINK

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Test Synchronization Test #417	Short	Long	No

Test Synchronization Test #417

This test updates all the synchronization maintenance component circuit packs with the correct information regarding their role in providing synchronization for the MCU. All the Tone-Clock and DS1 Interface circuit packs are updated via this test. This test always passes without error.

Table 8-305. Test Synchronization Test #417

Error Code	Test Result	Description Recommendation
	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, follow normal escalation procedures.
	PASS	The synchronization maintenance component circuit pack parameters have been successfully updated. The MCU should be synchronized after successful execution of this test. If synchronization problems persist, refer to the error log to obtain information about the source of the problem.

SYS-LINK (System Links)

MO Name (in Alarm Log)	Alarm Level	Initial System Technician Command to Run	Full Name of MO
SYS-LINK	WARNING	test sys-link PCSSpp	SYSTEM LINKS

System links are packet links that originate at the Packet Interface circuit pack and traverse various hardware components to specific endpoints. The hardware components involved on the forward and reverse routes can be different based on the configuration and MCU administration. The MCU supports the ISDN-PRI D-Channel link terminating at a Universal DS1 circuit pack.

Recording System Link Events

The system links maintenance object is used to record all errors encountered on the links. Most of these events are not extra-ordinary unless they occur with an alarming frequency. The events are logged as they occur and leave a trail that helps to analyze abnormal behavior exhibited by either the endpoints that are attached to the links or the links themselves.

When a link goes down, a WARNING alarm is raised immediately. Other alarming conditions that do not cause the link to go down also get a WARNING alarm.

Identifying a System Link

To trace problems associated with a system link, it is necessary to find the link's location. A PRI link can be uniquely identified by its endpoints.

Display Errors/Alarms

The output of the **display errors** or **display alarm** commands shows the location of the system link for entries with a Maintenance Name of SYS-LINK. You can restrict the scope of the output of these commands by specifying category **sys-link** on the input form. The link type is listed under the *Alt Name* field.

Common Procedure for Repairing Link Problems

The state of a system link is dependent on the state of the various hardware components over which it travels. To resolve any problems associated with a system link, use the following procedure.

The MCU maintains a "hardware path," which is a list of hardware components over which the link travels. There are two hardware paths for each of the system links: the current hardware path and the faulted hardware path. The current hardware path is present only for those links that are currently up. Whenever a link is down, the current hardware path is empty. The faulted hardware path is always present once the link has gone down, and it is *not cleared when the link subsequently recovers.* The faulted path preserves the path that the link traversed when it last went down. The time at which the faulted path was last recorded is preserved, and it is accessible through the **list signal-group, status signal-group x *(1-30)*,** and **status packet-control** commands. Therefore, the focus of attention for problems that do not involve a link that is down is the current hardware path. If the link is down, the faulted hardware path is the focus of attention.

When all the components are alarm free, wait three minutes to allow the links to recover. Test the system link through **test signal-group x *(1-30)* long clear** and notice any tests that fail. If any failures are found, fix the problems indicated by the tests and repeat the procedure.

Error Log Entries and Test to Clear Values

Table 8-306. SYS-LINK Error Log Entries

Error Type	Aux Data	Associated Test	Alarm Level	On/Off Board	Test to Clear Value
13 (a)		System Link Status (985)	WARNING	OFF	
	Indicates that the link went down. The link may have gone down or have never come up. Enter the **status signal-group *(1-30)*** command. Follow the Common Procedure described earlier in this section. Wait three minutes before checking the link state. Repeat the procedure until there are no problems with the components.				
257 (b)			WARNING	OFF	test sys-link PCSSpp l cl
	Indicates that the link has experienced uplink flow control. Manifest effect of this error is that the end-point may be hyperactive. The system link is alarmed if four or more errors of this type are detected within 10 minutes. To correct the problem, follow the Common Procedure described previously. Clear errors and wait 10 minutes.				
513 (c)			WARNING	OFF	test sys-link PCSSpp l cl
	Indicates that the link has experienced downlink flow control. Manifest effect of this error is that some information packets from the Packet Interface circuit pack have been lost. The link is reset on first occurrence; therefore, Error 1025 will also be logged. The system link is alarmed if two or more errors of this type are detected within ten minutes. To correct the problem, follow the Common Procedure described previously. Clear errors and wait 10 minutes.				
772 (d)			WARNING	OFF	test sys-link PCSSpp l cl
	Indicates that the link experienced a temporary disconnect due to excessive resets or state transitions. Manifest effect of this error is that the link is taken down and then brought up again. The system link is alarmed if two or more errors of this type are detected within 10 minutes. To correct the problem, follow the Common Procedure described previously. Clear errors and wait 10 minutes.				
1025 (e)			WARNING	OFF	test sys-link PCSSpp l cl
	Indicates that the link has been reset. Manifest effect of this error is that information packets queued at the time of reset have been lost. The system link is alarmed if 20 or more errors of this type are detected within 10 minutes. To correct the problem, follow the Common Procedure described previously. Clear errors and wait 10 minutes.				

Table 8-306. SYS-LINK Error Log Entries — *Continued*

Error Type	Aux Data	Associated Test	Alarm Level	On/Off Board	Test to Clear Value
1281 (f)			WARNING	OFF	test sys-link PCSSpp l cl
	Indicates that the link has experienced a slow transmit rate because the remote endpoint is busy. Manifest effect of this error is that the end-point location may experience slower throughput rate and/or noisy transmission. The system link is alarmed if four or more errors of this type are detected within 10 minutes. To correct the problem, ensure that the remote endpoint is functioning properly. If the problem persists, follow the Common Procedure described previously. Clear errors and wait 10 minutes.				
1537 (g)			WARNING	OFF	test sys-link PCSSpp l cl
	Indicates that the link has experienced a slow transmit rate due to excessive retransmission. Possible causes for this error may be that the MCU is overrunning the endpoint or that the endpoint is sick. Manifest effect of this error is that the endpoint location may experience slower throughput rate. The system link is alarmed if four or more errors of this type are detected within 10 minutes. To correct the problem, follow the Common Procedure described previously. Clear errors and wait 10 minutes.				
1793 (h)			WARNING	OFF	test sys-link PCSSpp l cl
	Indicates that the link has experienced a slow transmit rate due to unknown causes. Manifest effect of this error is that the endpoint location may experience slower throughput rate and the Packet Interface circuit pack may experience backup or congestion. The system link is alarmed if four or more errors of this type are detected within 10 minutes. To correct the problem, follow the Common Procedure described previously. Clear errors and wait 10 minutes.				
2049 (i)			WARNING	OFF	test sys-link PCSSpp l cl
	Indicates that the link has transmitted an excess number of packets. The transmit buffers of this link have been purged. The system link is alarmed if four or more errors of this type are detected within 10 minutes. To correct the problem, follow the Common Procedure described previously. Clear errors and wait 10 minutes				

8 SYS-PRNT (System Printer)

The report scheduler feature provides the capability to schedule selected administration commands to be printed by an asynchronous system printer (SYS-PRNT) or sent to a personal computer (PC). The system printer link to this external device can be administered either as a data extension or to the EIA port on the Processor (PROCR) circuit pack, which provides a standard EIA 232C interface.

Alarm Level	Initial Craft Command to Run
Minor	test sp-link l
Warning	release sp-link

System printer link maintenance provides a strategy for maintaining the link between the system and an external SYS-PRNT output device. The strategy includes a set of tests for detection of errors during normal operation, troubleshooting actions, and alarms for serious problems. System printer link maintenance uses a try-and-wait mechanism for maintaining the SYS-PRNT link. If the link setup fails, a minor alarm is raised for service attention. A warning alarm is raised when the SPE has been busied out.

A maximum of two link retry attempts is made. After the second attempt, set-up attempts are made only by the application software (that is, the 15-minute timer fires and jobs are printed unless an immediate job was entered). After two unsuccessful attempts to establish the link, a minor alarm is raised for service attention. If the system printer link is torn down due to an error, system printer link maintenance raises a minor alarm but does not attempt to bring up the system printer link.

The following physical configurations are supported for the system printer link:

— from the EIA port on the Processor circuit pack to a SYS-PRNT output device via the standard EIA 232C interface

— from a data channel (DATA-CHL) on the Netpkt Interface circuit pack (DATA-BD) to a data extension where the SYS-PRNT output device connects via the standard EIA 232C interface

The data extension (an MPDM) connects to a digital line (DIG-LINE) on the TN754C Digital Line circuit pack (DIG-BD).

System printer link maintenance does not cover the elements comprising the SYS-PRNT physical link; that is, the external SYS-PRNT output device, the EIA port on the Processor circuit pack, the data module (MPDM), the TN754C Digital Line circuit pack, and the data channels on the TN794 Netpkt Interface circuit pack. If system printer link maintenance cannot restore the system printer link, the

maintenance tests of these individual components of the system printer link must be executed to diagnose faults.

Restoring the System Printer Link

Use the following procedures to restore the system printer link:

1. Use **status sp-link** to determine the status of the system printer link. Be sure the link is not busied out for service. (**No** is entered in the *Maintenance Busy* field on the System Printer Link Status form.) If the link has been busied out, enter **release sp-link.**
2. Use **display system feature** to determine the destination of the system printer link.
3. If the destination is an extension number, enter **status data-module <extension>** to verify the data extension is in-service/idle. If the data extension is not available, refer to the *Port/Channel Number* field on the Data-Module Status form.
4. Look for errors and alarms on the circuit pack with which this extension is associated.
5. If the destination is *eia*, look for PR-MAINT errors in the error log. (See PR-MAINT.) Skip to Step 8.
6. Determine if a data channel on the Netpkt Interface circuit pack is in service/idle as follows:
   A. Use **list data-module** to find out the extension numbers of the data channels on the Netpkt Interface circuit pack. (There are up to eight such numbers. They are listed as “netcon” on the SPE.)
   B. Enter **status data-module <extension>** to verify at least one active data channel is in service/idle.
7. If four data channels are administered and none are available, look for DATA-CHL, DATA-CON, or DATA-BD errors in the error log. If errors are present, refer to the appropriate MO for details. After resolving these errors, go to Step 8.
8. If fewer than four data channels are administered, use **add data-module** to add a Netpkt Interface data module to the system.
9. Make sure the SYS-PRNT output device is on line and ready for service. Check the physical connectivity between the data module and the SYS-PRNT output device or between the EIA port on the backplane of the MCU and the SYS-PRNT output device.
10. Make sure there are fewer than three active logins to the MCU. If this condition exists, a login session must be terminated before the system printer link can be established.
11. If the system printer link cannot be restored, escalate the problem.

NOTE:
It is recommended that the system printer link be busied out before executing maintenance tests over objects that comprise the system printer link. If the system printer link is busied out, all system printer link maintenance actions are deactivated.

Hardware Error Log Entries

The following table shows the error log entries and related information.

Table 8-307. SYS-PRNT Maintenance Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	test sp-link
	Run the short test sequence first. If all tests pass, run the long test sequence. Refer to the appropriate test description.				
18	0	Any	Warning	Off	release sp-link
	The system printer link has been busied out by craft.				
257	1 - 6	#215	Minor/ Warning	Off	test sp-link l
	A failure occurred when attempting to set up the SYS-PRNT. This could have been initiated by either the report scheduler software or link maintenance (automatic link retry or test #215 request). The Aux Data field means: 1 = unavailable system resources (too many logins). 2 = no data channels (DATA-CHL) available on the Netpkt Interface circuit pack (DATA-BD). 3,4 = timeout during setup attempt; probably due to problem with physical link or printer status. 5 = internal system error, most likely temporary/sporadic failure. 6 = the data module the printer is trying to use is busy with another call. Use status data module to determine when the port is available for testing. See “Restoring the System Printer Link” earlier in this section for details. Minor alarms may be downgraded to warning based on the setting of set options.				

Table 8-307. SYS-PRNT Maintenance Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
513	0	None	Minor	Off	test sp-link
	SYS-PRNT was interrupted because of one of these reasons: — cable to the output device is disconnected; — output device is powered off; — data extension for output device is busied out; — internal software error. Check the connectivity of the wires and cables among the wall jacket, data module, and output device. See “Restoring the System Printer Link” procedures earlier in this section.				

Craft-Demanded Tests

When inspecting errors in the system and deciding which ones to address, always investigate errors in the order they are presented in the following table. By clearing errors associated with the Link Retry test, for example, you may also clear errors generated from other tests in the testing sequence.

Table 8-308. System Technician-Demanded Tests: SYS-PRNT

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Link Tear Down Test #213	Long		Yes
Link Retry Test #215	Short	Long	No

Link Tear Down Test #213

This test is destructive. It disconnects the existing link between the MCU and the external SYS-PRNT output device. If the link has already been disconnected, this test just returns PASS. All resources allocated for a system printer link are released after this test.

Table 8-309. Link Tear Down Test #213

Error Code	Test Result	Description Recommendation
40	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to two times. 2. If the test continues to abort, escalate the problem.

Table 8-309. Link Tear Down Test #213

Error Code	Test Result	Description Recommendation
50	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to two times. 2. If the test continues to abort, escalate the problem.
1010	ABORT	The system printer link has been busied out. 1. Enter release sp-link to release the link from the busied-out state. 2. Reenter the command to execute the test.
	FAIL	Internal system error. 1. Retry the command at one-minute intervals up to two times. 2. If the test continues to abort, escalate the problem.
	PASS	The system printer link is torn down or a short test sequence was executed and the link was not torn down.

Link Retry Test #215

The Link Retry test sends a message to the SYS-PRNT software process either to make a data call to the data extension to which the SYS-PRNT output device connects or to open the EIA port to the SYS-PRNT output device. If the system printer link is already up, this test passes without making a data call or opening the EIA port.

Table 8-310. Link Retry Test #215

Error Code	Test Result	Description Recommendation
10	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to two times. 2. If the test continues to abort, escalate the problem.
20	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to two times. 2. If the test continues to abort, escalate the problem.
30	ABORT	Internal system error. Refer to “Restoring the System Printer Link” for maintenance procedures.
1010	ABORT	The system printer link has been busied out. 1. Enter release sp-link to release the link from the busied-out state. 2. Reenter the command to execute the test.
	FAIL	The system printer link cannot be established. Refer to “Restoring the System Printer Link” for maintenance procedures.

Table 8-310. Link Retry Test #215

Error Code	Test Result	Description Recommendation
	PASS	The system printer link is up.

SYSTEM (System)

SYSTEM has only errors associated with it and thus appears only in the error log and not in the alarm log. No tests can be run with SYSTEM.

SYSTEM is generally used to log errors:

- when software encounters a problem with either hardware or itself and requests a restart to clear the problem. For example, if there is a loss of clock in the MCU, the MCU asks for a **reset system 2**.
- that cannot be associated with any single process.

These errors are more for use by software developers in debugging restarts than in pointing to current problems. This should not be considered a problem with the MCU. The Initcauses log should also confirm that a software-requested restart was performed.

Hardware Error Log Entries

The *Aux Data* field may be **0** or the return code from a bad software call, and the following examples in no way address all the possibilities. Often, two errors are logged simultaneously for each problem

Table 8-311. System Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	None
	Run the short test sequence first. If all tests pass, run the long test sequence. Refer to the appropriate test description.				
8	0	None			
	A System Restart Level 3 was requested.				
9	Any	None			
	A System Restart Level 2 was requested. This can happen due to a loss of tones (due to a faulty Tone-Clock circuit pack).				
10	Any				
	A System Restart Level 1 was requested.				

Table 8-311. System Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
21		None			
	A process trapped.				
355	Any	None			
	A Restart Level 2 occurred due to a power loss.				
356	Any	None			
	A Restart Level 2 occurred due to a tone clock loss.				
601		None			
	An error occurred during initialization.				
602		None			
	An error occurred while loading translations and the MCU requested a Restart Level 3.				
603		None			
	A process was reset.				

TBRI-BD (TN2185 ISDN Trunk-Side BRI)

MO Name (in Alarm Log)	Alarm Level	Initial Command to Run*	Full Name of MO
TBRI-BD	MINOR	test board PCSS l r#	TBRI-BD

* Where P is the port network number (1), C is the carrier designation (A, B, C, D, or E), and SS is the carrier slot address where the circuit pack is located (1, 2, and so forth).

The TN2185 circuit pack contains eight, 4-wire ports that interface to the network at the ISDN S/T reference point over two 64 kbps channels (B1 and B2) and over a 16Kb/s signaling (D) channel. The B1 and B2 channels can be simultaneously circuit switched, or individually packet switched. Only one channel per trunk can be packet switched due to Packet Processing Element (PPE) limitations. The D-channel is either circuit switched or packet switched. Packet switching uses the PPE to combine all D-channels into a single physical channel, which is then routed via the concentration highway to the Netpkt Interface Element (NCE) and then to the TDM bus. The circuit-switched connections have a Mu-law or A-law option for voice and operate as 64Kb/s clear data channels. The packet-switched channels support the LAPD protocol and conform with the CCITT Q.920 Recommendations for D-channel signaling.

LEDs

The three LEDs on the circuit pack's faceplate indicate board status. When illuminated, the red LED indicates a board failure or a major or minor on-board alarm, the green LED indicates that testing is in progress, and the amber LED indicates that the board is in use.

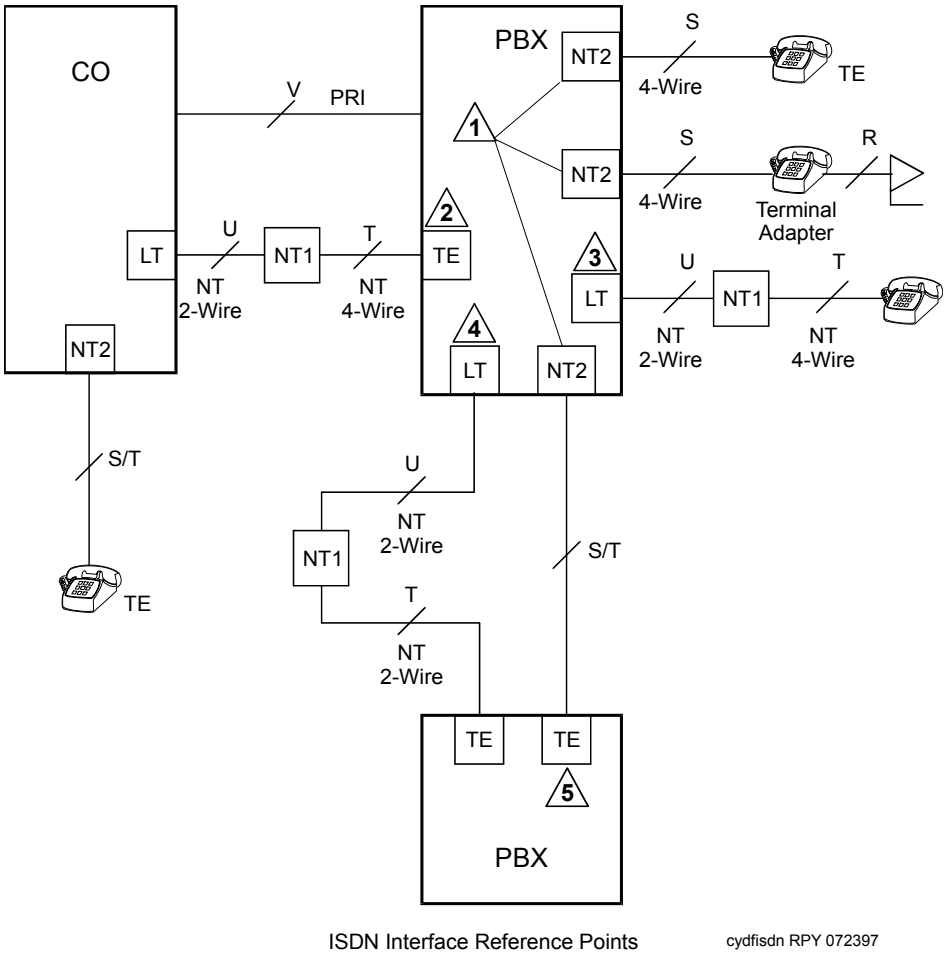


Figure 8-48. Integrated Trunk-Side BRI, ISDN Interface Reference Points

ISDN Interface Reference Point definitions:

LT	Logical Terminal
V	Primary Rate user/network (asymmetrical) trunk interface. The ECS is capable of acting as the user or as the network side of this 1.544 - or 2.048-MB interface.
R	Interface between Terminal Equipment and Network Termination
S	Basic Rate network-side 4-wire line interface
S/T	4-wire Basic Rate connection to a Network Termination*.
T	4-wire Basic Rate interface to a Network Termination.†
TE	Terminal Equipment
U	Basic Rate network-side 2-wire line interface.
1	TN556B ISDN-BRI 4-Wire S/T-NT Line (A-law)
2	TN 2185 ISDN-BRI 4-Wire S Interface (Trunk Side)
3	TN2198 ISDN-BRI 2-Wire U Interface
4	TN2198 ISDN-BRI 2-Wire U Interface
5	TN 2185 ISDN-BRI 4-Wire S Interface (Trunk Side)

* Network Termination 2 (NT2), that terminates Layer 1 and higher layers. PBXs, LANs, and terminal controllers typically provide NT2 functionality including protocol handling and multiplexing for Layers 2 and 3.

† Network Termination 1 (NT1), that terminates Layer 1 and monitors maintenance, performance, timing, power transfer, multiplexing, and multi-drop termination with contention resolution.

Hardware Error Log Entries and Test to Clear Values

Table 8-312. TBRI-BD Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	test board PCSS sh r 1
	Run the Short Test Sequence first. If all tests pass, run the Long Test Sequence. Refer to the appropriate test description and follow the recommended procedures				
1	Any	None	MINOR	ON	
	The circuit pack stopped functioning or is physically removed from the system. **Note**: This alarm logs approximately 11 minutes after removing the circuit pack and/or the SAKI Sanity Test (#53) fails. If the circuit pack is not in the system, insert a circuit pack in the same slot as the error indicates. See error 1294.				
257	65535	Control Channel Loop Test (#52)	MINOR	ON	test board PCSS r 20
	Transient communication problems between the switch and this circuit pack. Execute the **test board PCSS** command and refer to the repair procedures for the Control Channel Loop Around Test (#52).				
513	4352 - 4357		None	ON	
	On-board hardware failure. Aux data values correspond to the following detected errors: 4352 External RAM error 4353 Internal RAM error 4355 ROM Checksum error 4357 Instruction set error Reset the circuit pack with the **busyout board PCSS** and **reset board PCSS** commands. When reset, the circuit pack executes a set of tests to detect the presence of any of the faults listed above. Detection of one of these errors during initialization causes the circuit pack to lock-up and appear insane to the system. See the repair procedure in Error type 1.				
769	4358				
	The circuit pack detects a program logic error. While no action is required, this error can lead to other errors against this circuit pack.				

Table 8-312. TBRI-BD Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
1025	4363	NPE/NCE Audit Test (#50)	None	ON	
	The circuit pack cannot update and read back NPE/NCE memory. This error can be ignored, but may lead to other errors against this circuit pack.				
1291	4359	Clear Error Counters (#270)	MINOR	ON	
	The TN2185 board notifies maintenance software that it has detected a parity error while accessing its dynamic RAM (that stores the board's translation information and downloadable application firmware). Maintenance software resets the circuit pack.				
1294	46088 - 46096	SAKI Sanity Test (#53)	MINOR	ON	
	Unable to write LAN Translation RAM Error (internal memory access error). Translation RAM locations for the call connection attempt are not available, and one or more RAM locations are bad due to a translation RAM read-back error. Reset the circuit pack with the **busyout board PCSS** and **reset board PCSS** commands. If the Circuit Pack Restart Test (#594) passes, then the on-board circuitry is healthy. Retire the alarm with the **test board PCSS long clear** command. If the Circuit Pack Restart Test (#594) fails, replace the circuit pack.				
1537	46082		MINOR	ON	
	Frame overrun at Packet Bus interface. Due to an on-board fault or by faulty data received on one of the circuit pack's external ports. If any of the ports on this circuit pack is alarmed, refer to the repair procedures for those maintenance objects. If this error persists, maintenance software removes the board from service; replace the circuit pack.				

Table 8-312. TBRI-BD Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
1793	46080		MINOR	ON	
	The circuit pack is having problems transmitting/receiving data to/from the Packet Bus. 1793: Parity errors are detected when transmitting data to the Packet Bus. 1794: Packet Bus transmit buffers overflow. 1795: Circuit pack cannot find end of frame when transmitting to Packet Bus. Clear the alarm with: **busyout board PCSS**, **reset board PCSS**, **test board PCSS long clear**, **release board PCSS**. If the error recurs within 10 minutes, replace the circuit pack. 2306: Error in a received frame from the Packet Bus, most likely caused by a packet bus problem, but may be due to a circuit pack fault. An invalid Link Access Procedure Data (LAPD) frame error occurs if the frame contains a bad Cyclical Redundancy Check (CRC). If bus parity errors occur, run the LAN Receive Parity Error Counter Test (#595) to determine if the condition has cleared. Refer to the maintenance documentation to determine if the problem is isolated to this circuit pack or is caused by Packet Bus faults. If there are no Packet Bus alarms, reset the circuit pack with the **busyout board PCSS** and **reset board PCSS** commands. If the Circuit Pack Restart Test (#594) passes, then the on-board circuitry is healthy. Retire the alarm with the **test board PCSS long clear** command. If the Circuit Pack Restart Test (#594) fails, replace the circuit pack.				
1794	46094		MINOR	ON	
	The circuit pack is having problems transmitting/receiving data to/from the Packet Bus. 1793: Parity errors are detected when transmitting data to the Packet Bus. 1794: Packet Bus transmit buffers overflow. 1795: Circuit pack cannot find end of frame when transmitting to Packet Bus. Clear the alarm with: **busyout board PCSS**, **reset board PCSS**, **test board PCSS long clear**, **release board PCSS**. If the error recurs within 10 minutes, replace the circuit pack. 2306: Error in a received frame from the Packet Bus, most likely caused by a packet bus problem, but may be due to a circuit pack fault. An invalid Link Access Procedure Data (LAPD) frame error occurs if the frame contains a bad Cyclical Redundancy Check (CRC). If bus parity errors occur, run the LAN Receive Parity Error Counter Test (#595) to determine if the condition has cleared. Refer to the maintenance documentation to determine if the problem is isolated to this circuit pack or is caused by Packet Bus faults. If there are no Packet Bus alarms, reset the circuit pack with the **busyout board PCSS** and **reset board PCSS** commands. If the Circuit Pack Restart Test (#594) passes, then the on-board circuitry is healthy. Retire the alarm with the **test board PCSS long clear** command. If the Circuit Pack Restart Test (#594) fails, replace the circuit pack.				

Table 8-312. TBRI-BD Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
1795	46085		MINOR	ON	
	The circuit pack is having problems transmitting/receiving data to/from the Packet Bus. 1793: Parity errors are detected when transmitting data to the Packet Bus. 1794: Packet Bus transmit buffers overflow. 1795: Circuit pack cannot find end of frame when transmitting to Packet Bus. Clear the alarm with: **busyout board PCSS**, **reset board PCSS**, **test board PCSS long clear**, **release board PCSS**. If the error recurs within 10 minutes, replace the circuit pack. 2306: Error in a received frame from the Packet Bus, most likely caused by a packet bus problem, but may be due to a circuit pack fault. An invalid Link Access Procedure Data (LAPD) frame error occurs if the frame contains a bad Cyclical Redundancy Check (CRC). If bus parity errors occur, run the LAN Receive Parity Error Counter Test (#595) to determine if the condition has cleared. Refer to the maintenance documentation to determine if the problem is isolated to this circuit pack or is caused by Packet Bus faults. If there are no Packet Bus alarms, reset the circuit pack with the **busyout board PCSS** and **reset board PCSS** commands. If the Circuit Pack Restart Test (#594) passes, then the on-board circuitry is healthy. Retire the alarm with the **test board PCSS long clear** command. If the Circuit Pack Restart Test (#594) fails, replace the circuit pack.				
2305	46104		None	ON	
	Error Type (2305, 3330): A critical failure in the Circuit Pack's Packet Bus interface. Possible causes include either a Packet Bus fault or an on-board fault, for example, the board received a bad CRC or invalid DLCI. If the Packet Bus is alarmed, refer to the "*Maintenance Manual*" section for Packet Bus fault location and recommended repair procedures. The number of ISDN circuit packs displaying this error increases the probability of errors due to Packet Bus problems.				

Table 8-312. TBRI-BD Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
2306	46081		None	ON	
	The circuit pack is having problems transmitting/receiving data to/from the Packet Bus. 1793: Parity errors are detected when transmitting data to the Packet Bus. 1794: Packet Bus transmit buffers overflow. 1795: Circuit pack cannot find end of frame when transmitting to Packet Bus. Clear the alarm with: **busyout board PCSS**, **reset board PCSS**, **test board PCSS long clear**, **release board PCSS**. If the error recurs within 10 minutes, replace the circuit pack. 2306: Error in a received frame from the Packet Bus, most likely caused by a packet bus problem, but may be due to a circuit pack fault. An invalid Link Access Procedure Data (LAPD) frame error occurs if the frame contains a bad Cyclical Redundancy Check (CRC). If bus parity errors occur, run the LAN Receive Parity Error Counter Test (#595) to determine if the condition has cleared. Refer to the maintenance documentation to determine if the problem is isolated to this circuit pack or is caused by Packet Bus faults. If there are no Packet Bus alarms, reset the circuit pack with the **busyout board PCSS** and **reset board PCSS** commands. If the Circuit Pack Restart Test (#594) passes, then the on-board circuitry is healthy. Retire the alarm with the **test board PCSS long clear** command. If the Circuit Pack Restart Test (#594) fails, replace the circuit pack.				
3330	46083		MINOR	OFF	
	Error Type (2305, 3330): A critical failure in the Circuit Pack's Packet Bus interface. Possible causes include either a Packet Bus fault or an on-board fault, for example, the board received a bad CRC or invalid DLCI. If the Packet Bus is alarmed, refer to the "*Maintenance Manual*" section for Packet Bus fault location and recommended repair procedures. The number of ISDN circuit packs displaying this error increases the probability of errors due to Packet Bus problems.				
3586			MINOR	OFF	
	The SPE software detects an excessive number of up-link messages from the TN2185 board within a certain time period. To prevent the faulty board from flooding the switch with data, the MCU software takes the board out of service and alarms it. The MCU software also tells the Archangel to ignore up-link messages from the board. When the board is alarmed due to this error, the MCU software periodically puts the board back in service and tells the Archangel to process up-link messages from the board. If the problem still exists, the software takes the circuit pack out of service again. If the circuit pack does not exhibit the problem for a certain time period, then maintenance software resolves the alarm and the circuit pack is left in service.				
3840	4096 - 4101				
	The circuit pack received an inconsistent down-link message (a bad header, port number, data, subqualifier, or logical link) over the Control Channel.				

Table 8-312. TBRI-BD Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
3842	46095				
	The board is receiving data from the bus faster than it can distribute the data to its endpoints, causing the FIFO RAM buffer to overflow. This error can occur occasionally due to the statistical sizing of the buffers. If it occurs frequently, it may indicate a LAPD parameter mismatch. LAPD should recover from this problem, but it may degrade the performance of the LAN bus. When this error is reported, maintenance reads and clears the board counter and logs the problem in the maintenance error log.				
3843	46097				
	Bad translation RAM detected, but the call continues by using another translation location. The circuit pack reports this error when it cannot update NPE/NCE memory and read it back. This error is not service-affecting and can be ignored, but can lead to other types of errors against this circuit pack.				

System Technician-Demanded Tests: Descriptions and Error Codes

When inspecting errors in the system, always investigate tests in the order listed below. By clearing error codes associated with the *Control Channel Loop Around Test,* for example, you may also clear errors generated from other tests in the testing sequence

Table 8-313. System Technician-Demanded Tests: TBRI-BD

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Control Channel Loop-Around Test (#52)	Short	Long	No
NPE/NCE Audit Test (#50)	Long		No
LAN Receive Parity Error Counter Test (#595)	Long		No

Control Channel Loop Around Test (#52)

Refer to the repair procedure described in the "XXX-BD (Common Port Circuit Pack)" section.

NPE /NCE Audit Test (#50)

Refer to the repair procedure described in the "XXX-BD (Common Port Circuit Pack)" section.

SAKI Sanity Test (#53)

This test is destructive.

Refer to the repair procedure described in the "XXX-BD (Common Port Circuit Pack)" section. This test is only run as a part of a reset board procedure.

LAN Receive Parity Error Counter Test (#595)

This test is nondestructive. The test reads and clears the circuit pack's LAN Receive Parity Error Counter. This counter increments when it detects a parity error from the Packet Bus. These errors may indicate problems with a circuit pack, Packet Bus, or with another circuit pack on the bus. Use this test to verify the repair.

Table 8-314. LAN Receive Parity Error Counter Test #595

Error Code	Test Result	Description / Recommendation
2000	ABORT	Response to the test was not received from the circuit pack within the allowable time period. 1. If the test aborts repeatedly a maximum of 5 times, reset the circuit pack via the busyout board PCSS and reset board PCSS commands. 2. If the test aborts again, replace the circuit pack.
2100	ABORT	Could not allocate the necessary system resources to run this test.
2012	ABORT	Internal system error. 1. Retry the command at 1-minute intervals a maximum of 5 times.
1 - 10	FAIL	The circuit pack is still detecting errors of this type. The error code indicates the value of the on-board error counter. 1. Retry the command at 1-minute intervals a maximum of 5 times. 2. If the test continues to fail, verify the validity of the Packet Bus. Run the Packet Bus maintenance test with the test pkt P long command. If any Packet Bus tests fail, refer to the "PKT-BUS (Packet Bus)" section for recommended repair procedures. 3. If the Packet Bus test passes, check the validity of the circuit pack. Execute a test that involves data transmission onto the Packet Bus. For example, the test port PCSSpp command may use the connectivity tests of the BRI-PORT maintenance object. If the test fails, refer to the repair procedures; otherwise, proceed to the next step. 4. Other circuit packs on the Packet Bus may be causing of the parity error. Use the display errors command to check the Error Log for alarmed other circuit packs. Resolve any alarms for other circuit packs as well. Rerun the LAN Receive Parity Error Counter Test (#595).
	PASS	No errors detected.

TBRI-PT (TN2185 ISDN Trunk-Side BRI Port)

MO Name (in Alarm Log)	Alarm Level	Initial Command to Run*	Full Name of MO
TBRI-PT	MAJOR	test port PCSS l r#	TBRI-PT
TBRI-PT	MINOR	test port PCSS l r#	TBRI-PT
TBRI-PT	WARNING	test port PCSS s r#	TBRI-PT

* Where P is the port network number (1), C is the carrier designation (A, B, C, D, or E), and SS is the carrier slot address where the circuit pack is located (1, 2, and so forth).

This document describes the port maintenance features of the MCU ISDN Trunk-side BRI board (TN2185). The circuit pack provides eight S/T ISDN 2B+D ports that interface to either the central office or PBX.

The TN2185 circuit pack contains eight, 4-wire ports that interface to the network at the ISDN S/T reference point over two 64 kbps channels (B1 and B2) and over a 16Kb/s signaling (D) channel. The B1 and B2 channels can be simultaneously circuit switched, or individually packet switched. Only one channel per trunk can be packet switched due to Packet Processing Element (PPE) limitations. The D-channel is either circuit switched or packet switched. Packet switching uses the PPE to combine all D-channels into a single physical channel, which is then routed via the concentration highway to the Netpkt Interface Element (NCE) and then to the TDM bus. The circuit-switched connections have a Mu-law or A-law option for voice and operate as 64Kb/s clear data channels. The packet-switched channels support the LAPD protocol and conform with the CCITT Q.920 Recommendations for D-channel signaling.

LEDs

The three LEDs on the circuit pack's faceplate indicate board status. When illuminated, the red LED indicates a board failure or a major or minor on-board alarm, the green LED indicates that testing is in progress, and the amber LED indicates that the board is in use.

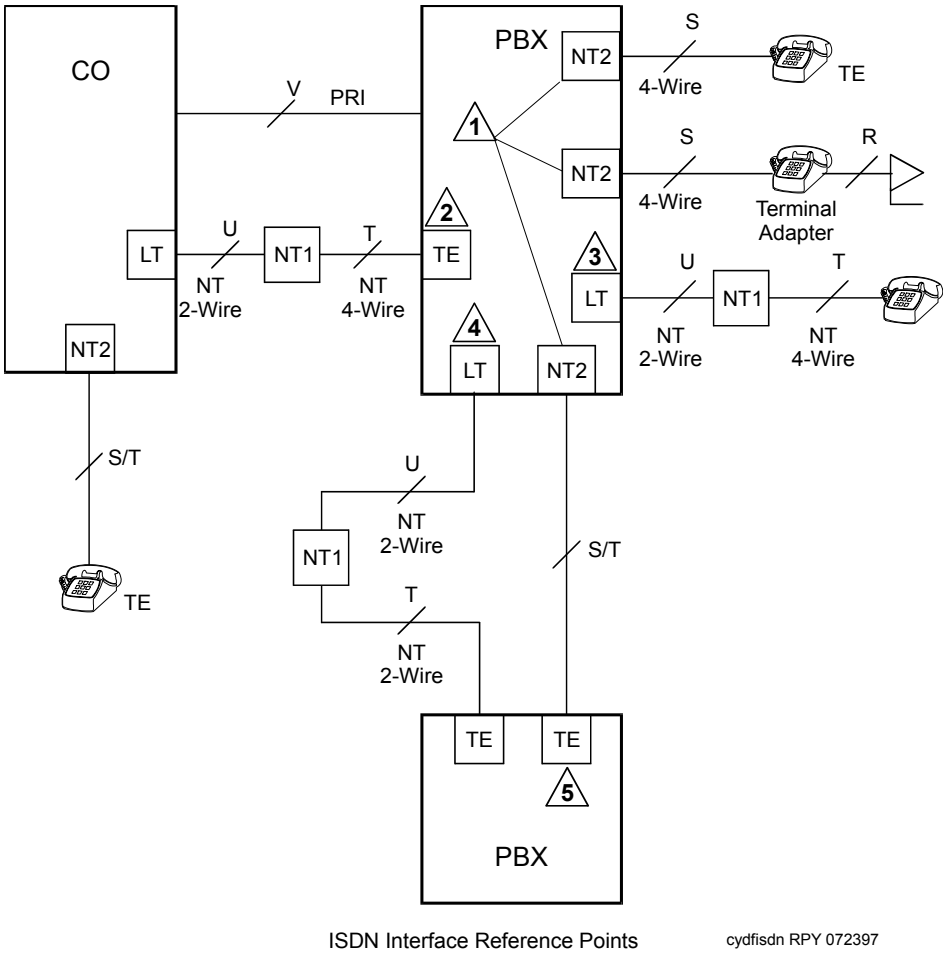


Figure 8-49. Integrated Trunk-Side BRI, ISDN Interface Reference points

ISDN Interface Reference Point definitions:

LT	Logical Terminal
V	Primary Rate user/network (asymmetrical) trunk interface. The ECS is capable of acting as the user or as the network side of this 1.544 - or 2.048-MB interface.
R	Interface between Terminal Equipment and Network Termination
S	Basic Rate network-side 4-wire line interface
S/T	4-wire Basic Rate connection to a Network Termination*.
T	4-wire Basic Rate interface to a Network Termination.†
TE	Terminal Equipment

U Basic Rate network-side 2-wire line interface.

1 TN556B ISDN-BRI 4-Wire S/T-NT Line (A-law)

2 TN 2185 ISDN-BRI 4-Wire S Interface (Trunk Side)

3 TN2198 ISDN-BRI 2-Wire U Interface

4 TN2198 ISDN-BRI 2-Wire U Interface

5 TN 2185 ISDN-BRI 4-Wire S Interface (Trunk Side)

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* Network Termination 2 (NT2), that terminates Layer 1 and higher layers. PBXs, LANs, and terminal controllers typically provide NT2 functionality including protocol handling and multiplexing for Layers 2 and 3.

† Network Termination 1 (NT1), that terminates Layer 1 and monitors maintenance, performance, timing, power transfer, multiplexing, and multi-drop termination with contention resolution.

Hardware Error Log Entries and Test to Clear Values

Table 8-315. TBRI-PT Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	test Port UCSSPP sh r 1
	Run the Short Test Sequence first. If all tests pass, run the Long Test Sequence. Refer to the appropriate test description and follow the recommended procedures				
1	0	Level 1 Status Test (#1242)	MINOR	OFF	test Port UCSSPP sh r 1
	Loss of continuity of Layer 1 to the far-end. It is assumed that Layer 1 remains active, even when both B-Channels are idle. This test determines whether Layer 1 is active or not. If Layer 1 is not active, the test attempts to activate it. If Layer 1 cannot be activated, the port is taken out of service, and the test fails.				
129					
	The far-end switch changed the ISDN service state. This may be a temporary condition				
257					
	The D-Channel failed at Layer 2. Expiration of this timer indicates that attempts to bring the failed link back into service have not succeeded and some recovery actions should be taken on the associated B-Channels. Upon expiration, associated in-service B-channels are put in the out-of-service/far end state.				

Table 8-315. TBRI-PT Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
513	46222	XMIT FIFO Overflow	MINOR	ON	test Port UCSSPP sh r 1
	Error Type (513): On-board hardware failure. The FIFO RAM buffers have overflowed, indicating a hardware problem.				
514		XMIT FIFO Overflow (TDM)	MINOR	ON	
	Error Type (514): Transmit FIFO Overflow - This error indicates that the circuit pack is having problems transmitting data to the TDM D-Channel. This error only occurs only in a system that switches the packet implementation of the D-channel over the TDM Bus. This error indicates an on board problem related to the packet implementation of the D-Channel (R6.2 and higher).				
769		Traffic Hyperactivity	MINOR	OFF	
	Error Type (769): The port is generating too many uplinks. The link is being suspended.				
1025					
	Error Type (1025): An expired timer has created an unexpected event. The timer could be any of the following: **Timer - Event** T3031 - ISDN T3031 timeout T3032 - ISDN T3032 timeout T305 - ISDN T305 timeout T3081 - ISDN T3081 timeout T3082 - ISDN T3082 timeout TL3 - Status Inquiry T304 - Setup ACK T310 - Call Proceeding Receive T313 - Connect SEND				
1281		NPE Crosstalk Test (#617)	MINOR	ON	
	Error Type (1281): This error occurs when the NPE Crosstalk Test (#617) has failed. The test will be repeated every 15 minutes until it passes. Follow normal trouble shooting procedures for NPE Crosstalk Test (#617). If this does not fix the problem, follow normal escalation procedures.				

Table 8-315. TBRI-PT Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
1537	46210	CRC error (D-Channel)	MINOR	OFF	
	Error Type (1537): The board received a bad Cyclical Redundancy Check (CRC) over the D-Channel. This error is reported on a per-port basis. When the CRC errors exceed 5 within 15 minutes, the port is taken out of service for 5 seconds. If 5 more CRC errors are received within 15 minutes of the first set of 5 errors, the port is taken out of service for 1 minute. If 5 more CRC errors are received within 15 minutes of the previous 5, the port is taken out of service for 15 minutes. This error is most likely due to a problem with backplane wiring, a noise source, or no termination (an open circuit). It usually does not indicate a problem with the circuit pack. 1. Check the backplane wiring. 2. If the problem persists escalate the problem.				
1538		CRC error (TDM D-Channel)	MINOR	OFF	
	Error Type (1538): This error occurs when a frame with a bad CRC is received by the BRI trunk board. This error only occurs on a system that switches the packet implementation of the D-channel over the TDM bus. This error indicates an off board problem related to the packet implementation of the TDM D-Channel.				
1793		BRI Port Local TDM Looparound Test (#619)	MINOR	ON	
	Error Type (1793): The BRI Port Local TDM Loop Around Test (#619) failed. Run the Long Test Sequence paying particular attention to the results of the BRI TDM Port Loop Test (#619).				
2049			MINOR	OFF	
	Error Type (2049): The Layer 2 Link Query failed. The test is repeated every 15 minutes until it passes.				
2305		Layer 3 Query (#1243)	MINOR	OFF	
	Error Type (2305): The Remote Layer 3 Query failed. The test is repeated every 15 minutes until it passes.				
3073		Slip Query Test (#1244)	MINOR	OFF	
	Error Type (3073): A frame of information had to be repeated or deleted. Slips usually occur when the received bit rate is not synchronized with the TDM Bus clock.				

Table 8-315. TBRI-PT Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
3585		Receive FIFO Overflow (TDM D-Channel)	Log Only	ON	
	Error Type (3585): The circuit pack detected an overflow of its receive buffers. This error occurs only a system that switches the packet implementation of the D-Channel over the TDM bus. This error indicates an on board problem related to the packet implementation of the TDM D-Channel.				
3586					
	Error Type (3586): Each port can support up to three Terminal Endpoint Identifiers (TEIs). Each channel on the port can request a TEI assignment from the switch if it supports ISDN-BRI TEI assignment procedures. If switch services gets a request for a fourth TEI on a port, it reports this event to maintenance software and initiates TEI check procedures on the port. Check to see if the correct number of channels are administered for this port. The user side supports automatic TEI assignment by the network. Both fixed and automatic TEI assignment are supported on the network side.				
3587					
	Error Type (3587)Service Profiler IDentifier (SPID) value is invalid or is a duplicate of another SPID that is already initialized at Layer 3 on the port. SPIDs are not used on the TN2185 circuit pack. However there will be related events.				
3588	46223				
	Error Type (3588): The board receives D-Channel data from the bus faster than it can process the data. The FIFO RAM buffers overflowed. This error occurs occasionally due to the statistical sizing of the buffers; however, frequent occurrences may indicate a LAPD parameter mismatch between the two endpoints of a packet-switched connection. Run the Long Test Sequence paying particular attention to the results of the Receive FIFO Overflow Test (#625).				
3589					
	Error Type (3589): The BRI Port Local LAN Loop Around Test (#618) failed. Run the Long Test Sequence and pay particular attention to the results of Test #618.				
3590	46211				
	Error Type (3590): An activated BRI port receives a frame containing a DLCI over a D-Channel for which it does not have a translation. This error normally indicates an off-board problem related to a state mismatch between the far-end and the switch. This error is logged only.				
3591					
	Error Type (3591): The port is generating too many uplinks and is taken out of service.				

Table 8-315. TBRI-PT Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
3592					
	Error Types (3841-3942): The following list contains the received ISDN cause values for Errors 3841-3942 that are recorded in the hardware error logs. Unless otherwise stated, the cause values are D-Channel events. The aux data field shows which port caused the error. **Value - Type of Problem - Meaning** 2 - admin- No route to specific transit network 3 - admin - No route to destination (or Germany bcap not imp) 6 - admin - Channel unacceptable 18 - switch problems - No user responding 38 - switch problems - Network failure 50 - subscription - Requested facility not subscribed 52 - admin - Outgoing calls barred 54 - admin - Incoming calls barred 62 - subscription - Service not authorized 63 - admin/sub - Service/option not available 65 - admin/sub - Bearer capability not implemented 66 - admin/sub - Channel type not implemented 69 - admin/sub - Requested facility not implemented 70 - admin/sub - Only restricted digital BC available 79 - admin - Service/option not implemented 88 - admin - Incompatible destination 102 - switch problems - Recovery on timer expired				
3841 - 3942					

System Technician-Demanded Tests: Descriptions and Error Codes

When inspecting errors in the system, always investigate tests in the order listed below. By clearing error codes associated with the *Control Channel Loop Around Test,* for example, you may also clear errors generated from other tests in the testing sequence

Table 8-316. System Technician-Demanded Tests: TBRI-PT

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
BRI Local LAN Port Loop Around Test (#618)	Long		Yes
BRI TDM Port Loop Around Test (#619)	Long		Yes
L1 State Query Test (#1242)	Short	Long	Yes
CRC Error Counter Test (#623)	Long		No
Receive FIFO Overflow Test (#625)	Long		No
Layer 3 Query Test (#1243)	Long		No
Slip Query Test (#1244)	Short	Long	No
Clear Error Counters Test (#270)	Short	Long	No
NPE Crosstalk Test (#617)	Long		Yes

Clear Error Counters Test (#270)

This test is nondestructive.

This test clears the various error counters associated with each TBRI-PT. This test passes if maintenance software is able to successfully send the downlink messages; the test aborts otherwise.

Table 8-317. Clear Error Counters Test #270

Error Code	Test Result	Description / Recommendation
Any	ABORT	Maintenance could not send the downlink message.
None	PASS	The message to clear the error counters of the TBRI-PT maintenance object has been sent.

NPE Crosstalk Test (#617)

This test is conditionally destructive.

One or more NPEs reside on each circuit pack with a TDM Bus interface. The NPE controls port connectivity and gain and provides conferencing functions on a per-port basis. The NPE Crosstalk Test verifies that this port's NPE channel talks on the selected time slot and never crosses over to time slots reserved for other connections. If the NPE is not working correctly, one-way and noisy connections may be observed. This test is part of a port's Long Test Sequence and takes approximately 20 to 30 seconds to complete. Crosstalk testing is performed on both B-channels (B1 and B2) associated with a BRI port. If this test fails on either channel, any channel connected to the port is taken out-of-service. This test aborts if the port and its associated channels are not in the idle state.

Table 8-318. NPE Crosstalk Test #617

Error Code	Test Result	Description / Recommendation
1000	ABORT	System resources required to run this test are not available. The port may be busy with a valid call. Use the display port PCSSpp command to determine the station extension or trunk group/member number of the port. Use the status bri-port PCSSpp command to determine the service state of the port. If the service state indicates that the port is in use, then the port is unavailable for certain tests. Wait until the port is idle before retesting. 1. If the port status is idle, then retry the command at 1-minute intervals a maximum of 5 times.
1004	ABORT	The port has been seized by a user for a valid call. Use the status bri-port command to determine when the port is available for testing. 1. Retry the command at 1-minute intervals a maximum of 5 times. 2. If the test continues to abort and the port is not in use, escalate the problem.
1005	ABORT	This test is not valid for this type of translation. Ports administered as "ASAI" or "ADJK" can not run this test, because the B-channels associated with the port are not used by ASAI or Avaya Adjunct Links. This is a normal condition.
2012	ABORT	Internal system error
2100	ABORT	Could not allocate the necessary resources to run this test. 1. Retry the command at 1-minute intervals a maximum of 5 times.
1, 2	FAIL	The NPE of the tested port was found to be transmitting in error, causing noisy and unreliable connections. Error code 1 indicates that the NPE Crosstalk Test failed on Channel B1. Error code 2 indicates that the NPE Crosstalk Test failed on Channel B2. 1. Replace circuit pack.

Table 8-318. NPE Crosstalk Test #617

Error Code	Test Result	Description / Recommendation
	PASS	The port is correctly using its allocated time slots. 1. To be sure that this is not an intermittent problem, repeat this test a maximum of 10 times to ensure it continues to pass. 2. If complaints still exist, examine the connections and wiring.

BRI Port Local LAN Loop-Around Test (#618)

This test is destructive.

This test checks the connectivity of the BRI port across the LAN bus. Because this test is destructive, run this test only if the port is out-of-service.

Failures of this test indicate either on-board faults associated with the TBRI-PT hardware on the circuit pack or problems with the LAN Bus, which is used to form connectivity between the MCU and the TBRI-PT.

If the port is in a state other than out-of-service, the BRI Port Local LAN Looparound Test will abort. If the port is out-of-service, then the port is put into a local looparound mode and the following test is executed.

A looparound test is performed across the Packet Bus for the D-Channel. The MCU sends data over a packet connection, which is looped back by the BRI port (D-Channel) and received back by the MCU. The test passes if the packet connection can be established and the transmitted data is received unaltered. The test aborts if the Packet Bus is alarmed in the port network where the circuit pack resides or if the Packet Interface board is out-of-service. The test fails due to either on-board faults associated with the BRI port hardware on the circuit pack or problems with the LAN bus.

Table 8-319. BRI Port Local LAN Loop-Around Test #618

Error Code	Test Result	Description / Recommendation
1015	ABORT	The port is not out-of-service. 1. Use the status bri-port PCSSpp command to determine the status of the port. 2. If it is in use, wait until it is idle, and then use the busyout port PCSSpp command to place it in the out-of-service state and repeat this test. **Caution:** Since the busyout command is destructive, execution of this command prior to the port being idle causes all calls associated with the BRI port to be torn down.

Table 8-319. BRI Port Local LAN Loop-Around Test #618

Error Code	Test Result	Description / Recommendation
1139	ABORT	The Packet Bus in the port network is out-of-service. 1. Follow the repair procedures for the Packet Bus. 2. Run the test port long PCSSpp command and verify the repair by viewing the results of the BRI Port Local LAN Looparound Test (#618).
1141	ABORT	The PKT-CTRL is out-of-service. 1. Follow the repair procedures for the PKT-CTRL. 2. Run the test port long PCSSpp command and verify the repair by viewing the results of the BRI Port Local LAN Looparound Test (#618).
1144	ABORT	The Packet Bus is out-of-service. 1. Follow the repair procedures for the Packet Bus. 2. Run the test port long PCSSpp command and verify the repair by viewing the results of the BRI Port Local LAN Looparound Test (#618).
2012 - 2100	ABORT	Internal system error Could not allocate the necessary system resources to run this test. 1. Retry the command at 1-minute intervals a maximum of 5 times.
	FAIL	The Looparound Test has failed. 1. If the test fails repeatedly, attempt to reset the circuit pack with the busyout board PCSS and the reset board PCSS commands if the other ports on the board are not in use. 2. If the test fails again, execute test pkt P. If this fails, follow failure procedures in the PKT-BUS section. 3. If the tests in Step 2 pass, the problem is local to the BRI board. Replace the trunk circuit pack.
	PASS	The BRI Port Local LAN Looparound Test passed.

BRI Port Local TDM Loop-Around Test (#619)

This test is conditionally destructive.

This test verifies the connectivity of a BRI port across the TDM Bus. It aborts if calls associated with the port are in progress. Failure of this test indicates an on-board fault associated with the port hardware on the circuit pack.

This Looparound Test runs the following individual tests on the two B-channels (B1 and B2) associated with the port.

- A Looparound Test across the TDM Bus for B1.
- A Conference Circuit Test for B1.
- A Looparound Test across the TDM Bus for B2.

- A Conference Circuit Test for B2.

The tests are run in the above order. If one fails, the remaining tests in the sequence are not executed, and maintenance software returns an error code.

Table 8-320. BRI Port Local TDM Loop-Around Test #619

Error Code	Test Result	Description / Recommendation
1000	ABORT	The system resources required to run this test are not available. The port may be busy with a valid call. Use the display port PCSSpp command to determine the trunk group/member number of the port. Use the status bri-port PCSSpp command to determine the service state of the port. If the service state indicates that the port is in use, then the port is unavailable for certain tests. Wait until the port is idle before retesting. 1. If the port is idle, then retry the command at 1-minute intervals a maximum of 5 times.
1002	ABORT	The system could not allocate time slots for the test. The system may be under heavy traffic conditions or it may have time slots out-of-service due to TDM-BUS errors. Refer to TDM-BUS to diagnose any active TDM Bus errors. 1. If the system has no TDM-BUS errors and is not handling heavy traffic, repeat test at 1-minute intervals a maximum of 5 times.
1003	ABORT	The system could not allocate a tone receiver for the test. The system may be oversized for the number of Tone Detectors present or some Tone Detectors may be out-of-service. 1. Look for TTR-LEV errors in the Error Log and if present, refer to TTR-LEV. 2. Look for TONE-PT errors in the Error Log and if present, refer to TONE-PT. 3. If neither condition exists, retry the test at 1-minute intervals a maximum of 5 times.
1004	ABORT	The port has been seized by a user for a valid call. Use the status trunk command for the trunks associated with this port and determine when the port is available for testing. 1. Retry the command at 1-minute intervals a maximum of 5 times. 2. If the test continues to abort and the port is not in use, escalate the problem.
1005	ABORT	This test is not valid for this type of translation. Ports administered as ASAI or ADJK cannot run this test because the B-channels associated with the port are not used by ASAI or Avaya Adjunct Links. This is a normal condition.

Table 8-320. BRI Port Local TDM Loop-Around Test #619

Error Code	Test Result	Description / Recommendation
2000	ABORT	Response to the test was not received from the BRI-LINE circuit pack within the allowable time period. 1. If this result occurs repeatedly, attempt to reset the circuit pack with the busyout board PCSS and the reset board PCSS commands if the other ports on the board are not in use. 2. If this result occurs again, replace the circuit pack.
2012	ABORT	Internal system error
2100	ABORT	Could not allocate the necessary resources to run this test. 1. Retry the command at 1-minute intervals a maximum of 5 times.
2103	ABORT	The system could not make the conference connection for the test. 1. Retry the command at 1-minute intervals a maximum of 5 times.
1 - 2	FAIL	The TDM Looparound failed on one of the channels. ■ Error Code 1 TDM Loop Around Test failed on B1. ■ Error Code 2 TDM Loop Around Test failed on B2.
7 - 8	FAIL	The Conference Circuit Tests failed on a B-channel. ■ Error Code 7 test failed on B1 ■ Error Code 8 test failed on B2. 1. If the test fails repeatedly, attempt to reset the circuit pack with the busyout board PCSS and the reset board PCSS commands if the other ports on the board are not in use. 2. If the test fails again, replace the circuit pack.
	PASS	The BRI Port Local TDM Loop Around Test passed.

CRC Error Counter Test (#623)

This test is non-destructive.

This test reads the BRI port's CRC error counters that are maintained on the BRI circuit pack. The Cyclic Redundancy Check (CRC) is a means of error detection used to determine the integrity of data frame contents. The CRC error counter is incremented by the circuit pack when it detects a CRC error. The test passes if the

value of the counter is 0 (that is, the error is cleared). If the counter is non-zero, the test fails, and the value of the counter is displayed in the `Error Code` field.

Table 8-321. CRC Error Counter Test #623

Error Code	Test Result	Description / Recommendation
ANY	FAIL	This error occurs when a frame with a bad CRC is received over the D-Channel by the BRI board. This error is reported on a per-port basis when the counter goes over the threshold. This error is most likely due to a problem with the wiring or interference on the wiring caused by a noise source or no termination. It usually does not indicate a problem with the circuit pack.
None	PASS	The CRC error counter was read correctly and has a value of 0.

Receive FIFO Overflow Error Counter Test (#625)

This test is non-destructive.

This test reads and clears the BRI port's Receive FIFO Overflow error counter maintained on the TBRI-BD circuit pack. This counter is incremented by the circuit pack when it detects an overflow of its receive buffers. The test passes if the value of the counter is 0 (that is, the error is cleared). If the counter is non-zero, the test fails, and the value of the counter is displayed in the Error Code field.

This error can occur if signaling frames are being received from the Packet Bus at a rate sufficient to overflow the receive buffers on the circuit pack for a port OR if a hardware fault is causing the receive buffers not to be emptied properly by the circuit pack. This test is useful for verifying the repair of the problem.

Table 8-322. Receive FIFO Overflow Error Counter Test #625

Error Code	Test Result	Description / Recommendation
2000	ABORT	Response to the test was not received from the circuit pack within the allowable time period. 1. If the test aborts repeatedly a maximum of 5 times, reset the circuit pack with the busyout board PCSS and reset board PCSS commands. 2. If the test aborts again, replace the circuit pack.
2012	ABORT	Internal system error
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at 1-minute intervals a maximum of 5 times.

Table 8-322. Receive FIFO Overflow Error Counter Test #625

Error Code	Test Result	Description / Recommendation
value	FAIL	The TBRI-BD circuit pack is still detecting errors of this type. The Error Code field contains the value of this counter. 1. Retry the command at 1-minute intervals a maximum of 5 times. 2. If the test continues to fail, run the Long Test Sequence and pay particular attention to the Looparound Tests (#618 and #619). See the repair procedures for the executed test if it fails. Otherwise, go to the next step. 3. Replace the circuit pack.
	PASS	The Receive FIFO Overflow error counter was read correctly and has a value of 0.

Level 1 Status Inquiry Test (#1242)

This test is non-destructive.

This test determines the state of the transmission facility of a BRI port at the Level 1 (L1) physical layer: Activated, Pending Activation, or Deactivated.

The Activated state is the correct state for an ISDN-BRI port. In this state the L1 interface can send and receive synchronized signals. This test passes if the state of L1 is Activated. This test also passes if software has taken this port out of service. See the description of the L1 “Deactivated State” below for more details.

The Pending Activation state indicates a problem with the channels, the wiring, or the TBRI-BD circuit pack. When in this state, the Level 1 interface is either not receiving any L1 framing from the channel, or it is communicating with the channel but cannot transition to the Activated state.

The Deactivated state indicates a problem with the TBRI-BD circuit pack. When in this state, the Level 1 interface is not active, and an idle signal is transmitted to the channels or that Layer 1 was deactivated by the switch. When an TBRI-PT port is placed in the out-of-service state, Level 1 is also put into the Deactivated state.

This could be due either to the system detecting a fault with the port or to a **busyout port PCSSpp** request.

Table 8-323. Level 1 Status Inquiry Test #1242

Error Code	Test Result	Description / Recommendation
1187	ABORT	The board or port may be busied out. 1. Look in the Error Log for Error Type 18 (port busied out) for this port and TBRI-BD (board busied out). If this error type is present for TBRI-PT only, then release the port with the release port PCSSpp command and run the test again. If the error is present for both TBRI-BD and TBRI-PT, then release the board with the release board PCSS command and run the test again. **Note:** When you release a port, you release all ports associated with it. If certain ports still need to be busied out, use the release port PCSSpp command to busy them out. 2. Make sure the terminal is connected. 3. Retry the command at 1-minute intervals a maximum of 5 times.
2000	ABORT	Response to the test was not received from the circuit pack within the allowable time period. 1. If the test aborts repeatedly a maximum of 5 times, reset the circuit pack with the busyout board PCSS and reset board PCSS commands. 2. If the test aborts again, replace the circuit pack.
2012	ABORT	Internal system error
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at 1-minute intervals a maximum of 5 times.
1	FAIL	Received a status of Level 1 Pending Activation. U interface down indicating a problem with a connection between the switch and the NT1, a 2- to 4-wire converter that is used to connect 4-wire terminals to a 2-wire TN2198 or TN2185 circuit pack. 1. Verify that the connections between the MCU and the NT1 are good. Verify that the NT1 has power. 2. Execute the test port PCSSpp command and review the results of the Level 1 Status Inquiry Test to verify the repair. If this test still fails, proceed to Step 3. 3. Follow the manufacturers repair procedures for the NT1. Then execute the test port PCSSpp command and review the results of the Level 1 Status Inquiry Test to verify repair.

Table 8-323. Level 1 Status Inquiry Test #1242

Error Code	Test Result	Description / Recommendation
2	FAIL	Received a status of Level 1 Pending Activation. U interface up, S/T interface down, which indicates a problem with the NT1 or the wiring between the NT1 and the BRI endpoint (S/T interface). 1. Execute the test port PCSSpp command and review the results of the Level 1 Status Inquiry test to verify the repair. If this test still fails, proceed to Step 2. 2. Follow the manufacturer-recommended repair procedures for the NT1. Then execute the test port PCSSpp command and review the results of the Level 1 Status Inquiry test to verify repair.
3	FAIL	Received a status of Level 1 Deactivated; the port is out-of-service. 1. Issue the status bri-port PCSSpp command to verify that the service state of the port is out-of-service. If the service state of the port is not out-of-service, escalate the problem to the next tier. Otherwise, proceed to Step 2. 2. If the port has been placed out-of-service with the busyout port PCSSpp command, try releasing the port by executing the release port PCSSpp command. Then issue the test port long PCSSpp command and review the results of Level 1 Status Inquiry test. If this test still fails, proceed to Step 3. 3. After executing the test port long PCSSpp command, review the results of all the tests. Follow the repair procedures for any tests that fail. Verify repair of the problem by executing the test port PCSSpp command and by determining that the Level 1 Status test passes. If the test continues to fail for this reason, escalate the problem to the next tier.
4	FAIL	Received a status of Level 1 Pending Activation, the NT1 has a loss of power indicating a problem with the NT1. 1. Follow the manufacturer-recommended repair procedures for the NT1. 2. Execute the test port PCSSpp command and review the results of the Level 1 Status Inquiry test to verify the repair.
	PASS	This test indicates that Level 1 is activated or that software has taken the port out of service.

Layer 3 Query Test (#1243)

This test is nondestructive.

This test is used to check the application layer communications across the in-service ISDN D-Channel. The test passes if a status enquiry message is successfully sent, fails if the signaling link is down, and aborts if a query is already running or there is an internal error.

Table 8-324. Layer 3 Query Test #1243

Error Code	Test Result	Description / Recommendation
1019	ABORT	Test is already running.
1113	ABORT	The signaling link is down. 1. Use the test port PCSSpp long command to clear any errors which prevent establishment of the signaling link. 2. Examine the results of Test #626, which is executed with the command. If this test aborts or fails, follow the repair procedure for the Signaling Link Status Test. 3. Escalate problem if BRI Layer 3 Query Test continues to abort.
1139	ABORT	The Packet Bus in the port network is out-of-service. 1. Follow the repair procedures for the Packet Bus. 2. After completing Step 1, execute the test port long PCSSpp command and review the results of the BRI Port Local LAN Looparound Test to verify the repair.
1141	ABORT	The PKT-CTRL is out-of-service. 1. Consult the repair procedure for PKT-CTRL. 2. If Step 1 does not resolve the problem, escalate to the next tier.
1144	ABORT	The Packet Bus is out-of-service. 1. Follow the repair procedures for the Packet Bus. 2. After completing Step 1, execute the test port long PCSSpp command and review the results of the BRI Port Local LAN Looparound Test to verify the repair.

Table 8-324. Layer 3 Query Test #1243

Error Code	Test Result	Description / Recommendation
1187	ABORT	The circuit pack or port may have been busied out by a technician. 1. Look in the Error Log for Error Type 18 (busied out) for TBRI-BD or TBRI-PT. a. If this error type is present for TBRI-PT, then release the port with the release port PCSSpp command and run the test again. b. If the error is present for both TBRI-BD and TBRI-PT, then release the circuit pack with the release board PPCSS command and run the test again. **Note:** When you release the circuit pack, you release all ports associated with it. If certain ports still need to be busied out, use the release port PCSSpp command to busy them out. 2. Make sure the terminal is connected. 3. Retry the command at 1-minute intervals a maximum of 5 times.
2012	ABORT	Internal system error
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at 1-minute intervals a maximum of 5 times.
None	PASS	The switch has successfully sent a Status Enquiry message.

Slip Query Test (#1244)

This test is nondestructive.

Slips occur when the transmitter and receiver are not running at precisely the same clock rate. The Slip Alarm Inquiry Test polls the total number of slips that have occurred on a link.

When the TN2185 circuit pack detects a slip condition, maintenance software initiates the Slip Alarm Inquiry Test to query the slip counters on the TN2185 circuit pack and total the slip counts in the maintenance software.

If the slip count is over the threshold, a Minor alarm is raised against the TN2185 circuit pack, leaving all ports of the TN2185 circuit pack in the in-service state. If the TN2185 circuit pack is used to supply the system synchronization source, the MINOR alarm will initiate a synchronization source switch. See TDM-BUS and SYNC for additional information.

Table 8-325. Slip Alarm Inquiry Test #1244

Error Code	Test Result	Description / Recommendation
None	ABORT	Internal System Error
2000	ABORT	Response to the test request was not received within the allowable time period. If Error Type 1538 is present in the Error Log, follow the maintenance strategy recommended for this error type.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at 1-minute intervals for a maximum of 5 times.
1 - 88	FAIL	The circuit pack and the remote endpoint are not synchronized to the same clock rate, which has generated the Slip alarm. The error code equals the number of slips detected by the TN2185 circuit pack since the last Slip Alarm Inquiry Test. 1. Retry the command at 1-minute intervals a maximum of 5 times. 2. If the circuit pack is a TN2185, enter the list measurement ds1-log PCSS command to read the error seconds measurement. 3. Verify that both endpoints of the DS1 link are administered using the same signaling mode, framing mode, and line coding. 4. Check the physical connections of DS1 Interface circuit packs and cable. 5. Replace the local DS1 Interface circuit pack and repeat the test. 6. Contact T1 Network Service to diagnose the remote DS1 endpoint.
	PASS	No Slip alarm is detected on the DS1 Interface circuit pack.
0	NO BOARD	The DS1 Interface circuit pack is not administered. 1. Administer the DS1 Interface circuit pack by issuing the add ds1 PCSS command. 2. Run the test again.

TBRI-TRK (TN2185 ISDN Trunk-Side BRI)

MO Name (in Alarm Log)	Alarm Level	Initial Command to Run*	Full Name of MO
TBRI-TRK†	MAJOR‡	test trunk PCSSpp l	MO_TBRI_TRK
TBRI-TRK	MINOR	test trunk PCSSpp l	MO_TBRI_TRK
TBRI-TRK	WARNING	test trunk PCSSpp sh	MO_TBRI_TRK

* Where P is the port network number (1), C is the carrier designation (A, B, C, D, or E), and SS is the carrier slot address where the circuit pack is located (1, 2, and so forth).

† For additional repair information, also see TBRI-BD and TBRI-PT Maintenance Object documentation.

‡ A MAJOR alarm on a trunk indicates that alarms on these trunks are not downgraded by the **set options** command and that at least 75 percent of the trunks in this trunk group are alarmed.

The TN2185 circuit pack contains eight, 4-wire ports that interface to the network at the ISDN S/T reference point over two 64 kbps channels (B1 and B2) and over a 16Kb/s signaling (D) channel. The B1 and B2 channels can be simultaneously circuit switched, or individually packet switched. Only one channel per trunk can be packet switched due to Packet Processing Element (PPE) limitations. The D-channel is either circuit switched or packet switched. Packet switching uses the PPE to combine all D-channels into a single physical channel, which is then routed via the concentration highway to the Netpkt Interface Element (NCE) and then to the TDM bus. The circuit-switched connections have a Mu-law or A-law option for voice and operate as 64Kb/s clear data channels. The packet-switched channels support the LAPD protocol and conform with the CCITT Q.920 Recommendations for D-channel signaling.

LEDs

The three LEDs on the circuit pack's faceplate indicate board status. When illuminated, the red LED indicates a board failure or a major or minor on-board alarm, the green LED indicates that testing is in progress, and the amber LED indicates that the board is in use.

System Technician-Demanded Tests: Descriptions and Error Codes

Always investigate tests in the order presented in the table below when inspecting errors in the system. By clearing error codes associated with the *Services State Test*, for example, you may also clear errors generated from other tests in the testing sequence

Table 8-326. System Technician-Demanded Tests: TBRI-TRK

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Signaling Link State Check Test (#1251)	Short	Long	No
Service State Audit Test (#256)	Short	Long	No
Call State Audit Test (#257)	Short	Long	No
ISDN Test Call Test (#258)	Long		No

Signaling Link State (#1251)

This test is non-destructive.

This test checks the current state of the signaling link. The test looks at the board-level translations, checks that the board is physically inserted, gets the state of the D-Channel and service state of the port.

The test passes if the signaling link (D-Channel) is connected and operating normally. The test fails if the board is not installed, the signaling link is disconnected, or if the port is out of service. The test aborts otherwise.

Table 8-327. Signaling Link State Test #1251

Error Code	Test Result	Description / Recommendation
None	ABORT	Internal system error
1018	ABORT	The test is disabled. 1. Enable the test by entering “enable test #1251”.
1114	ABORT	The signaling link is in a transitional state. 1. Retry the command at 1-minute intervals a maximum of 5 times.
8	FAIL	The signaling link is down. 1. Consult the procedures for the TBRI-PT maintenance object.
9	FAIL	The port is out of service. 1. Return the port to an in-service state.

Table 8-327. Signaling Link State Test #1251

Error Code	Test Result	Description / Recommendation
None	PASS	The signaling link is connected and operating normally.

Service State Audit (#256)

This test is non-destructive.

This test performs a service state audit on an ISDN B-Channel. The test passes if Call Processing informs Maintenance that the Restart message was transmitted successfully, or if the B-Channel was busy and could not send the message.

The test fails if the board is not inserted or translated properly, or if a reply is not received within a certain amount of time.

The test aborts if the signaling link is disconnected, if a message is already outstanding, or if the necessary resources could not be allocated.

To investigate the service state of the TN2185 ISDN Trunk-Side BRI Channel, issue the **status trunk trunk-group/trunk-member** command.

Table 8-328. Service State Audit Test #256

Error Code	Test Result	Description / Recommendation
1000	ABORT	System resources required to run this test are not available. The port may be on a valid call. Use status trunk to determine when trunk is available for testing. 1. Check the results of Test #1251 (Signaling Link State Check).
1018	ABORT	The test is disabled. 1. Enable maintenance by entering y in the Maintenance Tests? field on page 2 of the change trunk-group form.
1113	ABORT	The signaling link has failed, so the system cannot send any messages on behalf of this trunk. 1. Check the results of Test #1251 (Signaling Link State Test).
1114	ABORT	The signaling link is in a transitional state. 1. Retry the command at 1-minute intervals a maximum of 5 times.
1116	ABORT	The trunk is not in a service state which is appropriate for running the test. This test is only performed in the OOS/FE state.
1117	ABORT	A service state audit message is outstanding. 1. Wait two minutes and then try again.

Table 8-328. Service State Audit Test #256

Error Code	Test Result	Description / Recommendation
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at 1-minute intervals a maximum of 5 times.
	FAIL	Internal system error 1. Retry the command at 1-minute intervals a maximum of 5 times.
	PASS	Wait 4 minutes and then check the Error Log for any new errors of type 3073. If there are none, then both sides of the ISDN connection agree on the service state; the negotiation succeeded. If there is a new 3073 error, then the negotiation failed (the far-end twice failed to respond within 2 minutes). The MCU automatically retries every 15 minutes. If the trunk was initially in-service, it is now placed in the maintenance/far-end state. Incoming calls are accepted, but no outgoing calls can be originated. If an incoming call is presented, another Service State Audit is immediately performed in an attempt to put the TN2185 ISDN Trunk-Side BRI Channel in the proper state.

Call State Audit Test (#257)

This test is nondestructive.

This test performs a call state audit on an ISDN B-Channel, and upon successful completion, guarantees that both sides of the interface are in a consistent call state for connections using the B-Channel. The test can be helpful when trying to clear a hung call. If the internal call state data to the near-end is different from that of the far-end, *the call is torn down*.

The test first verifies that the board is physically inserted, gets the current state from Call Processing, gets the country code, then runs the call state audit.The test passes if the audit is successful.

The test fails if the board is not inserted, if there is an internal system error, or if a reply was not received within the prescribed time.

The test aborts if the signaling link is disconnected, the request is already active, or if the B-Channel is in an Out-Of-Service state.

Table 8-329. Call State Audit Test #257

Error Code	Test Result	Description / Recommendation
1018	ABORT	The test is disabled. 1. Enable the test by entering y in the Maintenance Tests? field on page 2 of the change trunk-group form.
1019	ABORT	An audit is already in progress. 1. Wait two minutes and try again.
1113	ABORT	The signaling link has failed, so the system cannot send any messages on behalf of this trunk. 1. Check the results of Test #1251 (Signaling Link State Check).
1114	ABORT	The signaling link is in a transitional state. 1. Retry the command at 1-minute intervals a maximum of 5 times.
1116	ABORT	The trunk is in an out-of-service ISDN service state. 1. A call cannot be present if the trunk is in an ISDN out-of-service state, so a call state audit would be inappropriate. No action necessary. (Use the status trunk command.)
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at 1-minute intervals a maximum of 5 times.
	FAIL	Internal system error 1. Retry the command at 1-minute intervals a maximum of 5 times.
	PASS	The audit passed successfully.

ISDN Test Call Test (#258)

This test performs a far-end loop around to a far-end over an ISDN trunk. The trunk's service state must be in-service, maint-NE, or out-of-service/NE, and no call can be active on the trunk.

A test call connection is established to a far-end over the ISDN trunk to be tested. The digital port on a TN711D Maintenance/Test circuit pack generates a test-pattern bit stream that is sent to the far-end and echoed back. The received pattern is then compared to the sent pattern and checked for errors that indicate a loss of integrity on the communications path.

If a test call is running when scheduled maintenance starts, the green LED is turned off. To determine if a test call is still running, use the **list isdn-testcall** and **status isdn-testcall** commands. A lit yellow LED on the Maintenance/Test circuit pack also indicates that a test call is running.

There are two methods available to place an outgoing ISDN Trunk-side BRI trunk test call:

1. The test call connection is established over the TDM Bus of the transmit and receive sides of the ISDN Trunk-side BRI trunk to a data channel. This method is selected when no Maintenance/Test circuit pack resides in the system.
2. The test call connection is established over the TDM Bus of the transmit and receive sides of the ISDN Trunk-side BRI trunk to a digital trunk testing port on the Maintenance/Test circuit pack. The Maintenance/Test Digital Port generates a pseudo bit stream.

A test is run periodically to check if the call is hung. If so, it gracefully tears down the call to release the resources.

Synchronous Commands

You can demand a synchronous outgoing test call by using the following maintenance commands:

- **test trunk trunk-group-no/member-no long [repeat number]**
- **test board PCsspp long [repeat number]**
- **test port port-location long [repeat number]**

Whenever a circuit translates to an ISDN Trunk-side BRI trunk during a Long Test Sequence, an outgoing test call is invoked, and the duration of the test call is 8.6 seconds. Once the test call completes, the bit error rate is retrieved from the Maintenance/Test Digital Port. A bit error rate greater than zero is reported as a failure to the MCU-MT. A failure indicates the need to run further diagnostics.

If no Maintenance/Test circuit pack exists, the outgoing ISDN Trunk-side BRI trunk test call is established over a high-speed data channel on the Netpkt Interface (Netpkt Interface) circuit pack (DATA-BD).

Asynchronous Commands

NOTE:
Only one trunk can be tested in a given port network, until the test call is canceled or completes.

Table 8-330. ISDN TEST Call Test #258

Error Code	Test Result	Description / Recommendation
4	ABORT	There is a problem with the Processor Interface Link. 1. Refer to the PI-LINK (Processor Interface Link) Maintenance documentation.

Table 8-330. ISDN TEST Call Test #258

Error Code	Test Result	Description / Recommendation
1004	ABORT	B-channel in use. 1. Determine if a call is active on this ISDN Trunk-side BRI trunk via the status trunk command. 2. When the service state indicates in-service/idle, retry the test.
1005	ABORT	Bad Configuration (that is, no Maintenance/Test circuit pack) Issue the test trunk <trunk Group/trunk member> command and make sure there is a DATA-CHL (Netpkt Interface channel) administered.
1018	ABORT	Test call is disabled. 1. Enable Maintenance on the Trunk Group form.
1024	ABORT	(M/T-DIG) Maintenance/Test Digital Port in use. 1. Wait until yellow and green LEDs are turned off on the M/T-BD (Maintenance/Test circuit pack). 2. Retry the test. If problem persists, refer to M/T-DIG (Maintenance/Test Digital Port) documentation.
1113	ABORT	The signaling link has failed; the system cannot send any messages on behalf of this trunk. 1. Check the results of Test #1251 (Signaling Link State Check Test).
1114	ABORT	The signaling link is in a transitional state. 1. Retry the command at 1-minute intervals a maximum of 5 times.
1116	ABORT	The switch could not appropriately change the ISDN service state. 1. Determine if a call is active on this ISDN Trunk-side BRI trunk (use the status trunk command). 2. If not, check the Error and Alarm Logs for problems with this TBRI-TRK MO.
1117	ABORT	ISDN B-channel maintenance message is already outstanding. 1. Wait two minutes, then try again.
1118	ABORT	Far-end of ISDN trunk is not administered. 1. Check the administration of the far-end ISDN trunk 8. Issue the **status trunk** command and try the test again.
1119	ABORT	The test call was aborted due to a normal call attempt on this trunk. The test call is performed only if the trunk is idle. 1. Either wait for the normal call to terminate normally, or force it to be dropped by using the busyout trunk command.

Table 8-330. ISDN TEST Call Test #258

Error Code	Test Result	Description / Recommendation
1120	ABORT	The ISDN Trunk-side BRI trunk is in the ISDN out-of-service/far-end state. 1. Try to change the service state via Test #256 (Service State Audit Test). Then retry this test. However, the trunk may be in the out-of-service/far-end state due to problems at the far-end. If that is the case, no remedial action can be taken at this end.
1122	ABORT	There is no test line number for the far-end. 1. Check the Trunk Group Administration form.
1123	ABORT	There is no Feature Access Code administration for this Facility Test. 1. Check the Dial Plan and Feature Administration forms.
2012 , None , 2000	ABORT	Internal system error 1. Retry the command at 1-minute intervals a maximum of 5 times.
2035	ABORT	The call has timed out, perhaps because of a lack of system resources. 1. Wait 1 minute and try again.
2036 - 2037	ABORT	Internal system error 1. Follow the recommendation for ABORT code 2012.
2038 - 2039	ABORT	A problem occurred while trying to read the test data. 1. Wait one minute and then try again. 2. If the test aborts again in the same manner, there is a serious internal problem. If so, escalate the problem.
2040	ABORT	Internal system error 1. Follow the recommendations for ABORT code 2012.
2041	ABORT	The call has timed out, perhaps because of a lack of system resources. 1. Follow the recommendations for ABORT code 2035.
2066	ABORT	Could not establish test call. 1. Retry the command at 1-minute intervals a maximum of 5 times.
2067	ABORT	The call has timed out, perhaps because of a lack of system resources. 1. Follow the recommendations for ABORT code 2035.
2074	ABORT	Bit and Block Error query failed. 1. Retry the command at 1-minute intervals a maximum of 5 times. 2. If the test continues to abort, there may be a serious internal problem with M/T-DIG (Maintenance/Test Digital Port). If this is the case, refer to the M/T-DIG (Maintenance/Test Digital Port) Maintenance documentation.

Table 8-330. ISDN TEST Call Test #258

Error Code	Test Result	Description / Recommendation
2075	ABORT	Internal system error 1. Follow the recommendations for ABORT code 2012.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at 1-minute intervals a maximum of 5 times.
2104	ABORT	Call dropped or could not be originated. 1. Make sure service is provisioned by the network. 2. Check the administration of the far-end test line extension on the trunk group administration form. 3. Check the administration of the test call BCC (Bearer Capability Class) on the trunk group administration form. 4. Try the test again.
2201 - 2205	ABORT	Internal system error 1. Follow the recommendations for ABORT code 2012.
2206	ABORT	Could not allocate the necessary system resources to run this test. 1. Follow the recommendations for ABORT code 2100.
2208	ABORT	Internal system error 1. Follow the recommendations for ABORT code 2012.
2209 - 2210	ABORT	Could not allocate the necessary system resources to run this test. 1. Follow the recommendations for ABORT code 2100.
2211	ABORT	Internal system error 1. Follow the recommendations for ABORT code 2012.
2212	ABORT	Call terminated by unexpected disconnect. 1. Wait one minute and then try again.
2213	ABORT	The call has timed-out, perhaps because of a lack of system resources. 1. Follow the recommendations for ABORT code 2035.
2214	ABORT	Call terminated by unexpected disconnect. 1. Wait one minute and then try again.
2215 - 2219	ABORT	Internal system error
2215 - 2219	ABORT	1. Follow recommendations for ABORT code 2012.
2220	ABORT	Call terminated prematurely. 1. Wait one minute and try again.

Table 8-330. ISDN TEST Call Test #258

Error Code	Test Result	Description / Recommendation
2221 - 2226	ABORT	Internal system error 1. Follow recommendations for ABORT code 2012.
2227	ABORT	Could not allocate the necessary system resources to run this test. 1. Follow the recommendations for ABORT code 2100.
2042	FAIL	This is the main purpose of the test. The comparison of the data sent with the data received indicates a loss of integrity on the communications path. 1. The trunk should be taken out-of-service and the quality of the ISDN Trunk-side BRI line should be investigated. The investigation should include an in-depth analysis of the facility including the transmission facility and any external equipment such as DACs, CSUs, etc.
	PASS	The call worked. A test pattern was sent and received properly; the communications path is OK if the synchronous test call command was issued. An in-depth analysis of the ISDN Trunk-side BRI trunk facility including the transmission facility and any external equipment such as DACs, CSUs, and others should take place if the bit and block error rates are not acceptable.

System Technician-Demanded Tests: Descriptions and Error Codes

Always investigate tests in the order presented in the table below when inspecting errors in the system. By clearing error codes associated with the *Control Channel Test*, for example, you may also clear errors generated from other tests in the testing sequence.

Table 8-331. System Technician-Demanded Tests: TBRI-TRK

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Control Channel Test on the Control Channel Bus (#296)	Short	Long	No
Digit Detection Test on the Non-Control Channel Bus (#297)	Short	Long	No
Idle Time Slot Test on TDM Bus A (#294)	Short	Long	No

Idle Time Slot Test on TDM Bus A or B (#294)

The Idle Time Slot Test detects noisy time slots on the bus and takes them out-of-service. The Tone Detector circuit pack is told to listen to idle time slots and if it detects any noise on a time slot, it returns a failure. At the end of the test, any

out-of-service time slots are retested to see if they are still noisy and restored to service if they are idle. After all the time slots have been tested, maintenance counts the number of bad time slots and reports the number to the technician in the error code field. No more than 220 time slots are taken out-of-service on one bus, and no more than 300 are taken out-of-service on both buses at one time.

Table 8-332. Idle Time Slot Test on TDM Bus A or TDM Bus B Test #294 or #295

Error Code	Test Result	Description / Recommendation
None	ABORT	Could not allocate the necessary system resources to run this test. For example, maintenance could be running on the Tone Detector circuit pack and it is using the CPTRs.
1115	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at 1-minute intervals a maximum of 5 times.
number	FAIL	The error code indicates the number of bad time slots that were detected. The cause of this failure is most likely due to a bad port circuit pack and not the TDM Bus itself. 1. Execute the command again. 2. If the error persists, check the Error and Alarm Logs for alarms on port circuit packs from the NPE Crosstalk Test. 3. Refer to the appropriate circuit pack's documentation to clear the circuit pack's problem. 4. Test the TDM Bus again. If the error continues, refer to " TDM Bus Fault Detection and Isolation Procedure" described earlier.
None	PASS	The success of this test indicates all the idle time slots that are supposed to be idle are indeed idle. There is no noise on any of the idle time slots.

Control Channel Test (#296)

This test tests the integrity of the Control Channel bus. It ensures that communication through the TDM Bus is operational.

Table 8-333. Control Channel Test #296

Error Code	Test Result	Description / Recommendation
any code other than 1005	ABORT	Internal system error 1. Retry the command at 1-minute intervals a maximum of 5 times.

Table 8-333. Control Channel Test #296

Error Code	Test Result	Description / Recommendation
1005	ABORT	Since this test is valid only on the control channel bus, it aborts execution when run on the non-control channel bus. This is a valid response. Use the status system command to verify which bus is the control channel bus.
	FAIL	Communication through the Control Channel is not working. The problem is not necessarily the TDM Bus itself. 1. Display the hardware error and alarm log for the Tone-Clock circuit pack. Refer to TONE-BD (Tone-Clock Circuit Pack) Maintenance documentation. 2. Resolve the errors for the Tone-Clock circuit pack. 3. Display the hardware error and alarm log for the Netpkt Interface circuit pack. Refer to DATA-BD (Netpkt Interface Circuit Pack) Maintenance documentation. 4. Execute the test tdm P command again. 5. If the test still fails, refer to the TDM Bus Fault Detection and Isolation Procedure described earlier.
	PASS	Communication through the TDM Bus is operational.

Digit Detection Test (#297)

This test is executed on the Non-Control Channel bus. The Tone-Clock circuit pack is told to put a tone on the Non-Control Channel bus and the Tone Detector circuit pack is told to listen to it. The test passes if the tone is successfully transmitted on the Non-Control Channel bus.

Table 8-334. Digit Detection Test #297

Error Code	Test Result	Description / Recommendation
None , 1001 , 2100	ABORT	Could not allocate the necessary system resources to run this test.
1005	ABORT	Since this test is valid only on the non-control channel bus, it aborts execution when run on the control channel bus. This is a valid response. Use the status system command to verify which bus is the control channel bus.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at 1-minute intervals a maximum of 5 times.

Table 8-334. Digit Detection Test #297

Error Code	Test Result	Description / Recommendation
	FAIL	This failure indicates that communication on the Non-Control Channel is not reliable. 1. Execute the command again. 2. If the problem persists, test the Tone-Clock circuit pack and Tone Detector circuit pack to make sure they are healthy. Refer to TONE-BD (Tone-Clock Circuit Pack), TONE-PT (Tone Generator), GPTD-PT (General Purpose Tone Detector Port), and DTMR-PT (Dual Tone Multifrequency Port). 3. Execute the command again. 4. If the problems persists, refer to the "TDM Bus Fault Detection and Isolation Procedure" described earlier.
	PASS	The non-control channel bus is operational.

System Technician-Demanded Tests: Descriptions and Error Codes

Use the **list configuration control** command to find the Tone-Clock circuit pack code of the system, and then proceed to look for the Short and Long Test Sequences according to the Tone-Clock circuit pack code.

Always investigate tests in the order presented in the following tables when inspecting errors in the system. By clearing error codes associated with the *SAKI Reset Test*, for example, you may also clear errors generated from other tests in the testing sequence.

For a system with a TN756 Tone-Clock Circuit Pack:

Table 8-335. System Technician-Demanded Tests: TBRI-TRK (With TN756)

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
SAKI Reset Test (#53) (a)	Long		Yes
Clock Health Test (#46) (b)	Short	Long	No
Control Channel Loop Around Test (#52) (a)	Short	Long	No
Tone Detection Verification Test (#42) (c)	Short	Long	No
Tone Detector Audit/Update Test (#43) (c)	Short	Long	No
Tone Generator Crosstalk Test (#90) (d)	Long		No
Tone Generator Transmission Test (#40) (d)	Short	Long	No

Table 8-335. System Technician-Demanded Tests: TBRI-TRK (With TN756)

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Tone Generator Audit/Update Test (#41) (d)	Short	Long	No

Notes:

a. Refer to XXX-BD (Common Port Circuit Pack) Maintenance documentation for descriptions of these tests.

b. Refer to TONE-BD (Tone-Clock Circuit Pack) documentation for a description of this test.

c. Refer to Dual Tone Multifrequency Receiver Port (TTR) (DTMR-PT) or General Purpose Tone Detector Port (CPTR) (GPTD-PT) Maintenance documentation for descriptions of this test.

d. Refer to TONE-PT (Tone Generator) documentation for descriptions of these tests.

For a system with a TN768, TN780 or TN2182 Tone-Clock Circuit Pack:

Table 8-336. System Technician-Demanded Tests: TBRI-TRK (With TN768, TN780, or TN2182)

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
SAKI Reset Test (#53) (a)	Long		Yes
Clock Health Test (#46) (b)	Short	Long	No
Control Channel Loop Around Test (#52) (a)	Short	Long	No
Tone Generator Crosstalk Test (#90) (c)	Long		No
Tone Generator Transmission Test (#40) (c)	Short	Long	No
Tone Generator Audit/Update Test (#41) (c)	Short	Long	No
TDM Bus Clock Circuit Status Inquiry Test (#148)	Short	Long	No
TDM Bus Clock Slip Inquiry Test (#149) (e)	Short	Long	No
TDM Bus Clock PPM Inquiry Test (#150)	Short	Long	No
TDM Clock Board Type (#574)	Long		No
TDM Bus Clock Parameter Update Test (#151)	Short	Long	No

Notes:

a. Refer to XXX-BD (Common Port Circuit Pack) Maintenance documentation for descriptions of these tests.

b. Refer to TONE-BD (Tone-Clock Circuit Pack) documentation for a description of this test.

c. Refer to TONE-PT (Tone Generator) documentation for descriptions of these tests.

d. Test #149 is not run on a TN2182.

TDM Bus Clock Slip Inquiry Test (#149)

This test evaluates the quality of the synchronization source for the Tone-Clock circuit pack. This test does not apply to the TN2182.

Table 8-337. TDM Bus Clock Slip Inquiry Test #149

Error Code	Test Result	Description / Recommendation
None	ABORT	The system could not allocate the necessary resources for the test.
1001	ABORT	The system could not allocate the necessary resources for the test. 1. Wait 1 minute, and retry the test.
2000	ABORT	Response to the test request was not received within the allowable time period.
2100	ABORT	System resources required to run this test are not available. 1. Retry the command at 1-minute intervals a maximum of 5 times.

Table 8-337. TDM Bus Clock Slip Inquiry Test #149

Error Code	Test Result	Description / Recommendation
ANY	FAIL	This error represents the number of timing slips detected on the incoming synchronization source since the last slip inquiry was sent to the Tone-Clock circuit pack. The incoming synchronization source can be from one of two sources: (1) a DS1 Interface circuit pack, or (2) a local oscillator on an Active Tone-Clock circuit pack. The error code is a variable amount ranging from 1 to 255. 1. If there are errors against synchronization (SYNC), refer to the Synchronization Maintenance documentation to change the system synchronization reference. 2. If there are errors against DS1 Interface circuit pack (DS1-BD), refer to the DS1 Interface circuit pack Maintenance documentation to resolve the errors 3. If there are no SYNC or DS1-BD errors and a. Error was logged against the Tone-Clock circuit pack that was the current system synchronization reference at the time (use the command status synchronization to determine this), replace this Tone-Clock circuit pack. **Note:** Disruption may occur when executing the following procedures. b. Tone-Clock circuit pack you are testing is in Active mode but does not contain the current system synchronization reference, switch the synchronization reference to the Tone-Clock circuit pack under test via the set synchronization PC command. Retry the command. If the error is still present, replace this Tone-Clock circuit pack.
None	PASS	The Tone-Clock circuit pack does not detect any timing slips. This indicates that the external synchronization timing source is valid or that the system synchronization reference is a Tone-Clock circuit pack. The status synchronization command should be used to verify that the desired synchronization reference is providing timing for the system.

TDM Bus Clock PPM Inquiry Test (#150)

This test evaluates the quality of the synchronization source for the Tone-Clock circuit pack.

Table 8-338. TDM Bus Clock PPM Inquiry Test #150

Error Code	Test Result	Description / Recommendation
	ABORT	The system could not allocate the necessary resources for the test.
1001	ABORT	The system could not allocate the necessary resources for the test. 1. Wait 1 minute, and retry the test.
2000	ABORT	Response to the test request was not received within the allowable time period.
2100	ABORT	System resources required to run this test are not available. 1. Retry the command at 1-minute intervals a maximum of 5 times.
255	ABORT	The test was not executed because the Tone-Clock circuit pack was using its local oscillator rather than synchronizing to an external source. 1. Verify that this Tone-Clock circuit pack is expected to be the synchronization source. If not, correct the synchronization information and re-execute the test.

Table 8-338. TDM Bus Clock PPM Inquiry Test #150

Error Code	Test Result	Description / Recommendation
ANY	FAIL	This error represents the number of PPM errors detected on the external synchronization source since the last PPM inquiry was sent to the Tone-Clock circuit pack. A failure of this test indicates that we are outside of Stratum 4 or Stratum 3 timing specifications on the external timing source. This error produces an invalid timing signal for any system that uses this source for a synchronization reference. The error code is a variable amount ranging from 1 to 254. 1. If there are errors against SYNC (Synchronization), refer to SYNC (Synchronization) Maintenance documentation to change the system synchronization reference, OR 2. If there are errors against STRAT-3 (Stratum 3 Clock), refer to the STRAT-3 (Stratum 3 Clock) Maintenance documentation to resolve the errors, OR 3. If there are errors against DS1-BD (DS1 Interface circuit pack), refer to the DS1-BD (DS1 Interface Circuit Pack) Maintenance documentation to resolve the errors, OR 4. If there are no other errors besides Error Type 1537 against TDM-CLK and if this error was logged against the Tone-Clock circuit pack that provided the current system synchronization reference (use the status synchronization command to determine this), replace the defective Tone-Clock circuit pack. **Warning:** Since service may be disrupted when the following procedures are carried out, try to perform the following steps when it is convenient for the customer. 5. If the Tone-Clock circuit pack under test is in the Active mode but is not providing the current system synchronization reference, switch the synchronization reference to the Tone-Clock circuit pack under test using the set synchronization PC command. Rerun the test. If the test still fails, replace the defective Tone-Clock circuit pack.
None	PASS	The Tone-Clock circuit pack does not detect timing any PPM errors. This indicates that the external synchronization timing source is valid or that the system synchronization reference is a Tone-Clock circuit pack. The status synchronization command should be used to verify that the desired synchronization reference is providing timing for the system.

TDM Bus Clock Parameter Update Test (#151)

This action updates the Tone-Clock internal circuit pack parameters. Tone-Clock circuit pack:

- Disable in-line duplication status messages.
- Disable in-line subrate frame maintenance messages (TN768, TN780 only).
- Set the PPM threshold at 60 PPM for TN768 and TN780. Set the PPM threshold at 85 PPM for TN2182.
- Enable PPM threshold switching
- Set the number of slips to trigger *loss of signal* - currently 30 per 5 millisecond period
- Enable the on-board synchronization switching algorithm (see above)
- Enable holdover operation (TN2182 only).

This is not a test and will always pass without identifying or reporting any Tone-Clock circuit pack errors.

Table 8-339. TDM Bus Clock Parameter Update Test #151

Error Code	Test Result	Description / Recommendation
	ABORT	Internal system error
	FAIL	Internal system error 1. Retry the command at 1-minute intervals a maximum of 5 times.
	PASS	The Tone-Clock circuit pack parameters have been successfully updated.

TDM-Clock Circuit Pack Type Test (#574)

The purpose of this query is to check if the required type of Tone-Clock circuit pack (TN780) is present when the Stratum 3 clock is administered.

Table 8-340. TDM Clock Circuit Pack Type Test #574

Error Code	Test Result	Description/ Recommendation
	ABORT	The system could not allocate the necessary resources for the test. 1. Wait 1 minute and retry the test.

Table 8-340. TDM Clock Circuit Pack Type Test #574 — *Continued*

Error Code	Test Result	Description/ Recommendation
	FAIL	The Tone-Clock circuit pack in the system is not a TN780. The Stratum 3 clock requires a TN780 Tone-Clock circuit pack. 1. Replace the Tone-Clock circuit pack with a TN780. The old circuit pack may still be good, and need not be discarded.
	PASS	The required TN780 circuit pack is present.

TDMODULE (Trunk Data Module)

The TDMODULE (Trunk Data Module) is covered under PDMODULE (Processor Data Module).

Alarm Level	Initial Craft Command to Run
Minor	test port PCSSpp l
Warning	test port PCSSpp l

TDM-BUS (TDM Bus)

The TDM Bus consists of a duplicated TDM Bus: TDM Bus A and TDM Bus B. Each TDM Bus consists of 256 time slots. The first five slots on each bus comprise the control channel, which is active on only one bus at a time.

The next 17 time slots are reserved for dedicated tones (such as dial tone). These time slots are called the dedicated tone time slots, and only one bus at a time carries the dedicated tones. The rest of the time slots on each bus are for general system use (that is, conference calls).

Alarm Level	Initial Craft Command to Run
Major	test tdm
Minor	test tdm
Warning	test tdm

On system initialization, the control channel is on TDM Bus A and the dedicated tones on TDM Bus B. The following terminology is used for the description of this MO:

- Control Channel Bus: The TDM Bus control channel is on.

- Non-Control Channel Bus: The TDM Bus control channel is *not* on.
- Tone Bus: The TDM Bus dedicated tone time slots are on.
- Non-Tone Bus: The TDM Bus dedicated tone time slots are *not* on.

TDM Bus Fault Detection and Isolation

TDM Bus faults are most likely caused by a defective circuit pack connected to the backplane or bent pins on the backplane. It is possible that a circuit pack can cause a TDM Bus fault but still exhibit trouble-free operation. For example, the insertion of an MBUS (Memory Bus) only circuit pack can bend the TDM Bus pins on the backplane and short two leads together.

The circuit packs that may cause this problem are the TN786B Processor circuit pack and the TN794 Netpkt Interface circuit pack. Since the TDM Bus is a shared resource, it is difficult to identify the cause of a TDM Bus fault.

If a TDM Bus problem is suspected, the system technician should run **test tdm**. If any of the resulting tests fail, the system technician must manually perform a TDM Bus isolation procedure to identify the cause of the problem.

WARNING:
Since the TDM Bus fault isolation procedure involves removing circuit packs and possibly disconnecting the carrier, the procedure is extremely destructive. If possible, this procedure should be used after hours or during hours that experience minimum system use.

As circuit packs are removed or the entire carrier is disconnected, any active calls terminating on those circuit packs or carrier are dropped. If the system technician has any hints about a particular circuit pack that may be causing the TDM Bus problem (for example, a new circuit pack was inserted just before the TDM Bus problem appeared), those hints should be investigated prior to performing this procedure.

For this procedure, make sure at least one Tone Detector circuit pack is in the same port network in which the TDM Bus fault is being isolated. The Tone Detector circuit pack is needed by maintenance to test the TDM Bus.

Procedure 1

This procedure attempts to isolate the TDM Bus fault to circuit packs that are essential to system operation. Perform this procedure for the following circuit packs:

Table 8-341. Circuit Packs Essential to MCU Operation

Circuit Pack	Error Log Name
Tone Clock	TONE-BD, TONE-PT, TDM-CLK
Netpkt Interface	SW-CTL
Tone Detector	DETR-BD, GPTD-PT, DTMR-PT
Processor Interface	PI-BD, PI-PT

1. Use **display errors** and **display alarms** to display the error log and alarm logs for the circuit pack.
2. Try to resolve all errors, and then use **test tdm** to test the TDM Bus again, even if some errors cannot be resolved.
3. If some TDM Bus tests fail, continue with the next circuit pack.
4. If there are no more circuit packs to test, go to Procedure 2.
5. If all the TDM Bus tests pass, the problem has been fixed.

Procedure 2

This procedure removes and reinserts circuit packs (purple slot), one or more at a time. If all the TDM Bus tests passed when the circuit pack was removed, but some failed when the circuit pack was reinserted, the circuit pack is the cause of the problem and must be replaced.

If some tests fail regardless of whether the circuit pack is inserted or removed, the circuit pack is not the cause of the problem (see **NOTE**). Repeat the procedure for each purple slot circuit pack in the port network.

NOTE:
Do not overlook the fact that in multiple failure situations, more than one circuit pack could be the cause of the TDM Bus problem. Also, the circuit pack itself may not be the cause, but the backplane pins may have been bent when the circuit pack was inserted.

1. Remove the circuit packs that failed NPE Crosstalk test #6 first. Use **display error** to determine which ones failed the test.
2. If no circuit test failed NPE Crosstalk test #6, remove one or more purple slot circuit packs.
3. Enter **test tdm.**

4. If any of the TDM Bus tests fail:
   - See if the backplane pins in the removed circuit pack's slot appear to be bent.
   - If backplane pins are bent, straighten or replace the pins, reinsert the circuit pack, and retry this procedure on the same circuit pack.
   - If the backplane pins are not bent, reinsert the circuit pack and perform this procedure on the next set of circuit packs.
5. If none of the TDM Bus tests fails:
   - Reinsert the circuit pack.
   - Enter **test tdm.**
   - If any of the TDM Bus tests fails, the circuit pack is faulty, replace it and perform this procedure again.
   - If none of the TDM Bus tests fails, the problem has been fixed.

Procedure 3

This procedure removes and reinserts control carrier circuit packs one at a time. The Netpkt Interface circuit pack and the Processor Interface circuit pack are the only processor complex circuit packs that communicate on the TDM Bus, and, therefore, are the only processor complex circuit packs likely to cause a TDM Bus problem in a stable system. This procedure should be performed for the Processor Interface circuit pack before it is attempted on any other processor complex circuit packs.

To perform this procedure for the Netpkt Interface circuit pack, the circuit pack must be swapped with a new one. The MCU cannot operate without the Netpkt Interface circuit pack.

1. Power down the MCU.
2. Remove the suspected circuit pack.
3. Check if the backplane pins are bent in the slot where the circuit pack was housed.
4. If the backplane pins are bent, do the following:
   A. Straighten or replace the pins.
   B. Insert the same circuit pack.
   C. Repeat from Step 2 with the same circuit pack.
5. If the backplane pins are not bent, insert or replace the circuit pack.
6. Turn the power back on to reboot the MCU.

7. Enter **test tdm**.
8. If any TDM Bus test fails, do the following:
   - If the circuit pack in Step 4a was inserted, try this step again but this time replace the circuit pack.
   - If the circuit pack in Step 4a was replaced, do this step again with the next circuit pack.
9. If none of the TDM Bus tests fail, the problem has been fixed.

Restarting Nonfunctioning Circuit Packs

A defective TDM Bus control channel or system timing reference on one of the networks can result in port circuit packs (that is, non-control carrier circuit packs) on this defective network entering the reset state. When this situation occurs, the circuit pack stops functioning and its red LED lights. The MCU does not detect the presence of a circuit pack when the circuit pack is in the reset state. Hence, executing **list config board PCSS** indicates that the circuit pack is not present.

If a circuit pack enters the reset state when the control channel is on TDM BUS PT (where network P contains the circuit pack), this circuit pack stops functioning until it receives a restart message when the control channel is on the same TDM BUS PT or when this circuit pack is powered up again.

To force the MCU to send a restart message to all circuit packs on a network, try one of the following methods, depending on the circumstances:

NOTE:
A circuit pack that is functioning normally (not in reset state) ignores the restart message.

- **Procedure 1 (Nondestructive)**

  Execute the Idle Time Slot test #294 with **test tdm** when the control channel is on the same TDM Bus as it was when the circuit pack entered the reset state. If this method is not feasible, try one of the following procedures.

- **Procedure 2 (Nondestructive)**

  Reseat the circuit pack. This action causes the circuit pack that was in the reset state to begin functioning on the current control channel bus. If this method is not feasible, try one of the following procedures.

- **Procedure 3 (Nondestructive)**

  Enter **test tdm** to execute the Idle Time Slot test #294 when the control channel is on the same TDM Bus as it was when the circuit pack entered the reset state. If using this method is not feasible, try the remaining procedure.

- **Procedure 4 (Destructive)**

  Reset the port network that contains the circuit pack in the reset state. When the network is reset, two restart messages, one on the control channel of each TDM Bus, are sent to each circuit pack on the network. Executing **reset system L** (where **L** is **2, 3, 4**, or **5**) resets all networks in the system.

Hardware Error Log Entries

The following table shows the error log entries and related information.

NOTE:
An on-board alarm refers to a problem with the TDM-BUS itself.

Table 8-342. TDM Bus Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any		Any	test tdm
	Run the short test sequence first. If all tests pass, run the long test sequence. Refer to the appropriate test description.				
1	0	#296	Minor	On	test tdm r 3
18	0		Warning	On	release tdm
	The TDM Bus has been busied out by craft.				
35	0 - 1		Minor	On	set tdm
	The TDM Bus is corrupted. Check the value in the Aux Data field as follows: 0 = the last reported TDM Bus corruption was on the control channel bus. 1 = the last reported TDM Bus corruption was on the non-control channel bus. If this error is logged on both TDM Bus A and B within three minutes, the red LED of several circuit packs may be lit and there could be switch control errors. Do the following: 1. Use display errors and look for SW-CTL errors (see SW-CTL). 2. Use test tdm to test the TDM Bus. 3. If all tests pass, the problem is fixed. 4. If not, escalate the problem.				

Table 8-342. TDM Bus Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
257	0	None	Major	On	
	The TDM Bus was switched to the other bus due to corruption. No action is required.				
513	Any	#294	Minor	On	test tdm r 3
	Some time slots are corrupted on the specified TDM Bus. A warning is raised when there are more than 10 bad time slots but fewer than 50 on the bus. The Aux Data field shows the number of bad slots.				
769	Any	#294	Warning	On	test tdm r 3
	Some time slots are corrupted in the specified TDM Bus. A warning is raised when there is at least one bad time slot but fewer than 50 in the bus. The Aux Data field shows the number of bad time slots. No alarm is associated with this error.				
1025	Any				
3872 - 3877	Any	None			
	There are communications problems. Use test tdm and follow the procedures according to the error codes reported. The circuit pack angel indicated in Aux Data may have been too busy to service the downlink message. If all TDM-Bus tests pass and this error continues to appear, escalate the problem.				

System Technician-Demanded Tests: Descriptions and Error Codes

Always investigate tests in the order presented in the table below when inspecting errors in the system. By clearing error codes associated with the *Control Channel Test*, for example, you may also clear errors generated from other tests in the testing sequence

Table 8-343. System Technician-Demanded Tests: TDM-BUS

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Control Channel Test on the Control Channel Bus (#296)	Short	Long	No
Digit Detection Test on the Non-Control Channel Bus (#297)	Short	Long	No
Idle Time Slot Test on TDM Bus A (#294)	Short	Long	No

Idle Time Slot Test on TDM Bus A or B (#294)

The Idle Time Slot Test detects noisy time slots on the bus and takes them out-of-service. The Tone Detector circuit pack is told to listen to idle time slots and if it detects any noise on a time slot, it returns a failure. At the end of the test, any out-of-service time slots are retested to see if they are still noisy and restored to service if they are idle. After all the time slots have been tested, maintenance counts the number of bad time slots and reports the number to the technician in the error code field. No more than 220 time slots are taken out-of-service on one bus, and no more than 300 are taken out-of-service on both buses at one time.

Table 8-344. Idle Time Slot Test #294 or #295 on TDM Bus A or TDM Bus B

Error Code	Test Result	Description / Recommendation
None	ABORT	Could not allocate the necessary system resources to run this test. For example, maintenance could be running on the Tone Detector circuit pack and it is using the CPTRs.
1115	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at 1-minute intervals a maximum of 5 times.
number	FAIL	The error code indicates the number of bad time slots that were detected. The cause of this failure is most likely due to a bad port circuit pack and not the TDM Bus itself. 1. Execute the command again. 2. If the error persists, check the Error and Alarm Logs for alarms on port circuit packs from the NPE Crosstalk Test. 3. Refer to the appropriate circuit pack's documentation to clear the circuit pack's problem. 4. Test the TDM Bus again. If the error continues, refer to "TDM Bus Fault Detection and Isolation," which is described earlier.
	PASS	The success of this test indicates all the idle time slots that are supposed to be idle are indeed idle. There is no noise on any of the idle time slots.

Control Channel Test (#296)

This test tests the integrity of the Control Channel bus. It ensures that communication through the TDM Bus is operational.

Table 8-345. Control Channel Test #296

Error Code	Test Result	Description / Recommendation
any code other than 1005	ABORT	Internal system error 1. Retry the command at 1-minute intervals a maximum of 5 times.
1005	ABORT	Since this test is valid only on the control channel bus, it aborts execution when run on the non-control channel bus. This is a valid response. Use the status system command to verify which bus is the control channel bus.
none	FAIL	Communication through the Control Channel is not working. The problem is not necessarily the TDM Bus itself. 1. Display the hardware error and alarm log for the Tone-Clock circuit pack. Refer to TONE-BD (Tone-Clock Circuit Pack) Maintenance documentation. 2. Resolve the errors for the Tone-Clock circuit pack. 3. Display the hardware error and alarm log for the Netpkt Interface circuit pack. Refer to DATA-BD (Netpkt Interface Circuit Pack) Maintenance documentation. 4. Execute the test tdm P command again. 5. If the test still fails, refer to “TDM Bus Fault Detection and Isolation,” which is described earlier.
	PASS	Communication through the TDM Bus is operational.

Digit Detection Test (#297)

This test is executed on the Non-Control Channel bus. The Tone-Clock circuit pack is told to put a tone on the Non-Control Channel bus and the Tone Detector circuit pack is told to listen to it. The test passes if the tone is successfully transmitted on the Non-Control Channel bus.

Table 8-346. Digit Detection Test #297

Error Code	Test Result	Description / Recommendation
none , 1001 , 2100	ABORT	Could not allocate the necessary system resources to run this test.

Table 8-346. Digit Detection Test #297

Error Code	Test Result	Description / Recommendation
1005	ABORT	Since this test is valid only on the non-control channel bus, it aborts execution when run on the control channel bus. This is a valid response. Use the status system command to verify which bus is the control channel bus.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at 1-minute intervals a maximum of 5 times.
none	FAIL	This failure indicates that communication on the Non-Control Channel is not reliable. 1. Execute the command again. 2. If the problem persists, test the Tone-Clock circuit pack and Tone Detector circuit pack to make sure they are healthy. Refer to TONE-BD (Tone-Clock Circuit Pack), TONE-PT (Tone Generator), GPTD-PT (General Purpose Tone Detector Port), and DTMR-PT (Dual Tone Multifrequency Port). 3. Execute the command again. 4. If the problems persists, refer to “TDM Bus Fault Detection and Isolation,” which is described earlier.
	PASS	The non-control channel bus is operational.

System Technician-Demanded Tests: Descriptions and Error Codes

Use the **list configuration control** command to find the Tone-Clock circuit pack code of the system, and then proceed to look for the Short and Long Test Sequences according to the Tone-Clock circuit pack code.

Always investigate tests in the order presented in the following tables when inspecting errors in the system. By clearing error codes associated with the *SAKI Reset Test*, for example, you may also clear errors generated from other tests in the testing sequence.

For a system with a TN756 Tone-Clock Circuit Pack:

Table 8-347. System Technician-Demanded Tests: TDM-BUS (With TN756)

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
SAKI Reset Test (#53) (a)	Long		Yes
Clock Health Test (#46) (b)	Short	Long	No
Control Channel Loop Around Test (#52) (a)	Short	Long	No
Tone Detection Verification Test (#42) (c)	Short	Long	No
Tone Detector Audit/Update Test (#43) (c)	Short	Long	No
Tone Generator Crosstalk Test (#90) (d)	Long		No
Tone Generator Transmission Test (#40) (d)	Short	Long	No
Tone Generator Audit/Update Test (#41) (d)	Short	Long	No

Notes:

a. Refer to XXX-BD (Common Port Circuit Pack) Maintenance documentation for descriptions of these tests.

b. Refer to TONE-BD (Tone-Clock Circuit Pack) documentation for a description of this test.

c. Refer to Dual Tone Multifrequency Receiver Port (TTR) (DTMR-PT) or General Purpose Tone Detector Port (CPTR) (GPTD-PT) Maintenance documentation for descriptions of this test.

d. Refer to TONE-PT (Tone Generator) documentation for descriptions of these tests.

For a system with a TN768, TN780 or TN2182 Tone-Clock Circuit Pack:

Table 8-348. System Technician-Demanded Tests: TDM-BUS (With TN768, TN780, or TN2182)

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
SAKI Reset Test (#53) (a)	Long		Yes
Clock Health Test (#46) (b)	Short	Long	No
Control Channel Loop Around Test (#52) (a)	Short	Long	No
Tone Generator Crosstalk Test (#90) (c)	Long		No
Tone Generator Transmission Test (#40) (c)	Short	Long	No
Tone Generator Audit/Update Test (#41) (c)	Short	Long	No

Table 8-348. System Technician-Demanded Tests: TDM-BUS (With TN768, TN780, or TN2182)

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
TDM Bus Clock Circuit Status Inquiry Test (#148)	Short	Long	No
TDM Bus Clock Slip Inquiry Test (#149) (e)	Short	Long	No
TDM Bus Clock PPM Inquiry Test (#150)	Short	Long	No
TDM Clock Board Type (#574)	Long		No
TDM Bus Clock Parameter Update Test (#151)	Short	Long	No

Notes:

a. Refer to XXX-BD (Common Port Circuit Pack) Maintenance documentation for descriptions of these tests.

b. Refer to TONE-BD (Tone-Clock Circuit Pack) documentation for a description of this test.

c. Refer to TONE-PT (Tone Generator) documentation for descriptions of these tests.

d. Test #149 is not run on a TN2182.

TDM Bus Clock Slip Inquiry Test (#149)

This test evaluates the quality of the synchronization source for the Tone-Clock circuit pack. This test does not apply to the TN2182.

Table 8-349. TDM Bus Clock Slip Inquiry Test #149

Error Code	Test Result	Description / Recommendation
None	ABORT	The system could not allocate the necessary resources for the test.
1001	ABORT	The system could not allocate the necessary resources for the test. 1. Wait 1 minute, and retry the test.
2000	ABORT	Response to the test request was not received within the allowable time period.
2100	ABORT	System resources required to run this test are not available. 1. Retry the command at 1-minute intervals a maximum of 5 times.

Table 8-349. TDM Bus Clock Slip Inquiry Test #149

Error Code	Test Result	Description / Recommendation
ANY	FAIL	This error represents the number of timing slips detected on the incoming synchronization source since the last slip inquiry was sent to the Tone-Clock circuit pack. The incoming synchronization source can be from one of two sources: (1) a DS1 Interface circuit pack, or (2) a local oscillator on an Active Tone-Clock circuit pack. The error code is a variable amount ranging from 1 to 255. 1. If there are errors against synchronization (SYNC), refer to the Synchronization Maintenance documentation to change the system synchronization reference. 2. If there are errors against DS1 Interface circuit pack (DS1-BD), refer to the DS1 Interface circuit pack Maintenance documentation to resolve the errors 3. If there are no SYNC or DS1-BD errors and a. Error was logged against the Tone-Clock circuit pack that was the current system synchronization reference at the time (use the command status synchronization to determine this), replace this Tone-Clock circuit pack. **Note:** Disruption may occur when executing the following procedures. b. Tone-Clock circuit pack you are testing is in Active mode but does not contain the current system synchronization reference, switch the synchronization reference to the Tone-Clock circuit pack under test via the set synchronization PC command. Retry the command. If the error is still present, replace this Tone-Clock circuit pack.
None	PASS	The Tone-Clock circuit pack does not detect any timing slips. This indicates that the external synchronization timing source is valid or that the system synchronization reference is a Tone-Clock circuit pack. The status synchronization command should be used to verify that the desired synchronization reference is providing timing for the system.

TDM Bus Clock PPM Inquiry Test (#150)

This test evaluates the quality of the synchronization source for the Tone-Clock circuit pack.

Table 8-350. TDM Bus Clock PPM Inquiry Test #150

Error Code	Test Result	Description / Recommendation
	ABORT	The system could not allocate the necessary resources for the test.
1001	ABORT	The system could not allocate the necessary resources for the test. 1. Wait 1 minute, and retry the test.
2000	ABORT	Response to the test request was not received within the allowable time period.
2100	ABORT	System resources required to run this test are not available. 1. Retry the command at 1-minute intervals a maximum of 5 times.
255	ABORT	The test was not executed because the Tone-Clock circuit pack was using its local oscillator rather than synchronizing to an external source. 1. Verify that this Tone-Clock circuit pack is expected to be the synchronization source. If not, correct the synchronization information and re-execute the test.

Table 8-350. TDM Bus Clock PPM Inquiry Test #150

Error Code	Test Result	Description / Recommendation
ANY	FAIL	This error represents the number of PPM errors detected on the external synchronization source since the last PPM inquiry was sent to the Tone-Clock circuit pack. A failure of this test indicates that we are outside of Stratum 4 or Stratum 3 timing specifications on the external timing source. This error produces an invalid timing signal for any system that uses this source for a synchronization reference. The error code is a variable amount ranging from 1 to 254. 1. If there are errors against SYNC (Synchronization), refer to SYNC (Synchronization) Maintenance documentation to change the system synchronization reference, OR 2. If there are errors against STRAT-3 (Stratum 3 Clock), refer to the STRAT-3 (Stratum 3 Clock) Maintenance documentation to resolve the errors, OR 3. If there are errors against DS1-BD (DS1 Interface circuit pack), refer to the DS1-BD (DS1 Interface Circuit Pack) Maintenance documentation to resolve the errors, OR 4. If there are no other errors besides Error Type 1537 against TDM-CLK and if this error was logged against the Tone-Clock circuit pack that provided the current system synchronization reference (use the status synchronization command to determine this), replace the defective Tone-Clock circuit pack. **Warning:** Since service may be disrupted when the following procedures are carried out, try to perform the following steps when it is convenient for the customer. 5. If the Tone-Clock circuit pack under test is in the Active mode but is not providing the current system synchronization reference, switch the synchronization reference to the Tone-Clock circuit pack under test using the set synchronization PC command. Rerun the test. If the test still fails, replace the defective Tone-Clock circuit pack.
	PASS	The Tone-Clock circuit pack does not detect timing any PPM errors. This indicates that the external synchronization timing source is valid or that the system synchronization reference is a Tone-Clock circuit pack. The status synchronization command should be used to verify that the desired synchronization reference is providing timing for the system.

TDM Bus Clock Parameter Update Test (#151)

This action updates the Tone-Clock internal circuit pack parameters. Tone-Clock circuit pack:

- Disable in-line duplication status messages.
- Disable in-line subrate frame maintenance messages (TN768, TN780 only).
- Set the PPM threshold at 60 PPM for TN768 and TN780. Set the PPM threshold at 85 PPM for TN2182.
- Enable PPM threshold switching
- Set the number of slips to trigger *loss of signal* - currently 30 per 5 millisecond period
- Enable the on-board synchronization switching algorithm (see above)
- Enable holdover operation (TN2182 only).

This is not a test and will always pass without identifying or reporting any Tone-Clock circuit pack errors.

Table 8-351. TDM Bus Clock Parameter Update Test #151

Error Code	Test Result	Description / Recommendation
None	FAIL	Internal system error 1. Retry the command at 1-minute intervals a maximum of 5 times.
	PASS	The Tone-Clock circuit pack parameters have been successfully updated.
	ABORT	Internal system error

TDM-Clock Circuit Pack Type Test (#574)

The purpose of this query is to check if the required type of Tone-Clock circuit pack (TN780) is present when the Stratum 3 clock is administered.

Table 8-352. TDM Clock Circuit Pack Type Test #574

Error Code	Test Result	Description / Recommendation
	ABORT	The system could not allocate the necessary resources for the test. 1. Wait 1 minute and retry the test.
	FAIL	The Tone-Clock circuit pack in the system is not a TN780. The Stratum 3 clock requires a TN780 Tone-Clock circuit pack. 1. Replace the Tone-Clock circuit pack with a TN780. The old circuit pack may still be good, and need not be discarded.

Table 8-352. TDM Clock Circuit Pack Type Test #574

Error Code	Test Result	Description / Recommendation
	PASS	The required TN780 circuit pack is present.

TDM-CLK (TDM Bus Clock)

The TDM bus clock resides on the Tone-Clock circuit pack. The Tone-Clock circuit pack is a critical component in the system and is necessary to ensure the operation of all port circuit packs in the MCU. Currently, the TDM Bus clock supports synchronizing the TDM Bus with interface rates from DS1 facilities.

The system timing reference can be derived from the Tone-Clock circuit pack or an external (off-board) timing reference. Moreover, the Tone-Clock circuit pack aids in monitoring and selecting synchronization references. The Tone-Clock circuit pack, after detecting that the external source of timing is not valid, automatically switches from the external synchronization reference to its local oscillator.

A strong interdependency exists among the DS1 Interface circuit pack maintenance, synchronization maintenance, and TDM Bus clock maintenance MOs.

Replacing the Tone-Clock Circuit Pack

TDM Bus clock failures may require replacement of the Tone-Clock circuit pack (TN768, TN780, or TN2182). Replacing it is a service-disrupting procedure because the Tone-Clock circuit pack generates clocks for the MCU. When replacing the Tone-Clock circuit pack, always make sure to swap it with a comparable Tone-Clock circuit pack.

The following procedure is destructive.

1. Remove the defective Tone-Clock circuit pack (thereby removing all the clocks in the system).
2. Insert a new Tone-Clock circuit pack. The MCU detects the return of the clocks and recovers by automatically performing a reset system 2. (All red LEDs come on and off within 30 seconds.)
3. If the red LEDs come on as described in step 2, go to step 5. If they did not light, go to Step 4.
4. Restart the system with **reset system 2**.
5. Test the new Tone-Clock circuit pack to verify that it is functioning properly.

Hardware Error Log Entries

The following table shows the error log entries and related information.

Table 8-353. TDM Bus Clock Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	test tone-clock sh r 1
	Run the short test sequence first. If all tests pass, run the long test sequence. Refer to the appropriate test description.				
130		None			
	This error type indicates that the circuit pack has been removed or has been insane for more than 11 minutes. To clear the error, reinsert or replace the circuit pack.				
513	Any	#148	Minor	Off	test tone-clock UUC
	The tone-clock has reported an out-of-lock condition. An aux value of 1 indicates that this error is an out-of-lock with the primary reference. An aux value of 2 indicates that this error is an out-of-lock with the secondary reference. It could not lock onto the frequency of that synchronization reference. This will lead to a change in the synchronization reference if the condition continues.				
769	Any	#148	Major	On	test tone-clock sh r 10
	The Tone-Clock circuit pack may be defective or switching of the system synchronization has occurred. 1. Use test tone-clock to test the Tone-Clock circuit pack. See the recommendations to resolve any errors. 2. If there are no tone clock errors, see SYNC to check for synchronization errors. 3. If the problem persists, escalate it.				
1025	Any	#149			test tone-clock sh
	If the Aux Data value is 18433 or 18434, this error is the result of clock switches or reference switches that can result in low number slip errors. Also check SYNC since this error may be the result of switching of the system synchronization reference.				
1281	Any	None			
	This error indicates that the Tone-Clock circuit pack detected a loss of timing signal from the system synchronization references. 1. Resolve any errors logged against the SYNC maintenance objects. 2. Refer to the "Approach to Troubleshooting" section in the SYNC section if the error is not resolved by Step 1.				

Table 8-353. TDM Bus Clock Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
1282	Any	None			
	This error indicates that the TN2182 Tone-Clock was synchronized to a DS1 facility and that the reference frequency provided by the DS1 drifted beyond a range that could be tracked by the TN2182. Therefore, the TN2182 is no longer synchronized to that DS1 reference. If a second DS1 is available, the tone-clock may be synchronized to that reference. If no secondary DS1 reference is available, the tone-clock will run off of its internal clock. This may result in slips being reported by the tone-clock and all DS1 facilities.				
1537	Any	#150			test tone-clock sh
	This error indicates switching of the system synchronization reference occurred (see SYNC).				

Craft-Demanded Tests

Use **list configuration control** to find the Tone-Clock circuit pack code of the system and then look for the short and long test sequences according to the Tone-Clock circuit pack code.

Always investigate tests in the order presented in the following table. By clearing errors associated with the SAKI Reset test, you may also clear errors generated by other tests in the testing sequence.

Table 8-354. System Technician-Demanded Tests: TDM-CLK

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
SAKI Reset Test #53*	Long		Yes
Clock Health Test #46*	Short	Long	No
Control Channel Loop-Around Test #52*	Short	Long	No
Tone Generator Crosstalk Test #90*	Long		No
Tone Generator Transmission Test #40*	Short	Long	No
Tone Generator Audit/Update Test #41*	Short	Long	No
TDM Bus Clock Circuit Status Inquiry Test #148	Short	Long	No
TDM Bus Clock Slip Inquiry Test #149	Short	Long	No
TDM Bus Clock PPM Inquiry Test #150	Short	Long	No
TDM Bus Clock Parameter Update Test #151	Short	Long	No
Board Type Check Test #574	Short	Long	No

* See the following MOs for descriptions of these tests: Test #52 and #53, see XXX-BD; Test #46, see TONE-BD; and Tests #40, #41, and #90, see TONE-PT.

TDM Bus Clock Circuit Status Inquiry Test #148

The TDM Bus clock circuitry is checked for sanity. Any problems found are reported via error codes.

Table 8-355. TDM Bus Clock Circuit Status Inquiry Test #148

Error Code	Test Result	Description Recommendation
	ABORT	The system could not allocate the necessary resources for the test. Wait one minute and retry the test.
1001	ABORT	The system could not allocate the necessary resources for the test. Wait one minute and retry the test.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2100	ABORT	System resources required to run this test are not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1	FAIL	This error indicates that the Parts Per Million (PPM) slip detector detects a continuous slip condition. The system synchronization reference is providing a bad timing source. See SYNC to change the system synchronization reference.
2	FAIL	This error indicates the Tone-Clock circuit pack has inaccurately detected loss of signal on the external synchronization timing source. Replace the Tone-Clock circuit pack. This error may produce errors in data communications.
4	FAIL	The local oscillator on the Tone-Clock circuit pack has failed. Replace the Tone-Clock circuit pack. This error may produce errors in data communications.
8	FAIL	The local oscillator on the Tone-Clock circuit pack has failed. Replace the Tone-Clock circuit pack. This error may produce errors in data communications.
16	FAIL	The circuitry on the Tone-Clock circuit pack used to detect synchronization timing errors has failed. Replace the Tone-Clock circuit pack. This error may produce errors in data communications.

Table 8-355. TDM Bus Clock Circuit Status Inquiry Test #148

Error Code	Test Result	Description Recommendation
32	FAIL	The circuitry on the Tone-Clock circuit pack used to detect synchronization timing errors has failed. Replace the Tone-Clock circuit pack. This error may produce errors in data communications.
64	FAIL	This message is only sent when an external synchronization reference is providing a timing signal for the Tone-Clock circuit pack. This error indicates the Tone-Clock circuit pack has detected a loss of timing signal from the external synchronization reference. No corrective action is needed. SYNC maintenance corrects this error.
65	FAIL	The tone-clock is currently not able to lock on to the current synchronization reference. If this tone-clock is in the master port network: 1. Examine the error log for any DS1-BD, SYNC or other TDM-CLK errors and resolve as applicable. 2. Run this test again via the test tone-clock UUC command. 3. Examine the DS1 measurements to determine if the facility is healthy. 4. Administer a new synchronization reference. 5. Replace the DS1 board currently supplying the reference.
66	FAIL	There is an on-board failure of TDM clock hardware. 1. Replace this faulty Tone-Clock circuit pack.
	PASS	TDM Bus clock circuit status is sane. There are no circuit problems on the Tone-Clock circuit pack.

TDM Bus Clock Slip Inquiry Test #149

This test evaluates the quality of the synchronization source for the Tone-Clock circuit pack

Table 8-356. TDM Bus Clock Slip Inquiry Test #149

Error Code	Test Result	Description Recommendation
None	ABORT	The system could not allocate the necessary resources for this test. Wait one minute and retry the test.
1001	ABORT	The system could not allocate the necessary resources for this test. Wait one minute and retry the test.

Table 8-356. TDM Bus Clock Slip Inquiry Test #149

Error Code	Test Result	Description Recommendation
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2100	ABORT	System resources required to run this test are not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
Any	FAIL	The error code is the number of timing slips detected on the incoming synchronization source since the last slip inquiry was sent to the Tone-Clock circuit pack. 1. If there are errors against synchronization, see SYNC to change the system synchronization reference. 2. Check for errors against DS1 Interface circuit pack (see DS1-BD). The incoming synchronization source can be either a DS1 Interface circuit pack or a local oscillator on a Tone-Clock circuit pack. 3. If there are no errors against either MO, use status synchronization to see if this error was logged against the Tone-Clock circuit pack that was the current system synchronization reference. If so, replace the Tone-Clock circuit pack. 4. If the tone clock does not contain the current synchronization reference, use set synchronization to switch the synchronization reference. NOTE: Disruption may occur when following these procedures. If the MCU does not return to normal after these procedures are completed, escalate the problem.
None	PASS	The Tone-Clock circuit pack did not detect any timing slips. The external synchronization timing source is valid or the system synchronization reference is a Tone-Clock circuit pack. Use status synchronization to verify the desired synchronization reference is providing timing for the system.

Board Type Check Test (#574)

This test verifies that a Tone-Clock circuit pack administered with a Stratum 3 Clock source has the “TN780” code.

Table 8-357. Board Type Check Test #574

Error Code	Test Result	Description Recommendation
2012	ABORT	Internal system error. 1. Retry the command at one-minute intervals a maximum of five times.
Any	FAIL	Stratum 3 Clock Synchronization is administered for the carrier in which this Tone-Clock circuit pack resides, but the Tone-Clock does not have the “TN780” code. 1. If the Stratum 3 Clock option is incorrectly administered, remove it. 2. Otherwise, replace the circuit pack. See the “How to Replace the Tone-Clock Circuit Pack” section in the TONE-BD section.
None	PASS	The proper (TN780) Tone-Clock circuit pack code is present for Stratum 3 Clock synchronization.

TDM Bus Clock PPM Inquiry Test #150

This test evaluates the quality of the synchronization source for the Tone-Clock circuit pack

Table 8-358. TDM Bus Clock PPM Inquiry Test #150

Error Code	Test Result	Description Recommendation
	ABORT	The system could not allocate the necessary resources for the test. Wait one minute and retry the test.
255	ABORT	The test was not executed because the Tone-Clock circuit pack had been on its local oscillator.
1001	ABORT	The system could not allocate the necessary resources for the test. Wait one minute then retry the test.
2000	ABORT	Response to the test was not received within the allowable time period. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2100	ABORT	System resources required to run this test are not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.

Table 8-358. TDM Bus Clock PPM Inquiry Test #150

Error Code	Test Result	Description Recommendation
Any	FAIL	The error code is the number of PPM errors detected on the external synchronization source since the last PPM inquiry was sent to the Tone-Clock circuit pack. A failure of this test indicates that the MCU is outside timing specifications on the external timing source. This error produces an invalid timing signal for any system that uses this source as a synchronization reference. 1. If there are synchronization errors, see SYNC to change the system synchronization reference. 2. If there are errors against the DS1 Interface circuit pack, see DS1-BD. 3. If there are neither, and if this error is logged against the Tone-Clock circuit pack that provided current system synchronization reference (use status synchronization to determine this), replace the defective Tone-Clock circuit pack. 4. If the Tone-Clock circuit pack is not providing the current system synchronization, use set synchronization to switch the synchronization reference to the Tone-Clock circuit pack. 5. Rerun the test. 6. If the test still fails, escalate the problem.
	PASS	The Tone-Clock circuit pack does not detect timing any PPM errors. The external synchronization timing source is valid or the system synchronization reference is a Tone-Clock circuit pack. Use status synchronization to verify that the desired synchronization reference is providing timing for the system.

TDM Bus Clock Parameter Update Test #151

This test handles the following internal parameters on the Tone-Clock circuit pack in the manner specified:

- Disables the in-line subrate frame maintenance messages (TN768, TN780 only)
- Sets the PPM threshold at 60 PPM for the TN768 and TN780. Sets the PPM threshold at 85 PPM for the TN2185
- Sets the number of slips to trigger a loss of signal, which is currently a 30 per 5 millisecond period
- Enables the on-board synchronization switching algorithm

- Enabling the hcid over operation (2182 only).

Table 8-359. TDM Bus Clock Parameter Update Test #151

Error Code	Test Result	Description	Recommendation
	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.	
	FAIL	Internal system error.	
	PASS	The Tone-Clock circuit pack parameters have been successfully updated.	

TIE-DS1 (DS1 Tie Trunks)

The DS1 tie trunk provides both voice and data communications. A 24-channel DS1 Interface circuit pack (TN767E) can support up to 24 digital tie trunks through a 1.544-Mb DS1 link. DS1 Interface circuit packs are described in DS1-BD.

Alarm Level	Initial Craft Command to Run
Major*	test trunk <grp/mbr> l
Minor	test trunk <grp/mbr> l
Warning	test trunk <grp/mbr>

* A major alarm on a trunk indicates the alarms on this trunk were not downgraded with **set options** and at least 75 percent of the trunks in this trunk group are alarmed.

DS1 tie trunk maintenance provides a strategy to maintain a DS1 tie trunk via a port on the DS1 Interface circuit pack. The maintenance strategy covers logging DS1 tie trunk errors, running tests for trunk initialization, periodic and scheduled maintenance, craft-demanded tests, alarm escalation, and resolution.

Three different trunk service states are specified in the DS1 tie trunk maintenance:

- Out-of-Service: the trunk is in a deactivated state and cannot be used for either incoming or outgoing calls
- In-Service: the trunk is in an activated state and can be used for both incoming and outgoing calls
- Disconnect (Ready-for-Service): the trunk is in an activated state but can only be used for an incoming call.

If the DS1 Interface circuit pack is out of service, all trunks on the DS1 Interface circuit pack are placed into out-of-service state and a warning alarm is raised.

Hardware Error Log Entries

The following table shows the error log entries and related information

Table 8-360. DS1 Tie Trunk Maintenance Error Log

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	test trunk <grp/mbr> sh r 1
	Run the short test sequence first. If all tests pass, run the long test sequence. Refer to the appropriate test descriptions.				
1	57476 , 57477, 57485				
	The DS1 Interface circuit pack detects a hardware error on the DS1 tie trunk. The Aux Data field means: 57476 = on-hook before wink. 57477 = on-hook before ready to receive digits. 57485 = wink too short for valid signal.				
15	Any	#36			
	This is a software audit error that does not indicate any hardware malfunction. Run the short test sequence and investigate associated errors (if any).				
18	0		Warning	Off	release trunk <grp/mbr>
	The DS1 tie trunk has been busied out by craft. No calls can be made on this trunk except the facility access test call.				
130		None	Warning	On	test trunk <grp/mbr>
	The circuit pack has been removed or has been insane for more than 11 minutes. To clear the error, reinsert or replace the circuit pack.				
257	57473 , 57474				
	The DS1 Interface circuit pack detects a hardware error on the DS1 tie trunk. The Aux Data field contains one of the following errors: 57473 = rotary dial rate below eight pulses per second. 57474 = rotary dial rate above 12 pulses per second. Escalate this error to the next tier.				

Table 8-360. DS1 Tie Trunk Maintenance Error Log

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
513	57392				
	The DS1 Interface circuit pack detects a hardware error on the DS1 tie trunk. The Aux Data field shows the following hardware error type: 57392 = delayed external release on MCU disconnect. Escalate this error to the next tier.				
769	57393				
	The DS1 Interface circuit pack detects a hardware error on the DS1 tie trunk. The Aux Data field contains the following hardware error type: 57393 = delayed external release on MCU disconnect. Escalate the error to the next tier.				
1025		#136	Major/Minor/Warning	Off	Test trunk <grp/mbr> r 2
	Minor alarms may be downgraded to warning alarms based on the values set in set options. If the minor alarm is not downgraded by set options, the minor alarm is upgraded to major if 75 percent of the trunks in this trunk group are alarmed.				
1281		#7	Major/Minor/Warning	On	test trunk <grp/mbr> l r 4
	Minor alarms may be downgraded to warning alarms based on the values set in set options. If the minor alarm is not downgraded by set options, the minor alarm is upgraded to major if 75 percent of the trunks in this trunk group are alarmed.				
1537		#6	Major/Minor/Warning	On	test trunk <grp/mbr> l r 3
	Minor alarms may be downgraded to warning alarms based on the values set in set options. If the minor alarm is not downgraded by set options, the minor alarm is upgraded to major if 75 percent of the trunks in this trunk group are alarmed.				
1793					test board PCSS long
	The DS1 Interface circuit pack is out of service. See DS1-BD.				
2305	50944				
	Reorder message. The trunk could not be seized. This error causes test #136 to run and it is considered a problem only if the Seizure Test fails (in which case error type 1025 also shows up). In this case, the trunk may be put in ready-for-service state (shown as disconnected by status command), which allows only incoming calls. Run test #136 and follow the procedures.				

Table 8-360. DS1 Tie Trunk Maintenance Error Log

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
2562	16665				
	Retry failure error. This error is logged only. It is not a hardware failure; therefore, it does not start any testing or generate any alarms. This error comes from call processing and is generated when a second attempt (retry) to seize an outgoing trunk fails.				
2817	52992				
	Glare error. This error is logged only. It is not a hardware failure; therefore, it does not start any testing or generate any alarms. This error is the result of a simultaneous seizure of a two-way trunk from both the near end and the far end. Attempt to place the call again. If the error persists, execute the DS1 Tie Trunk Seizure Test #136 and follow its procedure.				
3840	Any	#36			
	Test #36 failed due to an internal system error. Enter status trunk and verify the status of the trunk. If the trunk is out of service, enter release trunk to put it back in service. Retry the test command. If the test aborts again, escalate the problem.				

Craft-Demanded Tests

Always investigate tests in the order presented in the table below when inspecting errors. By clearing error codes associated with the NPE Crosstalk test, you may also clear errors generated by other tests in the sequence.

Table 8-361. System Technician-Demanded Tests: TIE-DS1

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
NPE Crosstalk Test #6	Long		No
Conference Circuit Test #7	Long		No
DS1 Tie Trunk Seizure Test #136	Short	Long	No
Port Audit and Update Test #36	Short	Long	No

NPE Crosstalk Test #6

One or more NPEs reside on each circuit pack with a TDM Bus interface. The NPE controls port connectivity and gain, and provides conferencing functions on a per-port basis. The NPE Crosstalk test verifies that this port's NPE channel talks on the selected time slot and never crosses over to time slots reserved for other connections.

If the NPE is not working correctly, one-way and noisy connections may result. This test is usually only part of a port's long test sequence and takes about 20 to 30 seconds to complete.

Table 8-362. NPE Crosstalk Test #6

Error Code	Test Result	Description Recommendation
	ABORT	System resources required for this test are not available. 1. Retry the command at one minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1000	ABORT	System resources required to run this test are not available. The port may be in use on a valid call. 1. Use status trunk to determine when the port is available. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to abort, escalate the problem.
1001	ABORT	System resources required for this test are not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1002	ABORT	The system could not allocate time slots for the test. The system may be under heavy traffic conditions or it may have time slots out of service due to TDM Bus errors (see TDM-BUS). 1. If the MCU has no TDM-BUS errors and is not handling heavy traffic, repeat the test at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1003	ABORT	The system could not allocate a tone receiver for this test. The system may be oversized for the number of tone detectors present or some tone detectors may be out of service. 1. Look for TTR-LEV errors in the error log (see TTR-LEV). 2. Look for TONE-PT error in the error log (see TONE-PT). 3. If neither condition exists, retry the test at one-minute intervals up to five times. 4. If the test continues to abort, escalate the problem.
1004	ABORT	The port has been seized by a user for a valid call. 1. Use status trunk to determine when the port is available for testing. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to abort, and the port is not in use, escalate the problem.
1020	ABORT	The test did not run because of a previously existing error on the specific port or a more general circuit pack error. Examine the error log for existing errors against this port or the circuit pack and attempt to diagnose the already existing error.

Table 8-362. NPE Crosstalk Test #6

Error Code	Test Result	Description Recommendation
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2053	ABORT	At least one of the following errors was found on the DS1 circuit pack: _1281: loss of signal _1793: blue alarm _2049: red alarm _2305: yellow alarm Look for the error types in the Hardware Error log, and follow the procedures provided in the appropriate DS1-BD or UDS1-BD maintenance documentation for the listed error types.
2100	ABORT	System resources required for this test are not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
0	NO BOARD	The test could not relate the internal ID to the port (no board). This could be due to incorrect translations or because no circuit pack is inserted, an incorrect circuit pack is inserted, or an insane circuit pack is inserted. 1. Check to ensure that the circuit pack translations are correct. Use the list config command, and resolve any problems that are found. 2. If the circuit pack was found to be correctly inserted in Step 1, issue the busyout board command. 3. Issue the reset board command. 4. Issue the release busy board command. 5. Issue the test board long command. This should re-establish the linkage between the internal ID and the port. If this is not the case, check to see that there is a valid circuit pack inserted.
	FAIL	The NPE of the tested port was found to be transmitting in error. This causes noisy and unreliable connections. Replace the circuit pack.
	PASS	The port is correctly using its allocated time slots. User-reported troubles on this port should be investigated using other port tests and by examining station, trunk, or external wiring.

Conference Circuit Test #7

One or more NPEs reside on each circuit pack with a TDM Bus interface. The NPE controls port connectivity and gain, and provides conferencing functions on a per-port basis. The Conference Circuit test verifies that the NPE channel for the port being tested can correctly perform the conferencing function.

The NPE listens to several different tones and conferences the tones together. The resulting signal is then measured by a tone detector port. If the level of the tone is within a certain range, the test passes.

Table 8-363. Conference Circuit Test #7

Error Code	Test Result	Description Recommendation
	ABORT	System resources required for this test are not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1000	ABORT	System resources required to run this test are not available. The port may be in use on a valid call. 1. Use status trunk to determine when the port is available for testing. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to abort, and the port is not in use, escalate the problem.
1002	ABORT	The system could not allocate time slots for the test. The system may be under heavy traffic conditions, or it may have time slots out of service due to TDM-BUS errors. The status health command can be used to determine if the system is experiencing heavy traffic. Refer to the TDM-BUS (TDM bus) Maintenance Documentation to diagnose any active TDM-BUS errors. 1. If the system has no TDM-BUS errors and is not handling heavy traffic and the port status is idle, retry the command at 1-minute intervals for a maximum of 5 times.

Table 8-363. Conference Circuit Test #7

Error Code	Test Result	Description Recommendation
1003	ABORT	The system could not allocate a tone receiver for this test. The system may be oversized for the number of tone detectors present or some tone detectors may be out of service. Issue the list measurements tone-receiver command to display basic information about the system's tone receivers. 1. Look for TTR-LEV errors in the error log (if present, see the TTR-LEV section). 2. Look for TONE-PT error in the error log (if present, see the TONE-PT section). 3. If neither condition exists, retry the test at one-minute intervals up to five times. 4. If the test continues to abort, escalate the problem.
1004	ABORT	The port has been seized by a user for a valid call. 1. Use status trunk to determine when the port is available for testing. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to abort, escalate the problem.
1018	ABORT	Test disabled via administration. This only applies to analog stations. Use change trunk <ext> to set the Test field on the Trunk Administration form for the particular trunk being tested to y.
1020	ABORT	The test did not run due to a previously existing error on the specific port or because of a more general circuit pack error. Examine the error log against this port or circuit pack, and attempt to diagnose the previously existing error.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2053	ABORT	At least one of the following errors is found on the DS1 circuit pack: 1281—Loss of signal, 1793—Blue Alarm, 2049—Red Alarm, 2305—Yellow Alarm, 1537—Hyperactivity. Look for the error types in the Hardware Error Log and follow the procedures given in the appropriate DS1-BD or UDS1-BD maintenance documentation for the listed error types.
2100	ABORT	System resources required for this test are not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
	FAIL	The NPE of the tested port did not conference the tones correctly. This causes noisy and unreliable connections. Replace the circuit pack.

Table 8-363. Conference Circuit Test #7

Error Code	Test Result	Description Recommendation
	PASS	The port is using its allocated time slots correctly. User-reported troubles on this port should be investigated using other port tests and by examining station, trunk or external wiring.
0	NO BOARD	The test could not relate the internal ID to the port (no board). This could be due to incorrect translations or because no circuit pack is inserted, an incorrect circuit pack is inserted, or an insane circuit pack is inserted. 1. Check to ensure that the circuit pack translations are correct. Use the list config command, and resolve any problems that are found. 2. If the circuit pack was found to be correctly inserted in Step 1, issue the busyout board command. 3. Issue the reset board command. 4. Issue the release busy board command. 5. Issue the test board long command. This should re-establish the linkage between the internal ID and the port. If this is not the case, check to see that there is a valid circuit pack inserted.

Port Audit and Update Test #36

This test sends port level translation data from the processor to the DS1 Interface circuit pack to ensure that the trunk's translation is correct. Translation updates include the following data: trunk type (on/out), dial type, timing parameters, and signaling bits enabled.

The port audit operation verifies the consistency of the current state of the trunk kept by the DS1 Interface circuit pack and the MCU software

Table 8-364. Audit and Update Test #36

Error Code	Test Result	Description Recommendation
	ABORT	Internal system error 1. Retry the command at one-minute intervals up to five times.

Table 8-364. Audit and Update Test #36

Error Code	Test Result	Description Recommendation
1000	ABORT	System resources required to run this test were not available. The port may be busy with a valid call. Use the display port UUCSSpp command to determine the trunk group/member number of the port. Use the status trunk command to determine the service state of the port. If the service state indicates that the port is in use, then the port is unavailable for certain tests. You must wait until the port is idle before retesting. 1. If the port status is active but the port is not in use (no calls), check the error log for error type 1025 (see the error log table for a description of this error and required actions). The port may be locked up. 2. If the port status is idle, retry the command at 1-minute intervals for a maximum of 5 times.
1006	ABORT	The test was aborted because the trunk is out of service. 1. Use the status trunk command to verify that the trunk is out of service. 2. If the trunk is out of service, determine why. 3. If it is OK to put the trunk back in service, issue the release trunk command to put the trunk back in service, and then retry the test.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to fail, escalate the problem.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
	FAIL	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to fail, escalate the problem.
0	NO BOARD	The test could not relate the internal ID to the port (no board). This could be due to incorrect translations or because no circuit pack is inserted, an incorrect circuit pack is inserted, or an insane circuit pack is inserted. 1. Check to ensure that the circuit pack translations are correct. Use the list config command, and resolve any problems that are found. 2. If the circuit pack was found to be correctly inserted in Step 1, issue the busyout board command. 3. Issue the reset board command. 4. Issue the release busy board command. 5. Issue the test board long command. This should re-establish the linkage between the internal ID and the port. If this is not the case, check to see that there is a valid circuit pack inserted.

Table 8-364. Audit and Update Test #36

Error Code	Test Result	Description Recommendation
	PASS	Trunk translation has been updated successfully. The current trunk states kept in the DS1 Interface circuit pack and MCU software are consistent. If the trunk is busied out, the test does not run, but it does return a PASS. To verify the trunk is in service: 1. Enter status trunk. 2. If the trunk is in service, no other action is necessary. If the trunk is out of service: 1. Enter release trunk. 2. Retry the test.

DS1 Tie Trunk Seizure Test #136

The DS1 Tie Trunk Seizure test is run to verify the trunk's signaling capability. The test is composed of two parts: the first part queries the circuit pack for the following errors: loss of signal, red alarm, blue alarm, yellow alarm, and hyperactivity alarm; the second part sends a seizure message to the DS1 Interface circuit pack and expects an active reply. If maintenance software does not receive a reply and the timer expires, the test aborts.

Once the active message is received, a dial pulse message is sent to the DS1 Interface circuit pack. If it replies with a dial pulse tone message when the far end responds to the seizure, the DS1 Tie Trunk Seizure test passes. If the far end does not respond to the seizure and the timer expires, and the DS1 Interface circuit pack sends a reorder message back to maintenance software, the test fails.

The second part of this test cannot be run on a trunk if one of the following cases is true:

- The trunk direction is administered as an incoming only trunk.
- The trunk is the 24th port on a DS1 Interface circuit pack that is administered using 24th common channel signaling.
- The trunk is administered with maintenance test disabled.
- The outgoing signal type of the trunk is either automatic or immediate-start.

Table 8-365. DS1 Tie Trunk Seizure Test #136

Error Code	Test Result	Description Recommendation
	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.

Table 8-365. DS1 Tie Trunk Seizure Test #136

Error Code	Test Result	Description Recommendation
1000	ABORT	System resources required to run this test are not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1004	ABORT	Far-end is seizing the trunk while the test in ongoing. A glare situation is detected. Current test is designed to be aborted. 1. Use status trunk to determine when the trunk is available for testing. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to abort, and the port is not in use, escalate the problem.
1005	ABORT	Test failed due to incompatible configuration administered on the Trunk Group form. 1. Verify the following fields on the Trunk Group form: - Is trunk direction incoming only? - Is the trunk the outgoing type (not wink-start or delay-dial? - Is the trunk port 24 of the DS1 Interface circuit pack while common control channel signaling is specified? 2. If you answered yes to any of the above questions, this test should abort.
1018	ABORT	Test has been disabled by trunk group administration. 1. Verify that the Maintenance Test field on the Trunk Administration screen is n. 2. To enable the test, change it to y. 3. Repeat the test.
1020	ABORT	The DS1 Interface circuit pack is out of service. 1. Look for DS1-BD errors in the error log (see DS1-BD). 2. Retry the command. 3. If the test continues to abort, escalate the problem.
1040	ABORT	This test is not performed for trunks ports that are administered as access endpoints. 1. Verify that this port is an access endpoint by using the display port command. If the port has been administered as an access endpoint, this test should abort.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.

Table 8-365. DS1 Tie Trunk Seizure Test #136

Error Code	Test Result	Description Recommendation
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
	FAIL	The trunk cannot be seized for an outgoing call. 1. Verify the Trunk Type (in/out) field on the Trunk Administration form matches the trunk type administered for the far end. 2. Look for DS1-BD errors in the error log (see DS1-BD). 3. Retry the test at one-minute intervals up to five times. 4. If the test continues to fail, escalate the problem.
2053	FAIL	At least one of the following errors was found on the circuit pack: Look for these errors in the error log (see DS1-BD). 1281: loss of signal 1537: hyperactivity 1793: blue alarm 2049: red alarm 2305: yellow alarm
0	NO BOARD	The test could not relate the internal ID to the port (no board). This could be due to incorrect translations or because no circuit pack is inserted, an incorrect circuit pack is inserted, or an insane circuit pack is inserted. 1. Check to ensure that the circuit pack translations are correct. Use the list config command, and resolve any problems that are found. 2. If the circuit pack was found to be correctly inserted in Step 1, issue the busyout board command. 3. Issue the reset board command. 4. Issue the release busy board command. 5. Issue the test board long command. This should re-establish the linkage between the internal ID and the port. If this is not the case, check to see that there is a valid circuit pack inserted.
	PASS	The trunk can be seized for an outgoing call.

TONE-BD (Tone Clock Circuit Pack)

The Tone-Clock circuit pack functionality is provided by two independent objects in the same circuit pack. The tone generator provides all the tones needed by the system and the clock generates the system clocks for the TDM Bus and aids in monitoring and selecting internal synchronization references.

Alarm Level	Initial Craft Command to Run
Major	test tone-clock
Minor	test tone-clock
Warning	test tone-clock

When resolving errors or alarms on the Tone-Clock circuit pack, use the following instructions:

- TONE-PT (Tone Generator)
- TDM-CLK (TDM Bus Clock)
- SYNC (Synchronization)

The MCU has one Tone-Clock circuit pack. It generates clocks and provides system tones for the port network it resides on.

The TN780 Tone-Clock circuit pack uses three firmware configuration parameters for international support. Two of these three parameters are automatically set by the software load for the targeted country. These parameters include the circuit pack's country code and the circuit pack's companding mode (A-law or u-law).

The TN2182 is a combined Tone-Clock-Detector circuit pack containing a third independent function that is not available on the TN768 or TN780 circuit pack. The TN2182 contains eight ports that are used for all-purpose tone detection. These ports are called Enhanced Tone Receiver ports (ETR-PT), and they are described in the documentation for ETR-PT.

For Italy and Australia, the companding mode is A-law. For the US, the companding mode is u-law. The third configuration parameter is used only for Italy (country code equals ITALY), and it selects whether new versus old ISPT (Istituto Superiore Poste Telegrafi) tones are to be used for dial tone or confirmation tone. These values can be independently selected for dial tone or for confirmation tones through system administration (via the System-Parameters Miscellaneous form).

Tone-Clock LED Flashing Interpretation

The following table provides appropriate information on Tone-Clock LEDs.

Table 8-366. Tone-Clock LED Flashing

Condition	Tone-Clock Circuit State	Explanation
"flashing yellow" 2.7seconds on, .3 seconds off	active	An external timing source is being used as a synchronization reference.
“Flashing yellow” .3 seconds on, 2.7 seconds off	active	Local oscillator on the Tone-Clock is being used as a synchronization reference.
“Yellow” on continuously	active	Circuit pack has been reset, but it has not been told which synchronization source to use. The 2182 has lost all external references and is in holdover mode.
“Double blink yellow” .3 seconds on, .3 seconds off, .3 seconds on, 2.4 seconds off	active	TN2182 has lost all external references and is in holdover mode.
Other green and yellow patterns	active	Maintenance software is testing the active circuit pack.

Replacing a Tone-Clock Circuit Pack

System clock failures require replacement of the Tone-Clock circuit pack. This is a service-disrupting procedure because the tone-clock generates the clocks for the MCU. When replacing a defective Tone-Clock circuit pack, always install a comparable Tone-Clock circuit pack in its place (TN768).

This procedure is destructive.

1. Pull out the faulty Tone-Clock circuit pack. If it is being replaced for a reason other than loss of clocks (Clock Health Inquiry test #46), pulling it out causes the clocks to go away.
2. Insert a new Tone-Clock circuit pack. The MCU detects that the clocks returned, and it recovers by automatically performing a **reset system 2**. All the red LEDs come on and go off within 30 seconds.
3. If the red LEDs are lit as described in the previous step, go to Step 5. If not, go to Step 4.
4. Enter **reset system 2**.
5. Test the new Tone-Clock circuit pack to make sure it is operational.

Hardware Error Log Entries

The following table shows the error log entries and related information.

Table 8-367. Tone-Clock Circuit Pack Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	test tone-clock PC sh
	Run the short test sequence first. If all tests pass, run the long test sequence. Refer to the appropriate test procedures.				
1	0	#53	Minor	On	
	The circuit pack stopped functioning or was physically removed. The alarm is logged approximately 11 minutes after the circuit pack is removed or test #53 fails. If the circuit pack is not in the MCU, insert a circuit pack (in the same slot the error indicates). If the circuit pack is in the MCU and the red LED is on, follow instructions for red alarm. If after replacing the Tone-Clock circuit pack the red LED is still on, the problem could be on the Netpkt Interface circuit pack (see SW-CTL).				
23	0	None	Warning	Off	
	The circuit pack has been administered but not installed. The alarm is cleared when it is installed.				
125		None	Minor	On	
	The wrong circuit pack is installed in the slot where this circuit pack is administered. Either remove the wrong circuit pack or use change circuit-pack to readminister the slot to match the circuit pack inserted.				
126		None	Minor	On	
	The port network specified in the PORT field of the error booted up without a Tone-Clock circuit pack.				
257	65535	#52	Minor	On	test tone-clock r 20
257	Any	None			
	Transient communications problems with the circuit pack. This is not service-affecting and no action is required.				
513		Any	None		
	When reported with Aux Data in the range of 4352 to 4358, this indicates the circuit pack reported a hardware failure. Replace the circuit pack.				
769	4358	None			
	Ignore this error, but look for others on this circuit pack.				

Table 8-367. Tone-Clock Circuit Pack Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
1025	4363	#50			test tone-clock sh
	This is not service-affecting and no action is required.				
1538	Any	None			
	The circuit pack is out of service. Use test tone-clock long to reset it. If that doesn't work, replace the Tone-Clock circuit pack.				
2049	0	#46	Major	On	test tone-clock r 1
	A loss of data clock requires that the Tone-Clock circuit pack be replaced.				
2305	0	#46	Major	On	test tone-clock r 1
	A loss of clock on the Tone-Clock circuit pack. Check the TDM Bus cables and bus terminators to be sure they are correct. If not, replace them. If the TDM Bus cables and bus terminators are correct, verify if a power alarm is still active or just retired. If so, and it was logged at the same time as the loss of clock, resolve the power alarm first. If error type 3329 is logged against TONE-BD, see the description for it. If this is not the case, follow these steps: 1. Replace the Tone-Clock circuit pack. 2. Use test tone-clock to test the new circuit pack. 3. The new circuit pack will generate clocks for the MCU even though test #46 will still report a failure. 4. If the loss of clock/ reset system 2 does not recur, the problem has been resolved. 5. If the problem reappears, see "Replacing a Circuit Pack."				
2561		None	Major	On	
	A Tone-Clock circuit pack with a different circuit pack code than required has been inserted. See "Replacing a Circuit Pack" for the appropriate circuit pack code and replace it accordingly.				
3329	0	None	Minor/Warning	Off	set tone-clock
	1. If errors other than 3329 are logged against TONE-BD, resolve them first. 2. Retry the test. 3. If the problem is not resolved, replace the circuit pack. Minor alarms may be downgraded to warning due to the setting of set options.				
3840	4096 - 4100	None			
	This error is not service-affecting. No action required.				
3848	0	#46			test tone-clock r 1
	The Tone-Clock circuit pack had a loss of clock. If error type 2305 is also logged, refer to its description.				

Table 8-367. Tone-Clock Circuit Pack Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
3872	0	#46			test tone-clock r 1
	The Tone-Clock circuit pack lost its data clocks. This error affects the MCU. If error type 2049 is also logged, refer to its description.				
3999	Any	None			
	Indicates that the circuit pack sent a large number of control channel messages to the MCU within a short period of time. If error type 1538 is also present, the circuit pack was taken out of service due to hyperactivity. If error type 1538 is not present, the circuit pack has not been taken out of service, but it has generated 50% of the messages necessary to be considered hyperactive. This may be completely normal during heavy traffic periods. However, if this error type is logged when the circuit pack is being lightly used, it may indicate a problem with the circuit pack or the equipment attached to it.				

Craft-Demanded Tests

Always investigate tests in the order presented. Use **list configuration control** to find the Tone-Clock circuit pack code of the MCU. Look for short and long test sequences according to the Tone-Clock circuit pack

Table 8-368. System Technician-Demanded Tests: TONE-BD

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
SAKI Sanity Test #53*	Long		Yes
Clock Health Inquiry Test #46	Short	Long	No
Control Channel Loop-Around Test #90*	Short	Long	No
Tone Generator Crosstalk Test #90†	Short	Long	No
Tone Generator Transmission Test #40†	Long		No
Tone Generator Audit/Update #41†	Short	Long	No
TDM Bus Clock Circuit Status Inquiry Test #148‡	Short	Long	No
TDM Bus Clock Slip Inquiry #149‡	Short	Long	No
TDM Bus Clock PPM Inquiry Test #150‡	Short	Long	No
TDM Bus Clock Parameter Update Test #151‡	Short	Long	No
Board Type Check Test #574	Short	Long	No

* See XXX-BD (Common Port Circuit Pack) for a description of this test.

† See TONE-PT (Tone Generator) for a description of this test.

‡ See TDM-CLK (TDM Bus Clock) for a description of this test.

Clock Health Inquiry Test #46

This inquiry reads special data stored in memory to determine if this Tone-Clock circuit pack had a loss of clock. If this data indicates this Tone-Clock circuit pack had a loss of clock, the inquiry reports a failure. If the circuit pack did not have a loss of clock, the inquiry reports a pass

Table 8-369. Clock Health Inquiry Test #46

Error Code	Test Result	Description Recommendation
	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
	FAIL	This Tone-Clock circuit pack had a loss of clock. Replace the Tone-Clock circuit pack.
1	FAIL	This Tone-Clock circuit pack is suspect of having a clock at the edge of its specified frequency. A Tone-Clock circuit pack with this problem can cause Expansion Interface circuit packs to go out-of-frame or report no neighbor conditions, thus causing EPNs to go down 1. Replace the Tone-Clock circuit pack identified in the error log. 2. If the error persists, follow normal escalation procedures.
	PASS	The Tone-Clock circuit pack did not report a loss of clock.

TONE-PT (Tone Generator)

The tone generator facility exists on the Tone-Clock circuit pack and provides all the tone services for the MCU. The Tone-Clock circuit pack also provides the clocks for the MCU and can serve as the synchronization reference. Therefore, when resolving alarms on the Tone-Clock circuit pack, the TDM-CLK (TDM Bus Clock) and SYNC (Synchronization) procedures should also be utilized, as well as TONE-BD (Tone-Clock circuit pack).

Alarm Level	Initial Craft Command to Run
Major	test tone-clock sh
Minor	test tone-clock sh
Warning	release tone-clock sh

If the active tone generation facility fails, the port network may not have tones (see the Tone Generator Transmission test #40). That is, a user may go off-hook and

hear no dial tone. The MCU can process certain types of calls (for example, internal calls succeed while outgoing calls do not).

Replacing the Tone-Clock Circuit Pack

Tone generation failures may require replacement of the Tone-Clock circuit pack. Replacing it is a service-disrupting procedure since it generates clocks for the MCU. When replacing the Tone-Clock circuit pack, be sure to use a comparable one (TN768).

This procedure is destructive.

1. Pull out the faulty Tone-Clock circuit pack.
2. Insert a new Tone-Clock circuit pack. When the MCU detects that the clocks came back, it recovers by automatically performing a **reset system 2**. All the red LEDs come on and go off within 30 seconds.
3. If the red LEDs light as explained above, go to Step 5. If not, go to Step 4.
4. Retry **reset system 2**.
5. Test the new tone-clock to be sure it is healthy.

Hardware Error Log Entries

The following table lists the error log entries and related information.

Table 8-370. Tone Generator Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	test tone-clock sh r 1
	Run the short test sequence first. If all tests pass, run the long test sequence. Refer to the appropriate test description.				
1	17664	#41	Major	On	test tone-clock r 2
	The Tone-Clock circuit pack has been removed since the last error log was cleared. Verify that the circuit pack has been reinserted.				
130	-	None	Minor	On	test tone-clock sh
	The circuit pack has been removed or has been insane for more than 11 minutes. Reinsert or replace it.				
257	17667	None	Minor	On	-
	The tone generation facility is having problems monitoring tones. This may be due to incorrect companding mode or country code. 1. Use test tone-clock long to reset the SAKI and restore proper configuration values. 2. If this does not work and this error is constantly logged, replace the circuit pack.				

Table 8-370. Tone Generator Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
513	17666	#41	Minor	On	test tone-clock r 3
	The port network specified in the Port field of the error booted up without a Tone-Clock circuit pack. The tone generation facility may not be able to generate tones. If this error is constantly logged, replace the circuit pack.				
769	Any	#40	Major	On	test tone-clock r 3
	Test #40 failed to generate and transmit tones correctly.				
1025	-	#90	Major	On	test tone-clock r 2
	Test #90 failed to put out tones correctly.				
1281	Any	#41	Minor	On	test tone-clock
	The system-parameters country-options administration is set up such that a TN780 or TN2182 is required, and the existing Tone-Clock circuit pack does not provided the needed functionality. The Base Tone Generation Set on page 1, or the custom tones fields beginning on page 2 of the Country-Options form may have values that are not supported by the existing tone-clock. This error (1281) indicates that the Country-Options form has customer tones that are translated, and that the alarmed tone board does not support the customized tones. The TN768 tone boards do not support any customized tones. TN780 tone boards support up to six customized tones by using the following frequencies/levels only: Silence---350Hz+440Hz at 13.75 dB---404Hz+425Hz at 11.0 dB ---350Hz at 17.25 dB---480Hz at 17.25 dB---375Hz+425Hz at 15.0 dB ---425Hz at 4.0 dB---620Hz at 1725 dB---404Hz+450Hz at 11.0 dB ---425Hz at 11.0 dB---440Hz+480Hz at 19.0 dB---1000Hz at 0.0 dB ---425Hz at 17.25 dB---404Hz at 11.0 dB---1000Hz at +3.0 dB ---440Hz at 17.25 dB ---404Hz at 16.0 dB---525Hz at 11.0 dB ---350Hz+425Hz at 4.0 dB---480Hz+620Hz at 24.0 dB---1400Hz at 11.0 dB				

Craft-Demanded Tests

Always investigate tests in the order presented in the following table. Use **list configuration** to find the Tone-Clock circuit pack code of the MCU.

Table 8-371. System Technician-Demanded Tests: TONE-PT

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
SAKI Sanity Test #53*	Long		Yes
Clock Health Inquiry Test #46†	Short	Long	No
Control Channel Loop-Around Test #52*	Short	Long	No
Tone Generator Crosstalk Test #90	Short	Long	No
Tone Generator Transmission Test #40	Long		No
Tone Generator Audit/Update #41	Short	Long	No
TDM Bus Clock Circuit Status Inquiry Test #148‡	Short	Long	No
TDM Bus Clock Slip Inquiry #149‡	Short	Long	No
TDM Bus Clock PPM Inquiry Test #150‡	Short	Long	No
TDM Bus Clock Parameter Update Test #151‡	Short	Long	No
Board Type Check Test #574	Short	Long	No

* See XXX-BD (Common Port Circuit Pack) for a description of this test.
† See TONE-BD (Tone-Clock Circuit Pack) for a description of this test.
‡ See TDN-CLK (TDM Bus Clock) for a description of this test.

Tone Generator Transmission Test #40

This test tests all the tones the tone generator is capable of generating. The test is performed in three parts. For the first part, the tone generator generates the touch-tone digits. The digits are received and checked by a tone detector touch-tone detector. If any of the digits fail, the test is repeated using a touch-tone detector in another Tone Detector circuit pack.

For the second part, the tone generator generates the 440-Hz call progress tone and the 2225-Hz answer-back tone. A tone detector general-purpose tone detector port listens for the tone. If either tone is not properly detected, the test fails.

For the last part of the test, the tone generator generates 404-, 1004- and 2804-Hz tones. A tone detector general-purpose tone detector port listens for the tones and measures the quality of the tone. If any of the measured values are not within the limits, the test fails.

If Test #40 fails, do the following:

1. Check that all Tone Detector circuit packs have the same companding mode as that administered for the MCU. If there is a mismatch, correct it.
2. Run the long test sequence: **test tone-clock long repeat 1**.
3. If the problem persists, replace the Tone-Clock circuit pack.

Table 8-372. Tone Generator Transmission Test #40

Error Code	Test Result	Description Recommendation
none	ABORT	The MCU was unable to allocate all the resources needed for this test or there was an internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1	ABORT	The system could not allocate all the resources needed to test the DTMF tones. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1001	ABORT	The system was not able to put the tone generation facility in the appropriate mode to test it. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem

Table 8-372. Tone Generator Transmission Test #40

Error Code	Test Result	Description Recommendation
1002	ABORT	The system could not allocate time slots for the test connection. This can happen when the MCU is heavily loaded. 1. If the system is not heavily loaded, use test tdm to test the TDM Bus. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to abort, escalate the problem.
1003	ABORT	The MCU could not allocate a tone receiver for the test connection. This can happen when the system is heavily loaded or there is no Tone Detector circuit pack in the port network where this test is being executed. 1. Make sure there is a Tone Detector circuit pack in the same port network. 2. If a Tone Detector circuit pack is missing, install one. 3. Allow approximately one minute for the tone detector maintenance to run on the newly inserted circuit pack. 4. Retry the command at one-minute intervals up to five times. 5. If the test continues to abort, escalate the problem.
1022	ABORT	Translation mismatch. This error can occur only if the system detection mode has been administered to one of the broadband schemes and if non-TN420C circuit packs are inserted in the system (that is the only circuit pack that supports this functionality). Non-TN420C GPTD ports are eventually placed in the out-of-service mode since they cannot provide the administered function. Use change system-parameters country-options to correct the detection administration or remove all non-TN420C Tone Detector circuit packs.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2100	ABORT	System resources required for the test are not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1	FAIL	DTMF generation failed for the active tone generator. Check that all Tone Detector circuit packs have the same companding mode as that administered for the system. If this is not the problem, replace the Tone-Clock circuit pack.
105	FAIL	Generation of 440-Hz tone failed. Check that all Tone Detector circuit packs have the same companding mode as that administered for the system. If this is not the problem, replace the Tone-Clock circuit pack.

Table 8-372. Tone Generator Transmission Test #40

Error Code	Test Result	Description Recommendation
109	FAIL	Generation of 2225-Hz tone failed. Check that all Tone Detector circuit packs have the same companding mode as that administered for the system. If this is not the problem, replace the Tone-Clock circuit pack.
110	FAIL	Generation of 404-Hz level invalid. Users may hear noisy tones. Maintenance may not be able to run on other objects that use the tone generation facility (that is, the Tone Detector circuit pack). In this case, replace it.
111	FAIL	Generation of 1004-Hz low level invalid. Users may hear noisy tones. Maintenance may not be able to run on other objects that use the tone generation facility (that is, the Tone Detector circuit pack). In this case, replace it.
112	FAIL	Generation of 1004-Hz high level invalid. Users may hear noisy tones. Maintenance may not be able to run on other objects that use the tone generation facility (that is, the Tone Detector circuit pack). In this case, replace it.
113	FAIL	Generation of 2804-Hz level invalid. Users may hear noisy tones. Maintenance may not be able to run on other objects that use the tone generation facility (that is, the Tone Detector circuit pack). In this case, replace it.
115	FAIL	Generation of count sequence invalid. Users may hear noisy tones. Maintenance may not be able to run on other objects that use the tone generation facility (that is, the Tone Detector circuit pack). In this case, replace it. This may also be caused by TDM Bus corruption. Check for TDM Bus errors (check the TDM/LAN Bus terminators, the bus cable, and the pins on the backplane to which the bus connects).
120	FAIL	Generation of quiet tone failed. Users may hear noisy tones. Maintenance may not be able to run on other objects that use the tone generation facility (that is, the Tone Detector circuit pack). In this case, replace it.
None	PASS	The tone generation facility is able to generate and transmit all the tones.

Tone Generator Audit/Update Test #41

The active tone generation facility is refreshed with all the time slot tone information. This test also triggers in-line error messages the Tone-Clock circuit pack generates when it detects problems by itself.

Table 8-373. Tone Generator Update/Audit Test #41

Error Code	Test Result	Description Recommendation
None	ABORT	The system was unable to allocate all the resources needed for this test. Wait one minute then retry the test.
2100	ABORT	System resources required for this test are not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1	FAIL	The system requires a TN780 or TN2182 Tone-Clock to support the currently administered country options tone generation parameters. 1. Check the administration on the Country-Options form. Specifically, check the Base Tone Generation Set on page 1 and any custom tone administration beginning on page 2. 2. Replace the existing Tone-Clock circuit packs with a TN780 or TN2182.
2	FAIL	The system requires a TN2182 Tone-Clock to support the currently administered country options tone generation parameters. 1. Check the administration on the Country-Options form. Specifically, check the Base Tone Generation Set on page 1 and any custom tone administration beginning on page 2. 2. Replace the existing Tone-Clock circuit packs with a TN780.
	PASS	The tone generation facility has been successfully refreshed with its translation. Use display errors to make sure this circuit pack did not generate new errors.

Tone Generator Crosstalk Test #90

The Tone Generator Crosstalk test checks the ability of the tone generator to talk on a specific time slot. The tone generation facility talks on a specific time slot and then the rest of the idle time slots are checked to make sure the tone generator put the tone only on the time slot specified

Table 8-374. Tone Generator Crosstalk Test #90

Error Code	Test Result	Description Recommendation
	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1001	ABORT	The system was unable to put the tone generator facility in the appropriate mode to test it. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1002	ABORT	The system could not allocate time slots for the test connection. This can happen when the MCU is heavily loaded. 1. If the MCU is not heavily loaded, use test tdm to test the TDM-Bus.
1002	ABORT	The system could not allocate time slots for the test connection. This can happen when the MCU is heavily loaded. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to abort, escalate the problem.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
	FAIL	The tone generator could be defective. 1. Use test tone-clock to test the Tone-Clock circuit pack again. 2. If the test fails again, look at the error log for Tone Detector circuit pack errors. 3. If there are none, see DETR-BD, DTMR-PT, and GPTD-PT and resolve these errors first. 4. If there are no Tone Detector circuit pack errors, replace the Tone-Clock circuit pack.
	PASS	The tone generation facility is able to put out tones.

TRANS-ID (Translation-ID)

Both the system processor and the PCMCIA translation card have matching ID numbers. If the system detects a mismatch between the two numbers, which can happen after a release update or processor circuit pack replacement, the system responds as follows.

- raises a MAJOR off-board alarm (TRANS-ID) against ports 01A.
- displays the warning: `TRANS-ID INTERVAL EXPIRATION: 5 days; call distributor immediately.` 5 days is the grace period during which only super-user Services logins can save translations.
- disables the add, change, remove, and duplicate commands if the translation ID is not reset prior to the expiration of the grace period **(reset translation-id** -- Services login required)

Clearing the alarm

Contact authorized Services personnel or distributor immediately. They can reset the translation ID **(reset translation-id**).

Alarm Level	Initial Craft Command to Run
Major	N/A

Error Log Entries and Test to Clear Values

Table 8-375. TRANS-ID Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
Any	None	N/A	MAJOR	OFF	Personnel to execute the **reset translation-id** command (requires Services super-user login.)

When upgrading to a new software load or when replacing Processor TN790B, a new login screen appears which warns when the Trans-ID Interval is due to expire and provides a reminder to call your distributor.

Repair Procedure

From init level login:

- Use command: **reset translation-id**

  This command takes approximately 7 minutes to complete.

- reset translation-ID

```
RESET TRANSLATION-ID

Processor  Command Completion Status                                  Error Code

  SPE-A    Success                                                    0

command: reset translation-id
```

TTR-LEV (TTR Level)

A TN420 Tone Detector circuit pack provides touch-tone receivers (TTRs or DTMR-PTs), devices used to interpret touch-tone calling signals and to translate the dual tones into the following valid digits: 0 through 9, * and #.

A Tone Detector circuit pack is a resource shared by all users. A Tone Detector circuit pack also has general-purpose tone detector ports (GPTD-PTs) to detect call progress tones, modem answer tones, and transmission test tones.

Alarm Level	Initial Craft Command to Run
Warning	See “Repairing TTR-LEV” which follows.

A TTR is needed to interpret the DTMF signals sent from a voice terminal. The TTR is in use until the total number of digits needed is collected or until a timeout occurs. Dial tone is supplied after receipt of an off-hook signal, which signifies that a TTR is connected and ready to receive digits.

The TTR-LEV errors can be used to determine if there is a shortage of tone detectors. Use **list measurements tone-receiver** to determine tone detector usage. The minimum threshold values are assigned on the Maintenance-Related System Parameters form for TTRs (DTMR-PT) and CPTR (GPTD-PT) and should match the number of touch-tone receivers (TTR) and tone detectors (GPTD-PT) in the system.

Four TTRs and two GPTDs for each Tone Detector circuit pack (TN748D) are used in the MCU.

The TTR Level MO represents the following events:

- The total number of GPTD-PTs, also known as CPTRs, currently in service is less than the administered threshold number.

- The total number of DTMR-PTs, also known as TTRs, currently in service is less than the administered threshold number.

The TTR Level maintenance performs a monitoring function. When one of the above events occurs, the MCU reports it. At this point, the MCU is still operating properly, but its capacity is reduced.

The above events can occur when:

- The threshold number of GPTD-PTs for service or the threshold number of DTMR-PTs for service is administered incorrectly on a Tone Detector circuit pack.
- Too many GPTD-PTs or DTMR-PTs have been taken out of service for a Tone Detector circuit pack (that is, the ports have been busied out by craft or maintenance has taken them out of service).
- There is an insufficient number of GPTD-PTs or DTMR-PTs in the MCU for a Tone Detector circuit pack.

Repairing TTR-LEV

To resolve TTR Level maintenance alarms, follow these procedures:

1. Use **display error** to determine if the TTR-LEV warning alarm is raised against the GPTD-PT level or the DTMR-PT level. In the error log, the *Error Type* field of the TTR-LEV has a value of **2** for DTMR-PT and a value of **4** for GPTD-PT.
2. Perform the action described for the appropriate MO. Use **change system-parameters maintenance** to check the administered value for TTRs and CPTRs for service on the Tone Detector circuit packs. If a threshold value is too high, change it to a lower value. Wait one minute for the alarm to clear.
3. Check the total number of tone detector and Tone-Clock circuit packs currently in the system. The total number should be greater than or equal to their respective administered threshold values. If not, either add more Tone Detector circuit packs or reduce the threshold to match the number in the system.
4. If after adding more Tone Detector circuit packs or reducing the threshold, the TTR-LEV alarm is still present, proceed to the next step.
5. Use **display error** to see if the MO has been busied out (a value of **18** appears in the *Error Type* field on the error log).
6. If the port has been busied out, determine why it was and if it can be placed back in-service, test the port with **test port PCSSpp**.
7. If all tests pass, use r**elease port PCSSpp** then wait one minute for the TTR-LEV alarm to clear. If it doesn't, go to the next step.

8. Use **display alarm** to determine the address of the Tone Detector circuit pack that contains the defective (alarmed) GPTD-PT or DTMR-PT.
9. Use **test board PCSS long rep 3** (that is, the port network number, carrier designation, and slot address of either the Tone Detector circuit pack or the call classifier circuit pack containing the defective GPTD-PT or DTMR-PT). If this does not clear the alarm, go to Step 10.
10. Replace the Tone Detector circuit pack that contains the defective GPTD-PT or DTMR-PT.

Hardware Error Log Entries

The following table shows the error log entries and related information

Table 8-376. TTR Level Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
1	1	None			
	This is not an error. This indicates the total number of DTMR ports in service is greater than or equal to the administered threshold number for service.				
2	2		Warning	Off	
	The total number of DTMR ports currently in service is less than the administered threshold number for service.				
3	3	None			
	This is not an error. The total number of GPTD ports in service is greater than or equal to the administered threshold number for service.				
4	4		Warning	Off	
	The total number of GPTD ports currently in service is less than the administered threshold number for service.				
5	5	None			
	This is not an error.				
6	6		Warning	Off	
	This is not an error.				
7	7		Major	Off	
	There are currently no DTMR ports in service. To clear the alarm, refer to the repair procedures provided in the previous section.				
8	8		Minor	Off	
	There are currently no GPTD ports in service. To clear the alarm, refer to the repair procedures provided in the previous section.				

Table 8-376. TTR Level Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
9	9		Minor	Off	
	There are currently no call classifier ports in service. To clear the alarm, refer to the repair procedures provided in the previous section.				

UDS1-BD (UDS1 Interface Circuit Pack)

The UDS1 Interface circuit pack provides an interface to the DS1 facility. See DS1-BD (DS1 Interface Circuit Pack) for complete details.

Alarm Level	Initial Craft Command to Run
Minor	**test board** *PCSS l*
Warning	**test board** *PCSS sh*
Major	**test board** *PCSS sh*

UNI-SYNC (Universal Sync)

UNI-SYNC determines if a new universal synchronization provider is needed, and performs a synchronization switch, if necessary.

To utilize the TN787K MMI and TN2303 Medpro circuit pack resources more efficiently and to support larger bandwidth conferences, conferences must span multiple MMI circuit packs or Medpro circuit packs. Since conferences can span circuit packs, every MMI and Medpro in the MCU must be synchronized. When an MCU is booted, the first MMI or Medpro circuit pack inserted by the system is designated as the *provider*. Only MMI and Medpro circuit packs can be a *provider* but VPP circuit packs cannot. The function of the *provider* is to provide a synchronization signal onto a TDM bus time slot. As subsequent MMI, Medpro, and VPP circuit packs are inserted, they are instructed to listen to this signal. Once all the circuit packs are synchronized, it is rare that synchronization is lost. Technicians should be aware that arbitrarily removing any MMI or Medpro circuit packs may cause service disruption, if the MMI or Medpro circuit pack removed is the *provider*. An MCU's universal sync provider can be determined by issuing the **list mmi/mp** command before pulling out any MMI or MEDPRO circuit packs.

If a listening MMI, Medpro, or VPP circuit pack loses the universal synchronization signal, it uplinks a "Sync Lost" message to the MCU software. UNI-SYNC decides if a synchronization switch is needed. If half or more of the MMI, Medpro, and VPP circuit packs in the MCU lose the synchronization signal, UNI-SYNC finds another healthy MMI or Medpro circuit pack to become the provider and initiates a switch. The previous *provider* is told to listen. If an MCU has only two potential synchronization providers, UNI-SYNC initiates a switch whenever the listener reports a loss of synchronization. If an MCU has any combination of MMI, Medpro, and VPP circuit packs, equal to five and has at least two potential synchronization providers, UNI-SYNC initiates a switch if three circuit packs report a loss of universal sync.

UNI-SYNC will only switch to an MMI circuit pack that is not alarmed. However, UNI-SYNC can switch to a Medpro circuit pack when counters 10 (error code 2305) and/or 11 (error code 2561) are active and alarmed. The two maintenance tests, which are associated with counters 10 and 11, are the IP Address Query Test and the Ping Test.

Unlike the MMI, the Medpro circuit pack requires administration. The IP Address Query Test will abort when an IP address is not administered or administered incorrectly causing an alarm. If a Medpro circuit pack is administered but not physically connected to the network, the Ping Test will fail and cause an alarm. If no *provider* can be found, UNI-SYNC will raise a minor alarm. The UNI-SYNC alarm will clear when a good universal synchronization *provider* is found and universal synchronization is restored.

Alarm Level	Initial Craft Command to Run
Minor	**Test board** *PCSS 1 r#*

Hardware Error Log Entries

The following table shows the error log entries and related information, including the test to clear values.

Table 8-377. UNI-SYNC Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
1	Any	None			
	A Universal synchronization switch successfully took place. Refer to MMI-BD, MEDPRO-BD, VPP-BD errors for the reason why the switch took place.				
257	Any	None	MINOR	OFF	
	A Universal synchronization switch was requested, but failed. Try resolving this alarm condition by resolving any MMI-BD or MEDPRO-BD alarms. If the problem is still not resolved, escalate the problem				

Craft-Demanded Tests

There are no craft-demanded tests for UNI-SYNC

VC-BD (Voice Conditioner Circuit Pack)

The Voice Conditioner circuit pack (TN788) is a service circuit that provides conditioning for the audio signals from multimedia equipment based on the ITU-T H.221 standard. It transcodes, gain adjusts, and bridges the audio bit streams demultiplexed by the MMI circuit pack (TN787K) and transmits encoded exclusive audio conference sums onto the TDM bus so the MMI circuit pack can multiplex the audio, video, and data streams for the H.221 endpoints.

Alarm Level	Initial Craft Command to Run
Major	test board PCSS l r#
Minor	test board PCSS l r#
Warning*	test board PCSS s r#

* Refer to XXX-BD (Common Port Circuit Pack) for details.

The following table provides the versions of the Voice Conditioner circuit pack based on the MCU Release.

MCU	Circuit Pack Versions
R1	TN788, TN788B, TN788C
R2 through R5	TN788B, TN788C
R6	
R6 with ClearPresence™@716 optioned, as indicated in the Customer-Options form (**display system-parameters customer-options**)	TN788C only

Hardware Error Log Entries

The following table shows the error log entries and related information.

Table 8-378. Voice Conditioner Circuit Pack Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value
0	0	Any	Any	Any	test board PCSS sh r 1
	Run the short test sequence first. If all tests pass, run the long test sequence. Refer to the appropriate test description and follow the recommendations.				
1	Any	None	Major	On	
	The circuit pack either stopped functioning or it was physically removed from the MCU. This alarm is logged approximately 11 minutes after the circuit pack has been removed or test #53 fails.				
18	o		Warning	Off	release board PCSS
	The voice conditioner circuit pack has been busied out by craft.				
23	0	None	Warning	Off	
	The circuit pack has been logically administered but is not physically installed. The alarm will be cleared when the circuit pack is installed.				
125		None	Minor	On	
	A wrong circuit pack is inserted in the slot where this circuit pack is logically administered. Either remove the wrong circuit pack and insert the administered one or readminister the slot.				
257	Any	#52	Major	On	test board PCSS r 20
	There are transient communications problems between the MCU and this circuit pack. Use **test board PCSS t**hen refer to the repair procedures for test #52 described under XXX-BD.				

Table 8-378. Voice Conditioner Circuit Pack Error Log Entries — *Continued*

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value
513	4352 to 4357				
	An on-board hardware failure has been detected by the circuit pack. The *Aux Data* values correspond to the following detected errors: **4352:** external RAM error **4353:** internal RAM error **4354:** N/A **4355:** ROM checksum error **4356:** N/A **4357:** instruction set error Reset the circuit pack with **busyout board PCSS** followed by **reset board PCSS,** then **release board PCSS.** When it is reset, the circuit pack executes a set of tests to detect the presence of any of the above faults. The detection of any one during initialization causes the circuit pack to lock up and appear insane. See repair steps for error type **1**.				
1281	Any	#53	Major	On	
	A critical hardware failure has been detected on the circuit pack. Use **busyout board PCSS** and **reset board PCSS** followed by **release board PCSS.** If test #53 passes, the on-board circuitry is healthy. Use **test board PCSS long clear** to retire the alarm. If test #53 fails, replace the circuit pack.				
1538	46082		Minor	On	
	The circuit pack is hyperactive in that it is flooding the MCU with messages sent over the control channel. It is taken out of service when a threshold number of these errors is reported to the MCU. Clear the alarm via **busyout board PCSS** and **reset board PCSS**, followed by t**est board PCSS long clear** and **release board PCSS.** If the error recurs within 10 minutes, replace the circuit pack.				

Craft-Demanded Tests

The following tests must be investigated in the order given.

Table 8-379. System Technician-Demanded Tests: VC-BD

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?	Reset Board Sequence
Control Channel Loop around Test #52*	Short	Long	No	
SAKI Sanity Test #53*			Yes	Reset

* See XXX-BD (Common Port Circuit Packs) for a description of this test.

VC-DSPPT (Voice Conditioner DSP Port)

Each VC-BD provides two types of resources:

- Transcoder resources used for encoding and decoding audio formats
- Summer resources used for summing audio from different sources

The VC DSP ports (VC-DSPPT) are the transcoder resources on the VC circuit pack. There are eight such ports on a VC circuit pack.

Alarm Level	Initial Craft Command to Run
Minor	test port PCSSpp l r#
Warning	test port PCSSpp 1 r#

Hardware Error Log Entries

The following table shows the error log entries and related information.

Table 8-380. VC-DSPPT Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value
0	0	Any	Any	Any	test port PCSSpp sh r 1
	Run the short test sequence first. If all tests pass, run the long test sequence. Refer to the appropriate test description and follow the recommendations.				
18	0		Warning	Off	release port PCSSpp
	The voice conditioner DSP port has been busied out by craft.				
257	Any	#1103	Minor	On	test port PCSSpp l r 3
	Test #1103 failed. Run the long test sequence and note the results of this test.				
513	Any	#1104	Minor	On	test port PCSSpp sh r 3
	Test #1104 failed. Run the long test sequence and note the results of this test.				
778 to 781	Any	#1106	Minor	On	
	A critical hardware failure has been detected on the circuit pack. Use **busyout port PCSSpp** followed by **reset port PCSSpp** and **release port PCSSpp** to reset the port. If test #1106 passes, the on-board circuitry is healthy. Retire the alarm with **test port PCSSpp long clear.** If the test fails, replace the circuit pack.				
1025					
	The VC DSP port reported a loss of framing on the service channel between the VC and the MMI circuit packs.				
1281	Any	#1105	Minor	On	test port PCSSpp sh r 3
	Test #1105 failed. Run the long test sequence and note the results of this test.				

Craft-Demanded Tests

The following tests must be investigated in the order given

Table 8-381. System Technician-Demanded Tests: VC-DSPPT

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?	Reset Board Sequence
NPE Crosstalk Test #1103	Long		Yes	

Table 8-381. System Technician-Demanded Tests: VC-DSPPT

TDM Loop-Back Test #1104	Short	Long	Yes	
DSP Loop-Back Test #1105	Short	Long	Yes	
VC Port Reset DSP Test #1106			Yes	Reset

VC DSP Port NPE Crosstalk Test #1103

This test is destructive. The NPE controls port connectivity and gain and provides conferencing functions. This test verifies that this port's NPE channel talks on the selected time slot and never crosses over to time slots reserved for other connections. If the NPE is not working correctly, one-way and noisy connections may be observed. This test is part of the port's long test sequence and takes approximately 20 to 30 seconds.

Table 8-382. VC DSP Port NPE Crosstalk Test #1103

Error Code	Test Result	Description Recommendation
1000 - 1001	ABORT	The port is not available for testing because it is being used for a conference. This is a normal abort. 1. Retry the command at one minute intervals up to five times. 2. If the problem persists and a conference is not active, follow normal escalation procedures.
2012	ABORT	Internal system error. 1. Retry the command at one minute intervals up to five times. 2. If the problem persists, escalate it.
2100	ABORT	Could not allocate the necessary resources to run this test. This is an abnormal abort. 1. Retry the command at one minute intervals up to five times. 2. If the problem persists, escalate it.
0 - 3	FAIL	The NPE of the tested port was found to be transmitting in error. This causes noisy and unreliable connections. Replace the circuit pack.
	PASS	The port is correctly using its allocated time slots. 1. To be sure this is not an intermittent problem, repeat this test up to ten times to make sure it continues to pass. 2. If complaints persist, examine the station, connections, and wiring.

VC DSP Port Local TDM Loopback Test #1104

This test is destructive. It verifies the connectivity of a VC DSP port across the TDM Bus. It aborts if calls associated with the port are in progress. Failure of this test indicates an on-board fault associated with the port hardware on the circuit pack. This test runs:

- Loop-Around test across the TDM Bus
- Conference circuit test

The tests are run in the above order. If one test fails, an error code is returned and the remaining test is not executed.

Table 8-383. VC DSP Port Local TDM Loop-Back Test #1104

Error Code	Test Result	Description Recommendation
1000	ABORT	System resources required to run this test are not available, or the port is busy with a valid call. 1. Retry the command at 1-minute intervals a maximum of 5 times.
1001	ABORT	The port is not available for testing because it is being used for a conference. This is a normal abort. 1. Retry the command at one minute intervals up to five times. 2. If the problem persists and a conference is not active, follow normal escalation procedures.
1002	ABORT	The system could not allocate time slots for the test. The traffic load on the system may be very high or time slots may be out of service due to TDM Bus errors. 1. Refer to TDM-BUS to diagnose any active TDM Bus errors. 2. If the system has no TDM-BUS errors and is not handling heavy traffic, repeat the test at one-minute intervals up to five times. 3. If the test continues to abort, follow normal escalation procedures.
1003	ABORT	The system could not allocate a tone detector for the test. The MCU may be oversized for the number of tone detectors present or some may be out of service. 1. Look for TTR-LEV errors in the error log. 2. Look for TONE-PT errors in the error log. 3. If neither condition exists, retry the test at one-minute intervals up to five times. 4. If the test continues to abort, escalate the problem.

Table 8-383. VC DSP Port Local TDM Loop-Back Test #1104

Error Code	Test Result	Description Recommendation
1004	ABORT	The resource has been seized by a user for a valid call. 1. Use the status conference command to verify that a conference is active. 2. If there are no active conferences, retry the test at one-minute intervals up to five times. 3. If the test continues to abort, escalate the problem.
2000	ABORT	Response to the test was not received from the VC circuit pack within the allowable time period. 1. If this result occurs repeatedly, attempt to reset the port. Use busyout port PCSSpp followed by reset port PCSSpp and release port PCSSpp. 2. If this result recurs, replace the circuit pack.
2012	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.
2100	ABORT	Could not allocate the necessary resources to run this test. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.
2103	ABORT	The MCU could not make the conference connection for the test. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.
0 - 3	FAIL	The TDM Loop-Around test failed. Replace the circuit pack.
4 - 7	FAIL	The Conference Circuit test failed. Replace the circuit pack.
	PASS	The VC DSP Port Local TDM Looparound test passed.

VC DSP Port DSP Loop-Back Test #1105

This test is destructive. It verifies the connectivity of a VC-DSP port across the TDM Bus. It aborts if calls associated with the port are in progress. Failure of this test indicates an on-board fault associated with the port hardware on the circuit pack.

Table 8-384. VC DSP Port DSP Loop-Back Test #1105

Error Code	Test Result	Description / Recommendation
1001	ABORT	The port is not available for testing because it is being used for a conference. This is a normal abort. 1. Retry the command at one minute intervals up to five times. 2. If the problem persists and a conference is not active, follow normal escalation procedures.
1002	ABORT	The system could not allocate time slots for the test. The traffic load on the system may be very high or time slots may be out of service due to TDM Bus errors. 1. Refer to TDM-BUS to diagnose any active TDM Bus errors. 2. If the system has no TDM-BUS errors and is not handling heavy traffic, repeat the test at one-minute intervals up to five times. 3. If the test continues to abort, follow normal escalation procedures.
1003	ABORT	The system could not allocate a tone detector for the test. The MCU may be oversized for the number of tone detectors present or some may be out of service. 1. Look for TTR-LEV errors in the error log. 2. Look for TONE-PT errors in the error log. 3. If neither condition exists, retry the test at one-minute intervals up to five times. 4. If the test continues to abort, escalate the problem.
2000	ABORT	Response to the test was not received from the VC circuit pack within the allowable time period. 1. If this result occurs repeatedly, attempt to reset the port. Use **busyout port PCSSpp** followed by **reset port PCSSpp** and **release port PCSSpp.** 2. If this result recurs, replace the circuit pack.
2012	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.

Table 8-384. VC DSP Port DSP Loop-Back Test #1105 — *Continued*

Error Code	Test Result	Description / Recommendation
2100	ABORT	Could not allocate the necessary resources to run this test. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.
2103	ABORT	The MCU could not make the conference connection for the test. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.
0	FAIL	The VC DSP Port DSP Loop-Back test failed. Replace the circuit pack.
	PASS	The VC DSP Port DSP Loop-Back test passed.

VC Port Reset DSP Test #1106

This test is destructive. It is used to reset the VC-DSPPT. The DSP associated with the VC-DSPPT is also reset. As part of the reset procedure, the VC-DSPPT executes a series of self-tests on the hardware. If these self-tests fail, the test will fail; otherwise the test will pass.

Before executing the test, the VC-DSPPT must be busied out; after completion of the test, the VC-DSPPT must be released.

Table 8-385. VC Port Reset DSP Test #1106

Error Code	Test Result	Description / Recommendation
1015	ABORT	The VC-DSPPT is not busied out. 1. Use **busyout port PCSSpp** then retry the test.
2000	ABORT	Response to the test was not received from the VC-DSPPT within the allowable time period. 1. Retry the command at one-minute intervals up to five times. 2. If this result occurs again, replace the circuit pack.
2012	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.
2100	ABORT	Could not allocate the necessary resources to run this test. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, escalate it.
	FAIL	The reset of the VC-DSPPT was unsuccessful. Replace the circuit pack.
	PASS	The VC DSPPT was successfully reset. 1. Use **release port PCSSpp** to release the port.

VC-LEV (Voice Conditioner DSP Port Level)

The Voice Conditioner DSP Port Level MO tracks the number of VC DSP ports in service in the MCU compared to the number of ports needed for the MCU to run efficiently. This is based on the MCU port capacity, which is an administrable value on the Customer Options form. The algorithm for determining a low level of VC resources uses this port capacity and the number of in-service VC ports. Each VC circuit pack contains eight DSP ports. One VC circuit pack (eight DSP ports) is required for every four ports of MCU port capacity. If the number of in-service VC ports is at or falls below the MCU port capacity, a VC-LEV error is logged. If this outage continues for 15 minutes, a major alarm is raised.

Alarm Level	Initial Craft Command to Run
Major	test port PCSSpp l r#

VC DSP ports are a key part of the MCU; a loss in the number of ports available for use degrades MCU service, raising a major alarm. If a VC circuit pack or port is busied out with **busyout board** or **busyout port**, these out-of-service ports are not included in the VC level calculation. In this way, a technician can busy out a VC circuit pack and not raise an alarm. But if the technician does not busy out the circuit pack prior to performing the maintenance, then an alarm may be raised. Once the problem has been corrected, and the number of VC ports are restored above this calculated level, the major alarm is resolved. There is no other way to resolve this alarm.

The best way to diagnose a VC-LEV problem is to check the state of all VC circuit packs in the MCU. Any alarm raised against these circuit packs should be resolved first. Therefore, check for VC-BD and VC-DSPPT errors and alarms first. Resolving these alarms may then resolve the VC-LEV alarm.

If a VC circuit pack is physically removed from the MCU or the circuit pack is removed logically from the MCU (for failing Archangel sanity scans), no error or alarm is logged. Therefore, if a VC-LEV alarm exists and no errors or alarms are reported for VC-BD or VC-DSPPT, then a circuit pack may have been removed. The VC circuit pack is maintained similarly to the Tone Detector circuit packs. VC, tone detectors, and MMI circuit packs may be removed and reinserted in any port board slot without administration. For this reason, no errors are logged when these circuit packs are removed.

To determine how many VC circuit packs are needed for the MCU, find the MCU port capacity on the Customer Options form. The MCU requires one VC circuit pack for every four ports of port capacity. Therefore, divide the port capacity by four and this gives the number of VC circuit packs required.

For example, a port capacity of 12 requires three VC circuit packs. Use **list configuration** to verify that the number of VC circuit packs listed agrees with the

required number of VC circuit packs. If the numbers differ, a VC circuit pack may have been either physically or logically removed from the system. Restoring the number of VC circuit packs in the MCU to the correct number should resolve the VC-LEV alarm.

Error Log Entries and Test to Clear Values

Table 8-386. VC-LEV Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
1	Any	None	MAJOR	OFF	
	The number of VC resources in the system that are in service has fallen below the calculated minimum value. If the number of in-service VC ports falls below the MMCH port capacity (value entered in the Minimum Maintenance Threshold `VCs` field on the system parameters maintenance form), a VEC-LEV error is logged. If this outage continues for 15 minutes a MAJOR alarm is raised. To resolve this alarm, correct the out-of-service problem by following the procedures below: 1. See “VC-DSPPT” and “VC-BD” and resolve any associated alarms. 2. If a VC-LEV error/alarm exist and none has been raised against VC-BD or VC-DSPPT maintenance objects, a VC circuit pack may have been removed from service causing the VC-LEV error/alarm. To resolve a VC-LEV MAJOR alarm, restore the number of VC ports available for service to be equal to or more than the calculated port capacity. See “Resolving VC-LEV ERRORS/ALARMS” for details. To determine how many Voice Conditioners there should be in the MCU execute command: ■ display system-parameters customer-options ■ Gather data for the number of 2B ports activated and audio add-on ports activated. ■ Number of 2B ports + the number of audio add-on ports = x ports ■ x ports/4 = Number of Voice Conditioner boards ■ Example: (12) 2B ports + (4) audio add-on ports = (16) ports ■ 16 ports / 4 = 4 Voice Conditioner boards ■ Execute command: list configuration all ■ Record all slots with TN788B Voice Conditioner Boards ■ Compare the two lists If one or more TN788B Voice Conditioner appear on the physical list but not on the command: list configuration all, replace those TN788B Voice Conditioners. if the two lists match, not enough TN788B Voice Conditioners are installed in the system to match the number of RTU (Right To Use) activated on the system-parameters customer-options form.				

System Technician-Demanded Tests: Descriptions and Error Code

There are no System Technician-Demanded test for VC-LEV.

VC-SUMPT (Voice Conditioner Summer Port)

Each Voice Conditioner circuit pack (VC-BD) provides two types of resources:

- Transcoder resources that are used for encoding and decoding audio formats
- Summer resources that are used for summing audio from different sources

The VC summer ports (VC-SUMPT) are the summer resources on the VC circuit pack. There are eight such ports on a VC circuit pack.

Alarm Level	Initial Craft Command to Run
Minor	test port PCSSpp l r#
Warning	test port PCSSpp l r#

Hardware Error Log Entries

The following table shows the error log entries and related information

Table 8-387. VC-SUMPT Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	test port PCSSpp sh r 1
	Run the short test sequence first. If all tests pass, run the long test sequence. Refer to the appropriate test and follow the recommendations.				
18			Warning	Off	release port PCSSpp
	The voice conditioner summer port has been busied out by craft.				
130			Warning	On	
	The circuit pack has been removed or has been insane for more than 11 minutes. To clear the error, replace or reinsert the circuit pack.				
257	Any	#6	Minor	On	test port PCSSpp l r 3
	Test #6 failed. Run the long test sequence and note the results of this test.				
513	Any	#1100	Minor	On	test port PCSSpp sh r 3
	Test #1100 failed. Run the long test sequence and note the results of test #950.				

Craft-Demanded Tests

Investigate the following tests in the order shown in the table

Table 8-388. System Technician-Demanded Tests: VC-SUMPT

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
NPE Crosstalk Test #6	Long		Yes
TDM Loop-Back Test #1100	Short	Long	Yes

NPE Crosstalk Test #6

This test is destructive. The NPE controls port connectivity and gain and provides conferencing functions. The NPE Crosstalk test verifies that this port's NPE channel talks on the selected time slot and never crosses over to time slots reserved for other connections. If the NPE is not working correctly, one-way and noisy connections may be observed. This test is part of the port's long test sequence and takes approximately 20 to 30 seconds.

Table 8-389. NPE Crosstalk Test #6

Error Code	Test Result	Description / Recommendation
1001	ABORT	The port is not available for testing because it is being used for a conference. This is a normal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists and a conference is not active, follow normal escalation procedures.
2012	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, escalate it.
2100	ABORT	Could not allocate the necessary resources to run this test. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, escalate it.
	FAIL	The NPE of the tested port was found to be transmitting in error. This causes noisy and unreliable connections. Replace the circuit pack.
	PASS	The port is correctly using its allocated time slots. 1. To be sure this is not an intermittent problem, repeat this test up to 10 times to make sure it continues to pass. 2. If complaints persist, examine the port, connections, and wiring.

VC Summer Port Local TDM Loop-Back Test #1100

This test is destructive. It verifies the connectivity of a VC summer port across the TDM Bus. It aborts if calls associated with the port are in progress. Failure of this test indicates an on-board fault associated with the port hardware on the circuit pack. The Loop-Back test runs:

- Loop-Back test across the TDM Bus
- Conference Circuit test

The tests are run in the above order; if the first test fails, an error code is returned and the second test is not executed.

Table 8-390. VC Summer Port Local TDM Loop-Back Test #1100

Error Code	Test Result	Description / Recommendation
1001	ABORT	The port is not available for testing because it is being used for a conference. This is a normal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists and a conference is not active, follow normal escalation procedures.
1002	ABORT	The system could not allocate time slots for the test. The traffic load on the system may be very high or time slots may be out of service due to TDM Bus errors. 1. Refer to TDM-BUS to diagnose any active TDM Bus errors. 2. If the system has no TDM-BUS errors and is not handling heavy traffic, repeat the test at one minute intervals up to five times. 3. If the test continues to abort, follow normal escalation procedures.
1003	ABORT	The system could not allocate a tone detector for the test. The MCU may be oversized for the number of tone detectors present or some may be out of service. 1. Look for TTR-LEV errors in the error log. 2. Look for TONE-PT errors in the error log. 3. If neither condition exists, retry the test at one-minute intervals up to five times. 4. If the test continues to abort, escalate the problem.
2000	ABORT	Response to the test was not received from the VC circuit pack within the allowable time period. 1. If this result occurs repeatedly, attempt to reset the port. Use **busyout port PCSSpp** followed by **reset port PCSSpp** and r**elease port PCSSpp.** 2. If this result recurs, replace the circuit pack.
2012	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.
2100	ABORT	Could not allocate the necessary resources to run this test. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.

Table 8-390. VC Summer Port Local TDM Loop-Back Test #1100 — *Continued*

Error Code	Test Result	Description / Recommendation
2103	ABORT	The MCU could not make the conference connection for the test. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.
0	FAIL	The TDM Loop-Around test failed. Replace the circuit pack.
1	FAIL	The Conference Circuit test failed. Replace the circuit pack.
	PASS	The VC Summer Port Local TDM Loop-Around test passed.

VPP-BD (Video Processor Plus Circuit Pack)

Alarm Level	Initial Craft Command to Run*
Minor	test board PCSS l r#
Warning**	test board PCSS s r#

* Where P is the port network number (only default of 1 applicable); C is the carrier number (A, B, ... etc.); and SS is the address of the slot in the carrier where the circuit pack is located (*01, 02,* ... etc.).

** Refer to XXX-BD (Common Port Board) maintenance.

The Video Processor Plus circuit pack (TN2237) is used to implement various features. One TN2237C circuit pack supports the following conference types:

- Continuous Presence *Plus* (CPP), specifically:
  - — Quad (four sub-pictures)
  - — Upper-panoramic (one sub-picture on the top half, two sub-pictures on the bottom half)
  - — Lower-panoramic (two sub-pictures on the top half, one sub-picture on the lower half)
  - — Dual-panoramic (one sub-picture on the top half, one sub-picture on the lower half)
- Speed match (SM)
- Continuous Presence *Plus*/Speed Match (CPP/SM)

- Executive Conferencing (for which the following apply: no self-view is provided; dual-panoramic is used for three designated sites; sites 4 through 25 see an upper-panoramic screen layout of the three designated no self-view sites; designated site 1 occupies the top half of the screen)
- H.261/H.263 Transcoding in full screen only
- H.263 Continuous Presence *Plus* (for which no SM or transcoding is allowed)

For Continuous Presence *Plus*, four H.261 video streams are mixed together and then rate adapted back to the bandwidth of the original video streams. This allows each endpoint in a multipoint conference to see up to four other conferees simultaneously.

Hardware Error Log Entries

Table 8-391. VPP-BD Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	test board PCSS sh r 1
	Run the Short Test Sequence first. If all tests pass, run the Long Test Sequence. Refer to the appropriate test description and follow the recommended procedures.				
1	Any	None	Minor	On	
	The circuit pack totally stopped functioning, or it was physically removed from the system. (The alarm is logged approximately 11 minutes after the circuit pack has been removed and/or SAKI Sanity Test [#53] fails.) If the circuit pack is not in the system, insert a circuit pack (in the same slot as the error indicates) to resolve this error. Or, if the circuit pack is in the system and the red LED is on, follow the instructions for ‘‘Red (alarm)’’ in the ‘‘Control and Port Circuit Pack Status LEDs’’ section in Chapter 7 ‘‘LED Interpretation,’’ and to Chapter 5 ‘‘Handling Common Port Circuit Packs.”				
18	0	busyout board PCSS	Warning	Off	release board PCSS
	This circuit pack has been busied out via the busyout board PCSS command.				
257	Any	#52	Minor	On	test board PCSS r 20
	This error indicates transient communication problems between the switch and this circuit pack. Execute the test board PCSS command and refer to the repair procedures for the Control Channel Loop-Around Test (#52) in the XXX-BD section of the this document.				

Table 8-391. VPP-BD Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
513	4352 - 4357	uplink error from pack			
	An Angel on-board hardware failure has been detected by the circuit pack.The reported aux data values correspond to the following detected errors: 4352— external RAM error; 4353— internal RAM error; 4355— ROM Checksum error; 4356— Angel Message Corruption. Reset the circuit pack by executing the busyout board PCSS and reset board PCSS commands. Warning: Resetting the circuit pack drops all calls on the circuit pack. When it is reset, the circuit pack executes a set of tests to detect the presence of any of the indicated faults. The detection of one of these errors during initialization causes the circuit pack to lock-up and appear insane to the system. See the repair procedure for error type 1.				
769	Any	#1148			
	This error occurs whenever the VPP circuit pack cannot derive the synchronization signal from the TDM time slot to which it was instructed to listen. This VPP circuit pack reported a loss of synchronization. Refer to test #1148 for repair procedures.				
1025	Any	#1144	Minor	On	
	A failure of the FPGA TSI circuit has occurred. Reset the circuit pack via the busyout board PCSS and reset board PCSS commands. If the reset passes, the on-board circuitry is healthy. Retire the alarm via the test board PCSS long clear command followed by the release board PCSS command. If the reset fails, replace the circuit pack.				
1537	4608 2	software-	Minor	On	
	The circuit pack is hyperactive (that is, it is flooding the switch with messages sent over the control channel). The circuit pack is placed out of service whenever a threshold of these errors is reported to the switch. Clear the alarm via the following commands: busyout board PCSS, reset board PCSS, test board PCSS long clear, release board PCSS. If the error recurs within 10 minutes, replace the circuit pack.				
1793	any	#1144	Minor	On	
	A failure of the FPGA AVP circuit has occurred.See recovery description for error type 1025.				
2049	Any	#1144	Minor	On	
	A failure of the DSP TSI circuit has occurred. See recovery description for error type 1025.				
2305	Any	#1144	Minor	On	
	A failure of the DSP1 circuit has occurred. See recovery description for error type 1025.				

Table 8-391. VPP-BD Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
2561	Any	#1144	Minor	On	
	A failure of the DSP2 circuit has occurred. See recovery description for error type 1025.				
2817	Any	#1146	Minor	On	
	This error occurs whenever maintenance requests the VPP circuit pack to listen to the synchronization signal from the TDM time slot. Refer to test #1146 for repair procedures.				
3073	Any	#1143	Minor	On	
	This error represents a failure of the TSi Xtalk and Loopback Test (#1143). See the description for this test and follow the corresponding repair procedures.				
3329	Any	upgrade firmware command	Minor	On	
	The circuit pack's SAKI could not be reset after the upgrade. 1. Reissue the upgrade firmware vpp xxx command. 2. If the command still fails, escalate the problem.				
3585	Any	upgrade firmware command	Minor	On	
	The upgrade firmware command was not successful. 1. Reissue the upgrade firmware command. 2. If the command still fails, escalate the problem.				

Craft-Demanded Tests

Always investigate tests in the order presented in the following tables when inspecting errors in the system. By clearing error codes associated with the *Control Channel Loop-Around Test,* for example, you may also clear errors generated from other tests in the testing sequence.

NOTE:
The VPP circuit pack is an upgradable circuit pack. Error types and error log entries for the associated **upgrade firmware** command are discussed in the "Firmware Download" section in Chapter 5 of this document.

System Technician-Demanded Tests: VPP-BD

Table 8-392. System Technician-Demanded Tests: VPP-BD

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Control Channel Loop-Around Test (#52)	Short	Long	No
TSI Crosstalk and Loopback Test (#1143)	Long		No
DSP/FPGA Status Query Test (#1144)	Short	Long	No
VPP Synchronization Status Test (#1146)	Short	Long	No
VPP Set Synchronization Test (#1148)	Long		No
SAKI Sanity Test (#53)			Yes

Control Channel Loop-Around Test #52

Refer to this repair procedure described in the XXX-BD (Common Port Circuit Pack) section of this document.

TSI Crosstalk and Loopback Test #1143

The TSI Loopback test checks the ability of the TSI to interface to the TDM bus. The test has two parts. The first part does a digital loopback on the TSI DSP. The second part checks the TSI to make sure that the circuit does not cause TDM cross talk.

TSI Loopback Test

This test checks whether the TSI can receive and transmit error-free data over the TDM bus. The TSI DSP is loop backed to the TDM bus by listening to a TDM timeslot and then talking on another timeslot. (The TSI DSP receives instructions for doing this from software.) Digital count data is then sent by the tone generator and looped back in the TSI without passing through any port hardware. The tone detector then verifies the digital count data.

This test is done for both TDM bus A and TDM bus B. Failures indicate that the TSI is unreliable.

TSI Crosstalk Test

This test is included in the maintenance subsystem's Loop-Around Transmission Testing feature. The TSI chip controls connectivity to the TDM bus. The TSI Cross Talk Test verifies that the TSI talks on the selected TDM bus time slot and never

crosses over to time slots reserved for other connections. If the TSI is not working correctly, one way and noisy connections may be observed.

Table 8-393. TSI Loopback and Crosstalk Test #1136

Error Code	Test Result	Description Recommendation
	ABORT	Internal system error. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.
1000	ABORT	System resources required to run this test are not available. The circuit pack may be busy setting up synchronization. This is a normal abort. 1. Retry the command at one-minute intervals up to five times. 2. Retry the command after one hour. 3. If the problem persists, follow normal escalation procedures. The escalation procedure may include issuing the reset system 2 command to free the allocated lock.
1002	ABORT	The system could not allocate time slots for the test. The traffic load on the system may be high or time slots may be out of service due to TDM-BUS errors. 1. See TDM-BUS for any active TDM Bus errors. 2. If there are no TDM Bus errors and the MCU is not handling heavy traffic, repeat the test at one-minute intervals up to five times. 3. If the test continues to abort, follow normal escalation procedures.
1003	ABORT	The system could not allocate a tone detector for the test. The system may be oversized for the number of tone detectors present or some tone detectors may be out of service. 1. Look for TTR-LEV errors in the error log. If such errors are present, refer to TTR-LEV (TTR Level) documentation. 2. Look for TONE-PT errors in the error log. If such errors are present, refer to the TONE-PT (Tone Generator) Maintenance documentation. 3. If neither condition exists, retry the test at one-minute intervals up to five times. 4. If the test continues to abort, escalate the problem.
2000	ABORT	Response to the test was not received from the Tone Detector circuit pack within the allowable time period. 1. If this result occurs repeatedly, attempt to reset the circuit pack if all ports are not in use. Reset the circuit pack by issuing busyout board PCSS and reset board PCSS followed by release board PCSS. 2. If this result recurs, replace the circuit pack.
2012	ABORT	Internal system error. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.

Table 8-393. TSI Loopback and Crosstalk Test #1136

Error Code	Test Result	Description Recommendation
2100	ABORT	Could not allocate the necessary resources to run this test. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times 2. If the problem persists, follow normal escalation procedures.
	FAIL	The TSI was found to be transmitting in error. This causes noisy and unreliable connections. Replace the circuit pack.
	PASS	The TSI is correctly using its allocated time slots.

Video Processor Plus Digital Signal Processor/Field-Programmable Gate Array (VPP DSP/FPGA) Status Query Test #1144

The purpose of this query is to make sure that maintenance and the VPP circuit pack have the same states for each of the three DSPs and two FPGA circuits. Test failure indicates that data integrity cannot be guaranteed for the circuit pack.

Table 8-394. VPP DSP/FPGA Status Query Test #1144

Error Code	Test Result	Description Recommendation
	ABORT	Internal system error. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.
1000	ABORT	System resources required to run this test are not available. The circuit pack may be busy setting up synchronization. This is a normal abort. 1. Retry the command at one-minute intervals up to five times. 2. Retry the command after one hour. 3. If the problem persists, follow normal escalation procedures. The escalation procedure may include issuing the reset system 2 command to free the allocated lock.
2000	ABORT	Response to the query was not received from the Video Processor Plus circuit pack within the allowable time period. 1. If this result occurs repeatedly, attempt to reset the circuit pack if all ports are not in use. Reset the circuit pack by issuing busyout board PCSS and reset board PCSS followed by release board PCSS. 2. If this result recurs, replace the circuit pack.

Table 8-394. VPP DSP/FPGA Status Query Test #1144

Error Code	Test Result	Description Recommendation
2012	ABORT	Internal system error. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.
2100	ABORT	Could not allocate the necessary resources to run this test. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times 2. If the problem persists, follow normal escalation procedures.
0	FAIL	The TSI FPGA circuit has failed. This resource cannot guarantee data integrity. All port resources on the circuit pack will be placed out of service Replace the circuit pack.
1	FAIL	The AVP FPGA circuit has failed. This resource cannot guarantee data integrity. All port resources on the circuit pack will be placed out of service Replace the circuit pack.
2	FAIL	The TSI DSP circuit has failed. This resource cannot guarantee data integrity. All port resources on the circuit pack will be placed out of service. Replace the circuit pack.
3	FAIL	The DSP1 circuit has failed. This resource cannot guarantee data integrity. All port resources on the circuit pack will be placed out of service. Replace the circuit pack.
4	FAIL	The DSP2 circuit has failed. This resource cannot guarantee data integrity. All port resources on the circuit pack will be placed out of service. Replace the circuit pack.
	PASS	All the DSP and FPGA circuits are functioning normally.

VPP Synchronization Tests #1146 and #1148

This test is nondestructive.

To support conferences, that span multiple MMI and Medpro circuit packs, and to Continuous Presence Plus conferences, the appropriate MMI, Medpro, and VPP circuit packs must be synchronized with one another. One circuit pack, either an MMI or a Medpro is designated, by the system, as the Universal Sync provider. The *provider* provides the synchronization signaling onto the TDM bus. To become synchronized, other MMI, Medpro, and VPP circuit packs in the system

listen to this signal on the TDM bus. This test monitors the synchronization state of individual the VPP circuit packs in the system.

Two Test numbers are associated with this test. Test 1146 runs automatically in the background when the circuit pack reports a sync problem. This test is not part of the test board sequence. The soul purpose of this test is to inform MO UNI-SYNC that the VPP circuit pack is not synchronized. MO UNI-SYNC then analyzes the problem and attempts to resynchronize the VPP circuit pack.

Test #1148 passes with an auxiliary code 1101 if the VPP circuit pack is in sync and is listening to the signal. The test fails is the VPP circuit pack in not in sync. VPP circuit packs usually do not lose the synchronization signal unless the providing MMI or Medpro circuit pack is either pulled out of the system or reset via a craft command. Test #1148, runs when the user enters either the “long” option or the “short” option of the test board command. Test #1148 gives only the status of the synchronization. However, if the circuit pack is not in sync, the test requests recovery actions.

Table 8-395. VPP Synchronization Status Test #1148

Error Code	Test Result	Description Recommendation
	ABORT	Internal system error. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.
1000	ABORT	System resources required to run this test are not available. The circuit pack may be busy setting up synchronization. This is a normal abort. 1. Retry the command at one-minute intervals up to five times. 2. Retry the command after one hour. 3. If the problem persists, follow normal escalation procedures. The escalation procedure may include issuing the reset system 2 command to free the allocated lock.
2000	ABORT	Response to the query was not received from the Video Processor Plus circuit pack within the allowable time period. 1. If this result occurs repeatedly, and if the VPP circuit pack is idle, attempt to reset the circuit pack if all ports are not in use. Reset the circuit pack by issuing busyout board PCSS and reset board PCSS followed by release board PCSS. 2. Retest the VPP circuit pack. If this result recurs, replace the circuit pack.
2012	ABORT	Internal system error. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.

Table 8-395. VPP Synchronization Status Test #1148

Error Code	Test Result	Description Recommendation
2100	ABORT	Could not allocate the necessary resources to run this test. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times 2. If the problem persists, follow normal escalation procedures.
1101	FAIL	The VPP circuit pack is not synchronized with an MMI circuit pack. The error codes displayed are intended only for development debugging. These codes cannot be used for field troubleshooting 1. Run the “long” option of the test board command. Then wait up to five minutes. 2. If this test continues to fail, reset the VPP circuit pack via the reset board command. 3. Replace the TN2237 VPP circuit pack. 4. If the test continues to fail, escalate the problem. The escalation procedure may include issuing a reset system 2 command.
	PASS	The VPP circuit pack is listening to the synchronization signal provided by an MMI circuit pack in the MCU (if it is in sync).

SAKI Sanity Test #53

Refer to this repair procedure described in the XXX-BD (Common Port Circuit Pack) section of this document.

VPP-PT (Video Processor Plus Port)

Alarm Level	Initial Craft Command to Run*
Minor	test port PCSSpp l r#
Warning	test port PCSSpp l r#

* Where P is the port network number (only default of 1 applicable); C is the carrier number (A, B, ... etc.); SS is the address of the slot in the carrier where the circuit pack is located (*01, 02,* ... etc.); and pp is the two-digit port number (for example, 01).

** Refer to XXX-BD (Common Port Board) maintenance.

The Video Processor Plus circuit pack (TN2237) is used to implement various media-processing features. For Continuous Presence *Plus*, four H.261 video streams are mixed together and then rate adapted back to the bandwidth of the original video streams. This allows each endpoint in a multipoint conference to see up to four other conferees simultaneously.

Hardware Error Log Entries

Table 8-396. VPP-PT Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	test port PCSSpp sh r 1
	Run the Short Test Sequence first. If all tests pass, run the Long Test Sequence. Refer to the appropriate test description and follow the recommended procedures.				
1	Any	uplink error from pack	Any	Any	test port PCSSpp sh r 1
	The endpoint connected to the conference sent too many messages to the MCU in a specified amount of time. To troubleshoot, check the appropriate Status Conference forms.				
18	0	busyout port PCSSpp	Warning	Off	release port PCSSpp
	This port has been busied out via the busyout port PCSSpp command.				
257	Any	#1151	Minor	On	test port PCSSpp l r 3
	This error occurs if the VPP circuit pack detects an AVP error. Maintenance software resets the AVP whenever this error is received. If the AVP continues to fail sanity, a minor alarm is raised, and the circuit pack should be replaced.				
513	Any	board-level error	None	On	test board PCSSpp l r 3
	MO VPP_BD has detected a board-level error that affects all VPP ports. This error is sent from MO VPP_BD to MO VPP_PT to place the port out of service.				
769	Any	#1174	Minor	On	test board PCSSpp l
	This error occurs if the VPP circuit pack detects an AVP error. Maintenance software resets the AVP whenever this error is received. If the AVP continues to fail, replace the circuit pack.				

Craft-Demanded Tests

Always investigate tests in the order presented in the following tables when inspecting errors in the system. By clearing error codes associated with the *VP Cable Data Test #985,* for example, you may also clear errors generated from other tests in the testing sequence.

Table 8-397. System Technician-Demanded Tests: VPP-PT

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
AVP Status Query (#52)	Short	Long	No
Video Processor Plus AVP Loop-Around (#1174)			

AVP Status Query Test #1151

The purpose of this query is to ensure that maintenance and the VPP circuit pack have the same sanity state for a specific resource (port). If an AVP circuit controlling a port goes insane, maintenance automatically attempts to reset the AVP circuit. This query does not actually reset a port's circuit but acts as an audit to ensure that maintenance is aware that an AVP circuit has gone insane.

This test is not destructive. However, it is attempted only if the resource is idle. If the query fails, data integrity cannot be guaranteed for that resource

Table 8-398. AVP Status Query Test #1151

Error Code	Test Result	Description Recommendation
	ABORT	Internal system error. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.
1000	ABORT	System resources required to run this test are not available. The port may be busy with a call. This is a normal abort. 1. Retry the command at one-minute intervals up to five times. 2. Issue the status conference command to check if there is a conference that is currently active. If so, this test cannot be run until the call terminates. 3. If the problem persists and a call is not active, follow normal escalation procedures.
1004	ABORT	The resource has been seized by a user for a valid call. 1. Use the status conference command to verify that a conference is active. 2. If there are no active conferences, retry the test at one-minute intervals up to five times. 3. If the test continues to abort, escalate the problem.

Table 8-398. AVP Status Query Test #1151

Error Code	Test Result	Description Recommendation
2000	ABORT	Response to the test was not received from the VPP circuit pack within the allowable time period. 1. If this result occurs repeatedly, attempt to reset the circuit pack if all ports are not in use. Reset the circuit pack by issuing busyout board PCSS and reset board PCSS followed by release board PCSS. 2. If this result recurs, replace the circuit pack.
2012	ABORT	Internal system error. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.
2100	ABORT	Could not allocate the necessary resources to run this test. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.
	FAIL	This port cannot guarantee data integrity and will be placed out of service. Replace the circuit pack.
	PASS	The resource is functioning normally.

Video Processor Plus AVP Loop-Around Test #1174

In this test, the AVP for the port is put into a local loop-back mode, and it is told to listen and talk on two different TDM timeslots. A digital count tone is then sent by the tone generator on the listen timeslot to the looped-back AVP. Internally, the AVP then loops the digital count tone back out onto the talk timeslot. A tone detector port, which is listening to the AVP's talk timeslot, then verifies the looped data. If the digital count is correct, the test passes. A failure indicates that the AVP is unreliable. This test is not run on port 5. In addition, this test requires at least a TN2237CV8 circuit pack

Table 8-399. Video Processor Plus AVP Loop-Around Test #1174

Error Code	Test Result	Description Recommendation
	ABORT	Internal system error. This is an abnormal abort. 2. If the problem persists, follow normal escalation procedures.

Table 8-399. Video Processor Plus AVP Loop-Around Test #1174

Error Code	Test Result	Description Recommendation
1002	ABORT	The system could not allocate timeslots for the test. The traffic load on the system may be very high, or timeslots may be out of service due to TDM Bus errors. See the TDM-BUS section to diagnose any active TDM-Bus errors. 1. If the MCU has no TDM-Bus errors and is not handling heavy traffic, repeat the test at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1003	ABORT	The system could not allocate a tone detector for the test. The system may be oversized for the number of tone detectors present, or some tone detectors may be out of service. 1. Look for TTR-LEV errors in the error log. If present, refer to TTR-LEV. 2. Look for TONE-PT errors in the error log. If present, refer to TONE-PT. 3. If neither condition exists, retry the test at one-minute intervals up to five times. 4. If the test continues to abort, escalate the problem.
1102	ABORT	This test is not supported on this port. Test 1174 is not run on port 5.
2000	ABORT	Response to the test was not received from the Tone Detector circuit pack within the allowable time period. 1. If this result occurs repeatedly, attempt to reset the circuit pack if all ports are not in use. Reset the circuit pack by issuing busyout board PCSS and reset board PCSS followed by release board PCSS. 2. If this result recurs, replace the circuit pack.
2012	ABORT	Internal system error. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, follow normal escalation procedures.
2100	ABORT	Could not allocate the necessary resources to run this test. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, follow normal escalation procedures.
2730	ABORT	The circuit pack does not support this test. Only circuit packs greater than CV7 support this test.
	FAIL	The AVP is unreliable. Replace the circuit pack.
	PASS	The AVP is correctly looping back the digital count.
	ABORT	Internal system error. This is an abnormal abort. 1. Retry the command at one-minute intervals up to five times.

WAE-PORT (Wideband Access Endpoint Port)

The Wideband Switching capability supports end-to-end connectivity between customer endpoints at data rates from 128 to 1536 kbps over T1 facilities and to 1920 kbps over E1 facilities. Switching capabilities are extended to support Wideband calls comprising multiple DS0s that are switched end-to-end as a single entity.

Alarm Level	Initial Craft Command to Run
Minor	test access-endpoint <extension> l
Warning	test access-endpoint <extension>

NOTE:
For additional repair information, see UDS1-BD maintenance documentation.

The Wideband Switching capability extends the Administered Connections feature to include nonsignaling Wideband Access Endpoints. Endpoint application equipment with direct T1 or E1 interfaces may connect directly to the switch's line-side facilities. Application equipment without T1 or E1 interfaces requires a Terminal Adapter, such as a DSU/CSU. The terminal adapter or endpoint application equipment is connected to the Universal DS1 circuit pack (TN2207). These endpoints are administered as Access Endpoints, and they have no signaling interface to the switch. Instead, they simply transmit and receive data (some applications detect and respond to the presence or absence of data). Calls are initiated from these endpoints using the Administered Connections feature.

Multiple Access Endpoints on one line-side UDS1 circuit pack facility are separate and distinct within the facility, and the endpoint application equipment must be administered to send and receive the correct data rate over the correct DS0s. All Administered Connections originating from Access Endpoints use the entire bandwidth administered for the Access Endpoint. An incoming call of a different data rate than that administered for the Access Endpoint cannot be routed to the Access Endpoint.

Although Wideband Access Endpoints are used primarily for line-side facilities, these endpoints can also be administered on network DS1 facilities to connect the MCU to non-switched network services, such as the Avaya fractional T-1 service. An example of this is the Avaya Static Integrated Network Access, where a trunk group to Avaya 4ESS Switched Services shares an access T-1 facility with a Wideband Access Endpoint. In this case, the Wideband Access Endpoint is connected to the Avaya fractional T-1 service, and it does not terminate on local endpoint equipment but is connected to a far-end CPE (for example, a PBX) via the dedicated fractional T-1. All Wideband Access Endpoint functionality and operation is identical on both line-side and network facilities. However, because

maintenance capabilities are limited to the Wideband Access Endpoint interface, and because faults can occur end-to-end, troubleshooting procedures based on an end-to-end view of the network is required.

Wideband Access Endpoint Port maintenance provides a strategy for maintaining a Wideband Access Endpoint Port via a port on the Universal DS1 interface circuit pack hardware. The maintenance strategy involves logging Wideband Access Endpoint Port hardware errors, running tests for port initialization, periodic and scheduled maintenance, craft-demanded tests, and alarm escalation and resolution. Two different port service states are specified in the Wideband Access Endpoint Port maintenance. These states include *out-of-service*, where the port is in a deactivated state and cannot be used for calls, and i*n-service*, where the port is in an activated state and can be used for calls. If the Universal DS1 Interface circuit pack is out of service, all ports on the Universal DS1 Interface circuit pack are placed into the out-of-service state.

Hardware Error Log Entries

The following table shows the error log entries and related information.

Table 8-400. Wideband Access Endpoint Maintenance Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	test access-endpoint<extension>sh r 1
18	0	busyout access-end point	Warning	Off	release access-endpoint <extension>
	The wideband access endpoint has been busied out by a busyout access-endpoint <extension> command. No calls can be made to this extension.				
130		None	Warning	On	test access-endpoint <extension>
	The circuit pack has been removed or has been insane for more than 11 minutes. To clear the error, replace or reinsert the circuit pack.				
1281		Conference Circuit (7)	Minor	On	test access-endpoint <extension> l r 4
	The Conference Circuit Test (#7) failed on this port. See Test #7 for repair procedures.				
1537		NPE Crosstalk Test (#6)	Minor	On	test access-endpoint <extension> l r 3
	The NPE Crosstalk Test (#6) failed on this port. See Test #6 for repair procedures.				
1793		None			test board UUCSS long
	There was a failure of the UDS1 Interface circuit pack. See UDS1-BD maintenance documentation for details.				

Table 8-400. Wideband Access Endpoint Maintenance Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
3840	Any	Port Audit and Update (#36)			
	The Port Audit and Update Test (#36) failed due to an internal system error. Enter the status access-endpoint <extension> command and verify the status of the port. If the wideband access endpoint is out of service, enter the release access-endpoint <extension> command to put it back to in-service. Retry the test command. If the test continues to fail, escalate the problem.				

Craft-Demanded Tests

Always investigate tests in the order presented in the table below when inspecting errors in the system. By clearing error codes associated with the *NPE Crosstalk Test*, for example, you may also clear errors generated from other tests in the testing sequence.

Table 8-401. System Technician-Demanded Tests: WAE-PORT

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
NPE Crosstalk Test #6	Long		No
Conference Circuit Test #7	Long		No
Port Audit and Update Test 36	Short	Long	No

NPE Crosstalk Test (#6)

One or more Network Processing Elements (NPEs) reside on each circuit pack with a TDM Bus interface. (The UDS1 circuit pack has one SCOTCH-NPE chip instead of several NPE chips). The NPE controls port connectivity and gain, and it provides conferencing functions on a per-port basis. The NPE Crosstalk Test verifies that this port's NPE channel talks on the selected time slot and that it never crosses over to time slots reserved for other connections. If the NPE is not

working correctly, one-way and noisy connections may be observed. This test is usually only part of a port's Long Test Sequence, and it takes between 20 and 30 seconds to complete.

Table 8-402. NPE Crosstalk Test #6

Error Code	Test Result	Description Recommendation
	ABORT	System resources required for this test are not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1000	ABORT	System resources required to run this test are not available. The port may be in use on a valid call. Use the status access-endpoint <extension> command to determine when the port is available for testing. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort and the port is not in use, escalate the problem.
1001	ABORT	System resources required for this test are not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1002	ABORT	The system could not allocate time slots for the test. The system may be under heavy traffic conditions or it may have time slots out of service due to TDM Bus errors. Use the status health command to determine if the system is experiencing heavy traffic. Refer to TDM-Bus maintenance documentation to diagnose any active TEM-Bus errors. 1. If the system has no TDM-Bus errors and is not handling heavy traffic, repeat the test at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1003	ABORT	The system could not allocate a tone receiver for the test. The system may be oversized for the number of tone detectors present or some tone detectors may be out of service. The list measurement tone-receiver command displays information on the system's tone receivers. 1. Look for TTR-LEV errors in the error log. If present, see TTR-LEV. 2. Look for TONE-PT errors in the error log. If present, see TONE-PT. 3. If neither condition exists, retry the test at one-minute intervals up to five times. 4. If the test continues to abort, escalate the problem.
1004	ABORT	The port has been seized by a user for a valid call. Use the status access-endpoint <extension> command to determine when the port is available for testing. The port is available when it is in the in-service or idle state. 1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, and the port is not in use, escalate the problem.

Table 8-402. NPE Crosstalk Test #6

Error Code	Test Result	Description Recommendation
1020	ABORT	The test did not run due either to a previously existing error on the specific port or to a more general circuit pack error. Examine the error log for existing errors against this port or the circuit pack and attempt to diagnose the already existing error.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2100	ABORT	System resources for this test were not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
	FAIL	The NPE of the tested port was found to be transmitting in error. This causes noisy and unreliable connections. Replace the circuit pack.
	PASS	The port is correctly using its allocated time slots. User-reported troubles on this port should be investigated by using other port tests and by examining the terminal adapter or external wiring.

Conference Circuit Test (#7)

One or more Network Processing Elements (NPEs) reside on each circuit pack with a TDM Bus interface. (The UDS1 circuit pack has one SCOTCH-NPE chip instead of several NPE chips). The NPE controls port connectivity and gain, and it provides conferencing functions on a per-port basis. The Conference Circuit Test verifies that the NPE channel for the port being tested can correctly perform the conferencing function. The NPE is instructed to listen to several different tones and to conference the tones together. The resulting signal is then measured by a Tone Detector port. If the level of the tone is within a certain range, the test passes.

Table 8-403. Conference Circuit Test #7

Error Code	Test Result	Description Recommendation
	ABORT	System resources required for this test are not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.

Table 8-403. Conference Circuit Test #7

Error Code	Test Result	Description Recommendation
1000	ABORT	System resources required to run this test are not available. The port may be in use on a valid call. Use the status access-endpoint <extension> command to determine when the port is available for testing. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort and the port is not in use, escalate the problem.
1004	ABORT	The port has been seized by a user for a valid call. Use the status access-endpoint <extension> command to determine when the port is available for testing. The port is available when it is in the in-service or idle state. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort and the port is not in use, escalate the problem.
1020	ABORT	The test did not run due to an already existing error on the specific port or a more general circuit pack error. Examine error log for existing errors against this port or the circuit pack and attempt to diagnose the already existing error.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2100	ABORT	System resources required for this test are not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
	FAIL	The NPE of the tested port did not conference the tones correctly. This causes noisy and unreliable connections. Although Wideband calls do not use the conferencing feature on the NPE, this failure indicates problems with the circuit pack hardware. Replace the circuit pack.
	PASS	The port can correctly conference multiple connections. User-reported troubles on this port should be investigated by using other port tests and by examining the terminal adapter or external wiring.

Port Audit and Update Test (#36)

This test sends port level translation data from switch processor to the UDS1 Interface circuit pack to ensure that the Wideband access endpoint port's translation is correct.

Table 8-404. Audit and Update Test #36

Error Code	Test Result	Description Recommendation
	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1006	ABORT	This port is out of service. If the port is busied out: 1. Issue the release access-endpoint <extension> command to put the port back into in-service. 2. Retry the test command. If the port is not busied out, check the error and alarm logs for WAE-PORT and UDS1-BD errors and alarms. Follow the recommended repair procedures.
2000	ABORT	Response to the test request was not received within the allowable time period. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to fail, escalate the problem.
2100	ABORT	Could not allocate the necessary system resources to run this test. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to fail, escalate the problem.
	FAIL	Test failed due to an internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to fail, escalate the problem.
	PASS	Port translation has been updated successfully.

XXX-BD (Common Port Circuit Pack)

The Common Port circuit pack maintenance is a set of common tests used by all the circuit packs with the generic hardware that interfaces with the TDM Bus. Circuit packs included in this category are listed in the following tables.

The XXX-BD designation is also used in the MCU-MT display in the case where a **reset board** is issued to a board type that is in conflict with the actual board type administered for that slot or when **reset board** is issued to an empty board slot.

When any of the Common Port circuit packs (except the TN754C Digital Line circuit pack) are physically removed from the backplane, no alarm is logged for approximately 11 minutes. In the case of the Digital Line circuit pack, approximately 21 minutes elapse before an alarm is logged.

When a circuit pack that has been removed is alarmed, the alarm type is minor and is classified as an on-board alarm. The time delay permits maintenance activity to be performed without triggering an additional alarm.

NOTE:
An alarm is logged only against XXX-BD on which ports have been administered.

In a heavily loaded system, the interval between the removal of a Common Port circuit pack and the logging of the alarm may be several minutes longer.

Table 8-405. Trunk Port Circuit Packs

Code	Description	MO Name
TN767	DS1 Interface	DS1-BD
TN2185	ISDN-BRI Trunk-Side 4-Wire	
TN2198	ISDN-BRI 2-Wire	
TN2207	UDS1 Interface	UDS1-BD

Table 8-406. Station Port Circuit Packs

Code	Description	MO Name
TN420	Tone Detector	DETR-BD
TN556	ISDN-BRI 4-Wire	BRI-BD
TN746/TN791	16-Port Analog	ANL-BD
TN754	Digital Line	DIG-BD
TN2224/TN2214	2 Wire Digital Line	

Table 8-407. Service Port Circuit Packs

Code	Description	MO Name
TN744	Call-Classifier	CLSFY-BD
TN748	Tone Detector	
TN768	Tone-Clock	TONE-BD
TN794	Net Packet Interface	
TN787	Multimedia Interface	MMI-BD
TN788	Voice Conditioner	VC-BD
TN2303	Media Processor	
TN799B	C-LAN	
TN2236	Data Interface	DI-BD
TN2237	Video Processor Plus	VPP-BD

Hardware Error Log Entries

The following table shows the error log entries and related information.

Table 8-408. Common Port Circuit Pack Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
0	0	Any	Any	Any	test board PCSS sh r 1
	Run the short test sequence first. If all tests pass, run the long test sequence. See the appropriate test description.				

Table 8-408. Common Port Circuit Pack Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
1	0	#53	Minor	On	
	The circuit pack has stopped functioning or it was physically removed from the system. This error type is not applicable to DETR-BD or CLSFY-BD. The alarm is logged approximately 11 minutes after the circuit pack has been removed and/or SAKI Sanity test #53 fails. If the circuit pack is not in the MCU, insert it in the same slot as the error indicates. Or, if it is in the MCU and the red LED is on, follow the procedures for “Red Alarm.”				
18	0		Warning	Off	release board PCSS
	The circuit pack has been busied out by craft.				
23	0	None	Warning	Off	
	The circuit pack has been logically administered but not physically installed. The alarm is cleared when the circuit pack is installed.				
125		None	Minor	On	
	A wrong circuit pack is inserted in the slot where this circuit pack is logically administered. Either remove the wrong circuit pack and insert the administered one or readminister the slot.				
217	0	None	Warning	On	
	This error applies to the Tone Detector (TN420C) and Call Classifier (TN748) circuit packs. There are more than ten circuit packs in the system. This error also applies to TN787 Multimedia Interface circuit packs whenever there are more than four such packs in the system. Remove the circuit pack against which the error is logged.				
257	65535	#52	Minor	On	test board PCSS sh r 20
257	Any	None			
	Transient communication problems with this circuit pack. This is not service-affecting and no action is required.				
267	0	None	Warning	On	
	This error applies to the Tone Detector (TN420C) and Call Classifier (TN748) circuit packs. There are more than ten circuit packs in the system. This error also applies to TN787 Multimedia Interface circuit packs whenever there are more than four such packs in the system. Remove the circuit pack against which the error is logged.				
513	Any	None	Minor	On	test board PCSS sh
	This error, when reported with Aux Data ranging from 4352 to 4358, indicates the circuit pack reported an on-board hardware failure. The circuit pack continuously tests the hardware and reports the results every 10 minutes. If it is resolved, the leaky bucket strategy should clear the alarm in 30 minutes. If it does not, the circuit pack should be replaced.				

Table 8-408. Common Port Circuit Pack Error Log Entries

Error	Aux Data	Assoc Test #	Alarm Level	On/OFF Board	Test to Clear Value
769	4358	None			
	Ignore this error but look for others on this circuit pack.				
1025	4363	#50			test board PCSS l r 20
	This error is not service-affecting and no action is required.				
1538	Any	None	Warning / Minor	On	
	The hyperactive circuit pack is out of service and may exhibit one or more of the following symptoms: - Common Circuit Pack level tests, such as test #51, are aborting with error code 2000. - The tests run on the ports of this circuit pack are returning with a NO BOARD. - A busyout/release of the circuit pack has no affect on test results. - A list configuration command shows the circuit pack and ports are properly installed. If the XXX-BD is not a TN754 DIG-BD and if this error recurs within 15 minutes, replace the circuit pack. If the XXX-BD is a TN754 DIG-BD, check the alarm level. A warning indicates users are probably causing the hyperactivity; a minor alarm suggests the circuit pack is hyperactive.				
3840	Any	None			
	This is not service-affecting. No action required.				
3999	Any	None			
	Indicates that the circuit pack sent a large number of control channel messages to the MCU within a short period of time. If error type 1538 is also present, the circuit pack was taken out of service due to hyperactivity. If error type 1538 is not present, the circuit pack has not been taken out of service, but it has generated 50% of the messages necessary to be considered hyperactive. This may be completely normal during heavy traffic periods. However, if this error type is logged when the circuit pack is being lightly used, it may indicate a problem with the circuit pack or the equipment attached to it.				

Craft-Demanded Tests

Always investigate the following tests in the order presented.

Table 8-409. System Technician-Demanded Tests: XXX-BD

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?	Reset Board Sequence
NPE Audit Test #50	Long		No	
Control Channel Loop-Around Test #52	Short	Long	No	
SAKI Sanity Test #53	Long		Yes	Reset

NPE Audit Test #50

The MCU sends a message to the on-board microprocessor to update the network connectivity translation for all the NPEs on the circuit pack.

Table 8-410. NPE Audit Test #50

Error Code	Test Result	Description Recommendation
	ABORT	System resources required for this test are not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1019	ABORT	Test already in progress. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2100	ABORT	System resources required for this test are not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
	FAIL	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
	PASS	The circuit pack's NPEs have been updated with their translation.
	EXTRA BD	Some circuit packs have limitations on how many can be in the system or port network, such as the Tone Detector circuit pack and the call classifier circuit pack. Only ten Tone Detector circuit packs are allowed in each system. All additional circuit packs return this error and should be removed.

Table 8-410. NPE Audit Test #50

Error Code	Test Result	Description Recommendation
Any	NO BOARD	This is normal if the test is being done when no circuit pack is in the system or the system is booting up. Otherwise, there is some inconsistency between the physical configuration and the data kept in the system. 1. Verify that the circuit pack is installed. 2. Verify that the MCU is not booting up. 3. Retry the command at one-minute intervals up to five times. 4. If the test continues to return NO BOARD, escalate the problem.

Control Channel Loop-Around Test #52

This test queries the circuit pack for its circuit pack code and vintage and verifies its records.

Table 8-411. Control Channel Loop-Around Test #52

Error Code	Test Result	Description Recommendation
None	ABORT	System resources required for this test are not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2100	ABORT	System resources required for this test are not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
	FAIL	The circuit pack failed to return the circuit pack code or vintage. 1. Retry the command a few times up to five tries. 2. If the test fails, issue the busyout board, reset board, and release busy board commands and then retest. 3. If the problem continues, replace the circuit pack. 4. Run the test again.
	PASS	Communication with this circuit pack is successful.
Any	NO BOARD	This is normal when the test is being done when the board is not installed or the system is booting up. Otherwise, there is an inconsistency between the physical configuration and the data kept in the MCU. 1. Verify that the circuit pack is installed. 2. Verify that the MCU is not booting up. 3. Retry the command at one-minute intervals up to five times. 4. If the test continues to return NO BOARD, escalate the problem.

Table 8-411. Control Channel Loop-Around Test #52

Error Code	Test Result	Description Recommendation
	EXTRA BOARD	(This result should appear only for the TN771B or TN771C Maintenance/Test circuit pack.) More than one circuit pack has been installed in this port network. Remove this circuit pack.

SAKI Sanity Test #53

This test is destructive. It resets the circuit pack.

Table 8-412. SAKI Sanity Test #53

Error Code	Test Result	Description Recommendation
	ABORT	System resources required for this test are not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1005	ABORT	Wrong circuit pack configuration to run this test (this error applies to the DS1 (UDS1) Interface circuit pack only). It means the DS1 (UDS1) Interface circuit pack is providing timing for the MCU and, therefore, it cannot be reset without major system disruptions. 1. If the circuit pack needs to be reset, set synchronization to another DS1 (UDS1) Interface circuit pack or to the Tone-Clock circuit pack and try again. (Refer to SYNC for more details.)
1015	ABORT	Port is not out of service. 1. Busy out the circuit pack. 2. Execute the command again.
2100	ABORT	System resources required for this test are not available. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1	FAIL	The circuit pack failed to reset. 1. Execute the command again. 2. If the problem persists, replace the circuit pack.
2	FAIL	The circuit pack failed to restart. 1. Execute the command again. 2. If the problem persists, replace the circuit pack.
	PASS	The circuit pack initializes correctly. Run the short test sequence.

Table 8-412. SAKI Sanity Test #53

Error Code	Test Result	Description Recommendation
ANY	NO BOARD	This is normal if the test is run when the circuit pack is not physically installed or when the MCU is booting up. If this is not the case, the DS1 (UDS1) Interface circuit pack may not be administered. 1. Check to see if the DS1 (UDS1) Interface circuit pack is administered by entering display ds1 PCSS. 2. If not, administer the DS1 (UDS1) Interface circuit pack by issuing add ds1 PCSS. 3. Retry the command at one-minute intervals up to five times. 4. If the test continues to return NO BOARD, escalate the problem.

12V-PWR (12-Volt Power Supply)

The 12-volt power supply unit in the TN794 Netpkt Interface circuit pack is required for programming flash memory devices in circuit packs such as the TN786B Processor circuit pack and the removable memory card inserted in the TN794 Netpkt Interface circuit pack. During the erase and write operations of a flash memory or a memory card, the 12-volt power supply must be turned on under the instruction of software.

For the read-only operation of a flash memory or a memory card, the 12-volt power supply is not required. The maintenance strategy for the 12-volt power supply is to ensure that the power supply is functional as designed.

Alarm Level	Initial Craft Command to Run
Minor	test card-mem sh
Warning	test card-mem sh

If the 12-volt power supply cannot be turned on, all the erase and write operations to a flash device fail. Features such as save translation, system upgrade, and core dump always fail in this case.

Hardware Error Log Entries

The following table shows the error log entries and related information.

Table 8-413. 12-Volt Power Supply Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value
0	0	Any	Any	Any	test card-mem
	Run the short test sequence first. If all tests pass, run the long test sequence. See the appropriate test description.				
1	Any	#701	Minor	On	test card-mem
	Software cannot turn on the 12-volt power supply to provide 12-volt power to the flash memory or the memory card.				
257	Any	#701	Warning	On	test card-mem
	Software can turn on the 12-volt power supply and 12-volt power is available. However, the software cannot turn off the power supply after operations are completed. This error does not affect normal operations involved in accessing memory or the memory card.				

Craft-Demanded Tests

Always investigate the following tests in the order given. The 12-Volt Power Supply test can be initiated with either **test card-mem** or **test network-control**.

Table 8-414. System Technician-Demanded Tests: 12V-PWR

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
12-Volt Power Supply Test #701	Short	Long	No
Memory Card Insertion Test #695*	Short	Long	No
Memory Card Format and Read Test #696*	Short	Long	No
Memory Card Match Test #697*	Short	Long	No
Memory Card Write-Protected Test #698*	Short	Long	No
Memory Card Directory Recovery Test #699*	Short	Long	No
Memory Card Translation Data Integrity Test #694*	Long		No
Memory Card Erase/Write/Read Test #693*	Long		No

* See CARD-MEM (Memory Card) for a description of this test.

12-Volt Power Supply Test #701

This nondestructive test diagnoses the 12-volt power supply unit in the TN794 Netpkt Interface circuit pack. No erase and write-to-memory operations are started or verified during the test. The contents of flash memory and the memory card should not be changed.

The test turns on the power supply and verifies that 12-volt power appears by reading the control register in the TN794 Netpkt Interface circuit pack. After the power supply is on, the maintenance software waits three seconds before verifying the appearance of 12-volt power. After the 12-volt power supply can be turned on and verified, the test turns off the power supply then verifies the power is off. The control register in the TN794 Netpkt Interface circuit pack is read again for verification.

If, while this test is running, an application attempts to erase or write a flash memory or a memory card, this test remains active and the application is barred.

Table 8-415. 12-Volt Power Supply Test #701

Error Code	Test Result	Description / Recommendation
1192	ABORT	The 12-volt power supply is being used by other applications or maintenance. The 12-volt power supply is in use. Retry **test card-mem** after the maintenance operation application is completed.
2106	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2108	ABORT	The Netpkt Interface circuit pack is not a TN794 circuit pack. 1. Replace the circuit pack with a TN794 circuit pack. 2. Reenter **test card-mem.**
2114	ABORT	Internal system error. 1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
109	FAIL	The 12-volt power supply unit in the TN794 Netpkt Interface circuit pack cannot be turned on by the software. 1. Retry **test card-mem** one more time to verify the operation of the 12-volt power supply in the TN794 Netpkt Interface circuit pack. 2. If the failure indicated by error code 109 persists, the TN794 Netpkt Interface circuit pack must be replaced. 3. After the new TN794 circuit pack is inserted, reenter **test card-mem**. The alarm is resolved when the test passes twice. 4. If the failure persists with the new circuit pack, escalate the problem.
110	FAIL	The 12-volt power supply unit in the TN794 Netpkt Interface circuit pack cannot be turned off by the software. 1. Retry **test card-mem** one more time to verify the operation of the 12-volt power supply in the TN794 Netpkt Interface circuit pack. 2. If the failure indicated by error code 110 persists, replace the TN794 Netpkt Interface circuit pack during the next scheduled maintenance visit. This failure does not cause service disruption.
	PASS	The 12-volt power supply unit in the TN794 Netpkt Interface circuit pack is functioning correctly.

Packet Bus Fault Isolation and Correction

9

General

This chapter describes the fault isolation/correction procedures for the Packet Bus and for the various maintenance objects that use the Packet Bus. Because the Packet Bus is shared by all circuit packs that must communicate on it, a faulty circuit pack can disrupt communication over the Packet Bus. In addition, a circuit pack that does not use the Packet Bus can cause service disruptions if the physical configuration of the switch is being modified (this is discussed in more detail later). For these reasons, isolating the cause of Packet Bus failure can be complicated. In this chapter, a flowchart is provided to aid in this isolation effort, as are detailed discussions of the tools and procedures used in the fault isolation and correction.

This chapter is organized into several sections that provide introductory information, as well as the Packet Bus Fault Isolation and Correction Procedures. The sections of the chapter are as follows:

- **Remote Maintenance Versus On-Site Maintenance** discusses the strategy and the requirements for performing remote maintenance and on-site maintenance for the Packet Bus.
- **Tools for Packet Bus Fault Isolation and Correction** discusses the tools that are needed to isolate and correct Packet Bus faults.
- **What is the Packet Bus?** describes the Packet Bus, its use in the MCU system, and the types of faults that can occur on the Packet Bus. A diagram that shows the physical and logical connections between circuit packs connected to the Packet Bus is also included.

- **Circuit Packs That Use the Packet Bus** describes the various circuit packs, ports, and endpoints that use the Packet Bus. The section discusses how these maintenance objects interact, how a failure of one maintenance object can affect another, and also the failure symptoms of these maintenance objects.
- **Maintenance of the Packet Bus in the MCU System** describes the Packet Bus maintenance software strategy. Similarities and differences between the Packet Bus and the TDM Bus are discussed. An overview of the Fault Isolation and Correction Procedures is also presented.
- **The Maintenance/Test Circuit Pack (TN771)** discusses the use of the Maintenance/Test circuit pack in normal switch maintenance as well as its role in Packet Bus fault isolation. The stand-alone mode of the Maintenance/Test (which is used to perform the Packet Bus Fault Isolation and Correction procedures on-site) is discussed in detail.
- **Packet Bus Fault Isolation Flowchart** presents a flowchart that is used to isolate a Packet Bus problem. This flowchart is the starting point for this process, and it is used to determine if a failure of service is caused by the Packet Bus itself or by another maintenance object on the Packet Bus.
- **Packet Bus Fault Correction** presents the procedures required to correct either a problem with the Packet Bus itself or one that is caused by a circuit pack connected to the Packet Bus.

The Packet Bus Fault Isolation Flowchart is intended to be the normal starting point for isolating and resolving Packet Bus problems. However, anyone who is unfamiliar with Packet Bus maintenance should read the introductory sections to gain a good understanding of the Packet Bus maintenance and the procedures involved.

Remote Maintenance versus On-Site Maintenance

Most Packet Bus Fault Isolation and Repair procedures require a technician to be on-site. This is true because a Packet Bus failure is caused by a hardware failure of the Packet Bus itself or by a circuit pack that is connected to it. However, initial diagnoses can be made via use of the flowchart presented in the ‘‘Packet Bus Fault Isolation Flowchart’’ section of this chapter. However, before the Maintenance/Test Stand-alone Mode Procedure (described later) and the Packet Bus Fault Correction Procedure can be implemented, a technician must be on-site. Accordingly, the procedures are presented with this requirement in mind.

The flowchart as presented refers to the repair procedures in Chapter 8, "Maintenance Object Repair Procedures" for various maintenance objects. When one of the decision points is reached, a remote technician can refer to the appropriate section and attempt to resolve any fault conditions. If the procedures for any maintenance object require a dispatch, this should be done. In addition, the remote technician can examine some of the other maintenance objects on the flowchart and determine if those procedures also require a dispatch. Keep in mind that if a maintenance object that appears early on the flowchart fails, this failure

can cause alarms with maintenance objects that appear later in the flowchart. However, multiple dispatches can be prevented by checking subsequent stages on the flowchart. Accordingly, the on-site technician can be prepared to replace more components.

The Maintenance/Test Packet Bus port (described in detail later in this chapter) can give the remote technician information about the state of the Packet Bus. This information can be obtained via the **status system** command and via the PKT-BUS test sequence. As described later, the Maintenance/Test circuit pack may or may not be present at a customer site, depending on the configuration of the switch. If a Maintenance/Test circuit pack is not present, one must be taken to the customer site when a dispatch is done for a loss of Packet Bus service.

Tools for Packet Bus Fault Isolation and Correction

The technician should be provided with a backplane pin-replacement kit, which may be required in the procedures described in the ‘‘Packet Bus Fault Correction’’ section of this chapter. If the kit is not available, replacement of a carrier may be required.

The following list identifies optional components that you may want to provide to the technician.

- TN771 Maintenance/Test circuit pack for use in stand-alone mode, as well as the required connectors and cables. (Refer to the "Maintenance/Test Circuit Pack (TN771)" on page 9-10.)
- Replacement TN771 Maintenance/Test circuit pack. Conditions for requirement and the relevant implementation steps are documented in the ‘‘A Special Precaution Concerning the TN771’’ section in this chapter.

What is the Packet Bus?

The Packet Bus is a set of 24 leads in the backplane of the MCU. Twenty of these leads are data leads, three are control leads, and one is a spare. This distinction is important only for understanding why some circuit packs are able to detect only certain faults; the distinction does not affect fault isolation and repair. The Packet Bus is not duplicated as is the TDM Bus. However, there are several spare leads on the Packet Bus, and these spare leads can be used to recover from some failures on the Packet Bus.

Packet Bus Usage

The Packet Bus is used to carry ISDN-BRI signaling information for ISDN-BRI stations and data modules. The TN556 ISDN-BRI circuit pack is used for these connections. The SPE interface to the Packet Bus is the TN794 Packet Control circuit pack. The TN771 Maintenance/Test Circuit Pack (discussed in detail later) provides Packet Bus maintenance testing and reconfiguration capabilities.

Packet Bus Faults

Two types of Packet Bus failures can occur, as follows:

- **Shorts**. A short occurs when leads on the Packet Bus become connected together. Such a connection can occur due to component failures on the Packet Bus interface of a circuit pack, a failure of the cables between carriers or the TDM/LAN terminators, or by pins being bent together on the backplane. Usually, a failure that occurs during the normal operation of a switch is caused by a circuit pack failure. However, if the switch configuration is being modified (for example, circuit packs are being moved), the cause of a subsequent Packet Bus failure is probably bent pins.
- **Opens**. An open occurs when there is a break on the Packet Bus such that the electrical path to the termination resistors is broken. Usually, this break is caused by a failed TDM/LAN cable or by a failed TDM/LAN terminator. The break can also be caused by a failure in the backplane of a carrier, although this is unlikely.

Shorts on the Packet Bus occur much more often than do opens. This is true because the incorrect insertion of a circuit pack can cause leads to be shorted together. It is possible, in fact, for a circuit pack to be the cause of a Packet Bus fault but still exhibit trouble-free operation. For example, the insertion of a TDM-only circuit pack (for example, TN754 Digital Line) could bend the Packet Bus pins on the backplane. However, since the circuit pack does not communicate on the Packet Bus, the pack is not affected by the problem.

Packet Bus faults do not necessarily cause service interruptions. However, most Packet Bus shorts do cause these interruptions. Depending on what leads are defective, the system may be able to recover and continue to communicate. While this scenario is advantageous in that the system continues to function, the scenario is also detrimental because it makes isolating the fault difficult. The Maintenance/Test circuit pack provides the capability to detect, and, in some cases, correct Packet Bus faults.

Packet Bus Connectivity Diagram

Figure 9-1 shows the various circuit packs that communicate on the Packet Bus. Logical and physical connections are illustrated. Connectivity with three port networks is similar.

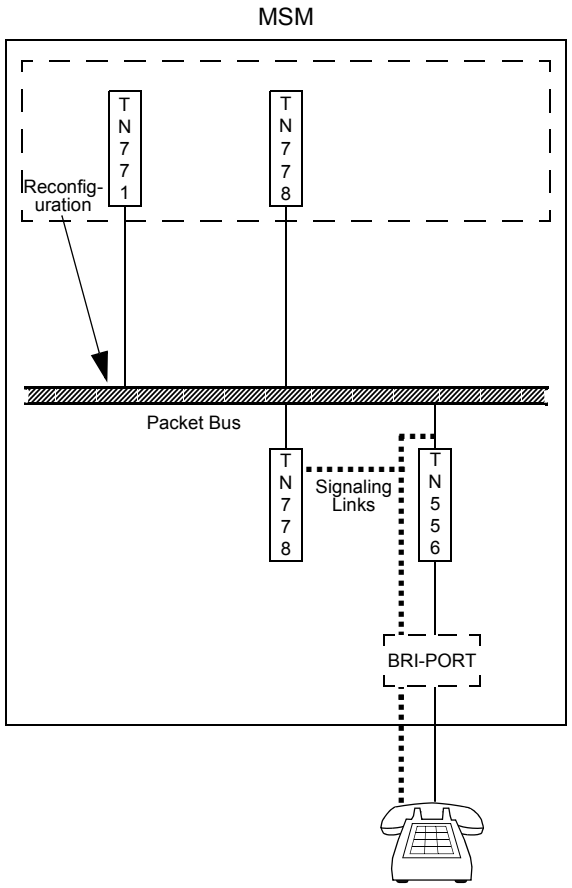

Figure 9-1. ISDN-BRI/Packet Bus Connectivity

For details on ISDN-BRI connectivity, refer to BRI-PORT and BRI-SET documentation in Chapter 8, "Maintenance Object Repair Procedures".'

Circuit Packs that Use the Packet Bus

This section gives a brief description of the MCU circuit packs that use the Packet Bus. The section explains how a Packet Bus failure can affect these circuit packs, and also how a failure of one of these circuit packs can cause a Packet Bus failure.

Overview of the Circuit Packs and Related Maintenance Objects

In MCU system, three circuit packs can use the Packet Bus. The following list identifies and discusses each circuit pack. An explanation of how each circuit pack assists in Packet Bus maintenance is also included.

NOTE:
The maintenance object(s) involved with each circuit pack are listed in brackets. Documentation for each maintenance object is provided in Chapter 8, "Maintenance Object Repair Procedures".

- **TN794 Packet Control circuit pack** [PKT-CTRL] provides the SPE interface to the Packet Bus, just as the TN777 Network Control circuit pack does to the TDM Bus. All traffic on the Packet Bus passes through the Packet Control.

  The Packet Control can detect failures of certain control leads on the bus. Such failures are indicated by an inability to transmit data. The Packet Control can also detect data errors on the Packet Bus.

- **TN556 ISDN-BRI circuit pack** [BRI-BD, BRI-PORT, BRI-SET, BRI-DAT,] provides connections for ISDN-BRI station sets and data modules. The Packet Bus is used to carry signaling information for sets and data modules.

- **TN771 Maintenance/Test circuit pack** [M/T-BD, M/T-DIG, M/T-PKT] is the workhorse of Packet Bus maintenance. This circuit pack can detect all Packet Bus failures for the Port Network in which it resides. The TN771D circuit pack provides a stand-alone mode (that is, one that does not involve communication with the SPE) for inspecting the Packet Bus for faults. This is a critical tool for the Packet Bus Fault Correction procedures, which are described later.

  NOTE:
  All Maintenance/Test circuit packs to be used in the MCU system must be of vintage TN771D or later.

Effect of Circuit Pack Failures on the Packet Bus

A failure of any of the circuit packs described in the previous section can disrupt traffic on the Packet Bus. Some failures cause actual Packet Bus failures with corresponding alarms, while others cause service outages without alarming the Packet Bus [although the failed circuit pack(s) should be alarmed].

The following list discusses how a failure on each circuit pack that uses the Packet Bus affects the Packet Bus.

- **TN794 Packet Control**. A failure of the Packet Control typically causes all Packet traffic in the system to fail. As a result, ISDN-BRI sets are not able to make or receive calls. A failure of the Packet Control may also cause a failure of the Packet Bus itself if the failure is on the interface circuitry. Otherwise, only the Packet Control is alarmed.
- **TN556 ISDN-BRI Circuit Pack**. A failure of the ISDN-BRI circuit pack typically causes some or all ISDN-BRI sets and data modules connected to the circuit pack to fail to function. If the failure is on the Packet Bus interface, the Packet Bus may be alarmed as well.
- **TN771 Maintenance/Test**. A failure of the Maintenance/Test may cause an incorrect indication of a Packet Bus failure or the inability to detect such a failure. A failure of the Packet Bus interface of the circuit pack may cause the Packet Bus to be alarmed.

As is indicated in the previous list, a failure of the Packet Bus interface on any of the circuit packs discussed can cause the Packet Bus to be alarmed. This is true because such a failure may result in shorting Packet Bus leads together. This typically disrupts *all* Packet Bus traffic in the affected port network. Packet Bus failures that do not affect all endpoints on that Packet Bus may occur. Therefore, a Packet Bus failure should not be ruled out even if some Packet service is still present.

A circuit pack can fail in a manner such that it transmits bad data on the Packet Bus. If the Packet Control fails in such a fashion, all Packet traffic is disrupted (because all traffic requires the Packet Control).

However, if an ISDN-BRI circuit pack fails such that it transmits bad data, all devices connected to the circuit pack fail to function. This failure may also disrupt the entire Packet Bus whenever the circuit pack tries to transmit data. Such a disruption may be indicated by Packet Bus alarms that occur and go away, intermittent failures of other Packet circuit packs, and/or interference with other connected endpoints. The failures mentioned are difficult to isolate because of their intermittent nature. In most cases, the failed circuit pack is usually alarmed, and all connected endpoints on the circuit pack are out of service until the circuit pack is replaced. These symptoms help in isolating the fault.

Packet Bus Maintenance

This section discusses the maintenance of the Packet Bus in the MCU system. Accordingly, the following topics are discussed:

- Comparison between the Packet Bus and the TDM Bus
- Packet Bus Maintenance Software
- Overview of Fault Correction Procedures

Packet Bus and TDM Bus: A Comparison

Although the Packet Bus is similar to the TDM Bus in many ways, there are some important differences. For example, there are two physical TDM Busses in the system (refer to the TDM-BUS section in Chapter 8, "Maintenance Object Repair Procedures" for more information), and one of these busses can fail without affecting the other (although half of the call-carrying capacity is lost in this case). On the other hand, there is only a single Packet Bus in the switch, and a failure of that bus can disrupt all traffic on the Packet Bus.

The Maintenance/Test circuit pack provides Packet Bus reconfiguration capabilities. This allows the Packet Bus to remain in service with up to three lead failures. There is no corresponding facility on the TDM Bus, where the second physical TDM Bus continues to carry traffic until repairs are completed.

In addition, the system response varies according to the type of bus failure. Specifically, a catastrophic TDM Bus failure (one that affects both TDM Buses) disables *all* traffic in the system, while a catastrophic Packet Bus failure affects only Packet traffic. The latter case indicates that all TDM traffic is unaffected, while all BRI traffic does not work. The significance of this distinction depends on the customer's application. The only way a Packet Bus failure can affect TDM traffic is via possible impact on system response time in a large switch due to ISDN-BRI endpoint maintenance running. This should rarely happen because the Packet Bus maintenance software is able to prevent this impact for most Packet Bus faults (see the next section).

⚠ CAUTION:

Since the correction procedures and some of the fault isolation procedures for the Packet Bus are highly destructive to service throughout the system (inasmuch as the procedures primarily involve removing circuit packs), particular attention must be paid to non-destructive fault isolation. Also, for the same reason, the time taken with destructive procedures must be minimized. This is the major reason that maintenance of the Packet Bus and of the Packet maintenance objects is described in such detail.

Packet Bus Maintenance Software

Packet Bus maintenance software involves the traditional set of error conditions, tests, and alarms relevant to Packet Bus faults. These are described in the PKT-BUS section in Chapter 8, "Maintenance Object Repair Procedures" and they are similar in design to the maintenance strategy for most maintenance objects.

In addition, because a Packet Bus failure can cause all BRI endpoints in the affected system (and their associated ports and circuit packs) to report failures, special care must be taken to ensure that the flood of error messages from the affected maintenance objects does not overload the system and interfere with

TDM Bus traffic. When such a failure occurs, maintenance of Packet circuit packs is affected in the following manner:

- ISDN-BRI circuit pack (BRI-BD) in-line errors indicating possible Packet Bus failures are placed into the error log, but are not acted upon.
- ISDN-BRI port (BRI-PORT) in-line errors indicating possible Packet Bus failures **are neither placed into the error log nor acted upon.**
- ISDN-BRI endpoint (BRI-SET, BRI-DAT) in-line errors **are neither placed into the error log nor acted upon.**
- Circuit pack and port in-line errors that are not related to the Packet Bus, or that indicate a circuit pack failure, are acted upon in the normal fashion.
- Normal background maintenance (periodic and scheduled) is not affected.
- Foreground maintenance (for example, commands executed on the MCU-MT) is not affected.

These interactions allow normal, non-Packet, system traffic to continue unaffected, and they reduce the number of extraneous entries into the Error/Alarm Logs. If the Packet Bus failure is caused by a failed circuit pack, the circuit pack should appear in the Error/Alarm Logs, which aids in fault isolation.

The following events indicate a Packet Bus failure that requires the actions in the previous paragraph to occur:

- In-line errors that indicate a possible Packet Bus failure reported by two or more Packet circuit packs
- Packet Bus Uncorrectable report from the Maintenance/Test Packet Bus port (M/T-PKT)
- Packet Bus Interface Failure from the Packet Control (PKT-CTRL)

If such a failure occurs, this information will be available in an Error Log entry for PKT-BUS. Refer to the PKT-BUS section in Chapter 8, "Maintenance Object Repair Procedures" for more detailed information.

Overview of Fault Correction Procedures

This section gives an overview of the procedures used to (1) isolate the cause of Packet Bus faults and to (2) correct the Packet Bus faults. These procedures are detailed fully later in this chapter:

1. The first procedure attempts to determine if a circuit pack that interfaces to the Packet Bus is the cause of the Packet Bus problem. The error and alarm logs are examined for entries for these circuit packs, and the normal maintenance procedures for those circuit packs are attempted.

2. If the Packet Bus problem still exists, port circuit packs (those in the purple slots) are removed to look for circuit pack(s) that have failed and/or have damaged the Packet Bus pins (a diagram of the backplane pins is provided later).
3. If the Packet Bus problem is still not resolved, the same procedure is attempted for the control complex circuit packs.
4. If the problem is still not resolved, or if the Packet Bus faults are known to have open leads, a procedure is undertaken in which the bus terminators and cables are replaced. If this does not resolve the problem, the carrier connectivity of the port network is reconfigured to attempt to isolate a faulty carrier.

Maintenance/Test Circuit Pack (TN771)

Description

The TN771 Maintenance/Test circuit pack provides the following functions:

- ISDN-PRI Trunk Testing
- Packet Bus Testing

The ISDN-PRI Trunk Testing functions are discussed in the ISDN-PRI and M/T-DIG sections in Chapter 8, "Maintenance Object Repair Procedures".'

⚠ CAUTION:
All TN771 circuit packs used in the MCU system must be of TN771D vintage or later.

Normal Packet Functionality

The Maintenance/Test Packet Bus Port (M/T-PKT) provides the Packet Bus testing capabilities. When the port is in service, the port continuously monitors the Packet Bus for faults (or recovery from faults), and it reports this information to Packet Bus (PKT-BUS) maintenance.

The yellow LED on the TN771 Maintenance/Test circuit pack provides a visual indication of the state of the Packet Bus, as follows:

- **Blinking** at a rate of 1 per sec — the Maintenance/Test Packet Bus port cannot swap leads to correct a Packet Bus fault (that is, there are too many faults). **The Packet Bus may be unusable**. If the failures detected by the Maintenance/Test Packet Bus port are open lead failures, the Packet Bus may still be operating.
- **On steady** — the Maintenance/Test Packet Bus port has swapped leads on the Packet Bus. **The Packet Bus is still operating**.

NOTE:
Because the yellow LED on the Maintenance/Test circuit pack can also be on steady when the other ports on the circuit pack are in use, the ports on the Maintenance/Test circuit pack used for ISDN-PRI trunk testing must be busied out before the Maintenance/Test circuit pack is used to help resolve Packet Bus faults. This is done via the **busyout port PCSS02** and **busyout port PCSS03** commands. Also, be sure to release these ports when the process is completed.

- **Off** — there is no Packet Bus fault present.

NOTE:
It takes 5 to 10 seconds for the LED to respond to a change in the state of the Packet Bus.

In normal switch operation, the Maintenance/Test provides the visual feedback of the Packet Bus state. When stand-alone mode (described in the next section) is in effect, these visual indications are still provided; however, the Packet Bus is never reconfigured and, as a result, the yellow LED either blinks or is off.

Stand-Alone Mode

The TN771D Maintenance/Test circuit pack provides a stand-alone mode for detecting Packet Bus faults. In the stand-alone mode, a terminal is connected to the Maintenance/Test circuit pack via the Amphenol™ connector on the back of the cabinet. This setup allows the System Technician to determine the state of the Packet Bus without having to access the MCU-MT to provide these functions, even if the switch is not in service. Note that the Maintenance/Test circuit pack does not reconfigure the Packet Bus when it is operating in stand-alone mode.

Stand-alone mode is used in the Packet Bus Fault Correction procedures. As a result, **a TN771 circuit pack and a corresponding terminal must be available to the technician who is to perform such procedures**.

The **list configuration** command is used to check for the presence of a circuit pack in the system. If a circuit pack is not present in the system, one must be taken to the customer site. The ‘‘Special Precaution Concerning the TN771 Circuit Pack’’ section in this chapter discusses the special cases when a spare TN771 circuit pack must be taken to the customer site.

NOTE:
When in stand-alone mode, the yellow LED on the TN771 blinks if there is a Packet Bus fault. If there is no such fault, the yellow LED is off. This is true because Packet Bus reconfiguration cannot occur in stand-alone mode.

Required Hardware for Stand-Alone Mode

In addition to the TN771 circuit pack, the following equipment is required to use the stand-alone mode:

1. Terminal or PC with terminal-emulation software. The EIA-232 (RS-232) port should be configured at 1200 baud, no parity, 8 data bits, and one stop bit. This is **not** the same configuration as for the MCU-MT. Therefore, if the MCU-MT can be used for this operation (and this depends on the switch configuration and on customer requirements), remember to restore the original communication parameters before returning the MCU-MT to service.
2. 355A EIA-232 Adapter (COMCODE 105 012 637). This adapter is illustrated in Figure 9-2.
3. 258B Six-Port Male Amphenol Adapter (COMCODE 103 923 025). This adapter is illustrated in Figure 9-3.
4. D8W 8-wire modular cable of an appropriate length to connect the 258A on the back of the cabinet to the 355A adapter. The relevant COMCODE is determined by the length of the cable, as follows:
   - 103 786 786 (7 feet)
   - 103 786 802 (14 feet)
   - 103 786 828 (25 feet)
   - 103 866 109 (50 feet)

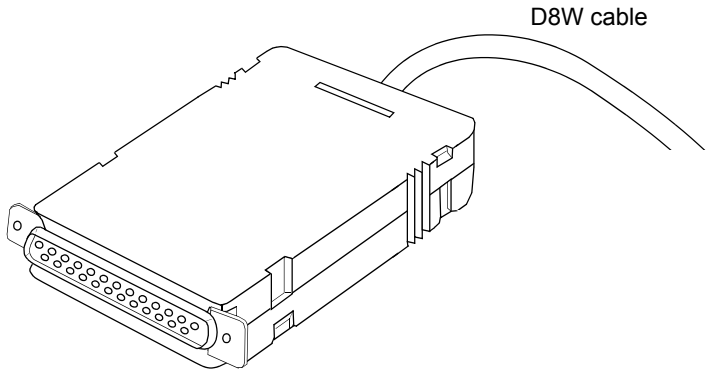

Figure 9-2. 355A EIA-232 Adapter

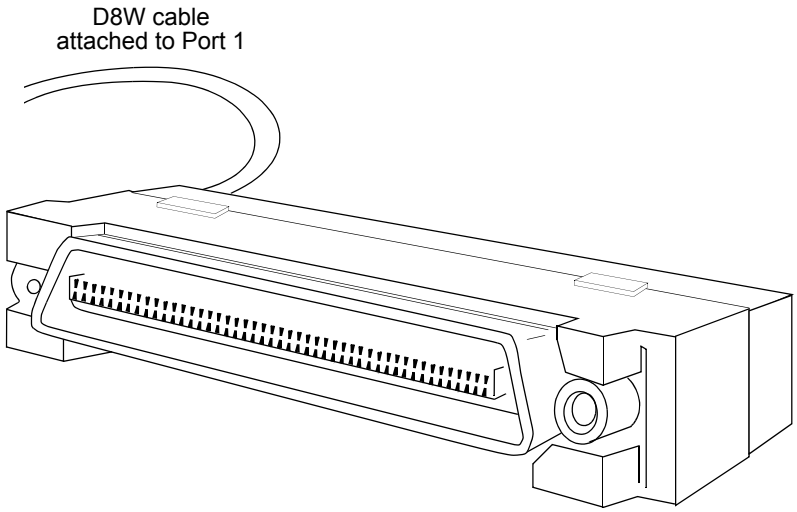

Figure 9-3. 258B Six-Port Male Amphenol Adapter

Slot Selection for Stand-Alone Mode

When selecting a carrier slot to use for stand-alone mode in a port network that does not already contain a TN771 circuit pack, keep the following points in mind:

- A port circuit slot (indicated by a purple label) should be used.
- -5 volt power supply must be available in the carrier.
- It is preferable that the slot chosen is in the A carrier if a free slot that matches the criteria presented in the first two items of information in this list is available.

Entering and Exiting Stand-alone Mode

NOTE:
When in stand-alone mode, the red LED on the TN771 is lit. This function is correct, and it serves as a reminder to remove the TN771 from stand-alone mode.

CAUTION:
The TN771 in stand-alone must be the only TN771 in the port network. If a TN771 is already in the port network, place that TN771 in stand-alone mode. Do not insert a second TN771 in stand-alone mode. System behavior is rendered as undefined if this is done. In addition, the system is not able to detect the extra circuit pack in this case because a TN771 in stand-alone mode is invisible to the SPE.

If the system has an installed TN771 to be examined, use the following steps to enter the stand-alone mode:

1. Ensure that Alarm Origination is suppressed either at login time or via the Maintenance-Related System Parameters form.
2. Attach the 258B Six-Port Male Amphenol Adapter to the Amphenol connector for the TN771's slot. Connect one end of a D8W 8-wire modular cable to port 1 of the 258B. Connect the other end of the cable to a 355A EIA-232 Adapter. Plug the EIA-232 Adapter into the terminal to be used, and turn the terminal on.
3. Reseat the TN771 circuit pack.

If there is no TN771 in the system, use the following steps to enter the stand-alone mode:

1. Attach the 258A Six-Port Male Amphenol Adapter to the Amphenol connector for the slot into which the TN771 is to be inserted. Connect one end of a D8W 8-wire modular cable to port 1 of the 258A. Connect the other end of the cable to a 355A EIA-232 Adapter. Plug the EIA-232 Adapter into the terminal to be used, and turn the terminal on.
2. Insert the TN771 circuit pack into the slot. The system does not recognize the presence of the circuit pack.

If the standalone mode is entered successfully, the following is displayed on the connected terminal:

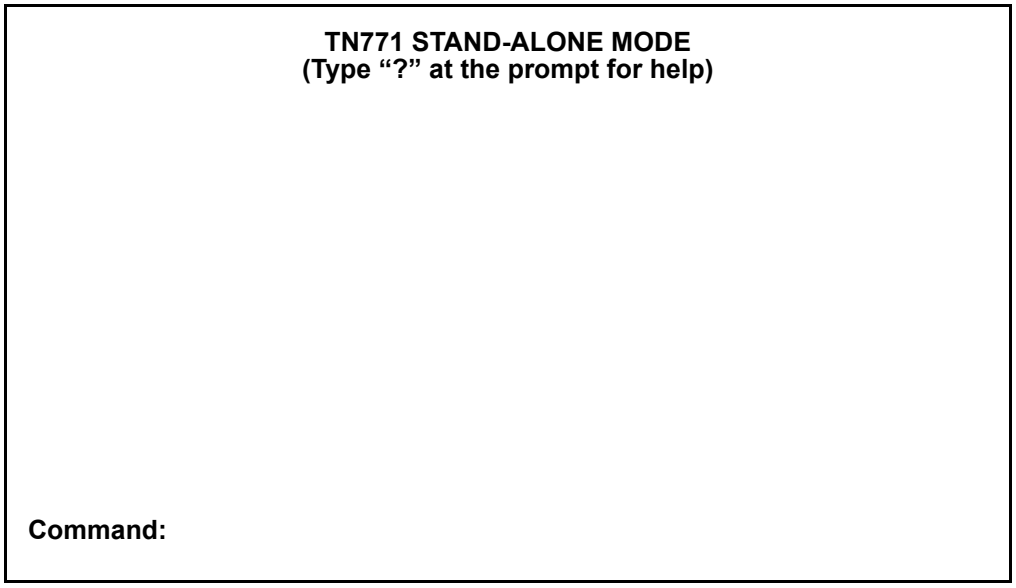

Figure 9-4. Normal Stand-Alone Mode Display

CAUTION:

If the display in Figure 9-4 does not appear, be sure to check the wiring between the terminal and the TN771 circuit pack, and also the terminal parameters. If these are correct, the TN771 circuit pack may be defective. In such a case, follow the procedures to exit stand-alone mode (described in the next paragraph). Then test the Maintenance/Test circuit pack (refer to M/T-BD and M/T-PKT in Chapter 8, "Maintenance Object Repair Procedures").

NOTE:

If the TN771 circuit pack fails while in stand-alone mode, the message **TN771 circuit pack failed** is displayed, and no further input is accepted on the terminal. The circuit pack must be replaced.

To exit stand-alone mode, follow these procedures:

1. Remove the 258A Adapter from the Amphenol connector.
2. If the TN771 circuit pack was installed for this procedure, remove it. Otherwise, reseat the TN771 circuit pack.
3. Be sure that alarm origination is re-enabled on the Maintenance-Related System Parameters form if it was disabled there (if it was disabled at login, it is automatically re-enabled at logoff).

Using Stand-Alone Mode in Packet Bus Fault Isolation and Correction

When the TN771 circuit pack is in stand-alone mode, three commands can be used at the terminal:

- **ds** displays the current state of the Packet Bus leads.
- **dsa** toggles auto-report mode on and off. In auto-report mode, the state of the Packet Bus leads are displayed and the terminal beeps whenever a change occurs.
- **?** displays the available commands.

Figure 9-5 presents an example of a stand-alone mode display. In the display, an 'S' indicates a shorted lead, an 'O' indicates an open lead, and a blank indicates no fault.

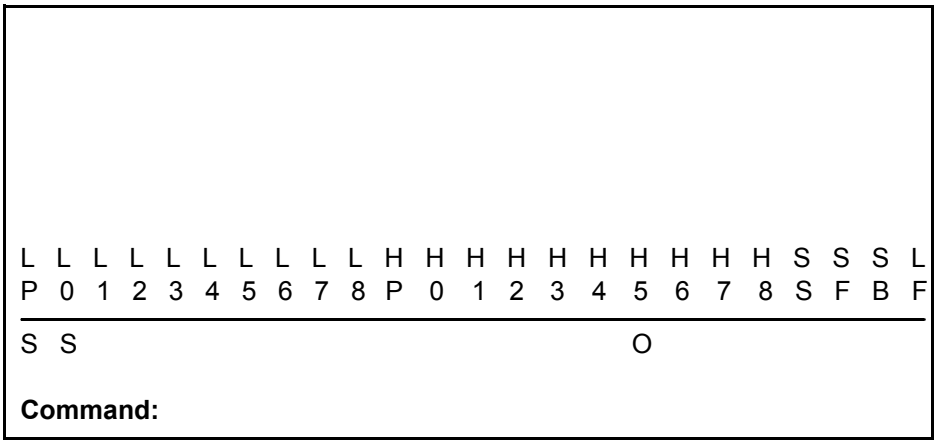

Figure 9-5. Example Stand-Alone Mode Display

The information within a stand-alone mode display is used in the Packet Bus Fault Correction procedures that follow. The TN771 circuit pack display indicates the specific leads on the backplane to examine for bent or damaged pins. Figure 9-6 shows the location of the Packet Bus leads on the backplane as viewed from the front of the carrier, while Figure 9-7 shows the same slot as viewed from the back of the carrier.

NOTE:
This information is available only from the stand-alone mode and with an on-site connected terminal. This information is not available from the MCU-MT and, therefore, it is not available remotely. This is not a concern, inasmuch as this information cannot be used effectively if testing is not on site.

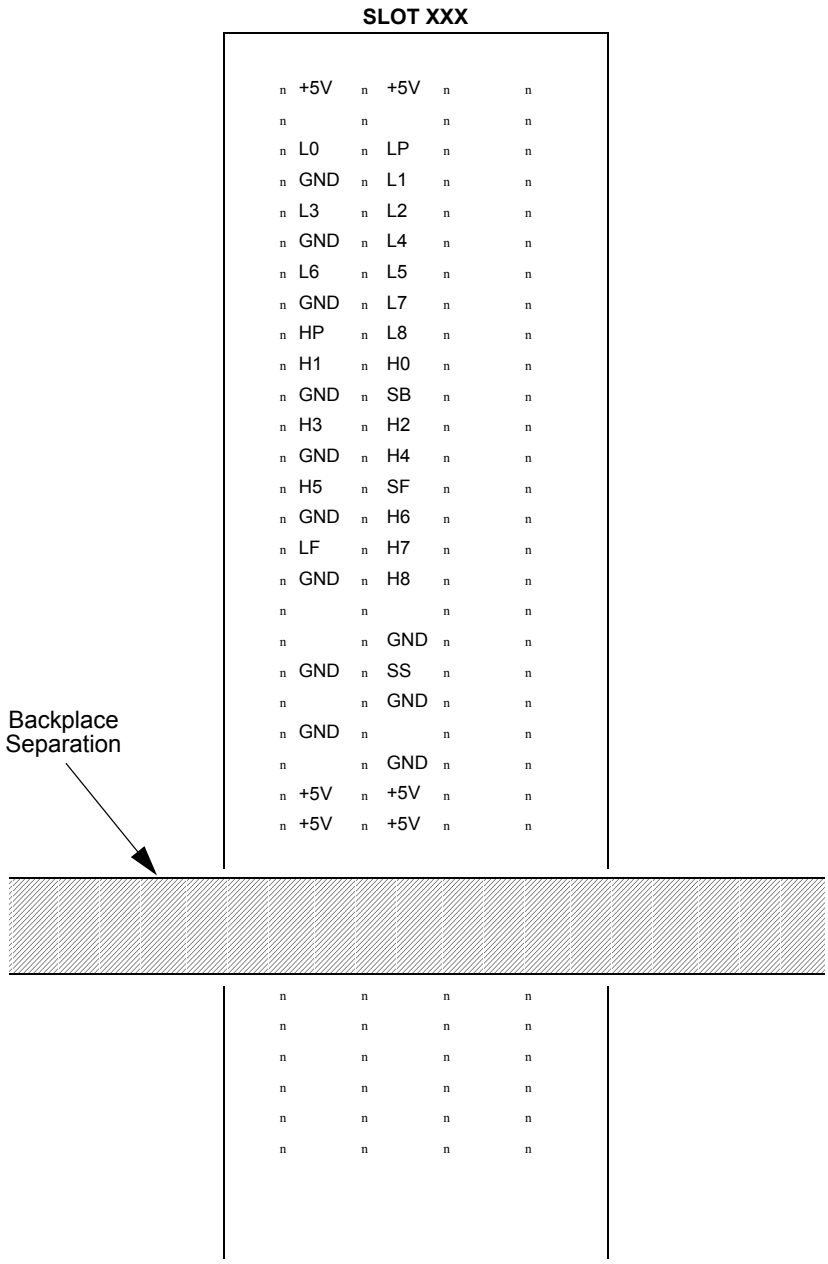

Figure 9-6. Packet Bus Leads on the Backplane—Front View

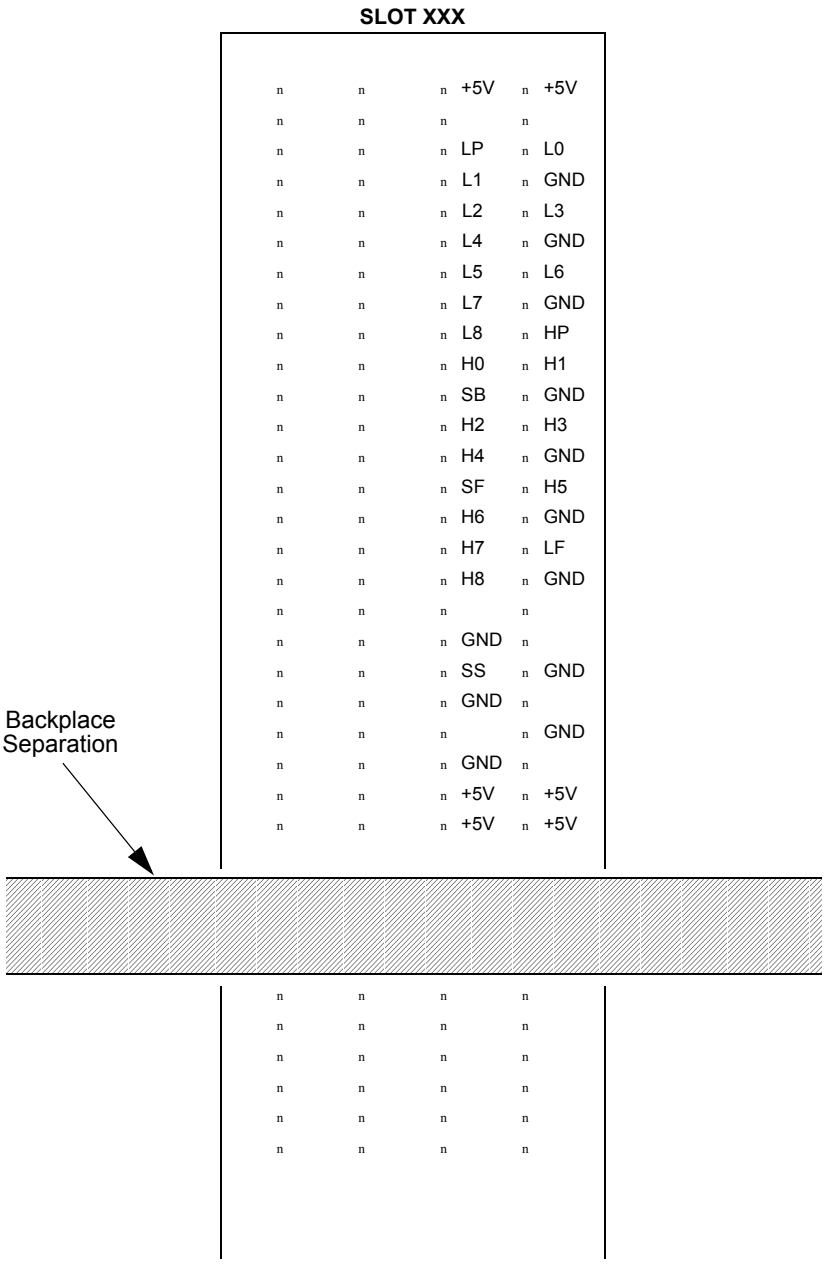

Figure 9-7. Packet Bus Leads on the Backplane—Back View

Special Precaution Concerning the TN771

A new TN771 Maintenance/Test circuit pack must be taken to the customer site whenever the following is true:

- Maintenance/Test Packet Bus port indicates that a Packet Bus fault is present.

  NOTE:
  Such a fault is indicated by a Major or Minor alarm against the Packet Bus. A Major alarm is indicated in the error log by Error Type 513, while a Minor alarm is indicated by Error Type 2049.

- Test #572 of the PKT-BUS test sequence is the only test that fails.

This precaution is taken because certain failures of the Maintenance/Test circuit pack can appear as Packet Bus failures. To ensure that the problem is indeed with the Packet Bus, implement the following steps:

1. Refer to the M/T-PKT Maintenance documentation in Chapter 8, "Maintenance Object Repair Procedures". Correct any problems with the TN771 Maintenance/Test Packet Bus port as described in that section. If the TN771 Maintenance/Test circuit pack is replaced during the correction process, enter the **test pkt P long** command to determine if the Packet Bus faults have been resolved. If there are still Packet Bus problems, correct them by using the procedures in the sections that follow.
2. If the Maintenance/Test circuit pack was not replaced, enter the **test pkt P** command. Record the results (PASS/FAIL/ABORT) and error codes for Test #572.
3. Enter the **status system P** command. Record the information listed for the Packet Bus.
4. Busyout the Maintenance/Test circuit pack by entering the **busyout board PCSS** command.
5. Replace the Maintenance/Test circuit pack with the new circuit pack.
6. Release the Maintenance/Test circuit pack by entering the **release board PCSS** command.
7. Enter the **test pkt P** and **status system P** commands as described in Steps 2 and 3.
8. If the data matches the previously recorded data, a Packet Bus problem exists. The original TN771 Maintenance/Test circuit pack is not defective, and it does not need to be returned to the factory. Replace the original TN771 circuit pack, and correct the Packet Bus problem by using the procedures in the sections that follow.

9. If the data does **not** match the previously recorded data, **the original TN771 Maintenance/Test circuit pack is defective.** If there are still indications of Packet Bus problems, correct them by using the procedures in the sections that follow.

Packet Bus Fault Isolation Flowchart

The flowchart in this section presents the steps to be taken for isolating and resolving Packet Bus problems. The order in which the maintenance objects should be examined can be determined by assessing the magnitude of the failure. For example, since all ISDN-BRI devices communicate with the TN794 Packet Control circuit pack, this MO should be examined early in the sequence.

Whenever the flowchart refers to the Maintenance documentation for a specific MO, keep in mind that the repair procedure for that MO may in turn refer to another MO's repair procedure. The flowchart tries to coordinate these procedures so that a logical flow is maintained if the Packet Bus problems are not resolved via the first set of repair procedures. However, a Packet Bus failure can lead to a somewhat haphazard referencing of various MO procedures that may result in your implementing steps that either have already been completed or are not necessary. If this occurs, return to the flowchart at the step that follows the reference to Chapter 8, "Maintenance Object Repair Procedures" and then continue.

The following **status** commands can also help diagnose Packet Bus problems:

- **status system**
- **status packet-control**
- **status bri-port**
- **status station**
- **status data-module**

For more information on these commands, refer to Appendix A, "Maintenance Commands and Troubleclearing Aids".

The Packet Bus Fault Isolation Flowchart appears on the following two pages.

NOTE:
See the "Flowchart Description and Supplement" section following the flowchart for a description of the flowchart as well as for supplementary information, the availability of which is indicated by the uppercase letters in bold that appear within some of the boxes and diamonds in the flowchart.

Packet Bus Fault Isolation Flowchart

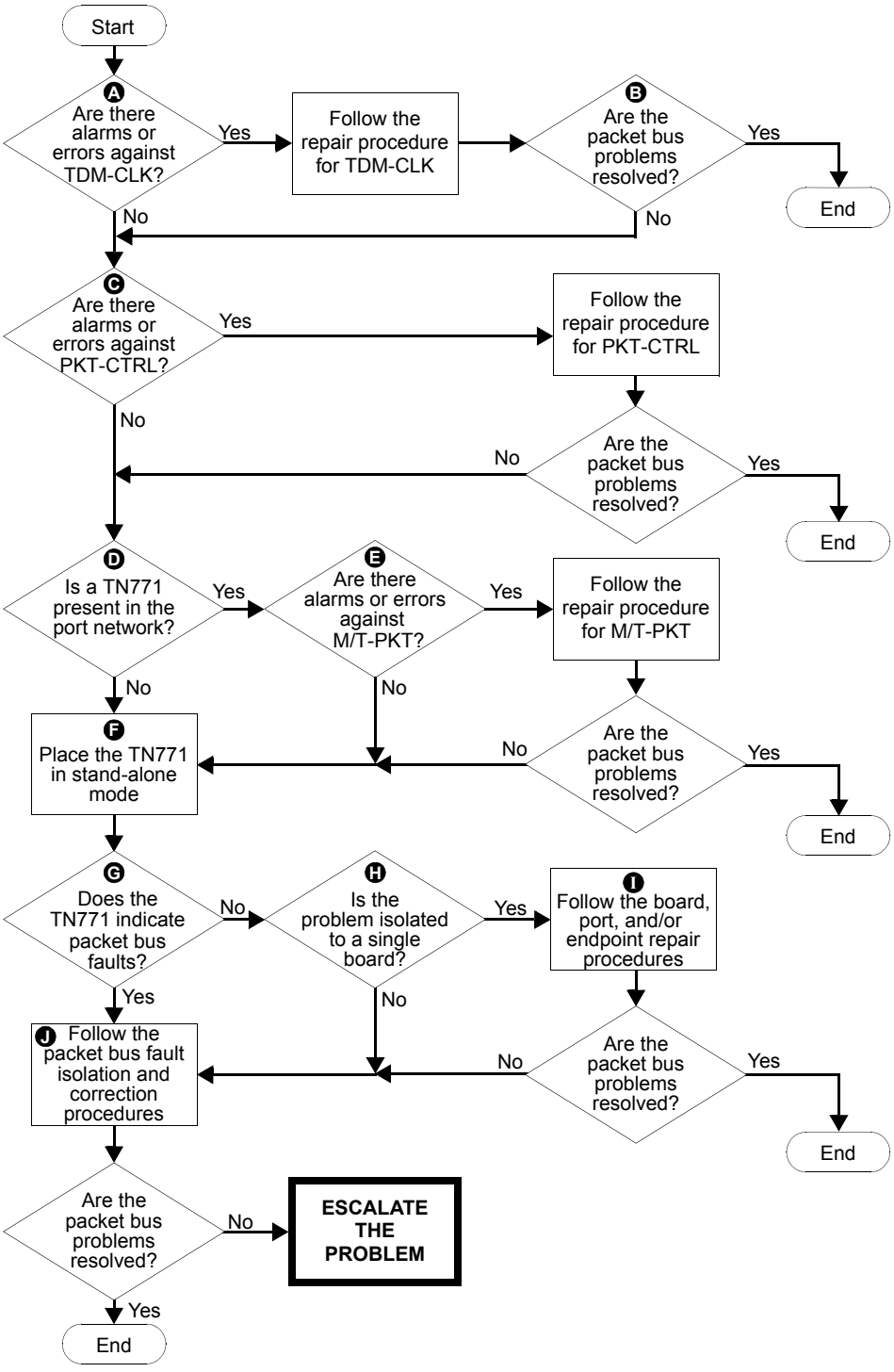

Figure 9-8. Processing of Packet Bus Problems

Flowchart Description and Supplement

A number of the boxes and diamonds in the flowchart contain an uppercase letter in white with a circular black background. Each box or diamond is supplemented by the paragraph in this section that is introduced by the same letter that appears in the box or diamond. Each paragraph gives details about the relevant process that could not fit into the appropriate box or diamond.

NOTE:
Due to space restrictions, individual error codes and alarms are not detailed on the flowchart. The maintenance object descriptions in Chapter 8, "Maintenance Object Repair Procedures" discuss which errors and alarms could cause or be indicative of Packet Bus problems. In general, unless an error, alarm, or test refers explicitly to the TDM Bus, the error, alarm, or test should be considered a possible cause of Packet Bus problems.

The following paragraphs supplement the appropriate box or diamond in the flowchart.

a. Problems with the system clock (TDM-CLK) can cause service disruptions on the Packet Bus as well as on the TDM Bus. Therefore, if there are alarms active against TDM-CLK, these alarms should be resolved before any other Packet Bus fault isolation is attempted.

   NOTE:
   All TDM-CLK problems should be resolved before the process is continued, even if the problems refer only to the TDM Bus. (This is an exception to the previous note.) This is recommended because a Packet Bus problem cannot cause a TDM-CLK problem, while a TDM-CLK problem can cause a Packet Bus problem.

b. The question ‘‘Are the Packet Bus problems resolved?’’ appears several times on the flowchart. This is a general question that can involve several checks. The basic question is ‘‘Are the problems that caused you to use this flowchart resolved?’’ Some of the more specific questions might be:

   - Are all Packet Bus alarms resolved?
   - Are all Packet circuit pack (port, endpoint) alarms resolved?
   - Are all ISDN-BRI stations/data modules in service?
   - Does the Maintenance/Test Packet Bus port (in normal or stand-alone mode) still indicate a Packet Bus fault?

c. The Packet Control is checked before the Packet Bus Fault Correction procedures are implemented.

d. If a TN771 is not present, one must be installed to accommodate the stand-alone mode, which is discussed earlier in this chapter.

e. If a TN771 is present, it can fail in such a fashion that it eventually disrupts the Packet Bus or misinterprets a Packet Bus problem.

f. If work is being done on-site, follow the procedures described earlier in this chapter for placing the TN771 into stand-alone mode. If work is not being done on-site, go to the next step.

g. The answer is “Yes” if the TN771 in stand-alone mode indicates any faulty leads. The answer is also “Yes” if Test #572 in the PKT-BUS test sequence fails, and/or if the **status system** display indicates that faulty leads are present (and the TN771 in the port network is known to be functioning correctly).

h. If the nonfunctional endpoints are isolated to a single circuit pack, the circuit pack is probably the cause of the problem.

i. The procedures that must be executed are determined by which maintenance objects on the circuit packs are alarmed. Start with the procedures for the circuit pack errors/alarms, then continue with those for the port. Finally, execute the procedures for the endpoint.

j. Follow the procedures outlined later in this chapter. If the Packet Bus problem cannot be resolved by executing these procedures, escalate the problem.

Packet Bus Fault Correction

Using and Interpreting Results from the Status System Command

The **status system P** command can be issued to retrieve information about the Packet Bus. This command provides the service state, alarm status, and, if the Maintenance/Test Packet Bus port is activated, the number of faulty and open leads. This information can be used to determine the urgency of the repair. In general, a service state of “out” indicates extreme urgency, while a service state of “reconfig” indicates moderate urgency.

CAUTION:

Ultimately, the urgency of a repair is determined by the customer’s requirements. A customer who uses ISDN-BRI for station sets probably considers a Packet Bus failure critical. However, a customer with only a small percentage of ISDN-BRI service may consider even an uncorrectable Packet Bus fault to be of minor importance and may prefer to delay performing repairs, due to their destructive nature.

NOTE:

If maintenance is actively running on the Packet Bus at the time the **status system** command is issued, the data reported for the Packet Bus may be inconsistent. The reason is that this data is updated by the maintenance tests that are running. If the data seems inconsistent, enter the command again.

If test results or the results of the **status system** command indicate that there are 24 faults on the Packet Bus, the problem is probably caused by faulty cables between carriers, or by defective bus terminators. However, before proceeding, make sure that the report is not being falsely given by the Maintenance/Test Packet Bus port. Accordingly, look for an M/T-PKT error in the error log. Then test the Maintenance/Test Packet Bus port by entering the **test port PCSSpp** command. Refer to the “Special Precaution Concerning the TN771" section earlier in this chapter if any problems are suspected.

If the carrier into which a TN771 Maintenance/Test circuit pack is installed does not have a -5 volt power supply, the Maintenance/Test Packet Bus port reports 24 open leads on the Packet Bus (via the **status system** command, and via Test #572 of the PKT-BUS test sequence). No failure of the TN771 is indicated in this case because the TN771 is not defective. Ensure that a -5 volt power supply is available.

Troubleshooting Procedures

As we discussed earlier in this chapter, Packet Bus faults are usually caused by a defective circuit pack connected to the backplane, by bent pins on the backplane, or by defective cables/terminators that make up the Packet Bus. The first two faults cause shorts, while the third fault causes either shorts or opens.

There are four procedures for correcting Packet Bus faults. The number of procedures that are to be used to correct faults depends on a number of factors relevant to system performance and to the content of the procedures themselves. For example, if the Maintenance/Test Packet Bus port is activated, and if there is an indication of open leads on the Packet Bus (either via the **status system** command or via Test #572 failure), **go directly to Procedure 4**. The reason for this is that Procedures 1 through 3 try to locate faulty circuit packs or bent pins behind circuit packs. Since these types of failures can never cause open faults, Procedures 1 through 3 need not be implemented in this case. However, if there are both shorts and opens, execute Procedure 4, then return to Procedure 1 if there are still shorts after the open lead problems are resolved.

CAUTION:
Since Packet Bus fault isolation procedures involve removing circuit packs and possibly disconnecting entire carriers, these procedure have a profound effect on service. Therefore, if possible, implement these procedures after hours or during hours of minimum system use.

NOTE:
Each of these procedures contains one or more steps that require a determination as to whether the Packet Bus problem has been resolved. Accordingly, several condition checks must be performed. We can present each such check in the form of a question, as follows:

- Did the Maintenance/Test circuit pack stand-alone mode initially indicate the existence of faulty leads, and are these leads no longer indicated?
- Have all alarms against the Packet Bus and Packet circuit packs been resolved?

  NOTE:
  If all alarms are resolved, issue the **clear pkt** command. This command attempts to put the switch back into the service state by resolving any BRI problems that exist.

- Are all ISDN-BRI stations and data modules in service?

  NOTE:
  If one of these conditions is not yet met, the others need not be checked.

The following sections discuss the four procedures for correcting Packet Bus faults.

Procedure 1

Procedure 1 determines if any circuit packs that use the Packet Bus have faults. For each circuit pack type (see Table 9-1), perform the following steps:

NOTE:
The circuit packs need not be checked in the order presented **if the flowchart in this chapter has been followed**. However, if newly added circuit packs are involved, check these packs first, inasmuch as the packs are most likely to have caused a problem.

1. Display the Error and Alarm Logs for the circuit pack via the **display errors** and **display alarms** commands.
2. If there are errors for the circuit pack, refer to the appropriate MO Maintenance documentation in Chapter 8, "Maintenance Object Repair Procedures" and follow the recommended maintenance procedure to resolve the errors. Note that some of these procedures may refer to PKT-BUS maintenance as the cause of the fault; if so, implement these Packet Bus Fault Correction procedures at that point.
3. After implementing the repair procedure for the circuit pack (and regardless of whether this procedure succeeds or fails), determine if the Packet Bus fault is still present.
4. If the Packet Bus fault is still present, implement Procedure 1 for the next circuit pack.
5. If there are no more circuit packs in the list, go to Procedure 2.

6. If the Packet Bus fault has been resolved, the procedures are completed.

Table 9-1. Packet Circuit Packs

Circuit Pack Name	Circuit Pack Code	Associated Maintenance Objects
ISDN-BRI	TN556	BRI-BD, BRI-PORT, BRI-SET, BRI-DAT
Maintenance/Test	TN771	M/T-BD, M/T-PKT
Packet Control	TN794	PKT-CTRL

Procedure 2

Procedure 2 removes and reinserts port circuit packs (those in the purple slots) one or several at a time. Use Procedure 2 for each port circuit pack in the port network until either (1) the problem is resolved or (2) there are no more circuit packs in the port network.

CAUTION:
The Tone-Clock circuit pack should be the last circuit pack checked. In addition, the TN771 circuit pack must be reseated after the Tone-Clock circuit pack is reinstalled.

If the Packet Bus problem is present when the circuit pack is inserted but is resolved when the circuit pack is removed, either the circuit pack or the backplane pins in that slot caused the problem. If the backplane pins are intact, replace the circuit pack.

NOTE:
In a multiple failure situation, the circuit pack could be one cause of the Packet Bus problem. However, there could also be other failures that are causing Packet Bus faults.

In Procedure 2, an option of working either with one circuit pack at a time or with multiple circuit packs simultaneously is available. In view of this, determine the level of service interruption to be allowed during this procedure. If causing a disruption to all users in the port network is deemed permissible, large groups of circuit packs should be worked with. This option allows faster job completion. **However, if large service disruptions are to be avoided, work with one circuit pack at a time**. This option is slower, but it disrupts only the users of a single circuit pack.

CAUTION:
If the TN771 Stand-Alone mode does not indicate Packet Bus faults, perform Procedure 2 for only the port (purple) slot Packet circuit packs listed in Table

9-1. Also, problems with the backplane pins need not be checked. Determining if the problem is resolved by removing circuit packs is sufficient.

Here are the steps for Procedure 2:

1. Remove one or several circuit packs as appropriate, according to the considerations presented in the previous paragraphs. Any circuit pack(s) (whether Packet or non-Packet) that have been recently inserted should be checked first. It is likely that such a circuit pack caused a new problem. Keep in mind that Packet circuit packs should be checked before non-Packet circuit packs.

   If the decision is made to remove multiple circuit packs, consider working with an entire carrier at a time to ensure a good granularity.

2. Determine if the Packet Bus fault is still present.
3. If the Packet Bus fault is still present:
   - Determine if the backplane pins in the removed circuit pack's slot are bent. Use the output from the Maintenance/Test stand-alone mode and Figures 9-6 and 9-7.
   - If the backplane pins are bent, power down the carrier (refer to the "Removing Power from the Cabinet" on page 5-17 in Chapter 5, "Routine Maintenance Procedures" straighten or replace the pins, reinsert the circuit pack, restore power (refer to the "Restoring Power to the Cabinet" on page 5-17'), and repeat Procedure 2, beginning with Step 2, for the same circuit pack.
   - If the backplane pins are not bent, reinsert the circuit pack(s), and perform Procedure 2 for the next set of circuit packs.
4. If the Packet Bus fault is not present, do the following:
   - Reinsert a circuit pack. If multiple circuit packs have been removed, reinsert the circuit packs **one at a time**, and repeat the following substeps until all of the circuit packs have been reinserted.
   - Determine if the Packet Bus fault has returned.
   - If the Packet Bus fault has returned, the reinserted circuit pack is defective. Replace the circuit pack and then continue.
   - If the Packet Bus fault does not return when all of the circuit packs have been reinserted, the procedure is completed.

Continue with Procedure 3 if all the port circuit packs have been checked but the Packet Bus fault is still not resolved.

Procedure 3

Procedure 3 removes and reinserts control carrier circuit packs one at a time. The Packet Control and Tone-Clock circuit packs are the only processor complex circuit packs that communicate on the Packet Bus. In addition, the Memory circuit pack is connected to the Packet Bus in the backplane. Therefore, these are the only processor complex circuit packs that are likely to cause a Packet Bus problem in a stable system. As a result, Procedure 3 should be performed only on the Packet Control and Memory circuit packs.

CAUTION:
If the TN771 Stand-Alone mode does not indicate Packet Bus faults, perform Procedure 3 for only the Packet Control and Tone-Clock circuit packs. Also, you need not check for problems with the backplane pins. Determining if the problem is resolved by removing circuit packs is sufficient.

Here are the steps for Procedure 3:

1. Power down the control carrier. Refer to the "Removing Power from the Cabinet" on page 5-17 in Chapter 5, "Routine Maintenance Procedures".
2. Remove the suspect circuit pack.
3. As in Procedure 2, determine if the backplane pins in the removed circuit pack's slot are bent.
4. If the backplane pins are bent, do the following:
    A. Straighten or replace the pins
    B. Insert the same circuit pack
5. If the backplane pins are not bent, replace the circuit pack (reinsert the circuit pack if a replacement is not available).
6. Turn the power back on to reboot the system. Refer to the "Restoring Power to the Cabinet" on page 5-17 in Chapter 5, "Routine Maintenance Procedures"'
7. Determine if the Packet Bus fault is still present.
8. If the Packet Bus fault is still present, do the following:
    A. If the circuit pack was reinserted in Step 5, replace the circuit pack, and repeat Procedure 3.
    B. If the circuit pack was replaced in Step 5, repeat Procedure 3 for the next processor complex circuit pack.
9. If the Packet Bus fault does not recur, the procedure is completed.

If Procedure 3 fails to identify the cause of the problem, go to Procedure 4.

Procedure 4

Procedure 4 tries to isolate the failure to a particular set of carriers. Only the circuit packs in those carriers are checked. Procedure 4 is used if the preceding procedures fail because it can help locate multiple circuit pack failures, as well as failures of the carrier hardware. The procedure is also used if there are open leads on the Packet Bus. (The faults detected by Procedures 1 through 3 cannot cause open leads.)

In Procedure 4, the TDM/LAN Cable Assemblies and TDM/LAN termination resistor packs are replaced. If this action does not resolve the Packet Bus fault, the carriers are reconfigured by moving the termination resistor packs in such a manner that certain carriers are disconnected from the bus. This is done by moving the termination resistors on the carrier backplanes. To terminate the Packet Bus at the end of a particular carrier, first unplug the cable that connects the carrier to the next carrier and then replace the cable with a termination resistor (see Figure 9-9). When the length of the Packet Bus is modified via this procedure, circuit packs that are essential to system operation (for example, Processor Complex, Tone-Clock) must still be connected to the new "shortened" Packet (and TDM) Bus. In addition, the Maintenance/Test circuit pack (in stand-alone mode) must be connected to the "shortened" bus.

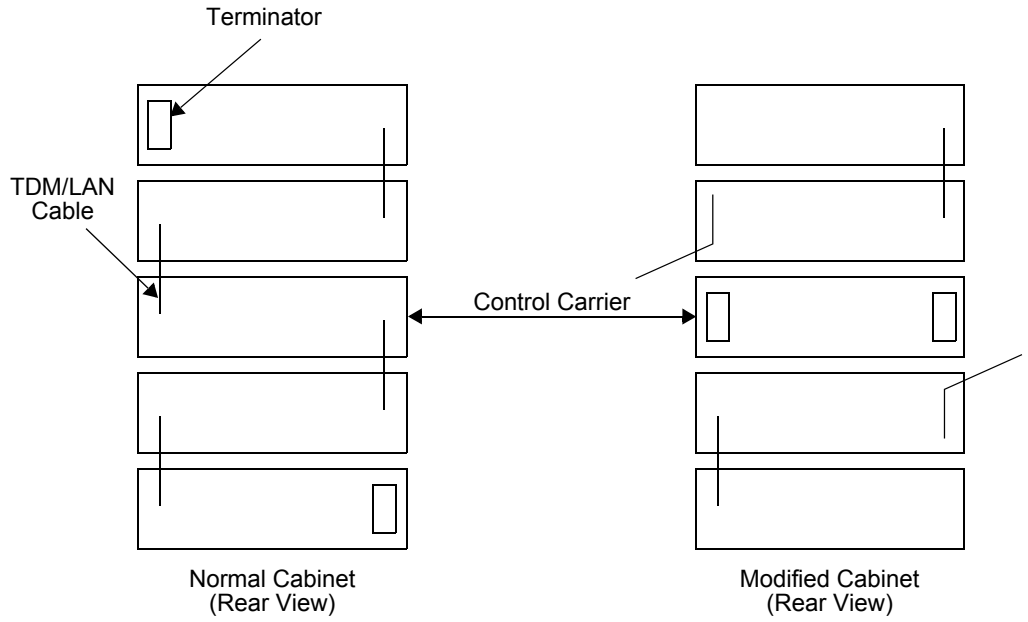

Figure 9-9. Carrier Rewiring Example

WARNING:

Power must be removed from the system before any cables or terminators are removed. Failure to do so can cause damage to circuit packs and power supplies and can also be hazardous to the technician. After cabling changes are made and verified, power must be restored to the port network. Use the TN771 Stand-Alone mode to determine if the Packet Bus fault is resolved.

CAUTION:

Circuit packs in carriers that are not part of the shortened bus are not inserted. As a result, these circuit packs are not alarmed. Ignore these alarms for now. All alarms should be resolved when the cabinet is restored to its original configuration.

Procedure 4 is organized into two parts, as follows:

Part 1:

1. Power down the system. Refer to the "Removing Power from the Cabinet" on page 5-17 in Chapter 5, "Routine Maintenance Procedures"'.
2. Replace all of the TDM/LAN Cable Assemblies and both TDM/LAN Terminators.
3. Restore power to the port network. Refer to the "Restoring Power to the Cabinet" on page 5-17 in Chapter 5, "Routine Maintenance Procedures".'
4. Determine if the Packet Bus fault is still present.
5. If the Packet Bus fault is resolved, the procedure is completed. Otherwise, go to Part 2.

Part 2:

1. Terminate the Packet Bus so that it extends only from the control carrier to the carrier that contains the Maintenance/Test circuit pack. To allow this procedure to isolate the failure to the smallest possible number of carriers, place the Maintenance/Test circuit pack into a carrier that contains a processor complex, if possible.
2. Determine if the Packet Bus fault is still present. If so, and if there are shorts on the Packet Bus, perform Procedure 2 and/or Procedure 3 for only the circuit packs in those carriers that are connected to the ‘‘shortened’’ Packet Bus. (Procedure 2 is performed for port circuit packs, and Procedure 3 is performed for processor complex circuit packs.)
3. If the Packet Bus fault is not present, extend the Packet Bus to another carrier, and repeat the procedure in the previous step. When a carrier that causes the fault to recur is added, and if there are shorts, perform Procedure 2 and/or Procedure 3 for only the circuit packs in that carrier.

4. If the Packet Bus fault recurs as the Packet Bus is extended, and if Procedures 2 and 3 (if performed) do not resolve the problem, the added carrier(s) that caused the problem to recur are defective and must be replaced.

If the Packet Bus problems are still not resolved, escalate the problem.

T.120 Maintenance From the ESM-MT

10

Using the ESM Management Terminal

In general, all MCU System maintenance and administration can and should be done from the MSM Management Terminal (MSM-MT). However, in special circumstances, it may be necessary to use the ESM Management Terminal (ESM-MT) for ESM Maintenance or Upgrade Procedures. The following special circumstances require using the ESM Management Terminal.

NOTE:
The ESM-MT is intended for use only by Avaya services and support personnel or authorized distributors. A “customer” login is not provided for the ESM-MT.

1. **The ESM/MSM link is not in-service.**

   ESM/MSM Link problems should always be evaluated from the MSM-MT first. Refer to Chapter 4, “Initialization and Recovery.” However, if the link problem cannot be resolved from the MSM-MT, and the link is still not in-service, the ESM-MT should be used to analyze the problem further. Refer to the specific sections later in this chapter for details on how to use the following ESM Maintenance Procedures to troubleshoot an ESM/MSM Link problem:

   - Check the MSM Interface Card’s status LEDs.
   - Execute the **display errors** command.
   - Execute the **check esm** command.

2. **The ESM requires a soft shutdown of the UNIX operating system.**

   To protect the UNIX file system from being corrupted, proper shutdown of the UNIX operating system must be implemented before powering off the ESM or initiating a hardware reset of the ESM using the RESET button on the faceplate of the unit. These shutdown commands must be executed from the ESM-MT or remote login. See the “Shutting Down the UNIX Operating System” section in chapter 3 of the Installation and Test document. Shutting down the ESM is required whenever the ESM needs any of the following:

   - To be physically relocated.
   - Hardware repair or maintenance.
   - Software or hardware upgrade.

3. **An ESM software upgrade is required.**

   As described in chapter 3 of the Installation and Test document, the installation procedures for ESM System Software require working from the ESM Management Terminal to install the UnixWare™ Operating System and to perform hardware and firmware verifications.

4. **ESM login or password management is required.**

   If the passwords for existing user logins need to be changed for security purposes, or if additional user logins need to be added to the system, these changes must be made via the ESM-MT or a remote login to the ESM.

Login-Based Command Setup

Two logins, “inads” and “root,” are provided on the ESM. Login “inads” should be used for nearly all maintenance and diagnostic activities. Login “root” is used for software installation and upgrades. It is also used for low-level UNIX tasks, such as changing passwords.

The following commands, which are discussed in the following sections, can be executed from login “inads”:

- check
- disable
- display
- enable
- emshut
- passwd
- reset
- rmbcmd
- status

The following commands can be executed from login “root”:

- passwd (used to change the “root” or “inads” login password)
- shutdown (used to shut down the system if the emshut command fails)

Login “root” allows logging in directly on the ESM-MT. However, whenever the user is logging in from a remote location, the user should first log in as “inads” and then run “su-root.”

Using the Status Command

The status command at the ESM-MT has the following usages:

- status autoboot
- status E1
- status link
- status L2 [-Bn]

The outputs from each status command, as seen on the ESM-MT console, are explained in detail in the following sections.

Status E1

The **status E1** command provides the following response at the ESM-MT:

Receive Alarm: <Status>

Send Alarm: <Status>

Where,

“Receive Alarm” indicates the E1 receive status.

Possible values are:

CLEAR Indicates no alarm on the E1 span.

YELLOW Receiving Yellow Alarm. Indicates that a remote alarm indication signal (yellow) is currently being received. This indicates the remote end cannot synchronize the signal the MSM Interface Card is sending

BLUE Receiving Blue Alarm. Indicates that an alarm indication signal is currently being received. This indicates the remote end has lost its connection to its data source and is sending all ‘1’s’ instead.

RED Receiving Red Alarm. Indicates that a carrier failure alarm (red alarm—loss of synchronization) is being declared.

Also, **Send status** indicates the sending status of the E1 line.

Possible values are:

CLEAR No yellow alarm is being sent.

YELLOW Sending Yellow Alarm. Indicates that a remote alarm indication signal (yellow) is currently being sent. This indicates the MSM Interface card cannot synchronize the signal that the remote end is sending.

Status Link

The s**tatus link** command provides the following response at the ESM MT:

INFORMATION	POSSIBLE VALUE
D-Channel Status:	**NOT ESTABLISHED**
	ESTABLISHING
	ESTABLISHED
	READY
TX Count	**number**
RX Count	**number**
DM received with F bit set:	**y/n**
SABME/SABM sent:	**y/n**
SABME/SABM received:	**y/n**
Received frame with nonintegral octet:	**y/n**
Received frame with bad CRC:	**y/n**
Received frame with bad length:	**y/n**
Received frame with unknown control field:	**y/n**
Received frame with unknown address:	**y/n**
Received valid message type in bad state:	**y/n**

Received disconnect message: **y/n**

T200/N200 timeout occurred: **y/n**

XID received: **y/n**

Where,

The **D-Channel Status** outputs indicate the following:

NOT ESTABLISHED Indicates that a physical connection has not been established with the MSM.

ESTABLISHING Indicates that a physical connection has been established with the MSM, and that the MSM Interface card is in the process of establishing Link Access Procedure Data (LAPD).

ESTABLISHED Indicates that LAPD has established but the MSM and ESM have not yet exchanged ready messages. The link is still not available to transfer control data between the MSM and ESM.

READY Indicates that the MSM and ESM have exchanged ready messages and the ESM control link is now up and running.

Also, **TX Count** indicates the number of level 2 packets transmitted by the MSM interface card. **RX Count** indicates the number of level 2 packets received by the MSM interface card.

The remaining Level 2 Detail Link Layer 2 information fields indicate whether or not the corresponding event has been detected **(y)** or not **(n)** since the last ESM/MSM Link restart.

Status L2 [-Bn]

The **status L2** (layer 2) command provides, on a per-channel basis, the statistics collected since the last **status L2** command was entered. When no **-Bn** option parameter is provided (**status L2 <CR>**), the command output designates D-channel statistics status. Whenever the **-Bn** option parameter is included, **B** designates the B-channel, and **n** is a numeric value from 1 to 30 that designates the B-channel number.

There are three columns of output headed *Type*, *TX* (Transmit), and *RX* (Receive). These columns contain a frame type, the number of such frames transmitted (n_tx), and the number of such frames received (n_rx), respectively. In addition, a count of CRC errors (n_crc), a count of non-CRC errors received

(n_rcv_err), and a count of retransmitted I Frames (n_retran) are provided in response to the **status L2** command. The format of the output of the **status L2** command, as seen at the ESM-MT console, is as follows:

Type	TX	RX
IFRAME	**n_tx**	**n_rx**
RR	**n_tx**	**n_rx**
RNR	**n_tx**	**n_rx**
REJ	**n_tx**	**n_rx**
SABM	**n_tx**	**n_rx**
SABME	**n_tx**	**n_rx**
DISC	**n_tx**	**n_rx**
RR	**n_tx**	**n_rx**
RNR	**n_tx**	**n_rx**
REJ	**n_tx**	**n_rx**
DM	**n_tx**	**n_rx**
UA	**n_tx**	**n_rx**
FRMR	**n_tx**	**n_rx**

CRC: n_crc

RCV-ERRORS: n_rcv_err

retransmit: n_retran

Using the Check Command

The **check <option>** command at the ESM MT has the following usages:

- **check factory**
- **check esm**
- **check procs**
- **check E1**
- **check link**
- **check loop**
- **check gccmcs**

The outputs from each check command, as seen on the console of the ESM-MT, are explained in detail in the following sections.

check factory

The **check factory** command should be used only in the Avaya factory. The command does not apply to installed ESMs. It requires an external looparound connector, and it is designed specifically to assist the factory in verifying the proper assembly of an ESM. The proper “group” test for checking installed ESMs is the **check esm** command, which is described in the next section.

The **check factory** command is a combination of the **check loop**, **check procs,** and **check E1** commands. The display for the command includes the concatenations of the displays for these commands in the order provided, with one exception: only the final “Looparound: summary” line of **check loop** is printed. However, without the proper looparound connector, which is available only to the factory test organization, the check loop portion of the test fails.

check esm

The **check esm** command is a combination of the **check procs, check E1**, and **check link** commands. The display for the command includes the concatenations of the displays for these commands in the order provided. (See the following sections for details for the output of the **check procs**, **check E1**, and **check link** commands.) The **check esm** command output provides an overall view of the ESM’s condition.

check procs

The **check procs** command prints out a list of all the ESM server processes that should be running, along with their UNIX process ID. Its display appears as follows:

pm:	**PASS**	**<Process ID>**
pmxs:	**PASS**	**<process ID>**
esm_maint:	**PASS**	**<process ID>**
clockmgr:	**PASS**	**<process ID>**
esmlink:	**PASS**	**<process ID>**
update_log:	**PASS**	**<process ID>**
bootalarm:	**PASS**	**<process ID>**
maint_log:	**PASS**	**<process ID>**

If any process is not running, **FAIL** appears in the second column, and there is no process ID for that process.

check E1

The **check E1** command gives a brief display for the information in status E1. Its display appears as follows:

E1 RECEIVE: **<status> <alarm>**

E1 SEND: **<status> <alarm>**

Where **<status>** is:

PASS if the E1 connection is CLEAR.

FAIL if a RED, BLUE, or YELLOW alarm is present.

ABORT if the ESM's maintenance process fails to return a result.

and where **<alarm>** is **CLEAR** or the alarm state.

check link

The **check link** command prints a brief display for the information in "status link." Its output is of the form:

LINK: **<result>** **<link status>**

Where **<result>** is:

PASS if the link is IN-SERVICE and READY.

FAIL if the link is in some known state but not READY.

ABORT if the ESM cannot determine the state of the link

and where **<link status>**, if present, is:

READY if the link is IN-SERVICE and READY.

ESTABLISHED f the LAPD layer is up but the ESM and MSM software has not yet completed their handshake.

ESTABLISHING if LAPD has not yet been established.

check loop

The **check loop** command performs a looparound test on all 30 channels of the E1 interface. It requires a looparound plug to be inserted in the E1B Interface. (See chapter 7.)

NOTE:
This test is not intended to be used on ESMs installed in the field because the external looparound plug is available only in the factory test shop.

The command prints 30 lines of the form:

Channel <n>: <result> <channel type>

followed by a summary line of the form:

Looparound : <result> <failed channels>

where,

<n> is the **channel number**,

<channel type> is **Signaling** or **Bearer**,

<result> is **PASS** or **FAIL**, and

<failed channels> is a list of the channels that failed the looparound test.

The output should display only one signaling channel (channel 16), and this signaling channel always fails this test. Therefore, the final summary line exists even if only channel 16 fails. This command may take a few minutes to complete, especially if any channels fail.

check gccmcs

The **check gccmcs** command prints the same output as the **check procs** command, with one exception: it displays only “gccmcs” and “startmcs” processes. These processes are present only whenever there are active data conferences. There is a minimum of one startmcs and one gccmcs process for each active data conference. If there are no active data conferences, the output from a **check gccmcs** command is null.

Therefore, the **check gccmcs** command can be used to verify that startmcs and gccmcs processes are running. However, since there can be many gccmcs processes running at once on the ESM whenever there are multiple data conferences active, the output of this command does not provide enough detail to verify that a gccmcs process exists for a particular conference. In other words, the output of the **check gccmcs** command does not provide a conference ID associated with each startmcs and gccmcs process.

Using the Disable Command

The **disable <option>** command at the ESM-MT has the following usage:

disable autoboot

This disables the automatic periodic reboot of the ESM’s UNIX operating system. To enable the autoboot feature, use the **enable autoboot** command.

Using the Enable Command

The **enable <option>** command at the ESM-MT has the following usage:

enable autoboot

This enables the automatic periodic reboot of the ESM’s UNIX operating system. To disable the autoboot feature, use the **disable autoboot** command.

Using the Display Command

The **display <options>** command at the ESM-MT has the following options:

- **alarms**
- **errors**
- **resets**
- **version**
- **bookmark**

- **autoboot**

Each **display** command and its outputs are explained in the following sections.

display alarms

The display alarms command displays the contents of the alarm log. For each entry in the log, the following information is displayed:

- *Alarm Description*—name of the alarm
- *Error Type*—numerical error code that identifies the problem
- *Error Count*—number of times the error occurred after the last reset
- *Date Alarmed*—date when the alarm occurred
- *Date Resolved*—date when the alarm was resolved
- *Ack Flag*—indication of whether the MSM acknowledged the alarm
- *Alarm State*—status of this alarm in the error and alarm logs, including:
  - **n** (not alarmed)
  - **a** (active alarm)
  - **r** (resolved alarm)
- *Alarm Class*—**major** or **minor**

The numerical codes and descriptions for the error types are included in the following table:

Table 0-1. Local ESM Event/Error Types

Event/Error Types	Aux Data	Description	Threshold	Alarm Type
513	1	Warm Start	None	None
1281		E1 Span errors	3	MAJOR
1537		D Channel Errors	2	MAJOR
1793		MSM Not Ready	2	MINOR
2305		Software	1	MAJOR
2817		Reboot needed	1	MAJOR
3329		Frigid Start	None	None
3538	Local Event Type	Minor Alarm	0	MINOR
3841	Local Event Type	Major Alarm	0	MAJOR

Table 0-2. ESM Reset Level 1

Reset Level 1	Description
Threshold Value	2
Purpose	Reset processes with minimal conference impact.
Action	Restart all server processes, but maintain existing domains. Endpoints that have established a data connection are not disturbed. Endpoints cannot establish a data connection during a reset. This will take no more than 10 seconds.
Escalation	Perform status E1 and D-channel. If either status test fails, retry until threshold is reached. If threshold is exceeded, generate an error and a major alarm.

Table 0-3. ESM Reset Levels 2-4

Reset Level 2-4	Description
Threshold Value	N/A
Purpose	Clear any operating system or hardware errors.
Action	Generate an error and a major alarm. Stop system operation. Reboot UNIX. Continue through normal cold start procedures, which includes initializing the MSM Interface card. Conferences are stopped until system run state has been reestablished. This may take more than five minutes.
Escalation	Reset counters for all levels.

display errors

The **display errors** command displays the contents of the error log. For each entry in the log, the following information is displayed:

- *Error Description*—name of the error
- *Error Type*—numerical error code that identifies the problem
- *Aux Data*—additional numerical information concerning the error type
- *First Occurred*—time when this error first occurred
- *Last Occurred*—time when this error was last reported
- *Error Count*—number of times this error occurred after the last reset

- *Alarm State*—status of this error in the error and alarm logs, including:
  - **n** (not alarmed)
  - **a** (active alarm)
  - **r** (resolved alarm)

display resets

This command displays the following fields:

- *Reset Description*—type of reset
- *Reset Level*—level of the reset (**1**, **2**, **3**, or **4**)
- *Error Type*—error type associated with this reset
- *Reset Origin*—indication of whether the reset was manually (**CRAFT**) or automatically (**ESM**) invoked
- *Reset Date*—date when this reset occurred
- *Reset Time*—time of day of the reset

display version

This command displays the version of the E1 Network Interface board, the MCS/ESM software vintage, and the ESM operating system vintage.

display autoboot

This command shows if the system is set to reboot automatically every seven days.

display bookmark

This command displays information about the current status of the process-analyzing events in the event log.

Using the Esmshut Command

The **esmshut** command can be used to shut down the ESM. This command can be run only by the “inads” login. The “root” login can use this command by entering **su-inads**.

To use this command, type **esmshut** at the prompt. After approximately 30 seconds, the system enters single-user mode and then shuts down. Thereafter, the user can power off the ESM.

If the **esmshut** command cannot complete the shutdown, the “root” login can use another method to complete the shutdown.

1. At the prompt, type **init S** to bring the system into single-user mode.
2. After approximately 10 to 30 seconds, the system prompts for the root password. Once single-user mode is in effect, enter **/usr/sbin/killall** at the prompt.
3. Enter **/sbin/shutdown -g0 -y** and wait for the system to shut down.

Using the Passwd Command

Both the root and inads logins can change their own pasword by entering **passwd**. Users are prompted for their old and new passwords. If the inads login loses its password, the root login can set it by entering **passwd inads**. The root login is not prompted for the inads login’s old password.

ESM Upgrade for 486 or Pentium Processor

This section describes the appropriate shutdown procedures, software installation/upgrade procedures, and installation/testing procedures for the ESM. These instructions pertain to both new installations and upgrades from existing ESM R4.0 or later systems. Note that upgrades from these systems do not require hardware changes and that the process for software upgrade is identical to that for a new installation. Upgrades from ESM R3.x systems require hardware changes and are not addressed in this document. Instructions for systems with either the 486 processor or the Pentium processor are included here.

NOTE:
For non-US installations, the remote maintenance board (RMB) and its UPS alarm cable are not used. Therefore, for such installations, skip the instructions referring to the RMB software and hardware. Furthermore, the voltage settings on the back of the ESM CPU should be verified as appropriate for the local power.

Shutdown Procedures

This section describes the proper procedure for shutting down a running ESM. This is an important procedure that will be needed several times during a software install or upgrade.

DO NOT power down a running ESM without first completing the following shutdown procedure. Doing so could result in operating system corruption and make it impossible to restore the state of the ESM without a re-installation of system software. Also, whenever it is necessary to power down an ESM, use the power switch, NOT THE RESET BUTTON.

The following steps must be followed to shut down the ESM appropriately prior to power off and/or upgrade. If the ESM is in a power-down state or in a state where the UNIX operating system is not running, the shutdown procedure is not required.

There are two approved methods for properly shutting down the UNIX Operating System from the ESM Management Terminal (MT). The first method involves using the ESM user **esmshut** command. This command should be used whenever possible. However, this command is not available if ESM application software has yet not been installed on the system or if the application software is not running properly. In these cases, you must issue a more conventional series of UNIX commands to complete a proper soft shutdown of the UNIX Operating System and all active UNIX processes.

Procedure Using the Esmhut Command

1. If a user is already logged in as “root,” log out by entering **exit** to display the “login” prompt on the monitor.
2. Log in as inads.
3. When prompted, enter the "inads" user password. This password can be obtained from your technical center.
4. At the "$" prompt, type **esmshut**. The action that follows takes about 10 to 30 seconds. During that time, ignore any command prompts (for example, "$").
5. Wait for the system to shut down. Once this happens, the monitor displays “Press CNTRL_ALT_DEL to reboot your computer.” **Do not press “CTRL_ALT_DELETE” to power down the system**.
6. Power off the ESM at the ON/OFF switch. Do not use the RESET button.
7. Wait two minutes. This allows the rotating mechanical parts to come to a rest, and it prevents damage.

Procedure Using the UNIX Shutdown Command

Execute the following sequence of UNIX commands directly to complete a proper shutdown of the UNIX operating system and to kill all running ESM Application software processes.

1. Log in as “root.” You can obtain the root password from your technical center.
2. Enter **/sbin/shutdown -g0 -y i0.** and wait for the system to shut down. Once this happens, the monitor displays “Press CNTRL_ALT_DEL to reboot your computer.” **Do not press “CTRL_ALT_DELETE” to power down the system**.
3. Power off the ESM at the ON/OFF switch. Do not use the RESET button.
4. Wait two minutes. This allows the rotating mechanical parts to come to a rest, and it prevents damage.

Basic System Setup

At this point, It is assumed that all necessary hardware is installed and correctly configured for the installation/upgrade.

Use one of the following steps, as appropriate, to prepare the PC for software upgrades.

- If the ESM is powered up, follow the shutdown procedure described in the “Procedure Using the Esmhut Command” section earlier in this chapter.
- If there is a Remote Maintenance Board (RMB) installed in the system, ensure that the BEE switch on the board is NOT in the "on" position. See the following figure.

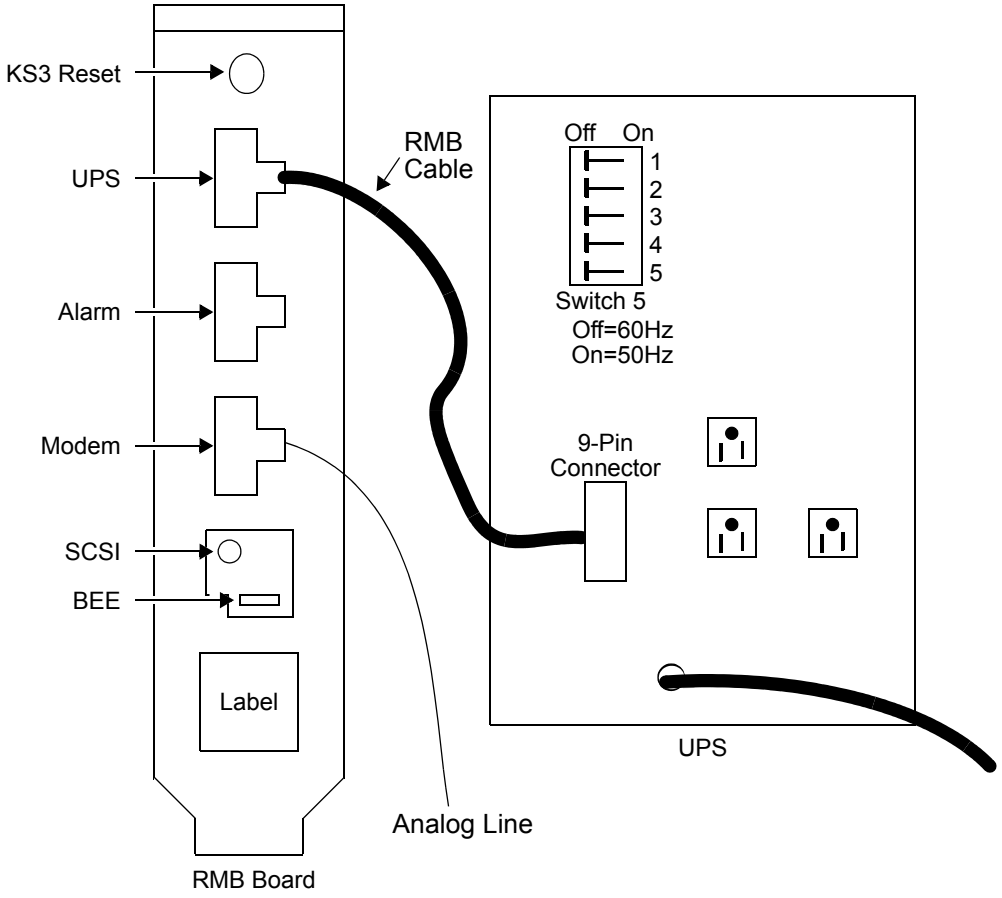

Figure 10-1. RMB-UPS Connection and RMB Faceplate Description

Installing ESM System Software

This section describes the software upgrade and installation process. This process requires approximately one hour to complete, and it cannot be halted.

WARNING:

Please be sure that the ESM Boot Diskette #1 is installed in the floppy drive because as soon as the "Main Setup" menu is exited, the system reboots and we want to boot from this diskette at this point. As mentioned earlier, if the system does reboot from the hard disk, allow the system to come up completely and follow the "ESM Shutdown Procedures" section earlier in this chapter.

To upgrade or install software on the ESM successfully, the following components are required:

- ESM Operating System Boot Disks 1, 2 and 3
- ESM Pentium Host Bus Adaptor (HBA) diskette (for systems with a Pentium processor only disk 4 of 4)
- ESM System Tape Cartridge

NOTE:
Systems with Pentium processors require a different tape from those with 486 processors. The tape is marked for the appropriate processor type. ESM.x.x.xx for the 486 system and PESM.x.x.xx for the Pentium system.

Procedure Using the Esmhut Command

1. If a user is already logged in as “root,” log out by entering **exit** to display the “login” prompt on the monitor.
2. Log in as inads.
3. When prompted, enter the “inads” user password. This password can be obtained from your technical center.
4. At the “$” prompt, type **emshut**. The action that follows takes about 10 to 30 seconds. During that time, ignore any command prompts (for example, “$”).
5. Wait for the system to shut down. Once this happens, the monitor displays “Press CNTRL_ALT_DEL to reboot your computer”. **Do not press “CTRL_ALT_DELETE” to power down the system.**
6. Power off the ESM at the ON/OFF switch. Do not use the RESET button.
7. Wait two minutes. This allows the rotating mechanical parts to come to a rest, and it prevents damage.

If you have just completed the “Main Setup” procedures, and if the system is already booting from ESM Boot Diskette 1, proceed to step 3.

1. Insert the ESM Boot Disk 1 of 3 into the floppy drive.
2. Power on the ESM machine at the ON/OFF Switch. The system now boots from Disk 1. Processing of Disk 1 requires approximately three minutes.

   After processing Disk 1, the Pentium system prompts you to insert a diskette labeled “Host Bus Adapter Drivers” (this is disk 4 of 4); the 486 system prompts you to insert the Operating System Boot Software Diskette 2.

   If this installation is for a system with a 486 processor, no Host Bus Adapter diskettes are used, and you should proceed to the next step.

If this installation is for a system with a Pentium processor, insert the Pentium Host Bus Adapter diskette at this time and press ENTER. Processing this diskette takes less than one minute.

After the processing is completed, you are prompted to insert additional Host Bus Adapter diskettes. No additional diskettes are required, and you should proceed to the next step.

3. Insert the Operating System Boot Software Disk 2 of 3 into the floppy drive and press ENTER. Processing of Disk 2 takes from five to 10 minutes.
4. When the system prompts to begin the Unixware Installation process, press (ENTER).
5. Set the following options by using the (ARROW) keys to select and the (ENTER) key to submit:
   A. Set the keyboard nationality (for example, U.S. ASCII).
   B. Set the date, time and time zone configuration (for example, North/South America).
   C. Set the country and location (for example, US/Eastern).
   D. Select (ENTER) to display the Hard Disk Partitioning Screen.
   E. Select “Overwrite system master boot code” (Option 1).
   F. Select “Delete a partition” (Option 2).
   G. Enter the number of the partition to delete.
   H. If there is more than one partition, repeat the previous two steps for each partition.
   I. Select “Create a partition” (Option 2).
   J. Select UNIX System and 100. (The UNIX partition is 100% of the disk.)
   K. Select “Exit (Update disk configuration and exit)” (Option 3).
   L. Select “Perform a destructive installation” (Option 1).
   M. Select “Automatic installation” (Option 1).
   N. Select “Perform surface analysis” (Option 1).
6. When prompted, insert Disk 3 of 3 into the floppy drive and press ENTER. Processing of Disk 3 takes approximately five minutes.
7. Remove Disk 3 when prompted to do so, and press ENTER.
8. Insert the cartridge tape. Wait one minute for the tensioning to stop.
9. Press ENTER to load the software from the cartridge tape. This process takes approximately 15 minutes. After the software is copied from the cartridge tape, the system displays the following:

“Read from tape: *x* blocks”

“Written to tape: *y* blocks”

The numbers representing ***x*** and ***y*** should be identical.
If the **Verification** fails and a message is displayed on the monitor, repeat the software installation process from the beginning. When the “*****VERIFICATION PASSED*****” message is displayed, the software has been successfully loaded from the media to the disk.

10. Remove the cartridge tape from the tape drive. For some tape drives, you may need to push the tape inward for the latch to release the tape.
11. Press (ENTER) to reboot. The system now boots from the hard disk.
12. When the system prompts for “kernel will now be rebuilt,” press (ENTER). If you do not press (ENTER), the system times out and proceeds. Also, the new kernel is built and the system reboots automatically. When the system comes up, the monitor displays a “login” prompt.
13. Log in as “root.”
14. Enter the root password when prompted. The password can be obtained from your technical center.
15. At the # prompt, type **cat /var/adm/kern.log**. If there are any suspicious messages regarding inodes, contact your technical center immediately and *do not continue the procedure*.
16. Log off by typing **exit**.

Installation Testing

Once the ESM software installation procedure is completed, execute the following steps to verify that all ESM components are performing correctly and running optimally.

Correcting COM Port Errors on ESM Terminal Display

If the ESM is displaying repeated error messages on the console (error opening com port for RMB repeated 11 times on the screen), this has no operational effect on the ESM. Even though RMB software was never loaded or the RMD board isn’t even present, here is the fix:

1. Login as root (you need someone who is not afraid to run UNIX commands and use VI to edit a file). The Password is available from your Technical Center.
2. Type the following **BOLD Italics** into ESM.
   - **cd /etc**
   - **cat inittab | more**

3. Use the ***space bar*** to scroll down the file. Look for a line which ends with rmb (probably at the end of the file). If such a line is found, press the space bar until you are back to the #.
4. Use chmod to add write permission and VI to delete the line:
   - **chmod +w inittab**
   - **vi inittab**
5. Use "***j***" to move cursor down to the "rmb" line and use press ***dd*** (small letter d twice) to delete it.
6. Use **(shift)ZZ** to write and close
7. Cat the file once more to make sure the line was deleted.
   - **cat inittab | more**
8. Now move to /etc/conf/init.d
   - **cd conf/init.d**
9. Look for a file called rmb
   - **ls –al**

Example:

-rw-r—r--	1	root	sys	99	Nov 12 1997	inads
-rw-r—r--	1	root	sys	1279	Nov 12 1997	kernel
-rw-r—r--	1	root	sys	45	Sep 9 1998	**rmb**

10. Move the file to /etc :
    - **mv rmb /etc/rmb**
11. Check again to see the file was moved:
    - **ls –al**

Example:

-rw-r—r--	1	root	sys	99	Nov 12 1997	inads
-rw-r—r--	1	root	sys	1279	Nov 12 1997	kernel

12. If the file is no longer in /etc/conf/init.d directory move back to the etc directory:
    - **cd /etc**
13. Look for the file called rmb
    - **ls –la | more**
14. Use the ***space bar*** to move down to locate moved rmb file

Example:

drwxrwxr-x 2 root sys 96 June 30 1970 rexec

-rw-r—r-- 1 root sys 45 Sep 9 1998 **rmb**

-r -xr-xr-x 1 bin bin 6208 May 15 1995 rmbalarm

15. If the file is in /etc directory move back to the root directory:
    - **cd /**
16. Reboot the ESM:
    - ***shutdown –i0 –y –g0*** **(These "0" are zeros)**

      Shutdown started “date displayed from PC”
    - Do you want to continue (y or n): ***y***

      #

      INIT: New run level: 0

      The system is coming down please wait

      The system is down

      Press CTRL-ALT-DEL to reboot your computer. (**Do not do this request**)
17. Once the system is down
    - ***shut off the power for 30 seconds and then power up.***

Logging into the ESM Management Terminal

Log into the ESM-MT as follows:

1. At the “login” prompt, enter **inads**.
2. At the password prompt, enter the password. For security purposes, this password is not displayed as you enter it, and it may be obtained only from your technical center.

Confirming Version Information

1. At the **$** prompt, enter **display version** followed by a carriage return. Output with the following format appears. (Specific values may vary from those shown):

   E1 Network Interface Board* PRII64D Rev 5.14f 10/10/95 5.10r

   ESM Software Vintage* E??.4.2.??

   Operating System Vintage: UNIX System V Release 4.2 Version 1.1.4

2. Verify that the ESM software version matches the version identified on the label on the cartridge tape. If the versions do not match, the installation was improper. Contact your technical center for additional assistance.

   NOTE:
   The E1 Network Interface circuit pack and the ESM software vintage may vary depending on the vintage of the circuit pack installed and the software just installed.

Checking the Server Processes

1. At the "$" prompt, enter **ps -u inads** followed by a carriage return.
2. Verify from the following sample output presented that all critical ESM server processes listed are running. The ordering, the PID, the TTY and the time are insignificant.

```
PID TTY TIME COMD
524  ?  0:00  pm
516  ?  0:00  update_l
525  ?  0:00  bootalar
526  ?  0:04  esmlink
527  ?  0:00  pmxs
528  ?  0:21  clockmgr
529  ?  0:01  maint_lo
531  ?  0:00  esm_main
```

Checking the MSM Interface Card

The MSM Interface Card has several status indicator LEDS on its bracket faceplate. These LEDs can be used to inspect visually the condition of the MSM Interface Card's hardware circuitry.

Check the following:

1. From the back of the ESM cabinet, verify that the D8W line is inserted into the E1B interface connector adjacent to the bank of LEDs on the board's rear bracket. Refer to the following figure.

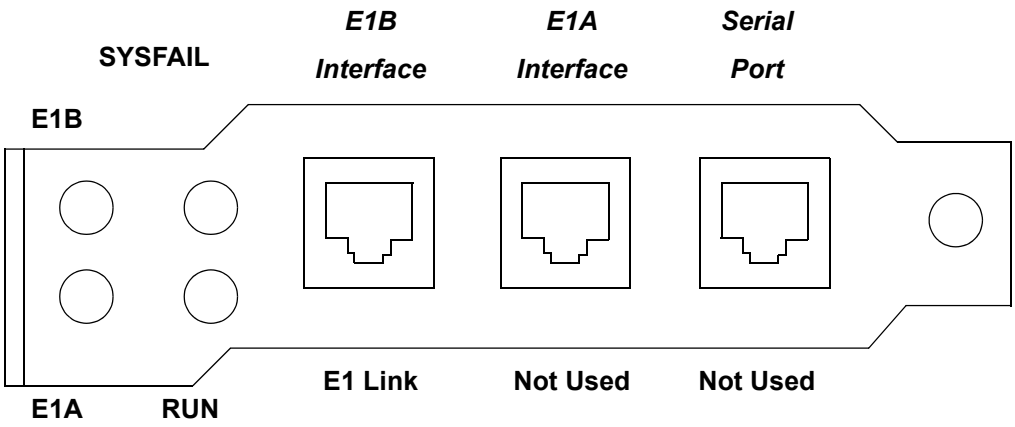

Figure 10-2. Rear Bracket of MSM Interface Card

2. Check the condition of two LED indicators on the rear bracket. Normal operation is indicated by LED conditions shown in the following table..

Table 10-1. MSM Interface Card LED Status for Normal Condition

LED	STATUS
E1A	YELLOW
RUN	GREEN

If any other lamp configuration is detected, consult the “LED Interpretation” chapter.

Checking the E1 Span

1. At the "$" prompt, enter **status E1** followed by a carriage return.
2. Verify from the following output presented that the E1 Span is functioning normally:

Receive Alarm: CLEAR

Send Alarm: CLEAR

Checking the Link

1. At the "$" prompt, enter **status link** followed by a carriage return.
2. Verify from the following sample output presented that the D-channel is functioning normally. The significant information displayed here is the D-Channel status. If it does not indicate READY, refer to the “ISDN-LNK” section in Chapter 8.

   D-Channel Status: READY

   TX Count: 1073

   RX Count= 1051

   DM received with F bit set: n

   SABME/SABM sent: n

   SABME/SABM received: n

   Received frame with non-integral octet: n

   Received frame with bad CRC: n

   Received frame with bad length: n

   Received frame with unknown control field: n

   Received frame with unknown address: n

   Received frame with message type in bad state: n

   Received disconnect message: n

   T200/N200 time-out occurred: n

   XID received: n

Verification At the MSM Management Terminal

To execute the following tests, log into the MSM through the MSM-MT as “craft.”

1. Once the MSM has been administered, enter the **status link *n*** command, where ***n*** is the link number of the ESM/MSM Link. If the MSM is using only packet control for D-channels, enter **status signal-group n** or **status esm** for a R6 MSM, or **status system 1** (page 2) for a R4 or R5 MSM.
2. Verify that the *Link Status* field displays **in-service**.
3. If this ESM has an analog modem connected to a COM2 Port for remote maintenance, follow procedures for connection via a COM2 Port in the MCU Installation document.

Logging Out Of the ESM Management Terminal (MT)

1. At the "$" prompt, enter **exit** to display the “login” prompt on the monitor.
2. Verify that you receive a “Console Login:” prompt.

Maintenance Commands and Troubleclearing Aids

A

Introduction

This appendix provides additional trouble-clearing information for resolving both system-alarmed and user-reported troubles. This chapter supplements the information found in Chapter 8, "Maintenance Object Repair Procedures" The information consists of using the maintenance commands as trouble-clearing aids. The maintenance commands are used to control, test, and obtain information associated with maintenance objects (MOs). The commands require the use of the administration terminal or remote Initialization and Administration System (INADS) interface (a valid login and password to perform maintenance are required).

In this chapter, each command is described individually.

Using the HELP Key

Once you enter the “fixed” part of a command, you can press the HELP key to display a message that prompts you to enter an appropriate “variable” portion of the command (if required). For example, if you enter the **disable test-number** command and then press the HELP key, the following help message is displayed: “Enter test number.” On the other hand, for example, if you enter the **release sp-link command** and then press the HELP key, the following help message is displayed: “Entry is not required.”

A Word About Error Messages

If you enter a command incorrectly or in an untimely fashion, an error message appears on the monitor display. In addition to identifying a problem, some error messages contain corrective actions.

Due to the number of error messages available, this appendix does not list these messages. However, the following list attempts to summarize why particular error messages are displayed.

NOTE:
The following list does not necessarily account for all of the causes of error messages. Also, the wording for some of the causes in the list may appear as part of some error messages.

- Required circuit pack is not inserted into the system.
- All maintenance resources are currently busy, or a resource problem has occurred.
- Required extension is not assigned or not valid, has an incorrect format, or is assigned to another object.
- Command just entered is in conflict with another currently executing command.
- Required link is not valid or not administered.

busyout access-endpoint

This command is destructive.

This command busies out a specified access endpoint.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
busyout access-endpoint	***extension***	Extension number of access endpoint (per dial-plan) Examples: **busyout access-endpoint 25012** **busyout access-endpoint 77868**	none	See next section

Feature Interactions

If there is an active call on the specified access endpoint, this command causes the call to drop.

Output

The following example shows the output for the **busyout access-endpoint 22502** command and assumes that access endpoint ports for extension 22502 are in cabinet 1, carrier C, slot 11, circuit 1 to 6. The responses display on a test-by-test basis with one line of data for each test result.

```
busyout access-endpoint 22502                          SPE A

                          COMMAND RESULTS

  Port    Maintenance Name  Alt. Name   Result       Error Code
  01C1101   WAE-PORT        22502       PASS
  01C1102   WAE-PORT        22502       PASS
  01C1103   WAE-PORT        22502       PASS
  01C1104   WAE-PORT        22502       PASS
  01C1105   WAE-PORT        22502       PASS
  01C1106   WAE-PORT        22502       PASS


Command Successfully Completed
```

Field descriptions

Port	Port address (cabinet-carrier-slot-circuit)
Maintenance Name	Name of maintenance object (WAE-PORT = wideband access endpoint; TIE-DS1 = single port access endpoint)
Alt. Name	The alternate way of identifying the maintenance object - the extension number of the access endpoint.
Result	Test result: Pass, Fail, Abort
Error Code	Numeric code explaining why the release failed or aborted. Refer to the detailed list of the codes by test number for each MO.

busyout board

This command puts all the ports associated with the specified access endpoint in a maintenance busy (craft busy) state. No periodic or scheduled tests are performed on the busied-out access endpoint ports until they are released. When the access endpoint ports are maintenance busy, the access endpoint is removed from active service on the switch, meaning that no call processing activity can include the busied objects because terminals on the administered ports do not receive dial tone. Warning alarms are generated on each busied-out port in the access endpoint. The **release access-endpoint** command returns all the ports associated with the specified access endpoint to operation.

WARNING:
This command is service disrupting and may cause extraneous alarms.

Action/ Object	Qualifier	Qualifier Description	Default	Feature Interactions
busyout board	***location***	Board address (**PCSSpp**) Examples: **busyout board 01c11** **busyout board 02c15**	none	None

Output

The following example shows the output from the **busyout board 1c07** command, and assumes that board in cabinet 1, carrier c, slot 7 is an analog board with three administered ports. The responses display on a test-by-test basis with one line of data for each test result.

```
busyout board 01C07                              SPE A

                            COMMAND RESULTS

  Port    Maintenance Name  Alt. Name   Result       Error Code
  01C07     ANL-BD                      PASS
  01C0702   ANL-LINE                    PASS
  01C0701   ANL-LINE         51001      PASS
  01C0703   ANL-LINE                    PASS


Command successfully completed
```

Field descriptions

Port	Port address (cabinet-carrier-slot-circuit)
Maintenance Name	The name of maintenance object
Alt. Name	Alternate way to identify maintenance objects. If the Object isThe field contains stationextension trunk*xxx/yyy* (where *xxx* = trunk group number and *yyy* = member number) private CO line*P/xxx* (where *xxx* = private CO line group number)
Result	Test result: Pass, Abort, or Fail
Error Code	Numeric code explaining why the release failed or aborted. Refer to the detailed list of the codes by test number for each MO.

busyout cdr-link

This command busyouts a maintenance object associated with the specified call detail recording (cdr) link.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
busyout cdr-link	***link-id***	Link identifier (primary or secondary) Examples: **busyout cdr-link primary** **busyout cdr-link secondary**	Primary	None

Output

The following example shows the output from the **busyout cdr-link primary** command.

```
busyout cdr-link primary                              SPE A
                            COMMAND RESULTS

  Port    Maintenance Name  Alt. Name   Result       Error Code
  1        CDR-LNK                      PASS

Command successfully completed
```

Field descriptions

Port — Port address (cabinet-carrier-slot-circuit); 1 = primary, 2 = secondary link

Maintenance Name — The name of maintenance object

Alt. Name — Alternate way to identify maintenance objects.

If the Object is	The field contains
station	extension
trunk	*xxx/yyy* (where *xxx* = trunk group number and *yyy* = member number)
private CO line	*P/xxx* (where *xxx* = private CO line group number)

Result — Test result: Pass, Abort, or Fail

Error Code — Numeric code explaining why the release failed or aborted. Refer to the detailed list of the codes by test number for each MO.

busyout data-module

This command puts the specified data module in a maintenance busy state, even uninstalled data modules. No periodic or scheduled tests is performed on the busied out data module or data channel until it is released and no call processing can be executed on the data modules or over the data channels. Warning alarms are generated (error type 18) on each maintenance object busied out, so that INADS can access the state of the objects. The **release data module** command returns the specified data module (or data channel) to operation.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
busyout data-module	***extension***	Extension number (per dial-plan) Example: **busyout data-module 31300**	None	None

Output

The following example shows the output from the **busyout data-module 300** command.

```
busyout data-module 300                          SPE A

                           COMMAND RESULTS

  Port    Maintenance Name  Alt. Name   Result       Error Code
  01C1103   DIG-LINE          300         PASS

Command successfully completed
```

Field descriptions

Port
Port address (cabinet-carrier-slot-circuit) or the data channel number

Maintenance Name
The name of maintenance object

Alt. Name
Alternate way to identify maintenance objects.

If the Object isThe field contains

stationextension
trunk*xxx/yyy* (where *xxx* = trunk group number and *yyy* = member number)
private CO line*P/xxx* (where *xxx* = private CO line group number)

Result Test result: Pass, Abort, or Fail

Error Code Numeric code explaining why the release failed or aborted. Refer to the detailed list of the codes by test number for each MO.

busyout gatekeeper

This command requests the Gatekeeper to unregister the MCU. No periodic or scheduled maintenance is performed on the GTKP MO when it is busied out. A warning alarm, with an error type of 18, is generated when the gatekeeper is busied out. The **release gatekeeper** command requests that the Gatekeeper re-registers the MCU.

NOTE:
The **busyout gatekeeper** command requests that the Gatekeeper unregisters the MCU. The **busyout gatekeeper** command does not receive a response from the Gatekeeper, indicating whether or not the request was granted. Therefore, the **busyout gatekeeper** command should always be followed by the **test gatekeeper** command to verify that the MCU was unregistered

```
busyout gatekeeper

                            COMMAND RESULTS

  Port    Maintenance Name  Alt. Name   Result       Error Code
         GTKP                           PASS

Command successfully completed
```

Field Descriptions

Port	Not applicable
Maintenance Name	Type of maintenance object that is busied out: GTKP
Alt. Name	Not applicable
Result	Test result: Pass, Abort, Fail
Error Code	Numeric code explaining why the busyout failed or aborted Refer to the detailed list of the codes by test number for each MO.

busyout link

This command places maintenance objects associated with a specified link in a maintenance busy state. No periodic or scheduled tests are performed on the busied out maintenance objects until they are released. The link is marked out of service and is inaccessible to call processing. Warning alarms (error type 18) are generated on each busied out maintenance object so that INADS can determine the state of the objects. The **release link** command reactivates the objects.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
busyout link	***link-id***	Processor Interface circuit pack 1a1 or 1b1 = 1 – 4 Processor Interface circuit pack 1a2 or 1b2 = 5 – 8 Examples **busyout link 1**	none	none

Output

The following example shows the output from the **busyout link 1** command. The responses display on a test-by-test basis with one line of data for each test result.

```
busyout link 1                              SPE A

                          COMMAND RESULTS

  Port    Maintenance Name  Alt. Name   Result       Error Code
  01C0301   PI-LINK                     PASS

Command successfully completed
```

Field descriptions

Port	Port address represents link-id
Maintenance Name	The name of the busied out maintenance object
Alt. Name	Not applicable
Result	Test result: Pass, Abort, Fail
Error Code	Numeric code explaining why the release failed or aborted. Refer to the detailed list of the codes by test number for each MO.

busyout mis

This command places the management information system in the maintenance busy state. No periodic or scheduled maintenance is performed until it is released. When the object is busied out, no call processing activity may be performed over the link. A warning alarm (error type 18) is generated on the busied out mis so that INADS can determine its state. The command **release mis** reactivates the busied out mis.

Action/Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
busyout mis		Example: **busyout mis**	None	None

Output

The following example shows the output from the **busyout mis** command. The responses display on a test-by-test basis with one line of data for each test result.

```
busyout mis                                SPE A

                        COMMAND RESULTS

  Port    Maintenance Name  Alt. Name   Result       Error Code
          MIS                           PASS

Command Successfully Completed
```

Field descriptions

Port	Not applicable
Maintenance Name	Name of busied out maintenance object: `MIS`
Alt. Name	Not applicable
Result	Test result: Pass, Abort, Fail
Error Code	Numeric code explaining why the release failed or aborted. Refer to the detailed list of the codes by test number for each MO.

busyout modem-pool

This command places specified installed and uninstalled modem pool groups or group members in the maintenance busy state. No periodic or scheduled tests are performed on the busied out modem pool groups or group members until they are released. When the object is maintenance busy it is deactivated (no call processing activity may include the busied object). A single group member can be busied out by specifying the group and member number. All members in a modem pool group can be busied out by specifying the modem pool group number. Warning alarms (error type 18) are generated on each busied out maintenance object, so that INADS can determine the state of the objects. The command, **release modem-pool**, reactivates the specified modem pool group or group member.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
busyout modem-pool	***group***	Group number = 1 – 5	none	none
	member	Member number = 1 – 32 (a member is a pair of analog and digital line ports).		
		Examples **busyout modem-pool 1** **busyout modem-pool 4/3**		

Output

```
busyout modem-pool 1                              SPE B

                          COMMAND RESULTS

  Port    Maintenance Name  Alt. Name   Result       Error Code

  01C0701   MODEM-PT                     PASS
  01C0703   MODEM-PT                     PASS

Command successfully completed
```

Field descriptions

Port — Port address (cabinet-carrier-slot-circuit)

Maintenance Name — Name of busied out maintenance object: `MODEM-PT`

Alt. Name — Not applicable

Result — Test result: Pass, Abort, Fail

Error Code — Numeric code explaining why the release failed or aborted. Refer to the detailed list of the codes by test number for each MO.

busyout packet-control

This command places the packet-control circuit pack in a maintenance busy state, and tears down each point-to-point signaling link that terminates on this packet-control. No periodic or scheduled test is performed on the busied out packet-control until it is released. A warning alarm (error type 18) is generated on the busied out packet-control, so that INADS can determine the state of the object. The **release packet-control** command reactivates the board and initiates recovery on all point-to-point signaling links terminated on this packet-control.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
busyout packet-control	***location***	Valid location = 1A. Example **busyout packet-control 1A**	cabinet 1, carrier A	See next section

Feature Interactions

When the packet-control in the active control complex is busied out, all connectivity across the Packet Bus is severed. Thus, all ISDN-BRI point-to-point signaling links that have been established through the active packet-control are torn down by the **busyout packet-control** command. The **release packet-control** command re-establishes all Packet Bus connectivity.

Output

The following example shows the output from the **busyout packet-control 1A** command. The responses display on a test-by-test basis with one line of data for each test result.

```
busyout packet-control 1A                          SPE A

                           COMMAND RESULTS

  Port    Maintenance Name  Alt. Name   Result       Error Code

  1A       PKT-CTRL                     PASS

Command successfully completed
```

Field descriptions

Port	Port address (cabinet-carrier)
Maintenance Name	Type of busied out maintenance object (PKT-CTRL).
Alt. Name	Not applicable
Result	Test result: Pass, Abort, Fail
Error Code	Numeric code explaining why the release failed or aborted. Refer to the detailed list of the codes by test number for each MO.

busyout port

This command places the specified port on a circuit pack in a maintenance busy state. No periodic or scheduled tests are performed on the busied out port until it is released. When the object is maintenance busy, it is deactivated (no call processing activity may include the busied object). Warning alarms (error type 18) are generated on each busied out maintenance object, so that INADS can determine the state of the objects. The **release port** command reactivates the administered port on a circuit pack at a specified location.

For a TN2185 circuit pack, this command busies out the D-channel and both B-channels.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
busyout port	***location***	Port location: **PPsspp** Examples: **busyout port 01c1101** **busyout port 02c1501**	none	none

Output

The following example is a display of the **busyout port** command.

```
busyout port 01C0701                              SPE A

                          COMMAND RESULTS

  Port    Maintenance Name  Alt. Name   Result       Error Code
  01C0701   ANL-LINE                     PASS

Command successfully completed
```

Field descriptions

Port
Port address (cabinet-carrier-slot-circuit)

Alt. Name
Alternate way to identify maintenance objects.

If the Object isThe field contains

stationextension

trunk*xxx/yyy* (where *xxx* = trunk group number and *yyy* = member number)

private CO line*P/xxx* (where *xxx* = private CO line group number)

Maintenance Name
Type of busied out maintenance object.

Result
Test result: Pass, Abort, Fail

Error Code
Numeric code explaining why the release failed or aborted. Refer to the detailed list of the codes by test number for each MO.

busyout sp-link

This command places the system printer link into a maintenance busy state. No periodic or scheduled maintenance is performed on the busied out system printer link until it is released. Warning alarms (error type 18) are generated on each busied out maintenance object, so that INADS can determine the state of the object. Placing the system printer link in a busyout state blocks access to the system printer. The **release sp-link** command reactivates the system printer link.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
busyout sp-link		Examples: **busyout sp-link**	none	none

Output

```
busyout sp-link                                SPE A

                          COMMAND RESULTS

  Port    Maintenance Name  Alt. Name   Result       Error Code
          SYS-PRNT                       PASS

Command Successfully Completed
```

Field descriptions

Port — Not applicable

Maintenance Name — Type of maintenance object that is busied out: `SYS-PRNT`

Alt. Name — Not applicable

Result — Test result: Pass, Abort, Fail

Error Code — Numeric code explaining why the release failed or aborted. Refer to the detailed list of the codes by test number for each MO.

busyout station

This command places the installed and uninstalled administered voice terminal extension (station) in a maintenance busy state. No periodic or scheduled tests are performed on the busied out station until it is released. When the object is maintenance busy, it is deactivated (no call processing activity can include the

busied object). Warning alarms (error type 18) are generated on each busied out maintenance object so that INADS can determine the state of the objects. The command **release station** reactivates the specified voice terminal extension.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
busyout station	***extension***	Extension number (per dial-plan) Examples: **busyout station 10020** **busyout station 32770**	none	none

Output

The following example is a display of the **busyout station** command.

```
busyout station 1002                              SPE A

                           COMMAND RESULTS

  Port    Maintenance Name  Alt. Name   Result       Error Code
  01C1102   DIG-LINE                     PASS

Command successfully completed
```

Field descriptions

Port Port address (cabinet-carrier-slot-circuit)

Maintenance Name Type of busied out maintenance object

Alt. Name Alternate means to identify maintenance object: extension number

Result Test result: Pass, Fail, Abort

Error Code Numeric code explaining why the release failed or aborted. Refer to the detailed list of the codes by test number for each MO.

busyout tdm

This command places the specified tdm bus in a maintenance busy state. No periodic or scheduled tests are performed on the busied out bus until it is released. When the object is maintenance busy, it is deactivated (no call processing activity may include the busied object). Warning alarms (error type 18) are generated on each busied out tdm bus so that INADS can determine the state of the objects. The **release tdm** command reactivates the specified tdm bus.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
busyout tdm	***pn number*** ***bus***	pn number = TDM bus Port Network number bus = “a” or “b” specifies desired half of TDM bus. Each 512 time slot TDM bus configures as two duplicate 256 time slot buses. This division allows duplication of control channels and dedicated tone time slots. “a” bus = the default control bus; “b” bus = the default tone bus. Examples: **busyout tdm 1a**	none	If a bus is busied out, no calls are torn down; no new calls are set up. Dedicated tone time slots must be moved to another bus (the other half of the duplicated bus) before a busyout of a particular bus is allowed.

Output

The following example is a display of the **busyout tdm** command.

```
busyout tdm port-network 1 bus a                        SPE A

                          COMMAND RESULTS

  Port    Maintenance Name  Alt. Name   Result       Error Code
  PN 01A  TDM-BUS                        PASS

Command successfully completed
```

Field descriptions

Port — Port address and associated TDM number and bus (PNA or PNB)

Alt. Name — Not applicable

Maintenance Name — Type of busied out maintenance object: `TDM-BUS`

Result — Test result: Pass, Abort, Fail

Error Code — Numeric code explaining why the release failed or aborted. Refer to the detailed list of the codes by test number for each MO.

busyout tone-clock

This command places the specified tone/clock in a maintenance busy state. No periodic or scheduled tests are performed on the busied out object until it is released. When the object is maintenance busy it is deactivated (no call processing activity may include the busied object). Warning alarms (error type 18) are generated on each tone clock circuit pack busied out so that INADS can determine the state of the objects. The command **release tone-clock** reactivates the specified tone/clock.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
busyout tone-clock	***location***	Physical location (**PC**) Examples: **busyout tone-clock 01c** **busyout tone-clock 03d**	1 (one)	none

Output

The following example is a display of the **busyout tone-clock** command.

```
busyout tone-clock 1a                              SPE A

                            COMMAND RESULTS

  Port    Maintenance Name  Alt. Name   Result       Error Code
  01A     TONE-PT                       PASS
  01A     TDM-CLK                       PASS
  01A     TONE-BD                       PASS

Command successfully completed
```

Field descriptions

Port — Tone/clock board address (cabinet-carrier)

Maintenance Name — Circuit pack name: `TONE-PT`, `TDM-CLK`, `TONE-BD`

Alt. name — Not applicable

Result — Test result: Pass, Abort, Fail

Error Code — Numeric code explaining why the release failed or aborted. Refer to the detailed list of the codes by test number for each MO.

busyout trunk

This command places the specified installed or uninstalled trunk group or trunk group member in a maintenance busy state. No periodic or scheduled tests are performed on the busied out trunk groups or trunk group members until they are released. When the object is maintenance busy, it is deactivated (no call processing activity may include the busied object). A single group member can be busied out by specifying the group and member number. All members in a trunk group can be busied out by specifying the trunk group number. Warning alarms (error type 18) are generated on each busied out maintenance object so that INADS can access the state of the objects. The **release trunk** command reactivates the specified trunk group or group member.

For a TN2185 circuit pack, this command busies out an individual B-channel.

NOTE:
If the user enters **busyout trunk <group number>/**, the lowest port-location in the group is busied out. **This is NOT recommended.**

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
busyout trunk	***group***	Trunk group number (1–99)	none	none
	member	Number of a trunk within a trunk group (1 – 99)		
		Examples: **busyout trunk 78** **busyout trunk 78/1**		

Output

The following example is a display of the **busyout trunk** command.

```
busyout trunk 78/1                              SPE A

                          COMMAND RESULTS

  Port     Maintenance Name  Alt. Name    Result       Error Code
  01C1505    ISDN-TRK           78/01       PASS

Command successfully completed
```

Field descriptions

Port	Port address (cabinet-carrier-slot-circuit)
Maintenance Name	Type of busied out maintenance object.
Alt. Name	Alternate way to identify maintenance objects. If the Object isThe field contains stationextension trunk*xxx/yyy* (where *xxx* = trunk group number and *yyy* = member number) private CO line*P/xxx* (where *xxx* = private CO line group number)
Result	Test result: Pass, Abort, Fail
Error Code	Numeric code explaining why the release failed or aborted. Refer to the detailed list of the codes by test number for each MO.

cancel hardware-group

This command temporarily or permanently aborts the execution of a **test hardware-group** command. To resume testing, enter **resume hardware-group or test hardware group**.

Action/Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
cancel hardware-group		Examples: **cancel hardware-group**	none	See next section

Feature Interactions

The following feature interactions are in effect:

- Scheduled and Periodic Maintenance

  When the **test hardware-group** command is entered, all activity related to scheduled background maintenance, periodic background maintenance, and data audits suspends for the duration of the **test hardware-group** command. All activity related to scheduled background maintenance, periodic background maintenance, and data audits restarts if the **test hardware-group** command is canceled.

- Status Hardware-group

  The **status hardware-group** command displays the state of a canceled **test hardware-group** command as `canceled`.

change circuit-packs

This command allows users to administer circuit packs that are inserted into the system port, expansion control, and switch node carriers. It is used to configure the system when circuit packs are not physically inserted.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
change circuit-packs	***cabinet number***	Cabinet number of the circuit packs Examples: **change circuit-packs 1** **change circuit-packs 2**	1 (one)	none

Output

The following example shows the output from the **change circuit-packs 1** command (SCC). All five pages are shown here.

```
change circuit-packs 1                          Page   1 of   5

                         CIRCUIT PACKS
    Cabinet: 1                                  Carrier: A
 Cabinet Layout: single-carrier              Carrier Type: processor
 Slot Code  Sfx  Name                          Slot Code  Sfx  Name
                                                 11:
  01:
  02: TN767  B   DS1 INTERFACE                   13:
  03:                                            14:
  04:                                            15:
  05:                                            16:
  06:
  07:
  08: TN556      BRI LINE
  09: TN754      DIGITAL LINE
  10: TN769      ANALOG LINE

  '#' indicates circuit pack conflict.
```

```
change circuit-packs 1                          Page   2 of   5

                CIRCUIT PACKS

    Cabinet: 1                                  Carrier: B
 Cabinet Layout: single-carrier              Carrier Type: port
 Slot Code  Sfx  Name                          Slot Code  Sfx  Name
  00:                                           11:
  01: TN754      DIGITAL LINE                   12:
  02: TN754      DIGITAL LINE                   13:
  03: TN754      DIGITAL LINE                   14:
  04: TN754      DIGITAL LINE                   15:
  05: TN754      DIGITAL LINE                   16:
  06: TN754      DIGITAL LINE                   17:
  07: TN754      DIGITAL LINE                   18:
  08: TN754      DIGITAL LINE                   19:
  09: TN754      DIGITAL LINE                   20:
  10: TN754      DIGITAL LINE

  '#' indicates circuit pack conflict.
```

```
change circuit-packs 1                          Page   3 of   5

                            CIRCUIT PACKS

    Cabinet: 1                                      Carrier: C
 Cabinet Layout: single-carrier                 Carrier Type: port
 Slot Code  Sfx  Name                            Slot Code  Sfx  Name
  00:                                             11: TN754     DIGITAL LINE
  01: TN748  C    TONE DETECTOR                   12: TN753     DID TRUNK
  02:                                             13: TN742     ANALOG LINE
  03:                                             14: TN760  C    TIE TRUNK
  04: TN771  C    MAINTENANCE/TEST                15: TN747  B    CO TRUNK
  05: TN748  B    TONE DETECTOR                   16: TN742     ANALOG LINE
  06: TN767       DS1 INTERFACE                   17: TN556     BRI LINE
  07: TN742       ANALOG LINE                     18: TN742     ANALOG LINE
  08: TN762  B    HYBRID LINE                     19:
  09: TN742       ANALOG LINE                     20: TN754     DIGITAL LINE
  10:

  '#' indicates circuit pack conflict.
```

```
change circuit-packs 1                          Page   4 of   5
                CIRCUIT PACKS
    Cabinet: 1                                 Carrier: D
 Cabinet Layout: single-carrier              Carrier Type: port
 Slot Code  Sfx  Name                          Slot Code  Sfx  Name
  00:                                           11:
  01:                                           12: TN722  B   DS1 TIE TRUNK
  02:                                           13: TN760  C   TIE TRUNK
  03:                                             14:
  04:                                           15: TN754    DIGITAL LINE
  05:                                           16:
  06:                                           17: TN742    ANALOG LINE
  07: TN747  B   CO TRUNK                       18:
  08: TN753      DID TRUNK                      19:
  09: TN742      ANALOG LINE                    20:
  10:
  '#' indicates circuit pack conflict.
```

```
 change circuit-packs 1                          Page   5 of   5

                CIRCUIT PACKS

    Cabinet: 1                                  Carrier: E
 Cabinet Layout: single-carrier               Carrier Type: port
 Slot Code  Sfx  Name                           Slot Code  Sfx  Name
                                                 11:
  01: TN570      EXPANSION INTF                  12:
  02: TN747  B   CO TRUNK                        13:
  03: TN747  B   CO TRUNK                        14:
  04: TN747  B   CO TRUNK                        15:
  05: TN747  B   CO TRUNK                        16:
  06: TN747  B   CO TRUNK                        17:
  07:                                            18:
  08:                                            19:
  09:                                            20:
  10:

  '#' indicates circuit pack conflict.
```

Field descriptions

Cabinet Administered cabinet number

Cabinet Layout Type of cabinet (single-carrier)

Carrier In-use cabinet carrier

Carrier Type Carrier function (port, processor, or expansion control)

Slot Slot numbers (0 - 21).

Code	Circuit pack code (TN number) to identify the circuit pack type
Sfx	Lists the suffix, if applicable
Name	Alphanumeric circuit pack name

change synchronization

The MCU requires synchronization between itself and the digital facilities it uses. The MCU must be synchronized to the incoming data rate of 8,000 frames per second. This timing information reference may be derived from DS1 or data interface facilities. Loss of the reference signal, excessive phase changes, and variation in timing frequency can cause loss of data or dropped data connections.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
change synchro nization		Examples: **change synchronization change synch**	none	DS1 interface, BRI trunk, or UDS1 board selected as either a primary or secondary synch source cannot be removed on the DS1 circuit pack administration form or the regular circuit pack administration form.

Output

Refer to the “Change Synchronization Plan Form” section in Chapter 2 of the MCU Administration document for details.

change system-parameters maintenance

This command specifies and displays scheduled maintenance operations and maintenance support functions. It also activates and deactivates INADS alarm origination during repairs. To deactivate alarm origination:

1. Make a note of the current entries in the Alarm Origination and CPE Alarm fields so you can restore them later.
2. Change the `Alarm Origination to OSS Numbers` field to “neither.”
3. Change the `CPE Alarm Activation Level` field to **none**.

4. If daily scheduled maintenance must remain idle during a maintenance procedure, set the `Start Time` field to a time after the session ends. If daily Scheduled Maintenance is running and needs to be deactivated, set the `Stop Time` field to one minute after the current time.
5. Press Enter and verify that the screen displays the message: `Command successfully completed`

NOTE:
For earlier releases of system software, disable Cleared Alarm Notification and Restart Notification before submitting the form.

NOTE:
When finished working on the switch be sure to return all fields to their original settings.

Action/Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
change system-parameters maintenance		Examples: **change system-parameters maintenance**	none	none

Output

Refer to the “Maintenance-Related System Parameters Form” section in Chapter 5 of this document for details.

clear errors

This command moves errors and resolved alarms to the cleared-error list, making room for new incoming error messages, but it does not clear active alarms from the alarm log. This command must be used with care to prevent overwriting cleared entries. When additional entries are needed to log new errors, the system overwrites cleared errors first. Use the **display errors** command to list the cleared errors.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
clear errors		Examples: **clear errors**	none	none

clear interface

This command reintializes counter values maintained by the Processor Interface (PI) circuit pack. The **status interface** command displays the counters. The PI circuit pack is a front end processor that implements the packet and link layers of the BX.25 protocol and the ISDN procedure-D protocol.

Action/Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
clear interface	***location***	Processor interface address (cabinet-carrier-position): 1 = first processor 2 = second processor Examples: **clear interface 01a1** **clear interface 01a2** **clear interface a2**	none	none

clear isdn-testcall

This command cancels any ISDN-PRI test calls in progress. Once a running test call is cleared, another can begin.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
clear isdn-testcall	***group number*** member number	Trunk group number Member within a trunk group Examples: **clear isdn-testcall 80/1** **clear isdn-testcall 78/2**	none	none

clear link

This command clears the hardware error counters associated with ports on the Processor Interface (PI) circuit pack (displayed with the **status link** command).

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
clear link	***link-id***	Link number (1-8) assigned through **communication-interface links** form. Examples: **clear link 1** **clear link 8**	none	none

clear mst

This command clears the trace buffer and is generally used before enabling a trace. If this command is executed while a trace is enabled, it clears unwanted data.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
clear mst		Examples: **clear mst**	none	none

clear pkt

This command helps resolve packet bus problems by sending a ‘clear stimuli’ message over the packet bus.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
clear pkt	***port network location***	Physical location of the packet bus (1 - 3) Examples: **clear pkt port-network 1**	none	none

clear port

This command removes maintenance marks from a port, freeing it for use.

Action/Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
clear port	***location***	Port location (**PCsspp**) Examples: **clear port 01c1102**	none	none

disable administered-connection

This command stops both scheduled and periodic testing and stops processing of in-line errors for all or selected administered connections.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
disable administered-connection	***ac number*** ***all***	Number of the administered connection Selects all administered connections Examples: **disable administered-connection all** **disable administered-connection 1** **disable administered-connection 128**	none	none

disable mst

This command stops the message trace facility. If the trace was not already disabled, the command inserts a GAP marker into the trace. The user should execute the **disable mst** command when the trace is complete. If left enabled, the trace continues to use CPU time until the time limit expires. Entering **disable mst** command has no effect on the system if the trace is already disabled. To view the results of the trace, enter the **list mst** command.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
disable mst		Example: **disable mat**	none	none

disable suspend-alm-orig

This command stops entries from the active Suspend Alarm Origination table and disables all board entries that match a specific physical board location.

NOTE:
This command does *not* disable port entries.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
disable suspend-alm-orig	***board location***	Physical location of the replaced or corrected board (does not support port location): **PCss** Examples: **disable suspend-alm-orig 1C03** **disable suspend-alm-orig 1E07**	none	none

disable synchronization-switch

This command stops the automatic clock switching capability of the maintenance subsystem. The clock refers to the oscillator on a tone/clock or DS1/DI interface. The synchronization subsystem (TDM bus clock, DS1/DI trunk board, and maintenance and administration software) provides error-free digital communication between the switch and other PBXs, COs, or customer equipment.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
disable synchronization-switch			none	none

disable test-number

This command prohibits selected maintenance tests from running. To run a disabled test number, enter the **enable test-number** command.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
disable test-number	***number***	Maintenance test number	none	none
	print	Report sent to printer		
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.*		
		Examples: **disable test-number 710** **disable test-number 710 print** **disable test-number 510 schedule**		

* Refer to the Report Scheduler and System Printer feature specification for more details.

display alarms

This command creates an Alarm Report. The user completes an option screen to select the parameters for the report.

The system creates the reports from the logs of the maintenance subsystem. The subsystem monitors the system hardware and logs problems as errors or alarms. The type of alarm indicates the impact of the problem, defined as follows:

Warning alarm—A minor interference which does not noticeably impair service.

Minor alarm—A problem which could disable a local area of the system and noticeably impair service.

Major alarm—A problem which widely degrades the system and seriously impairs service. The system automatically calls INADS to report major alarms.

Resolved alarm—A problem which has been corrected, and the system is correctly functioning. The system stamps resolved alarms with the date and time the problem was corrected. The system handles any errors associated with the alarms as "resolved."

System Reboots and the Alarm Logs

The system saves the alarm and error logs to the *active* SPE memory card if any of the following events occur:

- The **save translation** command is executed
- Translations are saved as part of scheduled maintenance
- A reboot
- The PPN is about to lose all power after having been on battery backup

The attempt to save the alarm and error logs may be unsuccessful if the MSS is not available.

Whenever the system reboots, the logs are restored from the SPE disk that becomes active with the reboot. Since the logs are saved to the disk on the SPE that was active *before* the reboot, the versions restored at reboot time may not be current. This condition occurs if:

- The attempt to save at reboot did not succeed.
- The SPE disk that is rebooted is not the same disk to which the logs were last saved.

In such a case, the logs do not contain the most recent errors and alarms. To determine if the restored logs are complete, look for indications that would have preceded the reboot.

System resets, that are less severe than a reboot, rarely affect the error and alarm logs.

NOTE:
If the error and alarm logs contain SYSTEM errors, then use the **display initcauses** command to search for information that the system could *not* log during reset operation.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
display alarms	***print***	Report sent to printer	all alarms displayed	See next section
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.*		
		Examples: **display alarms** **display alarms print** **display alarms schedule**		

* Refer to the Report Scheduler and System Printer feature specification for more details.

Feature Interactions

If the user disables the alarm origination with the **change system parameters-maintenance** command, then the `Ack?` (Acknowledged) field on the Alarm Report is blank regardless of the true acknowledged state of the alarm.

Options screen

When you enter the **display alarms** command, the system first displays the options screen. Select the options you want to view on the report. The following figure is an example of the options screen for Alarm Reports.

```
display alarms                                              Page 1 of 1
                                ALARM REPORTS

        The following options control which alarms will be displayed.
        ALARM TYPES
                    Active? y_      Resolved? n_
                     Major? y_         Minor? y_      Warning? y_
        REPORT PERIOD
                  Interval: m_    From: __/__/__:__   To: __/__/__:__
        EQUIPMENT TYPE ( Choose only one, if any, of the following )
                                Cabinet: ____
                            Port Network: __
                            Board Number: _______
                                    Port: ________
                                Category: ________
                               Extension: _____
                     Trunk ( group/member ): ___/___
```

The fields on the options screen are described in the following table:

ALARM TYPES	Enter **y** (yes) or **n** (no) in any of the 5 alarm type fields
Interval	Enter **one** of the codes below: **m** = last month **h** = last hour **d** = last day ***w*** = last week **a** = all (default)
From	Month/day/year (example: 01/01/97); if the From date is blank, the report contains all the active alarms for the month *prior* to the current date.
To	Month/day/year (example: 01/15/97); if the To date is not entered, the report contains all the active alarms starting with the From date to the current date.
Cabinet	Administered cabinet number (1-3)
Port Network	1-3
Board Number:	Board address (**PCSS**); example: 01A20
Port	Port address (**PCSSpp**); example: 01A2031
Category	Object code for the equipment category. Press HELP in this field to view a list of the object codes.
Extension	Extension number (per dial-plan)
Trunk	Enter a group number or a group and member number: Enter *only* the **group** number (01-99) to display *all* members in the group. Example: 01/__ Enter *both* the **group** number (01-99) and **member** number (01-99) to display a *specific* member in a group. Example: 01/99

Output

After you complete the options screen, the system displays a 1- or 2-page Alarm Report. To toggle between the pages and to exit the report, use the keys described in the following list:

- For 513 and 715 terminals, use **F8** for NEXT PAGE and PREV PAGE commands
- For all other terminals, use **F7** for NEXT PAGE and PREV PAGE commands
- Use **Esc** for the CANCEL command

The following figure is an example of an Alarm Report.

```
display alarms

                                ALARM REPORT

Port     Maintenance  On      Alt    Alarm    Svc    Ack?  Date         Date
         Name         Brd?    Name   Type     State  1 2   Alarmed      Resolved

02A      TONE-BD      y              MAJOR           y n   05/22/20:34 00/00/00:00
01C07    ANL-BD       y              MINOR           n n   05/22/20:26 00/00/00:00
01C0702  ANL-LINE     n       311    WARNING  IN           05/22/20:26 00/00/00:00
01C0701  ANL-LINE     n       1051   WARNING  IN           05/22/20:26 00/00/00:00
01C0703  ANL-LINE     n       1053   WARNING  IN           05/22/20:26 00/00/00:00
01C1505  CO-TRK       n       78/01  WARNING  OUT          05/22/20:26 00/00/00:00
01C1505  CO-TRK       n       78/01  WARNING  OUT          05/22/20:26 00/00/00:00
02A0201  TONE-PT      n              WARNING              05/22/20:34 00/00/00:00
02A      TDM-CLK      n              WARNING              05/23/13:43 00/00/00:00
PN 02B   TDM-BUS      n              WARNING              05/23/14:53 00/00/00:00




Command successfully completed
```

Field descriptions

Port

Lists the location codes for the alarmed object, as follows:

- Circuit packs locations display as: cabinet-carrier-[slot]-[circuit]. Example: **01C0702**.
- Port network locations display as: port network number-bus. Example: **PN 02B**. PN 02 = Port Network (PN) number and A or B = bus.
- Fiber link locations display as: fiber link number-PNC side. Example: **x A-PNC**. “X” = fiber link number and “A” = PNC side [A or B].

Maintenance Name

Lists the logical name of the maintenance object with the alarm.

On Brd	A **y** (yes) indicates the fault was found on the associated circuit pack. An **n** (no) indicates the fault is **not** connected to the circuit pack.
Alt Name	Identifies the location of maintenance object, as follows: ■ Station = extension number ■ Trunk = Group number (78/__) or group and member numbers (78/01) ■ Private CO Line = private CO line (P) and group number. (P/xxx)
Alarm Type	Alarm level: MAJOR, MINOR, or WARNING
Service State	Identifies the service state of the station and trunk ports, as follows: ■ RDY = ready for service ■ OUT = out of service ■ IN = in service ■ [Blank] = No associated service state
Ack?	Headings 1 and 2 identify the first and second OSS telephone numbers, respectively. The entries below indicate the acknowledged alarm state: ■ **Y** (yes) = alarm has been acknowledged ■ **N** (no) = alarm has **not** been acknowledged ■ **C** (cleared) = alarm was first acknowledged, then resolved and cleared [Blank] = no attempt was made to report the alarm **NOTE:** If the user disables the alarm origination with the **change system-parameters maintenance** command, then the Ack? field is blank regardless of the true acknowledged state of the alarm.
Date Alarmed	Indicates the month, day, hour, and minute of the alarm.
Date Resolved	Indicates the month, day, hour, and minute of the resolution. For active alarms, this field contains zeros (0).

display cabinet

This command displays the cabinet description and location and the carrier description for a selected cabinet number.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
display cabinet	***print***	Report sent to printer	none	none
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.*		
		Examples: **display cabinet 1**		

* Refer to the Report Scheduler and System Printer feature specification for more details.

Output

The example below shows the output for the **display cabinet 1**.

```
display cabinet 1
                              CABINET

 CABINET Description
                 Cabinet: 1
           Cabinet Layout: five-carrier
             Cabinet Type: processor
   Number of Portnetworks: 1
                     Room: 30n46
                    Floor: first
                 Building: main

 CARRIER Description
   Carrier       Carrier Type        Number

      C        port                 PN  01
      B        not-used             PN  01
      A        processor            PN  01
      X        Fan
      D        not-used             PN  01
      E        switch-node          SN  01


Command Successfully Completed
```

Field descriptions

Cabinet	Administered cabinet number
Cabinet Layout	Type of cabinet (five-carrier or single-carrier-stack)
Cabinet Type	Type of port network (processor or expansion)
Number of Port networks	Number of port networks (1 or 2)
Room	Room where cabinet is located, if administered on the cabinet form.
Floor	Floor where cabinet is located, if administered on the cabinet form.
Building	Building where cabinet is located, if administered on the cabinet form.
Carrier	Letter identifying the carrier (A-E or X not applicable)
Carrier Type	Port, processor, switch-node, fan, or not-used
Number	Administered port network number *or* switch node number

When you enter the command **display cabinet 3** and the cabinet is a stack of single-carrier-cabinets, the system displays a screen similar to the figure below. The fields on the screen are the same as described in the previous table.

```
display cabinet 3
                              CABINET

 CABINET Description
                  Cabinet: 3
           Cabinet Layout: single-carrier-stack
             Cabinet Type: expansion-portnetwork
   Number of Portnetworks: 1
                     Room: 30n46
                    Floor: first
                 Building: main

 CARRIER Description
   Carrier       Carrier Type        Number

      D        not-used              PN  03
      D        not-used              PN  03
      B        port                  PN  03
      A        expansion-control     PN  03
```

display disabled-tests

The **display disabled-tests** command lists the numbers for all maintenance tests that have been disabled by INADS. These tests are not available for background or demand testing.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
display disabled-tests	***print***	Report sent to printer	none	none
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.*		

* Refer to the Report Scheduler and System Printer feature specification for more details.

Output

The following example shows the output from the **display disabled-tests** command.

```
display disabled-tests                                    SPE A

                        DISABLED TEST INFORMATION

         Test Number

         710

Command successfully completed
```

display errors

This command creates an Alarm Report from a user-option screen to select the report parameters. The system creates the reports from the logs of the maintenance subsystem, which monitors the system hardware and logs problems as errors or alarms.

Errors can result from in-line firmware errors, periodic tests, failures detected while executing a test command, software inconsistency, or a data audit discrepancy.

System Reboots and the Error Logs

The system saves the alarm and error logs to the *active* SPE memory card if any of the following events occur:

- The **save translation** command is executed.
- Translations are saved as part of scheduled maintenance.
- A reboot
- The PPN is about to lose all power after having been on battery backup.

The attempt to save the alarm and error logs may be unsuccessful if the MSS is not available.

Whenever the system reboots, the logs are restored from the SPE disk that becomes active with the reboot. Since the logs are saved to the disk on the SPE that was active *before* the reboot, the versions restored at reboot time may not be current. This condition occurs if:

- The attempt to save at reboot did not succeed.
- The SPE disk that is rebooted is not the same disk to which the logs were last saved.

In such a case, the logs do not contain the most recent errors and alarms. To determine if the restored logs are complete, look for indications that would have preceded the reboot.

System resets, less severe than a reboot, rarely affect the error and alarm logs.

NOTE:
If the error and alarm logs contain SYSTEM errors, then use the **display initcauses** command to search for information that system could *not* log during reset operation.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
display errors	***high resolution***	Highlights the time stamps on the Error Report for the first and last occurrences of the error.	all errors displayed	none
	print	Report sent to printer		
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.*		
		Examples: **display errors** **display errors print** **display errors schedule** **display errors high-resolution print**		

* Refer to the Report Scheduler and System Printer feature specification for more details.

Input form

When you enter the **display errors** command, the system first displays the options screen. Select the options you want to view on the report. The following figure is an example of the options screen for an Error Report.

```
display errors                                                Page   1 of   1
                              ERROR REPORT
     The following options control which errors will be displayed.
         ERROR TYPES
            Error Type: _____          Error List: active-alarms
         REPORT PERIOD
            Interval: _       From: __/__/__:__ To: __/__/__:__
         EQUIPMENT TYPE ( Choose only one, if any, of the following )
                               Cabinet: __
                          Port Network: __
                          Board Number: ____
                                  Port: ______
                              Category: ________
                             Extension: _____
                  Trunk ( group/member ): ___/___
```

Field descriptions

Error Type	Enter a specific error type; press HELP in this field to view a list of codes. If the field is blank, the system displays all errors.
Error List	Enter one: active-alarms (default) errors cleared-errors The title for the Hardware Error Report includes the name of the selected error list.
Interval	Enter one: m = last month h = last hour d = last day (default) w = last week a = all
From	Enter 2-digit numbers for the month/day/year (Example: 01/01/97). The default is the earliest time of the existing error records in the log.
To	Enter 2-digit numbers for the month/day/year (Example: 01/01/97). The default is the current date.
Cabinet	Enter 1, 2, or 3 (the administered number)
Port Network	Enter 1, 2 or 3
Board Number:	Enter the **PCSS** location. Example: 01A20
Port	Enter the **PCSSpp** location. Example: 01A2031
Category	Enter the object code for the equipment category. Press HELP in this field to view a list of the object codes
Extension	Enter the extension number.

Trunk

Enter a group number or a group and member number:

Enter *only* the **group** number (01-99) to display *all* members in the group. Example: 01/__

Enter *both* the **group** number (01-99) and **member** number (01-99) to display a *specific* member in a group. Example: 01/99.

Form output

After completing the options screen, the system displays a 1- or 2-page Hardware Error Report. To toggle between the pages and to exit the report, use the keys described in the following list:

- For 513 and 715 terminals, use **F8** for NEXT PAGE and PREV PAGE commands
- For all other terminals, use **F7** for NEXT PAGE and PREV PAGE commands
- Use **Esc** for the CANCEL command to exit the report.

The following figure is an example of an Hardware Error Report -- Active Alarms, **without** the high-resolution qualifier in the command line.

```
display errors                                                Page  1   SPE A

                    HARDWARE ERROR REPORT - ACTIVE ALARMS

Port      Mtce      Alt      Err   Aux     First        Last       Err Err Rt/ Al Ac
          Name      Name     Type  Data    Occur        Occur      Cnt Rt  Hr  St
01C0702   ANL-LINE 311      257         01/31/09:20 01/31/20:26 255 256 255 a  y
01C0701   ANL-LINE 1051     257         01/31/20:26 01/31/20:26 4   0   4   a  y
01C0703   ANL-LINE 1053     257         01/31/20:26 01/31/20:26 4   0   4   a  y
01A       TDM-CLK           0     0     01/31/20:34 01/31/20:34 1   0   1   a  n
01C1505   CO-TRK   078/001 3329  57408 01/31/20:26 01/31/20:27 5   300 5   a  y
01C1505   CO-TRK   078/001 1537        01/31/20:26 01/31/20:28 5   150 5   a  y
02A0201   TONE-PT           0           01/31/20:34 01/31/20:34 1   0   1   a  y
PN 02B    TDM-BUS           18    0     01/31/14:53 01/31/21:12 1   0   1   a  n

Command successfully completed
```

Field descriptions

Port	Lists the location codes for the alarmed object, as follows: Circuit packs locations display as: cabinet-carrier-[slot]-[circuit]. Example: 01C702. Port network locations display as: port network number-bus. Example: **PN 02B**. PN 02 = Port Network (PN) number and A or B = bus.
Maintenance Name	The name of the maintenance object.
Alt Name	Identifies the location of maintenance object, as follows: Station = extension number Trunk = Group number (78/__) or group and member numbers (78/01) Private CO Line = private CO line (P) and group number (P/xxx)
Error Type	Error number for the type of problem encountered. The technician must use this error number in conjunction with the logical name information to determine the exact nature of the error.
Aux Data	Additional information concerning the error condition. Like the error type, this data is specific to the maintenance object type. However, unlike the error code, only the most recent value of the auxiliary data is retained for each error record.
First Occur	Displays the month, day, hour, and minute (and second if the high-resolution command line option is used) that the error was first recorded.
Seq Cnt	Sequence Count - This number indicates the order of errors logged within a second for the time stamps associated with the first occurrence and last occurrence of an error. This information is displayed only if the **high-resolution** command line option is entered. There may be gaps for the sequence numbers within a given second, since the last occurrence of an error may replace an existing entry that had been assigned the missing sequence number. Gaps may also appear in the numbers since sequence counts are also used with software event information not shown in the hardware error log.
Last Occur	Displays the month, day, hour, and minute (and second if the high-resolution command line option is used) of the most recent error. Note: if the system is unable to retrieve the time of day when the error occurred, a ‘dummy’ date is stamped in the log and appears as: **00/00/01:07**.
Err Cnt	Error Count - The total number of times that the error type has occurred for this maintenance object. If the number of errors exceeds 3 digits, the system enters the number **256**, which indicates that a larger number of errors occurred, but could not be displayed correctly.
Err Rt	Error Rate - The average rate at which the errors have occurred from the first occurrence to the present. If the number of errors exceeds 3 digits, the system enters the number **256**, which indicates that a larger number of errors occurred, but could not be displayed correctly.

Rt/Hr	Rate per Hour - An approximation of the rate that this error occurred in the last hour.If the number of errors exceeds 3 digits, the system enters the number **256**, which indicates that a larger number of errors occurred, but could not be displayed correctly.
Al St	Alarm Status - A character indicating the status of this MO in the error and alarm logs. The allowed values are: a = Active r = Resolved c = Resolved as a result of the long “clear” option s = Resolved; software-requested system restart t = Resolved; technician-requested system restart n = Not alarmed
Ac	Active? - A **y** (yes) entry indicates the maintenance object is still active. A **n** (no) entry indicates the object is no longer a problem.

The figure below is an example of an Hardware Error Report -- Active Alarms, using the high-resolution qualifier.

When you enter the command **display errors high-resolution**, the system adds the Seq Cnt (sequence count) column. The number in the column indicates the order of errors logged within a second for the time stamps associated with the first occurrence and the last occurrence of an error. Refer to the previous field description for more details.

```
display errors high-resolution                                  Page  1   SPE A

             HIGH RESOLUTION HARDWARE ERROR REPORT - ACTIVE ALARMS

Port     Mtce     Alt     Err   Aux         First    Seq       Last     Seq Err Al
         Name     Name    Type  Data        Occur    Cnt       Occur    Cnt Cnt St
01C0702  ANL-LINE 311     257         01/31/09:20:21 1  01/31/20:26:05 1  255 a
01C0701  ANL-LINE 1051    257          01/31/20:26:18 1  01/31/20:26:18 7  4   a
01C0703  ANL-LINE 1053    257          01/31/20:26:18 2  01/31/20:26:18 8  4   a
01A      TDM-CLK          0     0      01/31/20:34:35 1  01/31/20:34:35 1  1   a
01C1505  CO-TRK   078/001 3329  57408 01/31/20:26:07 1  01/31/20:27:28 1  5   a
01C1505  CO-TRK   078/001 1537         01/31/20:26:52 1  01/31/20:28:41 1  5   a
02A0201  TONE-PT          0           01/31/20:34:28 1  01/31/20:34:28 1  1   a
PN 02B   TDM-BUS          18    0      01/31/14:53:03 1  01/31/21:12:22 1  1   a

Command successfully completed
```

display initcauses

The **display initcauses** command displays a history of recovery steps taken by the system. *This command displays information for restarts of the active processor only*. Each time the system performs some type of recovery (user request or a hardware or software problem), the recovery information is stored. The software error log also contains information pertaining to restarts. Information in the software error log should be used in conjunction with information in the

initcauses log. The history of the last 16 restarts performed by the system is recorded to the initcauses buffer in chronological order. This buffer fills an entire screen with information if it is completely full. Power failures in the processor complex wipe out the entire initcauses buffer.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
display initcauses	***print***	Report sent to printer	none	none
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.*		
		Examples: **display initcauses** **display initcauses print** **display initcauses schedule**		

* Refer to the Report Scheduler and System Printer feature specification for more details.

Output

The following example shows the output from the **display initcauses** command.

```
display initcauses

                              INITIALIZATION CAUSES

     Cause                  Action    Escalated     Carrier      Time
 Initialized                   4         no            1B        08/01  1:14
 System Technician Request     i         no            1A        08/01  2:14
 System Technician Request     i         no            1B        08/01  2:18
 Sanity Timer Reset            1         no            1B        08/02  6:03
 Sanity Timer Reset            1         no            1B        08/02  6:08
 Sanity Timer Reset            2         yes           1B        08/02  6:14
 Scheduled Interchange         i         no            1A        08/03  2:33
 Bad Handshake                 1         no            1B        08/04  2:34
 Software Request              2         no            1B        08/05  8:22
 System Technician Request     1         no            1B        08/05  8:23
 System Technician Request     4         no            1A        08/05  9:15
 Upgrade Software              2         no            1A        08/05  9:29
 Software Request              i         no            1B        08/06  7:00
 System Technician Request     2         no            1B        08/06  7:09
 Software Request              1         no            1A        08/09  2:34
 No Handshake                  1         no            1A        08/09  2:36


 Command successfully completed
```

Field descriptions

Cause

Reason for the restart:

- **Bad Memory:** A defective memory circuit pack generating too many errors caused a restart.
- **System Technician Request:** The restart was performed because of system technician demand. A system technician-requested **reset system 4** command entry should always precede an **upgrade software** command entry.
- **Initialized:** This is always the first entry in the history and is present until more than 15 restarts have been performed. It indicates power-up.
- **LMM Request:** A sanity time-out was requested by the LMM firmware. The three processor circuit pack LEDs blink until the sanity timer goes off. The LMM requests a restart like this when it gets into trouble, usually with memory.
- **Maintenance Reset:** The Maintenance/Test Processor resets the system. This refers to resets of the SPE by maintenance in SPE Down mode in which maintenance periodically tries to awaken the SPE.
- **Oryx Request:** A sanity time-out was requested by the Oryx operating system. The three processor circuit pack LEDs blink until the sanity timer goes off. Oryx requests a restart like this when it gets into trouble, usually with software.
- **Sanity Timer Reset:** The sanity timer on the processor timed out and reset the system. This event usually indicates a software fault.
- **Software Request:** Software requested the system restart.

- **Unknown:** A restart that could not be classified. The Software Error Log may contain more information about the restart.
- **LMM Put Fail:** This initcause occurs when the LMM has failed to place the request for initcause message in the DPR. This could occur if the MTP does not respond to the DPR handshake. Level of Restart: Warm (escalation turned on).
- **LMM Get Fail:** This initcause occurs when the LMM does not receive a response to the request for initcause message from the MTP. This could occur if the MTP is not taking messages out of the DPR. Level of Restart: Warm (escalation turned on).
- **MTP Reset Unknown:** This initcause occurs when the LMM has reset the MTP during the process of trying to get initcause from the MTP. Level of Restart: Warm (escalation turned on).
- **S-vintage Mismatch:** This initcause occurs when a mismatch in the duplication super vintage is detected by the LMM. Level of Restart: Reboot (no escalation).
- **Monitor Reset:** (For Development Environment Only) This initcause occurs when “ini 1" is executed from the Flash Monitor. This initcause can occur only in systems with SBB. Level of Restart: Reboot (no escalation).
- **Bad GDT:** (For Development Environment Only) This initcause occurs when the LMM fails to transfer control to Oryx/Pecos because of absence of entry in GDT to point at O/P. This usually occurs in a system with no data. Again, this should only occur in systems with SBB.

Action The level of recovery performed by the system. The recovery levels are:

Reset system 1 (Warm)
Reset system 2 (Cold-2)
Reset system 3 (Cold-1)
Reset system 4 (Reboot)
Reset system 5 (Extended Reboot)

Escalated Whether the restart was escalated to a higher level to clear the problem. There is a software escalation strategy that can cause a higher level of restart than the one previously performed to be executed if the need arises.

Carrier The “carrier” statement indicates the carrier on which the recovery was performed (possible values are **1A** and **1B**). In most cases, this “carrier” is the Active SPE carrier when the restart occurs.

Time The date (month and day) and time of the restart.

display memory-configuration

This command indicates the total memory available for the active processor(s). This command is a single page display.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
display memory-configuration	***print***	Report sent to printer	none	none
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.*		
		Examples: **display memory-configuration** **display memory-configuration print**		

* Refer to the Report Scheduler and System Printer feature specification for more details.

Output

The following output example is for the **display memory** command.

```
display memory-configuration                                          SP_A
                      PROCESSOR MEMORY-CONFIGURATION
                                 (M bytes)



                                SPE_A   SPE_B

               Flash ROM:        16

              Total DRAM:        12

                  SIMM A:         4
                  SIMM B:         4
                  SIMM C:         4









Command successfully completed

Command:
```

display port

This command displays the port location, the equipment connected to the port, and the means by which the port can be identified (for example, an extension number, the trunk group and member, and so on).

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
display port	***location***	Port address (**PCSSpp**)	none	none
	print	Report sent to printer		
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.*		
		Examples: **display port 1c0801** **display port 1c0802 print** **display port 2c1504 schedule**		

* Refer to the Report Scheduler and System Printer feature specification for more details.

Output

The following example shows the output for the **display port 1c0801** command.

```
display port 1c0801                              SPE A

                      PORT INFORMATION

                         Port: 01C0801
                Equipment Type: Station
                Identification: 1021
```

Field descriptions

Port: Port address (cabinet-carrier-slot-circuit)

Equipment Type: Hardware that is physically connected to the specified port.

Identification:

Depends on the hardware that is physically connected to the port:

If hardware is	The field contains
station	station extension
trunk	trunk group and member number)
modem pool	modem pool group number

display synchronization

This command calls up the synchronization form where the administered synchronization stratum and reference sources are displayed. (No changes can be made to the system synchronization with this command.)

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
display synchron - ization	print	Report sent to printer	none	See next section
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.*		
		Examples: **display synchronization** **display synchronization print** **display synchronization schedule**		

* Refer to the Report Scheduler and System Printer feature specification for more details.

Feature Interactions

A DS1 interface or a UDS1 board that has been selected as either a primary or secondary synchronization source cannot be removed on the DS1 circuit pack administration form or the regular circuit pack administration form.

Output

The following example shows the output for the **display synchronization** command.

Field descriptions

```
display synchronization                        Page  1 of  2

       SYNCHRONIZATION SOURCE (DS1 circuit pack location)

           Stratum: 4
           Primary:      Secondary:

                        DS1 CIRCUIT PACKS

 Location    Name     Slip        Location    Name     Slip
 02B10 D92D1 ds1 2b10   n
 02B11 d92D1 ds1 2b11   n
 01C10 D92D1 ds1 1c10   n
 01C11 D92D1 ds1 1c11   n

 NOTE: TN722B DS1 sources result in stratum 4, type II synchronization
```

Stratum: Synchronization stratum that is used (3 or 4)

Primary: First choice system synchronization source (blank = no synchronization); valid only if stratum 4 synchronization specified

Secondary: Second choice system synchronization source (blank = no synchronization); valid only if stratum 4 synchronization specified

Location: Circuit pack location (cabinet-carrier-slot) of all administered DS1 circuit packs are listed here.

Name: User-defined name administered for the DS1 circuit pack. Blank means no user-defined name administered.

Slip: If the DS1 circuit pack has slip alarm, field shows `y`; otherwise it shows `n`.

Port Network: Only valid for stratum 3 synchronization; specifies the port network supplying synchronization through the tone clock circuit pack.

display system-parameters maintenance

This command displays the translation data for maintenance-related system parameters.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
display system parameters maintenance	***print***	Report sent to printer	none	none
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.*		
		Examples: **display system-parameters maintenance** **display system-parameters maintenance print** **display system-parameters maintenance schedule**		

* Refer to the Report Scheduler and System Printer feature specification for more details.

Output

Refer to the “Maintenance-Related System Parameters Form” section in Chapter 5 of this document for details.

display time

The **display time** command brings up the time form. The system time displays on this form. This command does not allow for any changes to be made to the system time.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
display time	***print***	Report sent to printer	none	Date and time are generally used by the switch.
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.*		
		Examples: **display time** **display time print** **display time schedule**		

* Refer to the Report Scheduler and System Printer feature specification for more details.

Output

The following example shows the output for the **display time** command.

```
display time

                    DATE AND TIME

    DATE
       Day of the Week:  Sunday       Month: January
       Day of the Month: 1            Year:  1990

    TIME
                  Hour: 6          Second: 20
                Minute: 8
```

Field descriptions

Day of the Week The day of the week that the system has stored.

Day of the Month The numerical day of the month.

Month The month of the year stored by the system.

Year	The current year stored by the system.
Hour	The hour of the current day.
Minute	The number of minutes into the hour.
Second	The number of seconds into the minute stored by the system.

download update-file

The update file is transferred to the switch asynchronously from either an INADS host or a personal computer (PC) using the XMODEM protocol.

Remote download

Remote users can dial into the switch by either using the “call” command (from an INADS host) or by dialing the switch directly with a modem. Once the connection has been established, the user logs into the switch as a remote system access terminal (SAT) using the inads login.

NOTE:
Only the INADS and INIT logins have the necessary permission to send an update file to the switch.

1. Type the **download update-file** command and press ENTER. `Please wait...` displays on the screen.

   After completing some initialization, `Please start file transmission now...` displays.

2. Start an XMODEM session on the remote end and send the update file.

   a. INADS host: enter **~dload <*file_name*>** to start the file transmission.

   b. PC: follow the instructions in the emulator’s manual for invoking an XMODEM session to send the update file.

Each block is written to flash card as it is received by the switch. The link level of XMODEM provide error detection and retransmission. Additional protection is provided within the application level. After the entire file has been written to flash card, it is read back and each update file block is validated, and the file checksum is also checked. If the file appears to be sound, the status word in the header block is changed to indicate that it is a valid update file.

There may be a delay between the end of the file transmission and command completion. This delay is caused by the patch application of any immediate sub-patches.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
download update-file			none	See next section

Feature Interactions

- The form displayed for the **list configuration software-vintage** command has been modified to reflect the changes imposed by the flash architecture. The **list configuration software** command allows INADS to determine with one query the hardware configuration, software vintage, and patch identifier.
- There is no interaction with routine periodic or scheduled maintenance, because patches are applied only on restarts before the system is in normal operation.
- The flash checksum test acts as a backup check to ensure that the entire field update file was applied correctly. It can fail because of a bad checksum update from a poorly constructed update file or because the patching operation has aborted. When the flash Checksum Test fails, a MAJOR on-board alarm is raised on the processor/memory circuit pack.
- When checking the software, the test compares the memory resident software version and patch identifier. It also checks for the presence of a field update file and, if found, compares the old and new patch identifiers to make sure the same patch file id loaded on each processor. If the software or update files are inconsistent, the **list configuration software** command can be used to display the status of the patch file.

Recovery procedures

In the event of a failure encountered during the download and application of the update file, follow the recommended recovery procedures.

Error on the download transmission

If the error displayed on the terminal indicates that the download step in the process failed, there are several culprits:

- The transmission line could have been noisy. Retry after making all the following checks. Failed attempts take up room in the hard patch file and may require a warm start to clear the file.
- The vintage of the update file may not match the vintage of software currently running in the system. Check the customer's vintage using **list configuration software** and patch vintage provided in the documentation.
- The switch may have had difficulty in writing to the hard patch file. Check the hardware error log for processor/memory board failures.

- The hard patch file may be full. Issue a **reset system 1**. This should cause valid files to be applied and invalid ones to be erased.

Error on Application of the Patch

A patch may not have been applied for the following reasons:

1. The memory card is write-protected. Remove this protection and issue a **reset system x** command.
2. The patch identifiers are inconsistent. Run **list configuration software** and compare the old patch identifier with the values in the update file.
3. The LMM encountered a problem with the patch file. This is unlikely because the same checks (and more) were performed when the file was downloaded, prior to marking the file valid. This implies that the memory that stored the update file was corrupted.
    a. Apply the back out file immediately to back out the changes.
    b. Run the flash checksum test to make sure the system is back to its prepatch state.
    c. Check the validity of the file again.
    d. Try re-downloading and applying the patch immediately.
4. The LMM reports a hard error. Symptoms of this are an entry in the hardware error log for the processor/memory board (if you're lucky), or extremely odd switch behavior followed by SPE down mode (if you're not). The problem is that the LMM cannot complete the programming of memory with the result that memory is in a corrupted state. The only recovery is to get or order new software and processor/ memory circuit packs.

Good application - bad patch

This error is not caused by a failure in the download or application, but by a fault in the patch file itself. To recover from this type of problem, the backout file that backs out the patch should be downloaded and applied. This requires that the system be sane enough to receive the file correctly and be able to apply it.

enable administered-connection

This command restarts scheduled and periodic maintenance for a single or all administered connections and can be used to track the maintenance processing of administered connections without interference from other maintenance processing. This command also restarts the processing of in-line errors for all or the selected administered connection.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
enable administered-connection	***ac number***	The number of the administered connection	none	none
	all	All administered connections are enabled.		
		Examples: **enable administered-connection 128** **enable administered-connection all**		

enable mst

Enables the message trace that is controlled according to the parameters created with the **change mst** command. If executed while the trace is enabled, the command has no effect and returns a screen message indicating that the command was successful.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
enable mst			none	none

enable suspend-alm-orig

This command enables Suspend Alarm Origination for a board (including all ports and endpoints on the board) or for a port (including all endpoints on the port) for both on- and off-board alarms or for off-board alarms only. Many control circuit packs do not have a board location, so this command cannot support all circuit packs. Each **enable** command becomes a new entry or replaces an existing entry in the Suspend Alarm Origination table. A new entry that matches both the physical location and off-only, on-, and off-board specifications of an active entry replaces the active entry in the Suspend Alarm Origination table.

This command may be particularly useful for:

- Improved control over customer requests. For example, to suspend off-board DS1 alarms temporarily for customers who periodically disconnect DS1 trunks for testing or other business-related purposes.
- Improved control over external (non-Avaya) problems such as suspending off-board DS1 alarms before a customer resolves facility problems (for example, a T1 trunk that has developed an off-board condition).

- Improved control over internal (Avaya) problems that cannot be resolved immediately. For example, the command can be used to suspend Alarm Origination for a bad circuit pack detected late Friday night when dispatch personnel cannot respond until Monday.

NOTE:
Also see other Suspend Alarm Origination related commands, including **disable suspend-alm-orig** and **list suspend-alm-orig**.

Action/ Object	Qualifiers	Qualifier Description	Defaults	Feature Interactions
enable suspend - alm-orig	**board/port location** ***off-board-only*** ***expires-in-hrs***	Physical location of the hardware optional; if not specified, both on-and off-board alarms suspended No. of hours (1-72) Examples: **enable suspend-alm-orig 1B03 expires-in-hrs 3** **enable suspend-alm-orig 1B0701 expires-in-hrs 72** **enable suspend-alm-orig 1B07 off-board-only expires-in-hrs 24**	Both on- and off-board alarms if the **off-board-only** keyword is not specified	none

enable synchronization-switch

This command re-enables automatic clock switching or returns the maintenance subsystem back to the normal state. The synchronization subsystem consists of the TDM bus clock, DS1 trunk board, and SPE-resident maintenance and administration software and provides error-free digital communication between the switch and other PBXs, COs, or customer-premise equipment (CPE).

Action/Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
enable synchronization-switch			none	none

enable test-number

This command enables a previously disabled test number. At the next request by maintenance or the technician, this test number runs.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
enable test-number	***number***	The test number to re-enable Example: **enable test-number 102**	none	The **display disabled-tests** command gives a list of all disabled tests.

format card-mem

This command erases and formats the active processor Flash Read-Only Memory card before writing translation, announcements, coredump, and firmware data.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
format card-mem		Erases and formats the memory card for:	none	none
	translation	translations only
	announcements	translations and announcements
	coredump	translations, announcement, and coredump
	firmware	translations, announcements coredump, and firmware

Output

The server shows the active SPE and returns `Command completed successfully` if completed.

list configuration

Hardware configuration reports list, for each circuit pack in the group specified, the type, code, suffix, and vintage of the requested circuit packs as installed in the switch, and all ports assigned to the circuit pack.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Inter-actions
list configuration	***hardware-group***	Enter a group listed in the Hardware Groups section below.	none	none
	print	Report sent to printer.		
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.		
		Examples: **list configuration carrier 2c schedule** **list configuration port-network 5** **list configuration stations print**		

NOTE:
The **list configuration software-version** command is discussed separately under its own heading.

Hardware Groups

Enter one of the following hardware groups:

`carriers all`	Displays all circuit packs administered and/or physically inserted in the port, switch node, and control carriers on the system.
`board PCSS`	Displays all assigned ports on the circuit pack specified by cabinet, carrier, and slot.
`carrier c`	Displays all circuit packs and assigned ports on a specified carrier.
`control`	Displays all circuit packs in the control complex.
`ds1`	Displays all the DS1 (TN722, TN767, and TN464) port circuit packs administered and/or physically inserted.

`port-network pn#`	Displays all circuit packs located in a specified port network. (The **list cabinet** command gives the port network number(s) associated with a particular cabinet.) Circuit packs on switch node carriers are not displayed when the port-network qualifier is entered. To display switch node circuit packs, use the ***all***, ***carrier*** or ***board*** qualifiers.
`stations`	Displays all circuit packs that can be assigned stations, including DS1 circuit packs for remote stations.
`trunks`	Displays all circuit packs that can be used for administering trunks. **NOTE**: For a TN2185 circuit pack, this command shows 16 elements, one for each B-channel on the circuit pack. All TN2185, TN556B, and TN2198 circuit packs in the system appear when the command is entered.

Output

The following display shows the output from the **list configuration all** command.

```
list configuration all                                          Page   1

                          SYSTEM CONFIGURATION

Board                                    Vintage          Assigned Ports
Number   Board Type              Code    Hw Fw  Bd    u=unassigned

01A02    DATA INTERFACE          TN2236B  00 007  u    01
01A03    MULTIMEDIA INTERFC      TN787 K  00 009  u    01 02 03 04 05 06 07 08
                                                       09 10 11 12 13 14 15 16
                                                       17 18 19 20 21 22 23 24
                                                       25 26 27 28 29 30 31 32
01A04    DIGITAL LINE            TN754    u   u  014   01 u  u  u  u  u  u  u
01A05    DS1 INTERFACE           TN2207   u   u  014   01 02 03 04 05 06 07 08
                                                       09 10 11 12 13 14 15 16
                                                       17 18 19 20 21 22 23 24
                                                       u  u  u  u  u  u  u  u
01A06    MULTIMEDIA INTERFC      TN787 K  00 009  u    01 02 03 04 05 06 07 08
                                                       09 10 11 12 13 14 15 16
                                                       17 18 19 20 21 22 23 24
                                                       25 26 27 28 29 30 31 32
```

Field descriptions

Board Number	The functional name of the circuit pack
`Code`	The TN or UN code and suffix of the circuit packs
`Vintage`	The vintage number of the circuit pack

`no board`	The circuit pack is administered but not physically installed
`conflict`	The circuit pack administered to the slot differs from the circuit pack that is physically installed
`no link`	The T1 link is down to a DS1 circuit pack

The following display shows output from the **list configuration ds1** command.

```
list configuration ds1

                    SYSTEM CONFIGURATION - DS1 Circuit Packs

                  Vintage
Location   Code    Hw Fw  Bd    Signaling        Name

01A05    TN2207    u   u  014   isdn-pri         HO SV 1D05
01A07    TN2207    u   u  006   isdn-pri         HO SV 1D07
01A09    TN2207    u   u  005   isdn-ext         HO SV 1D08
01B02    TN767 D   u   u  005   isdn-ext
01C08    TN2207    u   u  006   isdn-pri         ESM
```

Field descriptions

`Signaling`	Displays only when **list configuration ds1** is entered. The contents of the field are the same as the signaling mode administered for the DS1 circuit pack or `none` if the circuit pack is not administered.
`Name`	Displays only when **list configuration ds1** is entered. The contents of the field are the same as the signaling mode administered for the DS1 circuit pack or `none` if the circuit pack is not administered.
`CSU MOD`	Displays only when **list configuration ds1** option is selected. The field contains the identification number of the Integrated CSU module present on the DS1 circuit pack (TN767E or later / TN464F or later) or `none`. If the circuit pack is a TN464E or TN767D, `unknown` displays. If the circuit pack is a TN464D or TN767C or earlier suffix DS1 circuit pack, then `n/a` displays.

list config software-version

This command displays

- Software version numbers and compatibility indexes of the software load modules stored in system memory (RAM).
- The dates and times when translation data were last saved.
- Information about any software update files that have been applied to the system. See “Software Upgrade” in Chapter 5, "Routine Maintenance Procedures" for an explanation of software versions and compatibility indexes.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Inter-actions
list configuration software-version	***memory-resident | long***	Data for the active SPE.	none	none
	print	Report sent to printer.		
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.*		
		RAM-resident files only. Fields for tape data contain `n/a`		

* Refer to the Report Scheduler and System Printer feature specification for more details.

Output

If the memory card contains a core dump file, fields for memory card data display `coredump`. When a core dump is present, all other files on the device are marked invalid.

If the memory card cannot be read at the time the command is entered, the relevant fields display `no memory card`. (This does not indicate that the system does not recognize the presence of the device.)

The following display shows the output from the **list configuration software-version** command.

```
list configuration software-versions                          Page   1

                                SOFTWARE VERSIONS
                          SPE_A

          UPDATE FILE
Creation (GMT) Date: none
         Old Version: none
     Old Identifier: none
     New Identifier: none
       Update State: none in memory


    SOFTWARE VERSION
    Memory Resident: MCU.7.0.08
  Mem Card Resident: none
  Update Identifier: none

    TRANSLATION DATE
    Memory Resident: 1:00 am  TUE MAY 2, 2000
  Mem Card Resident: 1:00 am  TUE MAY 2, 2000

        press CANCEL to quit --  press NEXT PAGE to continue
```

Field descriptions, Page 1

Update File Section	Displays information pertaining to software field-update files or “patches.”
`Creation (GMT) Tape and (GMT) Disk`	When the update file was originally created, in Greenwich Mean Time (GMT). Note that this is *not* the time at which the update file was written to the MSS device.
`Old-Version Tape and Disk`	The software version for which the update was created.
`Old-Identifier Tape and Disk`	Which previous update file this update file expected to find stored in the MSS when it was applied.
`New-Identifier Tape and Disk`	Uniquely identifies the current update file.
Software Version Section	Displays information related to the current software-load module stored in memory and in the MSS.
Memory Resident	Version number of the RAM-resident load module.
Mem Card Resident	Version of memory card resident load module. If a memory card is not installed, this field will display “no card”.
Update-identifier (Patch Identifier)	This uniquely identifies the update file, if any, that has been applied to memory.
Update-state (Patch State)	The status of the software field-update (“patch”) file id is displayed.

Translation Date Section	Displays information related to the translation files as stored in memory and the MSS.
Memory Resident	Date and time when translation data was last read from the MSS into memory. This is stored in SPE memory and is not modified by changes to translation data. A **save translation** command updates this date. If `Date invalid` is displayed, the timestamp does not contain the expected information.
Mem Card Resident	The date and time when translation data was last saved to the memory card. If a memory card is not installed, this field will display `no card`.

```
list configuration software-versions

                              SOFTWARE VERSIONS
                         SPE_A

      PI FW VERSION
     PI 1 Resident: none
     PI 2 Resident: n/a
    Flash Resident: 000164

   ANNOUNCEMENT DATE
  Mem Card Resident: none

Command successfully completed
```

Field descriptions, Page 2

P1 FW Version Section	Displays information related to the Processor Interface (PI) circuit pack firmware.
PI 1 Resident	The version of firmware in the first PI circuit pack in the control carrier.
PI 2 Resident	The version of firmware in the second PI circuit pack in the control carrier.
Flash Resident	The version of PI firmware residing on the system flash memory.
Announcement Date Section	NA
Mem Card Resident	NA

PKT-CTRL FW Version Section	Displays information related to the Packet Control firmware. Information is displayed for the Packet Control circuit pack resident copy
Pkt-ctrl Resident	The version of firmware in the Packet Control circuit pack.
Flash Resident	The version of the Packet Control circuit pack residing on the system flash memory.

Some things to note when using the **list configuration software-version** command are:

1. Fields under column “SPE_B are always blank and the optional **Long** qualifier is not part of the command line.
2. If the memory card contains a core dump file system, fields for the tape or memory card will contain ***coredump***. This is because in a coredump file system all files other than the ***coredump*** file are marked as invalid.
3. If for any reason, MSS cannot be read when the command is issued, the string **none** for no memory card will be placed in the appropriate fields on the screen. This means only that the software was unable to read the appropriate information when requested.
4. When the status of the update field is displayed, the following strings will be used (for more information refer to step c of this list):
    a. `none in memory` — no update has been applied to memory.
    b. `immediate partially applied` — an error condition that is valid only when an update that is in the process of being applied fails. Check the validity of the update file that was sent and follow standard maintenance procedures.
    c. `all immediate applied deferred pending` — a valid update file was received by the switch, and all the immediate sub-patches were applied. This state indicates that there are deferred sub-patches in the update file, and a system reset of the proper level has not occurred since the update file was received.
    d. `deferred partially applied` — an error condition that is valid only when a update that is in the process of being applied fails. Check the validity of the update file that was sent, and follow standard maintenance procedures.
    e. `entirely applied to memory` — the update associated with the memory-resident identifier has been completely applied to memory.

list disabled-mos

This command displays all the MOs that have been maintenance disabled in the system.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
list disabled-mos	***print***	Report sent to printer.	none	none
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.*		
		Examples: **list disabled-MOs** **list disabled-MOs print** **list disabled-MOs schedule**		

* Refer to the Report Scheduler and System Printer feature specification for more details.

Output

```
list disabled-MOs

          DISABLED MAINTENANCE OBJECT INFORMATION

        Maintenance Name    Location     Status
        ALL                              Enabled
        DIG-LINE            02A1203      Disabled


 Command successfully completed
```

Field descriptions

Maintenance Name — The type of maintenance object (or group of maintenance objects) that have been disabled. `All` is also valid.

Location — The physical location of the disabled maintenance object that has been disabled. This field displays blanks if all maintenance objects have been disabled (**disable all**) or all MOs of a specific type have been disabled (**disable MO-all**).

Status — Whether the maintenance object or group of maintenance objects is `Enabled` or `Disabled`.

list history

The list history command generates a log listing of the most recently completed “data affecting” administration and maintenance commands. Data commands are those administration and maintenance commands that change the data state associated with any object and qualifier in the system. Administration data commands affect translation data, while maintenance data commands affect state information. For example, **change station** is a data command, whereas **display station** is not.

All information in the transaction log is saved as translation data when the **save translation** command is performed (LIFO order). When the switch COLD I starts or reboots, the saved translation, and therefore the transaction log, is loaded. This way, the translation data and the data in the transaction log remain compatible.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
list history	***print***	Report sent to printer.	none	See next section
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.*		
		Examples: **list history** **list history print** **list history schedule**		

* Refer to the Report Scheduler and System Printer feature specification for more details.

Feature Interactions

The translation log is written to the memory card as translation data when the **save translation** command is executed. The translation data is time stamped when saved. This time stamp is noted when translation is loaded from the memory card and included in all recent change history reports.

When a user requests a recent change history report, there could be other users concurrently issuing data commands and altering the contents of the transaction log. Therefore, if the user pages the entire way through the report, the oldest entries in the transaction log (maximum 250 commands) may have been overwritten by data commands issued by these other users. Should this occur, the final entries of the report show the data commands issued by the other users since the recent change history report was originally requested.

Also, use of the **set time** command to alter the system clock could make it look as if the recent change history report is not in true LIFO order.

Output

```
list history                          Page   1   SPE A

                              HISTORY

       Date of Loaded Translation: 11:34am Mon Apr 20, 1992

  Date  Time Port      Login   Actn  Object     Qualifier
  4/20 17:23 SYSAM-LCL init    go    tcm
  4/20 11:34 SYSAM-LCL init    cha   trunk-group  100
  4/20 11:25 SYSAM-LCL init    add   trunk-group  100
  4/20 11:25 SYSAM-LCL init    cha   circuit-pack 9
  4/20 11:25 SYSAM-LCL init    add   cabinet      9
  4/18 17:59 SYSAM-LCL init    clea  mst
  4/18 17:59 SYSAM-LCL init    test  board        2e01
  4/18 17:58 SYSAM-LCL init    clea  mst
  4/18 17:58 SYSAM-LCL init    enab  mst
  4/18 17:58 SYSAM-LCL init    cha   mst
  4/18 17:58 SYSAM-LCL init    disa  mst
  4/18 17:57 SYSAM-LCL init    test  board        2e01
  4/18 17:57 SYSAM-LCL init    clea  mst
  4/18 17:57 SYSAM-LCL init    test  board        2e01

press CANCEL to quit --  press NEXT PAGE to continue
```

Field descriptions

Date The date the command was issued (mm/dd)

Time The time the command was issued (hh:mm)

Port The port type to which the user was connected when the command was issued.

Port Number	Board	List History Display
0 - 30	EPN Maintenance Board Port	MAINT
31 - 40	System Access Port	SYS-PORT
41	Maintenance Board Port	SYSAM-LCL
42	Remote Maintenance Board Port	SYSAM-RMT

Login User login

Actn The action part of the command, specifying the operation to be performed. This field is truncated after four characters to allow enough space for objects and qualifiers and to uniquely identify each action.

Object The qualifier (12 characters) specifying the object of the command. Where the object is multiple words in length, only the first word is displayed in the object field; all succeeding words are treated as qualifiers.

Qualifier One or more qualifiers describing the characteristics of the action/object pair. This field is truncated after 31 characters to keep information for a command on a single line.

list isdn-testcall

This command displays the ISDN-PRI trunks in use for ISDN-PRI test calls. This command is useful to determine which trunk is in use for an outgoing ISDN-PRI test call.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
list isdn-testcall	***print***	Report sent to printer.	none	none
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.*		
		Examples: **list isdn-testcall** **list isdn-testcall print** **list isdn-testcall schedule**		

* Refer to the Report Scheduler and System Printer feature specification for more details.

Output

```
list isdn-testcall

                ISDN-PRI TESTCALLS
     B-Channel  Start Time    Duration  M/T Port
     078/001    25/12:36      120       1B1102


 Command successfully completed
```

Field descriptions

B-Channel The trunk in use for the ISDN-PRI test call (trunk group number/ member number).

Start Time The time the test call started (dd/hh:mm format).

Duration The expected duration of the test call.

M/T Port The TN771 Maintenance/Test circuit pack's digital port address (in cabinet/carrier/slot/circuit format) in use for the outgoing asynchronous ISDN-PRI test call.

list marked-ports

This command lists all the ports that have been marked unusable with the **mark port** command (maximum of fifteen marked ports per page).

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
list marked-ports	***print***	Report sent to printer.	none	none
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.*		
		Examples: **list marked-ports** **list marked-ports print** **list marked-ports schedule**		

* Refer to the Report Scheduler and System Printer feature specification for more details.

Output

```
list marked-ports

              MARKED-PORT INFORMATION
     Port      Board-Type
     1C0101    DIG-BD
     1C0601
     1C0702    DIG-BD

 Command successfully completed
```

Field descriptions

Port The port address (cabinet-carrier-slot-circuit) of the marked port.

Board-Type The type of circuit pack containing the marked port. If this circuit pack information is no longer available because the circuit pack was removed after the port was marked, the `Board-Type` field is blank.

list measurements

This command lists performance measurements of a DS1 link indicating the quality of the DS1 physical interface between the system and a far-end system. The **ds1 summary** option provides a summary report while the **ds1 log** option provides a detailed report.

NOTE:
The **list measurements** command has many more options than documented here. Only those options dealing with the DS1 circuit pack are documented on the following pages.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Inter-actions
list measure-ments	***log***	Detailed report generated	none	none
	summary	Summary report generated		
	ds1_location	The physical location of a DS1 circuit pack entered as cabinet-carrier-slot.		
	print	Report sent to printer.		
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.*		
		Examples: **list measurements ds1 log 2a18** **list measurements ds1 summary 2a18 print** **list measurements ds1 summary 2a18 schedule**		

* Refer to the Report Scheduler and System Printer feature specification for more details.

Output

```
list measurements ds1 summary 2a19                    SPE A

 Switch Name:                  Date: 1:25 pm  THU APR 16, 1992

      DS-1 Link Performance Measurements Summary Report

   Counted Since: 1:20 pm  THU APR 16, 1992
   Number of Seconds Elapsed Into Current 15-min Interval: 323
   Total of Valid 15-min Intervals in Past 24-hr Period:   0
                                          Total of  Current
                 Worst_15-Min_Interval    24-hr     15-Min Interval
   Category        Date   Time   Count    Count     Count
 Errored Seconds   4/16   13:20    0       0         4
 Bursty Err Secs   4/16   13:20    0       0         4
 Severely Err Secs 4/16   13:20    0       0         0
 Failed Seconds    4/16   13:20    0       0         0

 Command successfully completed
```

Field descriptions (list measurements ds1-summary)

Counted Since: The start time and date when the associated measurement counters were cleared or the DS1 circuit pack was administered.

Number of Seconds Elapsed Into Current 15-min Interval: The number of seconds from the beginning of the current 15-minute interval (0 - 900).

Total of Valid 15-min Intervals in Past 24-hr Period: The total number of 15-minute intervals in the past 24-hour period that contain valid data (0 - 96).

Category

The four categories correspond to four measurement error counters. The four categories are "," "," "," and "". The meanings of each category follow:

- `Errored Seconds`: the value of the errored seconds counter for the specified 15-minute interval (0 - 900 or N/A if data for the 15-minute interval is invalid).
- `Bursty Err Secs`: the value of the bursty errored seconds counter for the specified 15-minute interval (0 - 900 or N/A if data for the 15-minute interval is invalid).
- `Severely Err Secs`: the value of the severely errored seconds counter for the specified 15-minute interval(0 - 900 or N/A if data for the 15-minute interval is invalid).
- `Failed Seconds`: the value of the failed seconds counter for the specified 15-minute interval (0 - 900 or N/A if data for the 15-minute interval is invalid).

Worst_ 15-Min_ Interval

The date(Date), end time(Time), and error count (Count; from 0 to 900 in increments of four) of the 15-minute interval in the previous 24-hour period that contains the maximum value for each of the four error categories.

Total of 24-Hour Count

The sum of all valid 15-minute counts for the previous 24-hour period for each of the four error categories (0 - 65535).

Current 15-Minute Interval

The error count for the current (incomplete) 15-minute interval for each of the four error categories (0 - 900 or N/A if data for the 15-minute interval is invalid).

```
list measurements ds1 log 2a19                          SPE A

 Switch Name:                  Date: 1:26 pm  THU APR 16, 1992

      DS-1 Link Performance Measurements Detailed Log Report
  Counted Since: 1:20 pm  THU APR 16, 1992
             ERRORED BURSTY    SEVERELY   FAILED    VALID
  DATE  TIME  SECOND  ERR SECS  ERR SECS   SECONDS   INTERVAL
  4/16   13:05    0     0         0           0        y
  4/16   13:20    0     0         0           0        y

 Command successfully completed
```

Field descriptions (list measurements ds1 log)

Counted Since:

The start time and date when the associated measurement counters were cleared or the DS1 circuit pack was administered.

DATE

The date of the 15-minute interval.

TIME

The time of the 15-minute interval.

ERRORED SECONDS — The value of the errored seconds counter for the specified 15-minute interval (0 - 900 or N/A if data for the 15-minute interval is invalid).

BURSTY ERR SECS — The value of the bursty errored seconds counter for the specified 15-minute interval (0 - 900 or N/A if data for the 15-minute interval is invalid).

SEVERELY ERR SECS — The value of the severely errored seconds counter for the specified 15-minute interval (0 - 900 or N/A if data for the 15-minute interval is invalid).

FAILED SECONDS — The value of the failed seconds counter for the specified 15-minute interval (0 - 900 or N/A if data for the 15-minute interval is invalid).

VALID INTERVAL — This field indicates whether the data for the specified 15-minute interval is valid. Data is considered valid when a count for that 15-minute interval. If the field has a value of **y**, the data for the four error categories is valid; otherwise, the data is invalid.

Data is considered valid when a count for that 15-minute interval is retrieved and none of the following invalid conditions occur:

- If a system warm start or a system cold start occurred during the interval
- If the DS1 circuit pack was not inserted during the interval
- If the system time was changed during the interval
- If the system was too busy to respond to a poll request for the interval.

list mst

This command displays the messages in the trace buffer and can be used when the trace is disabled or active, but if active, older messages may be sporadically omitted if wraparound is selected and the message rate is high. The command can be used repeatedly without destroying the integrity of the buffer.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
list mst	***from message number***	Message number to start the display; if the number is not in the buffer, then that is indicated on the display, and no additional messages are displayed. Omitting this qualifier causes messages to be displayed starting with the oldest FIFO and continuous messages.	FIFO order	See document-ation on the system printer feature.
	count number	Message count; can be used to limit the trace		

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
	continuous	Display updates as new messages enter the trace buffer (FIFO). This option is most useful in conjunction with "auto-page." The command terminates only when canceled by the user.		
	LIFO	Newest message displayed first.		
	FIFO	Messages displayed in the order received.		
	[auto-page]	The screen will automatically page when full. Used in combination with ***continuous*** (above), provides a way to "watch" as messages arrive.		
	print	Report sent to printer.		
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.*		
		Examples: **list mst continuous** **list mst continuous auto-page** **list mst LIFO** **list mst from 222 count 7**		

* Refer to the Report Scheduler and System Printer feature specification for more details.

Output

```
list mst
                  MST DATA

 Number  Date/Time   Type  Message
   1   12/21/90
       14:30:21.220  62  00 00 74 17 08 02 00 11 05 04 03 80 90 a2 18
                         03 a1 83 86 70 01 80 96 28 0d 73 74 61 74 69
                         6f 6e 20 35 31 30 30 31
   2   14:30:22.420  60  00 00 74 17 08 02 80 11 02 18 03 a9 83 86
   3   14:30:23.420  60  00 00 74 17 08 02 80 11 03 1e 02 81 81
   4   14:30:25.420  60  00 00 74 17 08 02 80 11 01
   5   14:30:25.820  60  00 00 74 17 08 02 80 11 07 96 28 0d 73 74 61
                         74 69 6f 6e 20 35 31 30 30 34
   6   14:30:28.020  62  00 00 74 17 08 02 00 11 0f
   7   14:50:25.820  71  01
   8   14:52:26.020  56  00 00 70 00 08 01 04 64 96 1c 13 91 a1 10 02
                         01 03 02 01 c4 40 08 96 49 05 83 31 30 30 b4
   9   14:52:26.020  57  00 00 70 00 08 01 84 64 96 1c 0d 91 a2 0a 02
                         01 03 30 05 02 01 c4 40 00

 Command Successfully Completed
```

Field descriptions

Number The sequence number for the message.

Date/Time The Date/Time.

Type MST message type:
60 = ISDN uplink
62 = ISDN downlink,
6C = ISDN level 2 primitive

Message Message text in hexadecimal (ISDN or X.25). See Table A-1 for an explanation of the numeric codes.

Table A-1. Summary of MST Message Types

Code	Description
0x21	IMT proc_errs
0x22	IMT crec
0x23	IMT miscellaneous hooks (dbug)
0x24	Hardware error log
0x25	PREC message
0x26	CMS outgoing (individual)
0x27	CMS incoming (individual)
0x30	CCMS uplink message

Table A-1. Summary of MST Message Types — *Continued*

Code	Description
0x31	CCMS downlink message
0x32	Packet uplink message
0x33	Packet downlink message
0x40	IMT internal-message trace for call_p, conn_m, grp_m, serv_d, suser_m
0x60	ISDNPRI uplink
0x62	ISDNPRI downlink
0x64	ISDNBRI uplink
0x66	ISDNBRI downlink
0x68	ISDNBRI level 2 primitive uplink
0x6A	ISDNBRI level 2 primitive downlink
0x6C	ISDNPRI level 2 primitive uplink
0x6D	ISDNPRI level 2 primitive downlink
0x6E	ISDNPRI unrecognized message
0x6F	ISDNBRI unrecognized message
0x71	GAP marker
0x72	Time changed while trace enabled
0xA0	X.25 Outgoing application data message
0xA1	X.25 Incoming application data message
0xA2	X.25 Application error message
0xB0	X.25 Outgoing session layer control message
0xB1	X.25 Incoming session layer control message
0xCF	X.25 Message confirmation
0xE2	X.25 Session Timer Expirations
0xF0	X.25 Error Message (Outgoing Message Lost)
0xF1	X.25 Unrecognized Messages
0xF2	X.25 Error Message (DIP ICOM Record Aborted) (R2 Only)
0xF9	Snapper instrumentation message
0xFA	Snapper continuation message (for large msgs)

Detailed description of Messages**

Note that the X.25 messages discussed below really follow the BX.25 Message Protocol.

The terminology Message[n] used below refers to the byte at offset n in the message being displayed.

MST message types contain a version number. Whenever the structure of the MST message changes, the version field in the MST buffer is changed. Version 1 (default) displays a blank in the version field which is immediately after the MST message type field. Subsequent versions display the version number after the MST message type field and are connected with a hyphen (“-”). For example: Version 2 of the X.25 Application error/notification message has added the text of the pm state table stimulus which was ignored.

Version 1 of MST message type 0xA2 would appear on the ’list mst’ output:

```
Number  Date/Time     Type  Message
1       11:41:22:425  A2    17 10
```

Version 2 of MST message type 0xA2 would appear on the list mst output:

```
Number  Date/Time     Type   Message
90      12:41:14:112  A2-02  17 10 21 03 32 05 01 80
```

CCMS

Message types:

0x30 uplink
0x31 downlink

Message format:

Message[1]	= port network number
Message[2]	= endpoint number
Message[3]	= angel number
Message[4]	= circuit number
Message[5-6]	= hook identifier (defined in $BASEPJ/hdrs/mstencode.h)
Message[7]	= message length
Message[8]	= angel id
Message[9+]	= standard CCMS message

Packet

Message type:

0x32 uplink

Message format:

Message[1-4]	= user identifier
Message[5-6]	= hook identifier (defined in $BASEPJ/hdrs/mstencode.h)
Message[7-10]	= link identifier
Message[11-12]	= message type (defined in $BASEPJ/hdrs/pcd_calls.h)
Message[13+]	= standard packet message

Message type:

0x33 downlink

Message format:

Message[1]	= port network number
Message[2]	= endpoint number
Message[3]	= angel number
Message[4]	= circuit number

Message[5-6] = hook identifier (defined in $BASEPJ/hdrs/mstencode.h)

Message[7-10] = link identifier

Message[11+] = standard packet message

ISDN

0x60 - ISDN PRI uplink

Message[1] = Port Network Number of D-channel port

Message[2] = Reserved

Message[3] = Carrier Address of D-channel port

Message[4] = Port number of D-channel port

Message[5+] = standard ISDNPRI format

NOTE:
In abbreviated format, the header of the Q.931 message, the cause IE (if present) and the channel id Information Element (IE) (if present) are the only IEs present.

0x62 - ISDN PRI downlink

Message[1] = Port Network Number of D-channel port

Message[2] = Reserved

Message[3] = Carrier Address of D-channel port

Message[4] = Port number of D-channel port

Message[5+] = standard ISDNPRI format

NOTE:
In abbreviated format, the header of the Q.931 message, the cause IE (if present) and the channel id IE (if present) are the only IEs present.

0x64 - ISDN BRI uplink

Message[1] = Port Network Number of BRI port
Message[2] = Reserved
Message[3] = Carrier Address of BRI port
Message[4] = Port number of BRI port
Message[5] = SAPI
Message[6] = TEI

R1:

Message[7,8] = Link ID
Message[9+] = standard ISDNBRI format

R3:

Message[7-10] = Link ID
Message[11+] = standard ISDNBRI format

NOTE:
In abbreviated format, the header of the Q.931 message, the cause IE (if present) and the channel id Information Element (IE) (if present) are the only IEs present.

0x66 - ISDN BRI downlink

Message[1] = Port Network Number of BRI port
Message[2] = Reserved
Message[3] = Carrier Address of BRI port
Message[4] = Port number of BRI port
Message[5] = SAPI
Message[6] = TEI

R1:

Message[7,8] = Link ID
Message[9+] = standard ISDNBRI format

R3:

Message[7-10] = Link ID

Message[11+] = standard ISDNBRI format

NOTE:
In abbreviated format, the header of the Q.931 message, the cause IE (if present) and the channel id IE (if present) are the only IEs present.

An additional cancel byte (0xCA) may be present after the standard ISDNBRI formatted message if the message was not sent. The cancel byte will not be appended if the abbreviated format is selected.

0x68 - ISDN BRI level 2 uplink primitive

Message[1] = Port Network Number of BRI port

Message[2] = Reserved

Message[3] = Carrier Address of BRI port

Message[4] = Port number of BRI port

Message[5] = SAPI

Message[6] = TEI

R1:

Message[7,8] = Link ID

Message[9] = Uplink encode
0x01 - BRI Link State
0x02 - TEI Management Message
0x03 - XID Message

Message[10] = R1/R3 Link States:
0x00 - the link has gone down
0x01 - the link has come up
0x02 - the link id has changed
0x03 - the link has gone hyperactive
0x04 - the link has recovered
0x05 - the audit recovery stim
0x06 - the link has been reset
0x07 - link state hyper (too many SABMEs) disconnect
0x08 - broadcast link audit

= R1/R3 TEI Management Message
0x01 - Identity request
0x05 - Identity Check Response
0x07 - Identity Verify Request

= R1/R3 XID Messages
0x01 - XID Request
0x02 - XID Response

R3:

Message[7-10] = Link ID

Message[11] = Uplink encode
0x01 - BRI Link State
0x02 - TEI Management Message
0x03 - XID Message

Message[12] = BRI Link State:
0x00 - the link has gone down
0x01 - the link has come up
0x02 - the link id has changed
0x03 - the link has gone hyperactive
0x04 - the link has recovered
0x05 - the audit recovery stim
0x06 - the link has been reset
0x07 - link state hyper (too many SABMEs) disconnect
0x08 - broadcast link audit

= TEI Management Message
0x01 - Identity request
0x05 - Identity Check Response
0x07 - Identity Verify Request

= XID Messages
0x01 - XID Request
0x02 - XID Response

list mst

0x6A - ISDN BRI level 2 downlink primitive

Message[1] = Port Network Number of BRI port

Message[2] = Reserved

Message[3] = Carrier Address of BRI port

Message[4] = Port number of BRI port

Message[5] = SAPI

Message[6] = TEI

R1:

Message[7,8] = Link ID

NOTE:
The Link ID has no meaning for the link establish request, therefore the Link ID field will contain 0xff 0xff

Message[9] = Downlink encode
0x01 - BRI Link Events
0x02 - TEI Management Message
0x03 - XID Message

Message[10] = BRI Link Events:
0x02 - link release request
0x0f - link establish request sent to and received by the lower level

= TEI Management Message
0x02 - Identity Assigned
0x04 - Identity Check Request
0x06 - Identity Remove

= XID Messages
0x01 - XID Request
0x02 - XID Response

Message[11] = 0xCA - Cancel Byte

NOTE:
The cancel byte will only be present if the message was built, but could not be sent.

R3:

Message[7-10] = Link ID

NOTE:
The Link ID has no meaning for the link establish request, therefore the Link ID field will contain 0xff 0xff 0xff 0x.ff

Message[11] = Downlink encode
0x01 - BRI Link Events
0x02 - TEI Management Message
0x03 - XID Message

Message[12] = BRI Link Events:
0x02 - link release request
0x0f - link establish request sent to and received by the lower level

= TEI Management Message
0x02 - Identity Assigned
0x04 - Identity Check Request
0x06 - Identity Remove

= XID Messages
0x01 - XID Request
0x02 - XID Response

Message[13] = 0xCA - Cancel Byte

NOTE:
The cancel byte will only be present if the message was built, but could not be sent.

0x6C - ISDN PRI level 2 uplink primitive

Message[1] = Port Network Number of D-channel port

Message[2] = Reserved

Message[3] = Carrier Address of D-channel port

Message[4] = Port number of D-channel port

Message[5] = change type

R1/R3 change types:
0x01 - session up notification
0x02 - Session down notification
0x6D - ISDN PRI level 2 downlink primitive (not implemented)

Message[1] = Port Network Number of D-channel port

Message[2] = Reserved

Message[3] = Carrier Address of D-channel port

Message[4] = Port number of D-channel port

Message[5] = change type

R1/R3 change types:
0x01 - link establish request
0x02 - link release request

0x6E - ISDN PRI Unrecognized Messages

Message[1] = Port Network Number of D-channel port

Message[2] = Reserved

Message[3] = Carrier Address of D-channel port

Message[4] = Port number of D-channel port

Message[5] = type of failure

Types of failure:
0x01 - outgoing ISDNPRI
0x02 - incoming ISDNPRI

Message[6+] = standard ISDN format

0x6F - ISDN BRI Unrecognized Messages

Message[1] = Port Network Number of BRI port

Message[2] = Reserved

Message[3] = Carrier Address of BRI port

Message[4] = Port number of BRI port

Message[5] = SAPI

Message[6] = TEI

R1:

Message[7,8] = Link ID

Message[9] = type of failure

Types of failure:

0x01 - outgoing ISDN
0x02 - incoming ISDN

Message[10+] = standard ISDNBRI format

R3:

Message[7-10] = Link ID

Message[11] = type of failure

Types of failure:

0x01 - outgoing ISDN
0x02 - incoming ISDN

NOTE:
In abbreviated format, the header of the Q.931 message, the cause IE (if present) and the channel id IE (if present) are the only IEs present.

An additional cancel byte (0xCA) may be present after the standard ISDNBRI formatted message if the message was not sent. The cancel byte will not be appended if the abbreviated format is selected.

General

0x71 - GAP marker

Message[1] = GAP reason

Message[2] = GAP count (since last clear - high byte)

Message[3] = GAP count (since last clear - low byte)

GAP reasons:

0x01 - disabled, disable mst command executed
0x02 - disabled, mst timer expired
0x03 - disabled, buffer full on no-wrap
0x04 - disabled, restart occurred
0x05 - disabled, by stop trigger or count
0x06 - disabled, audit error
0x07 - not disabled, stopped by stop trigger or count

0x72 - Time changed while trace enabled

Message[1] = 0x00

Message[2] = timestamp indication

timestamp indication:

0x00 - MST timestamp is old time
0x01 - MST timestamp is new time

In abbreviated mode, the application message is not saved.

list suspend-alm-orig

This command lists active entries in the Suspend Alarm Origination table. Even though this command only lists active entries, an entry that expires during the list process still appears in the output. If the Suspend Alarm Origination table is empty, the output contains only the title and field headings.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
list suspend -alm-org	***print***	Report sent to printer.	none	none
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.*		
		Examples: **list suspend-alm-orig** **list suspend-alm-orig print** **list suspend-alm-orig schedule**		

* Refer to the Report Scheduler and System Printer feature specification for more details.

Output

```
list suspend-alm-orig

                    Suspend Alarm Origination Entries

                  Physical    Board         Expires At

                  01C03       off-only      06/11/15:06
                  01E0407     on-and-off    06/11/17:26
                  01E0406     on-and-off    06/12/45:34
```

list sys-link

The command **list sys-link** lists all system links present in the system. The location of the system link and the link type are displayed for each link.

Common procedure for repairing link problems

The state of a system link is dependent on the state of the various hardware components that it travels over. To resolve any problems associated with a system link, use the following procedure.

The switch maintains a list of hardware components over which the link travels called the hardware path. There are two hardware paths, the current hardware path and the faulted hardware path for each of the system links. The current hardware path is present only for those links that are currently up. When a link is down, the current hardware path is empty. The faulted hardware path, is always present once the link has gone down and is *not cleared when the link subsequently recovers.* The faulted path preserves the path that the link traversed when it last went down. The time at which the faulted path was last recorded is preserved and is accessible through the **status sys-link** location and **list sys-link** commands. Therefore, the focus of attention for problems which do not involve a link that is down, is the current hardware path. If the link is down, faulted hardware path is the focus of attention.

The command **status sys-link** location will present the state of both the hardware paths (current and faulted) along with the state of each of the components in the hardware path. When analyzing any system link problem, look for alarms on the components listed under desired hardware path. If any alarms are present, then follow the maintenance procedures for the alarmed components to clear those alarms first.

When all the components are alarm free, wait for 3 minutes to allow the links to recover. Test the system link through **test sys-link PCSSpp long clear** and notice any tests that fail. If any failures are found, fix the problems indicated by the tests and repeat the procedure.

Demand Reset Test (#704)

This test is destructive.

This test executes a comprehensive set of diagnostic tests. The test aborts if the **I/O Processor** is in the in-service state. The test takes the I/O Processor out-of-service if background maintenance has reset it 3 times by within the last 15 minutes.

Demand Reset of a Packet Interface

System software denies a demand reset of a Packet Interface on an active SPE (**reset packet-interface**) if the Packet Interface is in service. A reset would disrupt service, existing calls, and links to adjuncts such as AUDIX. The software that controls Packet Interface maintenance puts a Packet Interface in the out-of-service state if that Packet Interface has been reset four times within the last 15 minutes, as part of the automatic recovery action that is initiated when a hardware fatal fault condition is detected.

A demand reset of a Packet Interface on the standby SPE is not disruptive and is allowed regardless of the service state of the associated maintenance software. When a standby Packet Interface is reset, the following actions take place:

- Memory shadowing is turned off.
- The standby SPE is booted into Maintenance Mode. Both standby Packet Interfaces are reset automatically during this process.
- The Packet Interface reset action is performed by the Standby SPE.
- The Standby SPE is put back into Standby Mode.
- A standby SPE memory refresh is performed.

It takes approximately one minute after a Packet Interface on the standby SPE is reset before memory refresh of the standby SPE is complete. During that time, any demand tests of the standby Packet Interface abort.

mark port

The **mark port** command marks faulty ports as defective to prevent their use in other administrative operations (for example, adding a data-module or station). Ports on any type of circuit pack may be marked except for installed circuit packs that are administered automatically (for example, Tone Detector, Tone Generator, Speech Synthesizer, Call Classifier and Maintenance/Test circuit packs). If the port can be administered manually, and it is unassigned, the port is marked as faulty. The **clear port** command reactivates the port. The **list marked-ports command** displays marked ports in a list format. All marked port information is saved as part of translations.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
mark port	***location***	Physical location: **PCSSpp** Examples: **mark port 1c0208** **mark port 2a1001**	none	none

monitor security-violations

This command displays information about failed attempts to access the system, including the time of the violation, the login entered, and the port accessed during the failed login attempt. The system logs trunk group numbers, members, and extensions for remote access violations. The system logs remote and local invalid access attempts with a total of 16 entries maintained for each access type. This online status report automatically updates every 30 seconds until the command is canceled by pressing the CANCEL key.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
monitor security-violations	***print***	Report sent to printer. Examples: **monitor security-violations** **monitor security-violations print**	none	none

Output

The following example is a display of the **monitor security-violations** command.

```
monitor security-violations                          SPE A

                    SECURITY VIOLATIONS STATUS

                       Date:   9:12 MON DEC 30 1991

   SYSTEM MANAGEMENT VIOLATIONS        REMOTE ACCESS VIOLATIONS

 Date   Time  Login  Port    Ext    Date   Time   TG No.   Mbr  Ext
 12/30  09:12 init   MGR1           12/30  12:42  80        1   1111
 12/30  09:12 init   MGR1
 12/30  09:12 init   MGR1
```

Field descriptions

Date: Current date and time.

Date Date of the logged security violation shown as MM/DD (where MM = month and DD = day).

Time Time of the logged security violation shown as HH:MM (where HH = the hour and MM = minute of the invalid access attempt).

Login Login ID entered for the login violation attempt.

Port	Type of port used when login violation occurred. The following is a table of valid port types:
MGR1	MGR1 represents a connection to a system MCU-MT port. Connections are either hardwired or dialed-up.
Ext	Extension assigned to the data module that failed during “logging in” session. If a data module is not used, this field is blank.
Date	Date of the logged security violation shown as MM/DD (where MM = month and DD = day).
Time	The time of the logged security violation shown as HH:MM (where HH = the hour and MM = the minute).
TG No.	The trunk group number associated with the trunk from the failed remote access attempt (remote access violations only).
Mbr	The trunk group member number associated with the trunk from the failed remote access attempt (remote access violations only).
Ext	Extension that interfaces with remote access features (remote access violations only).

monitor system

The **monitor system view1 and view2 commands** summarize the system’s condition. This on-line status report automatically updates every minute (or by pressing the UPDATE key) until the command is canceled by pressing the CANCEL key. For security reasons, the **cancel** command automatically logs of technicians.

Overall system status is available with either view option. “View1” displays attendant, maintenance, and traffic status. Attendant and maintenance status update every minute and traffic status updates hourly. “View2” displays all “view1” items, except hunt group measurements that are omitted from traffic status portions. These screens contain simplified high-level information about the system’s health. The **monitor system conn** command displays connection’s status in the connection manager process. Data is collected frequently in the connection manager for key information items used to create this report.

The single option to the command line entry, is **monitor system conn** and its parameter is *pnn*. The command line parameter *pnn* indicates the desired three pnns.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
monitor system	*view 1* *view 2* *conn* *pnn ###* *pnn ###* *pnn ###*	see below Examples: **monitor system view1** **monitor system view2** **monitor system conn** **monitor system conn pnn 1 5 7**	none	none

Qualifier Description

view1 This screen displays attendant status, maintenance status, last hour's measurement of trunk groups, hunt groups, attendant groups, and the time of day.

view2 This screen displays a subset of view1 forms entries. It includes view1 forms except the last hour's hunt group measurements.

entering no options Omitting the "pnn # # (# argument on the command line displays default configurations of Pnn's 1, 2 and 3.

pnn # # # Entering "pnn # # #", where "#" is replaced by a pnn number from 1 to 3, displays data for specified pnns.

Output

Below are displays of **monitor system view 1** and **monitor system view 2**.

```
monitor system view1
                ATTENDANT STATUS                    MAINTENANCE STATUS

                  Console no.                        # of alarms for trunks: 4
  Activated: 1 2 3 4 5 6                           # of alarms for stations: 2
                                                  # of alarms for other res: 1
Deactivated: 7 8                          First OSS number has been informed? n


                              TRAFFIC STATUS
                            Measurement Hour: 1800
           Trunk Group Measurement                Hunt groups Measurement
(4 grps with highest %time ATB)          (4 grps with highest # of qued calls)
    Grp no: 78                                        Grp no: 16
   Grp dir:                                        Calls qued: 2
Calls qued: 1                                      Calls aban: 1
 %Out blkg:                                              Attendant Group Measurement
 %Time ATB:                                        Calls qued: 1     Calls aban: 0

                                                          16:06 WED MAR 6 1996
                - press CANCEL to quit -
```

```
monitor system view2
                ATTENDANT STATUS                    MAINTENANCE STATUS

                  Console no.                        # of alarms for trunks: 4
  Activated: 1 2 3 4 5 6                           # of alarms for stations: 2
                                                  # of alarms for other res: 1
Deactivated: 7 8                          First OSS number has been informed? n


TRAFFIC STATUS  Measurement Hour: 1800
          Trunk Group Measurement
(4 grps with highest %time ATB)
    Grp no: 78
   Grp dir:
Calls qued: 1
 %Out blkg:
 %Time ATB:
          Attendant Group Measurement
Calls qued: 1     Calls aban: 0
                                                          16:08 WED MAR 6 1996
                - press CANCEL to quit -
```

Field descriptions

Console # — A list of console numbers that are activated or deactivated.

Activated: — The attendant console is active. An attendant console activated if:

its handset/headset is plugged in

it is not busied out, and the system is in day service and the console is a day or day/night or principle console, or the system is in night service and the console is a night or day/night console.

Deactivated: — The attendant console is inactive. The attendant console deactivated if it does not meet activated conditions.

# of alarms for trunks — The number of existing minor and major trunk port alarms.

# of alarms for other resources — The number of existing minor and major alarms on all maintainable objects in the system, except trunks and stations.

First OSS number has been informed? — Questions if the first OSS telephone number reports and acknowledges alarms. If “Alarm Origination” is disabled or there are no active alarm, the field is “n”.

Measurement Hour — The starting time for taking measurements. For example, if the measurement hour is shown as 1800, traffic status data display is the time period from 6 PM to 7 PM (The measurement is taken hourly).

Grp no — A number between 1 and the maximum trunk or hunt group number.

Grp dir — Group direction: incoming, outgoing or two way.

Calls qued Total calls that arrive and are placed in the trunk group queue.

Calls aban Total abandoned calls by the caller.

%Out blkg: The ratio of outgoing calls that are not carried (due to overload conditions) on a trunk group to outgoing calls offered.

% Time ATB: The percentage of time within polling intervals that all trunks in the trunk group are unavailable for use.

Time of day The current time of day acquired from the system.

The following example is a display of the **monitor system conn** command.

```
       Time Slot Status                  Bus Status
Pnn     Bus   State  *Idle Count   Pnn  Bus  State
 10       0   Maint     0           10    0  Avail
 10       1   Normal    233         10    1  Avail
 10       0   Maint     0           22    0  Avail
 10       1   Normal    233         22    1  Avail
 22       0   Maint     0            1    0  Avail
 22       1   Normal    233          1    1  Avail
 22       0   Maint     0
 22       1   Normal    233        *Callrate:  20
  1       0   Maint     0          *Interval:  60
  1       1   Normal    233      *Max_callrate:45
  1       0   Maint     0         *Next_hour:  70
  1       1   Normal    233
 tot_ts_req :0F24 0000 3CE2 ts_count :0010 0920 0200 Requests-TN748 TTRs :0014
 ts_denied  :0E46 3CE2 0000 ts_total :0000 0090 0028 Requests-TN748 CPTRs:0041
 tot_fts_req:0000 53D2 2231 fts_count:02E0 0910 0784 Requests-TN744 CPTRs:0082
                           fts_total:0320 0192 7048 Requests-TN744 TTRs :0082
                           Requests-TN744 MFCs :0082
Note: * Denotes Base 10, All Other Figures are in Base 16
```

Field descriptions

Time Slot Status 4 numbers are associated with time slot status for each specified pnn; the two buses (0 and 1) have a maintenance and a normal state, and a number of idle counts. These fields represent real-time status data.

Bus Status Two numbers are associated with the two buses for each pnn. Shown are the pnn number; the associated bus (0 or 1); and the bus's state (avail or unavail). These fields represent real-time status data.

Callrate The callrate field represents call rates currently executing on the switch. This is a counter that is bumped for each call attempt. This field represents real-time status data.

Interval This field represents the interval applied to the call rate. It is normally a 36 second time period. This field represents constant status data.

Max_callrate This field represents the maximum call rate achieved since the last hour. If, at 20 minutes past 12:00, the system executes this command, the maximum call rate obtained during the past 20 minutes displays. This field represents real-time status data.

Next_hour This field contains a value of 0 or 1 depending related to measurements taken this hour or the next. This hour reflects maximum call rates. When this flag is set, statistics accumulate for the next hour and shortly thereafter.

tot_ts_req This field holds the total time slots in use during the time period elapsed since the top of the last hour. Data is internally collected every 100 seconds. When the timer fires and the data collection occurs, a check is made as to how many time slots are currently in use. That is where the total comes from. There are three numbers displayed for this field on the form; one for each of the pnns requested. This field represents real-time status data.

ts_denied This field records total time slots requests denied since the beginning of the last hour. Data is collected internally every 100 seconds. Three numbers display for this field; one for each requested pnn. This field represents real-time status data.

tot_fts_req This field represents the total number of requested fiber time slots. This field increments each time a fiber time slots is allocated since the last top of the hour measurement polling. Three values display; one for each requested pnn. This field represents real-time status data.

ts_count The value in this field represents the requests for time slots during the last 100 second interim. An internal timer initiates polling every 100 seconds. Three numbers display for this field on the form; one for each requested pnn. This field represents real-time status data.

ts_total This field represents the total number of time slots requested since the top of the last hour. This field represents real-time status data.

fts_count The value in this field represents the requests for fiber time slots during the last 100 second interim. An internal timer initiates polling every 100 seconds. Three numbers display for this field; one for each requested pnn. This field represents real-time status data.

fts_total This field indicates the total number of fiber time slots during the last 100 second interim. This field represents real-time status data.

Requests-TN748 TTRs This field reflects the total number of requested touch tone receivers that are currently-active. It decrements when tone receivers are freed and increments when they are requested. This field applies strictly to the TN748 circuit pack. This field represents real-time status data.

Requests-TN748 CPTRs This field reflects the total number of requested call progress tone receivers that are currently active. It decrements when call progress tone receivers are freed and increments when they are requested. This field applies strictly to the TN748 circuit pack. This field represents real-time status data.

Requests-TN744 CPTRs This field reflects the total number of requested call progress tone receivers that are currently active. It decrements when call progress tone receivers are freed and increments when they are requested. This field applies strictly to the TN744 circuit pack. This field represents real-time status data.

Requests-TN744 TTRs This field reflects the total number of requested touch tone receivers that are currently active. It decrements when tone receivers are freed and increments when they are requested. This field applies strictly to the TN744 circuit pack. This field represents real-time status data.

Requests-TN744 MFC This field reflects the total number of requested multi-frequency receivers that are currently active. It decrements when multi-frequency receivers are freed and increments when they are requested. Note that this field applies strictly to the TN744 circuit pack. This field represents real-time status data.

monitor traffic

This command provides information on the number of trunk group and hunt group calls waiting to be serviced, and the time the oldest call in the group has been waiting for service.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
monitor traffic	*trunk-groups* *hunt-groups*	see below Examples: **monitor traffic trunk-groups** **monitor traffic trunk-groups 4** **monitor traffic hunt-groups**	none	none

Qualifier Description

trunk-groups The number of trunk group calls waiting to be serviced, members in the group, and number of members that are active on calls in the group. This field displays up to 60 administered trunk groups. Technicians specify the starting trunk group. If technicians enter 5, the displayed trunks start at 5. Numbers 1-4 do not appear.

hunt-groups This field displays the waiting time for oldest call in each hunt group. Screen data updates every minute; only changed fields refresh. Unadministered hunt groups have blank values.

Output

The following output example is a display of the **monitor traffic hunt-groups** command.

```
monitor traffic hunt-groups

                HUNT GROUP STATUS   22:49 SAT DEC 31 1988
      #   S   A   Q   W   LCIQ      #   S  A   Q   W  LCIQ
      1   15  10  10  0   20        17
      2                             18
      3                             19
      4                             20
      5                             21
      6                             22
      7                             23
      8                             24  10   5   0   0   10
      9                             25
      10                            26
      11                            27
      12                            28
      13                            29
      14                            30
      15                            31
      16                            32

 (#: Group;  S: Grp Size;  A: Active Members;  Q: Q Length;  W: Calls Waiting)

 (LCIQ: Longest Call In Queue in seconds)
```

Field descriptions

Group number for trunk group or hunt group.

S Number of members administered for each trunk or hunt group.

A Number of group members that are active on a call. This does not include busied out members.

Q The length of queues administered for groups.

W Number of calls waiting in group queues to be serviced.

LCIQ The longest call in queue (LCIQ) indicates the time in seconds the oldest call in the hunt group queue has been waiting to be serviced.

```
monitor traffic trunk-groups

                TRUNK GROUP STATUS   22:49 SAT DEC 311988
  #  S  A  Q  W  #  S  A  Q  W  #  S  A  Q  W  #  S  A  Q  W
  1  15 10 0  0
  2  22 21 10 10
  9  31 12 20 0
  65 5  5  10 8
  99 12 0  0  0

 (#: Group;  S: Grp Size;  A: Active Members;  Q: Q Length;  W: Calls Waiting)
```

netstat ip-route

This command displays the routing tables that are resident in the C-LAN circuit pack. With the “board” option, the command **netstat ip-route board UUCss** displays the routing tables that are resident on the specified C-LAN circuit pack.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interaction
netstat ip-route	**board UUCss**	Example: **netstat ip-route board 01A03**	none	none

Output

The following example shows the output from the netstat ip-route command.

```
netstat ip-route

                    IP ROUTING - C-LAN

     Destination      Gateway          C-LAN Bd/Pt   Interface
     127.0.0.1        127.0.0.1        01A1118       lo0
```

Field descriptions

Destination Fixed field giving the destination of the route. The destination is a name administered on the Node Name form which can include the keyword “Default,” indicating the default route.

Gateway The node name of the Gateway by which the Destination can be reached. The Gateway must be a name administered on the Node Name form.

C-LAN Board/Pt The circuit pack location for the circuit pack that provides the interface for the route.

Interface

- `pppn` represents one of the PPP inter faces on the C-LAN, which is administered as port n+1.
- `cpm0` represents the ethernet interface on the C-LAN which is administered as port 17.
- `lo0` represents the loopback interface on the C-LAN which does not need to be administered.

ping

When debugging connectivity problems, a ping only indicates low-level connectivity. If an external ping works but higher-level applications such as DCS, CMS, or INTUITY do not, then you can only assume that there is connectivity to the board. Interrogate the switch for other clues as to why the higher-level application is not working.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
ping	ip-address	The IP address of the device to ping in the following format: www.xxx.yyy.zzz	packet length = 64 bytes	
	node-name	Administered node name (use **display node-name**s).		
	board	The location of the C-LAN circuit pack **(UUCSS**)		
	packet-length	Range: 64-1,500 bytes		
	repeat	1-100		
		Examples:		
		ping ip-address 192.68.3.26		
		ping ip-address 192.68.3.26		
		board 1C05		
		ping ip address 168.24.3.66		
		packet-length 1500		

You can place additional restrictions on the command by selecting the object “ip-address” on the Restricted Object List:

1. Type **change permissions loginid** (an administered login such as inads), and press Enter.
2. Set the Additional Restrictions field to **y** in the Administration Commands section of the form.
3. Go to the second or third page of the form.
4. Enter **ip-address** in the list of Restricted Objects and press Enter.

The ping command has 4 qualifiers:

- “ping ip-address”
- “ping node-name”
- “ping board”
- “ping packet-length”

ping ip-address

This command “pings” the given IP address of the destination to ping. The command returns

- the port used to perform the test
- the pass/fail results of the test
- the round-trip delay time for successful tests
- the error code on tests that failed.

ping node-name

This command pings an administered node. Look the **“node-name”** up with the display node-names command).

```
ping ip-address 135.17.65.159

                        PING RESULTS

End-pt IP        Port      Port Type  Result    Time(ms)  Error Code

135.17.65.159    01B0717   ETH-PT     PASS      8
```

Figure A-1. ping node-name report

ping board

The **board** qualifier specifies which C-LAN circuit pack from which to ping. By adding the **board UUCSS** qualifier to the command, you can also specify which C-LAN circuit pack (in the case of multiple C-LAN circuit packs). If only one C-LAN circuit pack is present, the **board** qualifier is optional.

ping packet-length

The **packet-length** qualifier specifies the packet length of the ping packet. Packet lengths of from 64 to 1500 bytes can be specified. The **packet-length** qualifier is optional, and if not used, the default packet length is 64 bytes. Specifying a longer packet length in the command line can show

- if a router or host has a problem fragmenting or reassembling transferred packets
- a more complete indication of the link status

If the packet length is not specified, the default is 64 bytes. You can add the **packet-length** qualifier and the packet size (64-1500 bytes) to the other ping commands. Some examples include:

- ping node-name packet-length 800
- ping ip-address 24.103.5.7 packet-length 100
- ping board UUCSS packet-length 1000

Output

The following example shows the output from the **ping ip-address packet-length** command.

```
ping ip-address 135.17.65.159

                        PING RESULTS

End-pt IP        Port      Port Type  Result    Time(ms)  Error Code

135.17.65.159    01B0717   ETH-PT     PASS      8
```

Figure A-2. ping ip-address report

Field descriptions

End-pt IP The TCP/IP destination address of the ping command.

Port Location of the C-LAN circuit pack (UUCSS).

Port Type Can be either PPP-PT for PPP ports (ports 1-16) or ETH-PT for the Ethernet port (port 17).

Result PASS or FAIL

Time (ms) The round-trip time (in milliseconds) of the ping.

Error Code Identifies problems associated with the circuitry in the data path for a peer-to-peer IP layer connection

Error messages

The system returns error messages listed in Table 2-2.

Table A-2. Ping command error messages

Message	Interpretation
www.xxx.yyy.zzz Internet address not assigned	The system cannot find the IP address.
Internet address not reachable from this board	The IP address is not in the route table of the specified board.
More than one default route exists, specify board	The IP address is not in the route table, and more than 1 C-LAN circuit pack has a default route.
Invalid internet address	Invalid Internet address parameter
“CCcss” is an invalid identifier; please press HELP	Invalid board location (when using the “board” option).
Error encountered, could not complete request	The internal error of not being able to find the port through which the IP address is reached.
Out of range	The packet size is greater than 1500 or less than 64 bytes in length or if there are invalid or unrecognized parameters
WARNING Default packet length of 64 bytes used for TN799	Indicates that the default packet length of 64 bytes is used for a TN799 board

recycle carrier

This command recycles power for specified carriers. When power units are replaced in carriers, this command recycles that carrier's power. **Carriers with active, recycled EIs, experience disrupted communications with their cabinets. Carriers with active, recycled tone-clock boards experience disrupted service for ports in port networks.** For more details on recycling and troubleshooting power units, refer to "Troubleshooting Control Carrier Power Units" in Chapter 5, "Routine Maintenance Procedures."

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
busyout mis	***location***	Physical location of desired carrier. Carrier b-e.	cabinet = 1 none for carrier	See next section

Feature Interactions

Carrier "a" cannot recycle its power.

Recycling maintenance objects results in:

Recycled component	Result
Port Carriers	Interrupted service
Carriers with active EIs	Disrupted communication with that cabinet
Carriers with active tone-clock boards	Interrupted service for ports port network
Carrier	The list configuration command causes circuit packs to display red LEDs and NO BOARDs.

The **test tdm command** accelerates retirement of these problems.

Output

The following output example displays the **recycle carrier c** command.

```
recycle carrier c

                          TEST RESULTS

  Port    Maintenance Name  Alt. Name Test No. Result       Error Code
  01C     CARR-POW                     126      PASS

Command successfully completed
```

Field descriptions

Port — Port address (cabinet-carrier) for tested maintenance objects. This field displays cabinet and carrier values.

Maintenance Name — CARR-POW.

Alt. Name — Not applicable.

Test Number — T126.

Test Result — Success status of a busied out object (PASS, ABORT, FAIL)

Error Code — System-generated description of a command failure.

release access-endpoint

This command removes all ports associated with the specified access endpoint from a maintenance busy state. Periodic and scheduled tests subsequently resume on the released ports. Maintenance completes background initialization testing on the released ports.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
release access-endpoint	***extension***	number associated with desired access endpoint. Examples: **release access-endpoint 25012** **release access-endpoint 77868**	none	none

Output

The following example shows the output from the **release access-endpoint 22502** command and assumes that the access endpoint ports for extension 22502 are in cabinet 1, carrier C, slot 11, circuit 1 to 6.

```
release access-endpoint 22502          page 1 of 1

                    COMMAND RESULTS

 Port  Maintenance Name Alt. Name  Result   Error Code
 01C1101  WAE-PORT    22502    PASS
 01C1102  WAE-PORT    22502    PASS
 01C1103  WAE-PORT    22502    PASS
 01C1104  WAE-PORT    22502    PASS
 01C1105  WAE-PORT    22502    PASS
 01C1106  WAE-PORT    22502    PASS

Command Successfully Completed
```

Field descriptions

Port	Port address (cabinet-carrier-slot-circuit) of released maintenance.
Maintenance Name	The type of released maintenance object. (wideband access point =WAE-PORT, single port access endpoint = TIE-DS1.
Alt. Name	Alternate way to identify maintenance objects. This field contains the extension number of the access endpoint.
Result	Success status of a busied out object (PASS, ABORT, FAIL)
Error Code	System-generated description of a command failure.

release board

This command activates administered maintenance objects on the circuit pack at specified locations. Tests are executed to ensure its usability.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
release board	***location***	Physical location: **PCsspp** Examples: **release board 01c11** **release board 02c15**	none	none

Output

The following example shows the output from the **release board 1c07** command and assumes that the board in cabinet 1, carrier c, slot 7 is an analog board with three ports administered.

```
release board 01C07

                    COMMAND RESULTS

Port   Maintenance Name  Alt. Name  Result  Error Code
01C07     ANL-BD                    PASS
01C0702   ANL-LINE                  PASS
01C0701   ANL-LINE        51001     PASS
01C0703   ANL-LINE                  PASS

Command successfully completed
```

Field descriptions

Port	Port address (cabinet-carrier-slot) of released maintenance object.
Maintenance Name	The type of maintenance object that is being released.
Alt. Name	Alternate way to identify maintenance objects. If the Object isThe field contains stationextension trunk*xxx/yyy* (where *xxx* = trunk group number and *yyy* = member number) private CO line*P/xxx* (where *xxx* = private CO line group number)
Result	Success status of a busied out object (PASS, ABORT, FAIL)
Error Code	System-generated description of a command failure.

release cdr-link

This command removes maintenance objects associated with specified call detail recording (cdr)-links from a maintenance busy state.

These links provide asynchronous data connections from switches to peripherals; they are composed of a:

- Far end data module
- Simulated data channel on a PKTINT board
- Manager that initiates and maintains the link
- Controller/protocol that services the link

For information on what a CDR link is and does, see the description of the "status cdr-link" command.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
release cdr-link	***link-id***	primary secondary Examples: **release cdr-link primary** **release cdr-link secondary**	none	none

Output

The following example shows the output from the **release cdr-link primary** command.

```
release cdr-link primary

                    COMMAND RESULTS

 Port  Maintenance Name  Alt. Name  Result   Error Code
         PRI-CDR                    PASS

Command successfully completed
```

Field descriptions

Port Not applicable. ( )

Maintenance Name Type of released maintenance object. (primary cdr-link = PRI-CDR, secondary cdr-link = SEC-CDR)

Alt. Name Not applicable. ( )

Result Success status of a busied out object (PASS, ABORT, FAIL)

Error Code System-generated description of a command failure.

release data-module

This command activates the specified data module (or data channel). Hardware tests are executed to verify that the equipment is functioning.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
release data-module	***extension***	Extension number associated with desired data module or data channel. Examples: **release data-module 310**	none	none

Output

The following example shows the output from the **release data-module 300** command.

```
release data-module 310

                          COMMAND RESULTS

Port    Maintenance Name  Alt. Name    Result    Error Code
01C1103     DIG-LINE                   PASS

Command successfully completed
```

Field descriptions

Port — Port address (cabinet-carrier-slot-circuit) of the maintenance object that is busied out or released, or the number of the data channel.

Maintenance Name — The type of maintenance object that is being busied out or released.

Alt. Name — Alternate way to identify maintenance objects.

If the Object is	The field contains
station	extension
trunk	*xxx/yyy* (where *xxx* = trunk group number and *yyy* = member number)
private CO line	*P/xxx* (where *xxx* = private CO line group number)

Result — Success status of a busied out object (PASS, ABORT, FAIL)

Error Code — System-generated description of a command failure.

release gatekeeper

This command requests that the Gatekeeper re-registers the MCU after a **busyout gatekeeper** command.

NOTE:
The **release gatekeeper** command requests that the Gatekeeper re-registers the MCU. The **release gatekeeper** command does not receive a response from the Gatekeeper, indicating whether or not the request was granted. Therefore, the **release gatekeeper** command should always be followed by the **test gatekeeper** command to verify that the MCU was re-registered.

```
release gatekeeper

                              COMMAND RESULTS

   Port    Maintenance Name  Alt. Name   Result       Error Code
          GTKP                          PASS

 Command successfully completed
```

Field Descriptions

Port	Not applicable
Maintenance Name	Type of maintenance object that is busied out: GTKP
Alt. Name	Not applicable
Result	Test result: Pass, Abort, Fail
Error Code	Numeric code explaining why the busyout failed or aborted. Refer to the detailed list of the codes by test number for each MO.

release link

The **release link** command activates MOs associated with a specified link. Hardware tests are executed to verify that equipment is functioning properly.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
release link	***link-id***	Number associated with each link (1–8). 1through 4 reside on Processor Interface circuit packs “1a1” or “1b1” 5 through 8 reside on Processor Interface circuit pack “1a2” or “1b2.” Examples: **release link 1** **release link 8**	none	none

Output

The following output example is a display of the **release link 1** command.

```
release link 1

                        COMMAND RESULTS

Port   Maintenance Name  Alt. Name  Result  Error Code
01C0301    PI-LINK                  PASS

Command successfully completed
```

Field descriptions

Port — Port address (cabinet-carrier-slot-circuit) of the busied out or released maintenance object. Port address represents the link-id.

Maintenance Name — The type of maintenance object that is being released.

Alt. Name — Not applicable.

Result — Success status of a busied out object (PASS, ABORT, FAIL)

Error Code — System-generated description of a command failure.

release modem-pool

The **release modem-pool** command deactivates specified modem pool groups or group members. Specifying group numbers, member numbers releases single group members. Specifying modem pool group numbers releases members in a modem pool group.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
release modem -pool	***group***	1-5.	none	none
	member	pair of analog and digital line ports (or two pair for the Integrated modem-pool case). 1-32.		
		Examples: **release modem-pool 1** **release modem-pool 4/3**		

Output

The following example shows the output from the **release modem-pool 1** command.

```
release modem-pool 1              SPE B

                        COMMAND RESULTS

Port      Maintenance Name   Alt. Name  Result   Error Code

01C0701      MODEM-PT                   PASS
01C0703      MODEM-PT                   PASS

Command successfully completed
```

Field descriptions

Port — Port address (cabinet-carrier-slot-circuit) of busied out maintenance object.

Maintenance Name — MODEM-PT.

Alt. Name — This field is not applicable to this command.

Result — Success status of a busied out object (PASS, ABORT, FAIL)

Error Code — System-generated description of a command failure.

release packet-control

This command activates the packet-control circuit pack and reestablishes each terminated point-to-point signaling link on this packet-control. This command is the complement to the **busyout packet-control** command. (deactivates packet control and destroys terminated point-to-point signaling links).

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
release packet-control	***location***	location parameter not used. Examples: **release packet-control 1A** **release packet-control 1B**	cabinet 1, carrier A.	See next section

Feature Interactions

When packet-controls in the active control complex are released from previous busied-out states, connectivity across Packet Buses reestablishes. ISDN-BRI point-to-point signaling links reestablish with the **release packet-control** command.

Output

The following output example is a display of the **release packet-control 1A** command.

```
release packet-control 1A

                    COMMAND RESULTS

Port  Maintenance Name   Alt. Name   Result   Error Code

 1A       PKT-CTRL                   PASS

Command successfully completed
```

Field descriptions

Port Cabinet-Carrier where Packet-Control resides.

Maintenance Name PKT-CTRL.

Alt. Name Not applicable.

Result Success status of a busied out object (PASS, ABORT, FAIL).

Error Code System-generated description of a command failure.

release sp-link

The **release sp-link** command reactivates busied out system printer links and resolves active alarms for system printer links.

The system printer link is a link from the switch to an external printer. Administering system printer extensions to call system printers creates the links.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
release sp-link			none	none

Output

The following output example is a display of the **release sp-link** command.

```
release sp-link                SPE A

                        COMMAND RESULTS

Port    Maintenance Name    Alt. Name    Result    Error Code
             SYS-PRNT                     PASS

Command Successfully Completed
```

Field descriptions

Port Port address (cabinet-carrier-slot-circuit) of busied out maintenance objects. ( )

Maintenance Name The type of maintenance object that is being busied out.

Alt. Name

Alternate way to identify maintenance objects.

If the Object is	The field contains
station	extension
trunk	*xxx/yyy* (where *xxx* = trunk group number and *yyy* = member number)
private CO line	*P/xxx* (where *xxx* = private CO line group number)

Result

Success status of a busied out object (PASS, ABORT, FAIL)

Error Code

System-generated description of a command failure.

release station

This command removes specified administered voice terminal extensions from a maintenance busy state.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
release station	***extension***	extension number associated with the desired voice terminal Examples: **release station 10020** **release station 32770**	none	none

Output

The following output example is a display of the **release station 1002** command.

```
release station 1002

                         COMMAND RESULTS

 Port      Maintenance Name    Alt. Name    Result    Error Code
 01C1102       DIG-LINE                     PASS

Command successfully completed
```

Field descriptions

Port

Port address (cabinet-carrier-slot-circuit) of the released maintenance object.

Maintenance Name

Type of released maintenance object.

Alt. Name	Alternate way to identify maintenance objects. This field contains an extension when the object is a station.
Result	Success status of a busied out object (PASS, ABORT, FAIL)
Error Code	System-generated description of a command failure.

release tdm

This command removes specified tdm buses from a maintenance busy state.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
release tdm	*port-network pn number* *bus bus*	specifies the Port Network number of the TDM bus to be released. ("a" or "b") specifies desired half of the TDM bus. Each 512 time slot TDM bus is configured as two duplicate 256 time slot buses. This division allows for duplication of control channels and dedicated tone time slots. The default control bus (carrying the control channel) is the "a" bus, while the default tone bus (carrying dedicated tones) is the "b" bus. (1 - 3) Examples: **release tdm port-network 1 bus a** **release tdm port-network 1 bus b**	none	System tears down busied out buses. No new calls can be administered on busied out buses

Output

The following output example is a display of the **release tdm port-network 1 bus a** command.

```
release tdm port-network 1 bus a

                        COMMAND RESULTS

Port     Maintenance Name   Alt. Name   Result    Error Code
PN 01A       TDM-BUS                   PASS

Command successfully completed
```

Field descriptions

Port	Port network number (preceded by “PN”) and bus (“A” or “B”) associated with the TDM bus.
Maintenance Name	TDM-BUS
Alt. Name	Not applicable.
Result	Success status of a busied out object (PASS, ABORT, FAIL)
Error Code	System-generated description of a command failure.

release tone-clock

This command removes specified tone/clocks from maintenance busy states.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
release tone-clock	***location***	Physical location: **PCsspp** Examples: **release tone-clock c**	1 (one)	none

Output

The following output example is a display of the **release tone-clock 1a** command.

```
release tone-clock 1a

                          COMMAND RESULTS

Port   Maintenance Name   Alt. Name   Result   Error Code
01A          TONE-PT                   PASS
01A          TDM-CLK                   PASS
01A          TONE-BD                   PASS

Command successfully completed
```

Field descriptions

Port — The tone clock circuit pack maintenance object displays the cabinet and carrier of the specified tone/clock board.

Maintenance Name — TONE-PT, TDM-CLK and TONE-BD

Alt. Name — Not applicable.

Result — Success status of a busied out object (PASS, ABORT, FAIL)

Error Code — System-generated description of a command failure.

release trunk

The **release trunk** command removes specified trunk groups or trunk group members from a maintenance busy state. Specifying the group number releases a single group member and the member number. Specifying the trunk group number releases members in a trunk group.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
release trunk	***group***	Group number (1–99)	none	none
	member	Member number (1–99)		
		Examples: **release trunk 78** **release trunk 78/1**		

Output

The following output example is a display of the **release trunk 78/1** command.

```
release trunk 78/1

                          COMMAND RESULTS

 Port     Maintenance Name    Alt. Name   Result    Error Code
 01C1505        CO_TRK           78/01     PASS

Command successfully completed
```

Field descriptions

Port	Port address (cabinet-carrier-slot-circuit) of the released maintenance object.
Maintenance Name	The type of maintenance object that is being released.
Alt. Name	Alternate way to identify maintenance objects.
	If the Object isThe field contains
	stationextension
	trunk*xxx/yyy* (where *xxx* = trunk group number and *yyy* = member number)
	private CO line*P/xxx* (where *xxx* = private CO line group number)
Result	Success status of a busied out object (PASS, ABORT, FAIL)
Error Code	System-generated description of a command failure.

reset board

This command performs a soft reset of every specified administered port on the port circuit pack. Ports must be busied out before the port circuit pack resets.

WARNING:
This command is service disrupting and may cause extraneous alarms.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
reset board	***location***	Physical location: **PCsspp**	carrier = 1	none
	repeat number	Number of times each board reset repeats (1– 00)	repeat number = 1	
		Examples: **reset board 01c11** **reset board c08** **reset board 03d12 r 3**		

Output

The following output example is a display of the **reset board 1c07** command and assumes that the board in port network 1, carrier c, slot 7 is an analog board with three ports administered.

```
reset board 1C07

                              TEST RESULTS

 Port    Maintenance Name    Alt. Name Test No. Result    Error Code
 01C07        ANL-BD                      53     PASS

Command Successfully Completed
```

Field descriptions

Port — Port address (cabinet-carrier-slot) of the reset maintenance object.

Maintenance Name — Type of reset maintenance object.

Alt. Name — Alternate way to identify maintenance objects.

If the Object is	The field contains
stationextension	
trunk*xxx/yyy* (where *xxx* = trunk group number and *yyy* = member number)	
private CO line*P/xxx* (where *xxx* = private CO line group number)	

Result — Success status of a busied out object (PASS, ABORT, FAIL)

Error Code — System-generated description of a command failure.

reset system

This **reset system** command is increasingly destructive as reset levels increase.

The **reset system interchange** command does not disrupt in-progress calls. However, it drops links (including CDR and PMS) to local and remote administration terminals. It also drops and re-establishes connections on the Network Control circuit pack data channels. During the interchange, callers cannot place calls, but current calls are unaffected.

When a system restart occurs with the corresponding vector bit set, a core dump is written to memory card (only if the memory card is the special core dump card), the vector is cleared, and the requested restart is performed.

All successful reset system commands log users off.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
reset system	*level* *health-override*	See below Examples: **reset system 1** **reset system 2** **reset system health-override**	none	see next section

level Reset levels are entered numerically:

1 = Warm Restart

2 = Cold-2

3 = Cold1

4 = Reboot

5 = Extended Reboot

The following table indicates the maintenance objects, their alarms, severities, and restart level that affect an SPE's Fault Severity Level.

Maintenance Object	Alarm Level	On/Off Board	Fault Severity Level	Restart Level
MEM-BD	MAJOR or MINOR	ON	110	Hot or Warm
MEMORY	MAJOR or MINOR	ON	110	Hot or Warm
PROCR	MAJOR	ON	70	Hot or Warm
SW-CTL	MAJOR	ON	65	Cold 2
MEM-CARD	MAJOR	OFF	65	Cold 1

Maintenance Object	Alarm Level	On/Off Board	Fault Severity Level	Restart Level
12V-PWR	MIN	ON	65	Hot
CARR-POW	MAJOR	ON	61	Cold 2
SW-CTL	MINOR	ON	40	Hot
PR-MAINT	MINOR	ON	30	Hot
PI-BD	MAJOR or MINOR	ON	20	Hot
PKT-CTRL	MAJOR	ON or OFF	20	Hot
PKT-CTRL	MINOR	ON or OFF	15	Hot
PI-PT	MAJOR	ON	15	Hot
DATA-CHL	MINOR	ON	15	Hot
DATA-CON	MINOR	ON	15	Hot
DATA-BD	MINOR	ON	15	Hot
MEM-CARD	MINOR	ON or OFF	10	Hot
PR-MAINT	MINOR	OFF	8	Hot

Feature Interactions

- The **reset command** invokes system initialization like low level maintenance. Software never escalates requested reset levels. Technicians determine the levels.
- Restart levels null the effect of the health-override option.

save translation

This command allows users to save to the memory card the in-memory translation data. This command runs as part of scheduled maintenance and/or on demand by the technician. All translation data in memory during system operation is volatile, meaning that if the switch goes down, the system loses all data.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
save translations	*spe-active*	identifies that save translations should occur on the active processor's MSS device. Examples: **save translation** **save translation spe-active**	SPE A	Command cannot be performed if data is being changed by an administration command.

Output

The following output example is a display of the **save translation** command.

```
save translation

                          SAVE TRANSLATION

Processor   Command Completion Status         Error Code
SPE-A       Success                               0


Command Successfully Completed
```

Field descriptions

Processor
Identifies the processor carrier where translation data saves.

Command Completion Status
Displays a variety of messages, identifying the success or failure of the command.

set options

This command enables the technician (that is, remote user with INADS permission) to select which types of maintenance categories report alarms automatically and which types require customer call-in. Judicious use of this command can reduce the number of ineffective alarms to the TSC. For effective results, technicians should use the **set options** command default settings specified in this section. Technicians should not change these settings. Special circumstances (for example, special studies) may require temporary changes under the guidance of Tiers 3 and 4.

NOTE:
Alarms do not upgrade.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
set options			see rest of this section	none

Form Input

The following example is a display of the **set options** command.

```
set options                                          Page 1 of  8

                     ALARM REPORTING OPTIONS

                                          Major  Minor
                 On-board Station Alarms:  w      w
                Off-board Station Alarms:  w      w
     On-board Trunk Alarms (Alarm Group 1):  y     y
    Off-board Trunk Alarms (Alarm Group 1):  w     w
     On-board Trunk Alarms (Alarm Group 2):  w     w
    Off-board Trunk Alarms (Alarm Group 2):  w     w
     On-board Trunk Alarms (Alarm Group 3):  w     w
    Off-board Trunk Alarms (Alarm Group 3):  w     w
     On-board Trunk Alarms (Alarm Group 4):  w     w
    Off-board Trunk Alarms (Alarm Group 4):  w     w
                  On-boar Adjunct Alarms:  w      w
                        Off-board Alarms:  w      w
                   Off-board DS1 Alarms:   w      w
               Off-board PI-LINK Alarms:   w      w
               Off-board Alarms (Other):   w      w
            Memory Card Capacity Alarms:           y
```

```
set options                                          Page  2 of  8

                        TRUNK GROUP ALARM OPTIONS
                                (Alarm Group)

01: 1  11: 1  21: 1  31: 1  41: 1  51: 1  61: 1  71: 1  81: 1  91: 1
02: 1  12: 1  22: 1  32: 1  42: 1  52: 1  62: 1  72: 1  82: 1  92: 1
03: 1  13: 1  23: 1  33: 1  43: 1  53: 1  63: 1  73: 1  83: 1  93: 1
04: 1  14: 1  24: 1  34: 1  44: 1  54: 1  64: 1  74: 1  84: 1  94: 1
05: 1  15: 1  25: 1  35: 1  45: 1  55: 1  65: 1  75: 1  85: 1  95: 1
06: 1  16: 1  26: 1  36: 1  46: 1  56: 1  66: 1  76: 1  86: 1  96: 1
07: 1  17: 1  27: 1  37: 1  47: 1  57: 1  67: 1  77: 1  87: 1  97: 1
08: 1  18: 1  28: 1  38: 1  48: 1  58: 1  68: 1  78: 1  88: 1  98: 1
09: 1  19: 1  29: 1  39: 1  49: 1  59: 1  69: 1  79: 1  89: 1  99: 1
10: 1  20: 1  30: 1  40: 1  50: 1  60: 1  70: 1  80: 1  90: 1
```

NOTE:
Remaining Trunk Group information displays on pages 3-8, and is not documented in this document.

The first page of the Alarm Reporting Options Form provides the following alarm options: the four trunk alarm severity groups, off-board DS1 alarms, PI-LINK alarms, memory card translation capacity alarms, and other off-board alarms. The second page, known as the Alarm Reporting Options Form, provides alarm severity groups to each trunk group.

The following alarm options are available:

- Minor

Maintenance testing discovers raised alarms, downgrades them to minor alarms, and deactivates alarmed resources. LEDs on the port board and maintenance board follow standard minor alarm LED protocol and call receiving OSSs.

- Warning

  Maintenance testing discovers raised alarms, downgrades them to warnings and deactivates alarmed resources. The Alarm Log pinpoints customer-reported trunk or station problems. Alarm LEDs light on the port circuit pack and Maintenance circuit pack as before, but no stations reporting alarms are affected. No call is placed to INADS.

- Report

  The report option treats alarms the same as warnings with one exception: alarms report to INADS with a special WARNING category. When this type of alarm is received, INADS logs the occurrence and creates a trouble ticket or closes it immediately. Retry strategy for this type of call is similar to normal Major or Minor alarm reports. However, the acknowledgment LED on the alarm reporting station does not reflect the status of the call.

- Yes

  Alarms raise normally without filtering alarm data.

- No

  Alarms that raise on trunks or stations in this category drop. Error information displays as before, but an alarm is evident. LED is inactive and calls are not sent to INADS. Because resources are deactivated without any record, this option is recommended only when other options do not provide desired results.

Technicians can administer alarm options on a system-wide basis for the following categories:

- Major on-board station alarms
- Minor on-board station alarms
- Major off-board station alarms
- Minor off-board station alarms

Trunk alarms have four alarm severity groups with administrable alarm options in the categories provided in the following list:

- Major on-board trunk alarms
- Minor on-board trunk alarms
- Major off-board trunk alarms
- Minor off-board trunk alarms

Technicians can administer options for Minor off-board DS1 Interface circuit pack alarms and Minor off-board Memory Card Capacity Alarms on a system-wide basis.

The system inspects alarm reporting options information in the Alarm Reporting Options Form as translation data and preserves it through all restart levels.

This command affects the MO alarming as described in the following sections. Neither the trunk nor the station category applies to alarms raised on the common portion of the circuit pack.

If the option associated with the alarm type is set to “n,” the system drops the alarm report. Alarm error information remains intact, but no records of alarms and no LEDs light on the port circuit pack, the Maintenance circuit pack, the attendant console, or alarm reporting station to indicate a problem.

If technicians set the option “warning” or “report,” port circuit pack LEDs and LEDs on the Maintenance circuit pack are affected the same as warning alarms.

Default parameters are:

- The system downgrades all station, trunk (except on-board trunk alarms), and Minor DS1-BD alarms to warning alarms.
- On-board Major and Minor trunk alarms, and the Memory Card Capacity alarm continue to raise alarms and report to INADS.

Station MOs Affected By This Command

NOTE:
Although alarms on some MOs appear as warnings, they should be investigated with user-reported problems.

- Analog Lines (ANL-LINE)
- Digital Lines (DIG-LINE)
- ISDN-BRI Lines (BRI-PORT, BRI-SET)

If more than 75% of the members of the trunk group alarm, minor alarms escalate to major alarms. If the trunk category option is set to “warning,” “minor,” “report,” or “no,” this no longer happens. Maintenance reactivates individual trunk members according to Major and Minor alarm criteria.

Trunk MOs Affected By This Command:

NOTE:
Although alarms on these MOs may appear as warnings, the alarms should be investigated with user-reported problems.

- DS1 Tie Trunks (TIE-DS1)
- ISDN Trunks (ISDN-TRK)

Circuit Pack MOs Affected By This Command

NOTE:
Although alarms on some MOs appear as warnings, the alarms should be investigated with user-reported problems.

NOTE:
The alarm severity of group one downgrades trunks that are not members of Trunk Groups, (for example, PCOLs).

- DS1 Interface Circuit Pack (DS1-BD)

PI-Link and Associated Link MOs Affected by this Command:

NOTE:
Although alarms on some MOs appear as warnings, the alarms should be investigated with user-related problems.

- See Processor Interface Link [“PI-LINK (Processor Interface Link)”] for other associated Link Maintenance Objects.

Other MOs Affected by this Command

NOTE:
Although alarms on some MOs appear as warnings, the alarms should be investigated with user-related problems.

- ISDN-PRI Signaling Group (ISN-SGR)
- Journal Printer (JNL-PRNT)
- PMS Link (PMS-LINK)
- PMS log printer (PMS-LOG)
- Primary CDR Link (PRI-CDR)
- Synchronization (SYNC)
- System Communication Interface (PI-SCI)
- System Printer (SYS-PRNT)
- TDM Clock (TDM-CLK)
- Tone Generator Circuit Pack (TONE-BD)

set signaling-group

This command upgrades a secondary D-channel in specified signaling groups to primary D-channels. Current primary D-channels then revert to secondary D-channels.

A signaling group is a collection of B-channels that designate single D-channels or a set of D-channels signals over an ISDN-PRI.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
set signaling -group	***group identifier***	administered number associated with each signaling group. Examples: **set signaling-group 1** **set signaling-group 2**	none	none

set synchronization

This command sets DS1 trunks, DI trunks, or active tone/clock circuit packs that supply references for synchronization. The **set synchronization** command works after the **disable synchronization** command disables synchronization. Technicians may administer DS1 trunks, DI trunks, or active tone/clocks with the **set synchronization** command. DS1, DI, or tone/clocks remain synchronization references until the **set synchronization** command runs with another board or until the **enable synchronization** command runs.

After the **enable synchronization** command runs, administered primary or secondary synchronization sources become synchronization references. If no primary or secondary source is administered, synchronization uses active tone/clock boards as synchronization references after synchronization is enabled.

The synchronization subsystem provides error-free digital communication between the switch and other PBXs, COs, or customer premise equipment. System components involved in synchronization include: TDM bus clock, DS1 trunk board, DI trunk board, maintenance and administration software resident in the SPE.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
set synchronization	***location***	Physical location: **PCsspp** (DS1 or DI trunk, or active tone/clock) that supplies a synchronization reference. Examples: **set synchronization 01c08** **set synchronization 02a01** **set synchronization 01a** **set synchronization 02c**	none	none

set tdm

This command establishes the TDM bus on a port network that houses control channels and dedicated tones.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
set tdm	***port network***	specifies the Port Network number of the TDM bus.	none	see next section
	pn number bus	(“a” or “b”) specifies desired half of the TDM bus. Configure each 512 time slot TDM bus as two duplicate 256 time slot buses, allowing duplication of control channels and dedicated tone time slots. A port network number (1 - 3)		
	bus ***override***	forces the setting of a deactivated bus, or a bus whose dedicated tone time slots are active. Examples: **set tdm port-network 2 bus a** **set tdm port-network 2 bus b override**		

Feature Interactions

New calls go to time slots reserved for tones on the bus that do not have other time slots when:

- Time slots on a specified bus are in use
- Dedicated tone time slots are on the other half of the bus

A **set** command to buses that have calls on dedicated tone time slots drops these calls.

set time

This command allows system technicians to change the day of the week, the day of the month, the month, year, hour, and minute. The second field resets to zero (0) whenever the time on the clock is altered, but cannot be modified by the technician. The day of the week, entered as a text string, translates to an integer for internal storage.

The system clock time remains the same if no changes are entered on the form.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
set time			The system assigns a time, if the system clock is not set	The date and time are available to software from a system primitive.

Output

The following example is a display of the **set time** command.

```
set time                                              Page 1 of 1

                          DATE AND TIME

  DATE
    Day of the Week: _________   Month: _________
   Day of the Month: __           Year: ____

  TIME
         Hour: __      Second:
       Minute: __
```

Field descriptions

Day of the Week: Monday through Sunday.

Day of the Month: 1-31. The system also checks for leap year.

Month: January through December.

Year: 1970-2999

Hour: 0-23.

Minute: 0-59

Second: The system sets this field to zero when the time of day clock is set.

status access-endpoint

This command displays diagnoses for internal software and helps to locate facilities with which Access Endpoints communicate.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
status access-endpoint	***extension***	extension number of the access endpoint	none	none
	print	prints reports to MCU-MT printers. Examples: **status access-endpoint 25012** **status access-endpoint 77868** **status access-endpoint 66078 print**		

Output

Refer to the “Access Endpoint Form” section in Chapter 5 of the MCU Administration document for details.

status administered-connection

The **status administered-connection** provides automatic end-to-end connections between two access/data endpoints.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
status administered -connection	***ac number*** print	number assigned to an administered connection. reports print to MCU-MT printers. Examples: **status administered-connection 1** **status administered-connection 50** **status administered-connection 128 print**	none	none

Output

The following output example is a display of **status administered-connection 3** command.

```
status administered-connection 3                page 1 of 1

                 ADMINISTERED-CONNECTION STATUS


   Connection Number:
             Enabled?
          Originator:
         Destination:
    Connection State:
       Failure Cause:
   Number of Retries:
     Auto Restorable?
```

Field descriptions

Connection Number: Number assigned to the administered connection.

Enabled? Is administered connection enabled? (y or n).

Originator: Extension of originating access/data endpoint.

Destination: Destination address used to route administered connections.

Connection State: Current status of the administered connection. (connected, restored, failed, waiting to retry, attempting to restore, attempting to connect, not scheduled, and disabled.

Failure Cause: Reason that the administered connection is attempting to connect, to restore, or failed to restore. If the administered connection was scheduled to be active but is disconnected, this field shows the most recent failure reason.

Number of Retries: Number of consecutive failed establishment attempts.

Auto Restorable? When an administered connection is connected, this field indicates if auto restoration attempts when a failure occurs.

status bri-port

This command displays the service state, maintenance state and layer 1 state of an ISDN-BRI port. This form also displays information about point-to-point signaling links that transport over the port.

For a TN2185 circuit pack, the appropriate trunk group and one or two member numbers are displayed instead of the endpoint extension.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
status bri-port	***location***	Physical location: **PCsspp**	none	none
	print	Report sent to printer.		
		Examples: **status bri-port 1c0701** **status bri-port 1c0701 print**		

Output

The following example shows the output from the **status bri-port 1c1701** command.

```
status bri-port 1c1701                Page 1 of  1  SPE A

                          STATUS BRI-PORT

             Port: 01C1701
    Service State: in-service
Maintenance Busy?: no
    Layer 1 State: activated

     TEI Value  Layer2 State   Endpt Extension   Endpt SPID   Service SPID?

Link1   64      13-established      1010            1010

Link2

Link3
```

Field descriptions

Port: ISDN-BRI port address.

Service State: ISDN-BRI port is "in-service" or "out-of-service."

Maintenance Busy?: specifies if maintenance testing is executing on the ISDN-BRI port ("yes" or "no").

Layer 1 State: BRI Layer 1 (physical) state on the port. Valid states are "activated," "pend-activation," and "deactivated."

"activated" state = layer 1 frames are passing between the port and BRI endpoints.

"pend-activation" state = the port is in-service, the layer 1 interface device is on, layer 1 frames are sending to the BRI endpoints connected to this port, but BRI endpoints are not responding.

"deactivated" state = the layer 1 interface device on the BRI is off, because the port goes out-of-service.

TEI Value Layer 2 addressing parameter used by the switch to exchange information over point-to-point signaling links between BRI endpoints. Each point-to-point signaling link has an associated TEI. This field displays the addressing parameter value. (0–127)

Layer2 State:

Point-to-point signaling link layer 2 state. Valid states are "un-assigned," "assigned," "established," "l3-established" or "hyperactive."

"un-assigned" = the link is in TEI-UNASSIGN state at Layer 2.

"assigned" state = the link is in the AWAIT_EST (Await Establish) state at layer 2. (If BRI endpoints support TEI allocation procedures, they successfully execute and a TEI is assigned to the endpoint by the switch.

"established" = the link is in the MF_EST_NORM (Multi-Frame Established Normal) state at layer 2. The switch successfully initiates the link can now exchange layer 3 frames with the endpoint. If the endpoint does not support SPID initialization procedures, the endpoint extension associated with the link also displays. This is the normal state for the link in the point-to-point wiring configuration.

"l3-established" = link is in the MF_EST_NORM state at layer 2 and SPID initialization procedures successfully complete. The endpoint extension associated with the link also displays. This is the normal state for the link in the multi-point wiring configuration.

"hyperactive" = traffic on this link goes over threshold. The link suspends and is deemed hyperactive.

Endpt Extension

Voice/data endpoint extension associated with the link if the link is in the "established" (point-to-point configuration) or "l3-established" (multipoint configuration) layer 2 state. Otherwise, this field is blank.

Endpt SPID

This field displays the SPID administered on the voice/data endpoint associated with the link. Note that this information is displayed only if the link is in either the "established" (point-to-point configuration) or the "13-established" (multipoint configuration) layer 2 state. Otherwise this field is blank.

Service SPID

Indicates if the link is associated with the Service SPID. If the link is associated with Service SPIDs, the field contains a "yes" and the endpoint extension field is blank; otherwise, this field is blank. Service SPID checks building wiring between the switch and the BRI endpoint.

Status Interpretation

The following table provides information on the status bri-port form.

Table A-3. Status BRI-Port Command Interpretation

Endpoint Types	TEI Range	Layer 2 State	Voice Extension	Service SPID	Description / Recommendation
BRI	0-126	Assigned	blank	blank	Transitory state for BRI endpoints. The switch attempts link establishment. Check endpoints and wiring by following SPID Facility Test Procedures described in the BRI-SET Maintenance documentation. Verify repairs by executing the **status bri-port PCSSpp** command. Determine that L2 state of the signaling link is “L3-Established” for BRI endpoints supporting MIM (management information messages) initialization, and “Established” for fixed TEIBRI endpoints and automatic TEIBRI endpoints not supporting MIM initialization. A MIM is a level-3 message that conveys management and maintenance information between communications systems and BRI terminals.
BRI	0-126	Established	ext	blank	Normal state for non-MIM initializing, fixed and automatic TEIBRI endpoints.
BRI	64-126	Established	blank	blank	Transitory state for automatic TEIBRI endpoints which support MIM initialization. Verify that SPID administration on the switch and endpoint are consistent. Verify the repair by executing the **status bri-port PCSSpp** command. Determine that the L2 state of the signaling link is L3-Established. Otherwise, proceed to Step 2. Try to replace the endpoint. Verify the repair by executing the **status bri-port PCSSpp** command. Determine that the L2 state of the signaling link is L3-Established.

Table A-3. Status BRI-Port Command Interpretation — *Continued*

Endpoint Types	TEI Range	Layer 2 State	Voice Extension	Service SPID	Description / Recommendation
BRI	64-126	L3-Established	ext	blank	Normal state for automatic TEIBRI endpoints supporting MIM initialization.
BRI	64-126	L3-Established	blank	yes	Technicians conduct SPID facilitation tests on the port. Links are not associated with BRI port endpoints. See description of SPID Facility Test Procedures in the BRI-SET and BRI-DAT Maintenance documentation.
BRI	64-126	L3-Established	ext	yes	Technicians conduct SPID facilitation tests on the port. Links are associated with port endpoints. See description of SPID Facility Test Procedures in the BRI-SET and BRI-DAT Maintenance documentation.
BRI	0-126	L3-Established	blank	blank	Invalid SPID assigned to link. Change the SPID value in the BRI endpoint to match the SPID administered to the BRI endpoint on the port. Verify the repair by executing the **status bri-port PCSSpp** command. Determine that the L2 state of the BRI endpoint is L3-Established.
BRI	0-126	L3-Assigned	ext	blank	Transitory state for BRI endpoints which support MIM initialization. Wait for five seconds and repeat the command. If the state has not changed, continue with Step 2. Make sure SPID administration on the switch and endpoint are consistent. Verify the repair by executing the **status bri-port PCSSpp** command. Determine that the L2 state of the signaling link is L3-Established. Otherwise, go to Step 3. Try to replace the endpoint. Verify the repair by executing the **status bri-port PCSSpp** command. Determine that the L2 state of the signaling link is L3-Established.

Table A-3. Status BRI-Port Command Interpretation — *Continued*

Endpoint Types	TEI Range	Layer 2 State	Voice Extension	Service SPID	Description / Recommendation
BRI	0-126	L3-Assigned	ext	yes	Transitory state for BRI endpoints which support MIM initialization when SPID Facility Test initializes the station. Wait for five seconds and repeat the command. If the state has not changed, continue with Step 2. Make sure SPID administration on the switch and endpoints are consistent. Verify the repair by executing the **status bri-port PCSSpp** command. Determine that the L2 state of the signaling link is L3-Established. Otherwise, go to Step 3. Try to replace the endpoint. Verify the repair by executing the **status bri-port PCSSpp** command. Determine that the L2 state of the signaling link is L3-Established.
BRI					Signaling suspends. System timeouts in 60 seconds and attempts reactivate the link. If links remain in this state while no activity occurs at BRI endpoints: Ensure that SPID switch administration and endpoints are consistent. Verify repairs by executing the **status bri-port PCSSpp** command. Determine that the L2 state of the signaling link is L3-Established. Replace the endpoint. Verify repairs by executing the **status bri-port PCSSpp** command. Determine that the L2 state of the signaling link is L3-Established.

status card-mem

Memory cards are portable, compact memory cards that contain banks of flash EPROM chips. Non-volatile memory cards are erasable and randomly programmed with user data. Main memory stores system software in its “flash” section. Memory cards that save translations do not contain copies of the system software. During system reboot or system power down conditions, in-core system maintenance hardware error logs temporarily save in memory cards before the system goes down. The error logs file then reads back when the system restarts. The Hard Patch feature also uses the memory card as temporary storage when LMM applies patched files to the system software.

The **status card-mem** command displays the following memory card information located at SPEs:

- Is a valid memory card in place?
- Is the memory card write-protected?
- What is the capacity of the inserted memory card?
- What kind of system configuration - small or medium?
- What is the number of pulses counted in the last erase operation?
- What is the percentage of translation storage space used?
- What are the names of files stored in the memory card, and what is date and time (if available) when it was saved?

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
status card-mem	***location***	Physical carrier position where the memory card resides	none	see next section
		Report sent to printer.		
		Examples: **status card-mem** **status card-mem A** **status card-mem b print**		
	print			

Feature Interactions

Core Dump features require 10 MB memory cards for saving core dumps. If the memory card has a capacity less than 10 MB, the core dump operation fails.

Output

For following output example is a display of the **status card-mem** command.

```
status card-mem

                        MEMORY CARD STATUS

     Location: 01A               Write Protection: off
       Status: inserted             Capacity (MB): 4 Series 1
  System Size: Medium      Number of Erase Pulses: 78
               Translation Storage Space Used (%): 21


   File Name    Data Present    Date     Time
   translation       y         2/17/91   9:00

Command successfully completed
```

Field descriptions

Location Physical location (carrier) of the memory card.

System Size System configuration (Small or Medium). This information catches errors such as incorrectly-sized memory card inserted into the system.

Capacity Inserted memory card capacity and the series number of the memory card. (a 3-digit format for the memory card size and a 1-digit format for the series number). Memory card file contents are described in the following table.

Capacity of Memory Card

Card Size	User	Customer File Names
10 Mb	Maintenance (core dump)	translation
10 Mb	System Upgrade	system_software

Field descriptions

Status "inserted" = valid memory card is in the memory card slot. When the status is "inserted," the switch can perform I/O operation to the memory card

"no card" = no memory card is inserted or the inserted memory card has a bad connection

"unformatted"= the inserted memory card is unformatted or the switch cannot recognized it.

Write-Protection "on" = the write-protection toggle on the memory card is on. "off" = the write-protection toggle on the memory card is off. If the "Write-Protection" field is "on," the switch cannot store files to the memory card.

Number of Erase Pulses	Number of pulses counted in the last erase operation on a Series 1 memory card. This field is blank for Series 2 memory cards due to different algorithm of erase operations between the two series.
Translation Storage Space Used (%)	Percentage of reserved storage space for storing translation files in the memory card that saves translations to the memory card. This percentage is valid for the specific memory card used in the *most recent* save translation operation (which is implemented with the **save translation** command or with scheduled maintenance and save translation enabled). If the memory card is replaced with another card, or if no save translation is performed on the new memory card, the percentage does **not** indicate the translation storage space used in the new card.
File Name	Each formatted memory card has reserved a fixed space in the card for each file. The starting address and size of each reserved slot is pre-determined according to the capacity of the memory card. The file name as defined in Table "Capacity of Memory Card" is shown in this field.
Data Present	The "Data Present" field is "y" when the file contains valid data. Otherwise, the "Data Present" field has a value of "n."
Date Time	This field shows the date and time when the file was saved into the memory card. For the "Software Upgrade" type of memory card, this field contains the system software release number instead of the time stamp. Due to the restriction of "core dump" file format, the year information is not available in the date/time string.

status cdr-link

This command displays the status of call detail recording (CDR) links. Link up or down status displays. If a link is down, the system displays the number of times the switch attempts link setup.

Call detail recording (CDR) links physically link SPEs to a recording device (for example, printer) for sending CDR call records. CDR links are composed of a data channel on the NETCON board or EIA port on the processor circuit pack, a digital port and a data module. Two CDR links can exist in the system.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
status cdr-link	***print***	Report sent to printer. Examples: **status cdr-link** **status cdr-link print**	none	none

Output

The following example is a display of the **status cdr-link** command.

```
status cdr-link

                        CDR LINK STATUS

         Primary                        Secondary
       Link State: up                   extension not administered
Number of Retries: 0
 Maintenance Busy? no
```

Field descriptions

Link State
Up, down, or unadministered extension.
"up" = link is up and available to the application. (normal state)
"down" = link is physically down.
"Extension not administered" = administer **system cdr feature** form.

Number of Retries
The number of times the switch tries to initialize the link.

Maintenance Busy
"yes" = maintenance object is busied out. "no" = maintenance object is not busied out.

status conference (endpoint)

Technicians use the **status conference** (**endpoint**) command to solve various multimedia problems. For details, refer to Chapter 5 of the MCU Administration document.

status data-module

This command displays internal software state information for diagnosis. This command can help locate facilities to which the data module is communicating.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
busyout mis	***extension***	data module extension	none	none
	print	Report prints if a printer is linked to the MCU-MT. Examples: **status data-module 30000** **status data-module 32770** **status data-module 32770 print**		

Output

For the following output example, the command that was entered is **status data-module 301**.

```
status data-module 301

                          DATA-MODULE STATUS

Data Ext/Stn Ext for Stn DM: 301        Service State: out-of-service
        Port/Channel Number: 01C1103    Maintenance Busy? no
         CF Destination Ext:
            Connected Ports:
```

Field descriptions

Data Ext/Sta Ext for Stn DM	The data module extension number. The DTDM is an exception: the connected station extension is shown.
Port/Channel Number	The port location of the data module (cabinet-carrier-slot-circuit). If the data module specified is a data channel, the channel number is shown instead.
Service State	This entry displays the status of the data module; valid states are: In-service/idle The data module is present but not in use. In-service/active The data module is present and is in use. Out-of-service The data module has been removed from service Disconnected The data module no longer appears to be present
CF Destination Ext	This entry displays the call forwarding destination, if any, of the station.
Maintenance Busy?	Whether maintenance is testing the object, "yes" or "no".
Connected Ports	Port locations to which the data module is connected (cabinet-carrier-slot-circuit).

status esm

This command displays the link status and equipment and software revision identifiers for the Expansion Services Module (ESM).

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
status esm			none	none

Output

The following output example is a display of the **status esm** command.

```
status esm                                                    page 1 of 1

                          SYSTEM STATUS ESM

                       Link Status: up

VINTAGE
                    RMB Product ID: NA
      MSM Interface Card Vintage: 5.3.d
    UNIX System Revision SNumber: 1.1.4
    ESM Software Revision Number: ESM.4.2.07
    State of ESM Process Manager: 1
```

status gatekeeper

This command displays MCU and gatekeeper registration information, H.323 signaling group information and CLAN link information.

Action / Object	Qualifier	Qualifier Description	Defaults	Feature Interaction
Status gatekeeper	print	Report sent to printer	none	none

Output

The following example shows the output from the **status gatekeeper** command and assumes the following:

- The MCU is registered with a Gatekeeper.
- The MCU sent a registration request (RRQ) to the Gatekeeper at 18:00:05 on 11/09.
- The MCU received a Registration Confirm (RCF) message from the Gatekeeper at 18:00:05 on 11/09.
- A gatekeeper is administered in the Far-end node name field on Signaling Group 1.

- Signaling Group 1 is in-service.
- A CLAN is administered in the Near-end node name field on Signaling Group 1. The CLAN is also administered to a data module of type ethernet, which assigns it to link 8.
- Link 8 is connected and is in-service/idle.
- An IP address of 135. 17. 65.129, is assigned to the default Gatekeepers name on the Node Names form.
- An H.323 prefix of 96 is assigned to the default Gatekeepers name on the Node Names form.
- The Gatekeeper has a Time-To-Live of 3314 seconds.
- The Gatekeeper has a ID String of gk-sv.
- The Gatekeeper does not respond to IRR's.
- There is no alternate Gatekeeper.
- The Gatekeeper does not pregrant ARQ's.
- MO GTKP is not alarmed.

```
status gatekeeper
                              GATEKEEPER STATUS

 Registered: yes     Fail Cause:

                                      Un-Reg Req Rcvd(URQ): 00:00:00 00/00
   Reg Request(RRQ): 10:53:58 02/22    Un-Reg Req Sent(URQ): 00:00:00 00/00
      Reg Cfrm(RCF): 10:53:58 02/22   Un-Reg Cfrm Rcvd(UCF): 00:00:00 00/00
       Reg Rej(RRJ): 00:00:00 00/00    Un-Reg Rej Rcvd(URJ): 00:00:00 00/00

          Sig Grp ID: 06            Sig Grp Status: in-service
         Link Number: 06              Link Status: connected
                                  Link Service State: in-service/idle

          IP Address: 135.  8. 18. 70         H.323 Prefix: 806
    Time-To-Live(TTL): 0          sec
Gatekeeper ID String: RVGK
       Respond to IRR: no
Alternate Gatekeeper: no                    PreGranted ARQ: no  0x00000000

        Alarm Status: none            LRQ Ping Test Status: pass
```

Field descriptions

Registered

Displays the registration state of the MCU.

yes: The MCU is registered with the gatekeeper.

no: The MCU is not registered with the Gatekeeper.

Fail Cause	Displays the reason why the MCU is not registered with the Gatekeeper. Some possible reasons are: rcvd RRJ-no reason provided rcvd RRJ-discovery required rcvd RRJ-invalid revision rcvd RRJ-invalid call sig addr rcvd RRJ-invalid RAS addr rcvd RRJ-duplicate alias rcvd RRJ-invalid terminal type rcvd RRJ-undefined reason rcvd RRJ-transport not supported rcvd RRJ-unavailable rcvd RRJ-invalid alias rcvd RRJ-security denial rcvd URQ-no reason provided rcvd URQ-re-registration required rcvd URQ-ttl expired rcvd URQ-security denial rcvd URQ-undefined reason sent URQ-no reason provided sent URQ-re-registration required sent URQ-ttl expired sent URQ-security denial sent URQ-undefined reason rcvd URJ-no reason provided rcvd URJ-not currently registered rcvd URJ-call in progress rcvd URJ-undefined reason rcvd URJ-permission denied rcvd URJ-security denial gatekeeper is busied out
Un-Reg Req Rcvd(URQ)	Displays the time and date the MCU received an Un-Registration Request (URQ) from the Gatekeeper.
Reg Request(RRQ)	Displays the time and date the MCU sent a Registration Request (RRQ) to the Gatekeeper.
Un_Reg Req Sent(URQ)	Displays the time and date the MCU sent an Un-Registration Attempt (URQ) to the Gatekeeper.

Reg Cfrm(RCF)	Displays the time and date the MCU received a Registration Confirmation (RCF) from the Gatekeeper.
Un-Reg Cfrm Rcvd(UCF)	Displays the time and date the MCU received an Un-Register Confirmation (UCF) from the Gatekeeper**.**
Reg Rej(RRJ)	Displays the time and date the MCU received a Registration Reject (RRJ)from the Gatekeeper.
Un-Reg Rej Rcvd(URJ)	Displays the time and date the MCU received an Un-Registration Reject (URJ) from the Gatekeeper.
Sig Grp ID	Displays the signaling group number that the gatekeeper is administered on.
Sig Grp Status	Displays the status of the signaling group. *in-service* *out-of-service*. *not administered:* None of the signaling groups in the system has a Gatekeeper administered in its Far-end Node Names field.
Link Number	Displays the ethernet link number that the CLAN is assigned too.
Link Status	Displays the status of the link. Possible status states are: *no* *yes* *unnavail* *connected* *disconnected* *enabled,* *out-of-service* *restarting* *not administered*: None of the signaling groups in the system has a CLAN administered in its Near-end Node Names field.

Link Service State	Displays the service state of the link. Possible service states are: *in-service/idle* *in-service/active* *disconnected,* *out-of-service* *maintenance busy* *in-service* *in-active* *active* idle
IP Address	Displays the Gatekeepers IP address that is administered on the Node Names form.
H.323 Prefix	Displays the H.323 Prefix that is administered on the Node Names form.
Time-To-Live(TTL)	Displays the duration of the registration, in seconds**.** The MCU must reregister within this time interval to extend registration.
Gatekeeper ID String	Displays the Gatekeepers name that is in received in the RCF.
Respond to IRR	Indicates whether or not the Gatekeeper will acknowledge un-requested Information Request Responses (IRR) *yes:* The Gatekeeper will respond to IIR. *no:* The Gatekeeper will not respond to IIR.
Alternate Gatekeeper	Indicates whether or not an alternative Gatekeeper is used in the event that the primary Gatekeeper does not respond. *yes:* An alternative Gatekeeper is used. *no:* An alternative Gatekeeper is not used.
PreGranted ARQ	Displays events for which the Gatekeeper has pre-granted permission. Allows MCU to not send admission requests (ARQ) for some calls(i.e. dial-in/out). *yes:* The Gatekeeper support Pregranted ARQ. *no:* The Gatekeeper does not support Pregranted ARQ.

status gatekeeper

0x

Displays the bit options/flags, in hex, that are set when PreGranted ARQ is set to yes.

00000001: Use Gatekeeper Call Signal Address to Answer enabled.

00000002: Answer Call enabled.

00000003: Use Gatekeeper Call Signal Address to Answer and Answer Call enabled.

00000004: Use Gatekeeper Call Signal Address to Make Call enabled

00000005: Use Gatekeeper Call Signal Address to Answer and Use Gatekeeper Call Signal Address to Make Call enabled.

00000006: Answer Call and Use Gatekeeper Call Signal Address to Make Call enabled.

00000007: Use Gatekeeper Call Signal Address to Answer, Answer Call, and Use Gatekeeper Call Signal Address to Make Call enabled.

00000008: Make Call enabled.

00000009: Use Gatekeeper Call Signal Address to Answer and Make Call enabled.

0000000A: Answer Call and Make Call enabled

0000000B: Use Gatekeeper Call Signal Address to Answer, Answer Call and, Make Call enabled.

0000000C: Use Gatekeeper Call Signal Address to Make Call and Make Call enabled

0000000D: Use Gatekeeper Call Signal Address to Answer, Use Gatekeeper Call Signal Address to Make Call and, Make Call enabled.

0000000E: Answer Call,Use Gatekeeper Call Signal Address to Make Call, and Make Call enabled.

0000000F: Use Gatekeeper Call Signal Address to Answer, Answer Call, Use Gatekeeper Call Signal Address to Make Call enabled, and Make Call enabled.

Alarm Status

Displays whether or not GTKP is alarmed.

none: GTKP has no alarms.

warning: GTKP has a warning alarm.

minor: GTKP has a warning alarm

major: GTKP has a major alarm.

unknown: The MCU could not determine the alarm state of GTKP

LRQ Ping Test Status	*pass* - indicates that the MCU successfully received an LRQ response from the Gatekeeper *fail* - Indicates that the MCU did not successfully receive an LRQ response from the Gatekeeper.

status isdn-testcall

The **status isdn-testcall** command displays the progress of an outgoing ISDN-PRI test call. The status form displays the tested ISDN-PRI B-channel port number, bit error rate, number of bits transmitted, block error rate, number of blocks transmitted, start time, duration specified, duration of test call and reason of termination.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interac-tions
status isdn-testcall	***group number***	administered number associated with each trunk group.	none	see next section
	group member	administered number identifying a particular trunk within a trunk group.		
	number print	Report prints to MCU-MT-linked printer.		
		Examples: **status isdn-testcall 80/1** **status isdn-testcall 78/1 print**		

Feature Interactions

If the bit error rate or block error rate is greater than zero, the ISDN-PRI trunk may be in trouble. The statistical information displayed on the terminal may deactivate the ISDN trunk. This is subjective because the ISDN trunk may be used for data or voice. If the trunk is used for data and the rates are high, the trunk should be deactivated. If the trunk is used for voice, the trunk may not be deactivated. Also, high rates may be at risk for some type of power hit.

Output

The following output example is a display of the **status idsn-testcall 80/1** command.

```
status isdn-testcall 80/1                  Page 1 of   1   SPE A

                            ISDN TESTCALL STATUS

          Bit    Number Block Number          Duration          Reason
          Error Of      Error Of     Start    Duration  Of      Of
Port      Rate  Bits    Rate  Blocks Time     Specified Test    Termination

1B1401    0EE0  4EE7    0EE0  6EE2   25/12:36 120       100    in progress
```

Field descriptions

Port (cabinet/carrier/slot/circuit) of the ISDN-PRI B-channel.

Bit Error Rate The measured bit error count based on the comparison between sent and received bit patterns. (Number displays in scientific notation.)

Number of Bits Number of bits generated. (Number displays in scientific notation.)

Block error Rate The measured block error count based on the comparison between sent and received bit patterns. (Number displays in scientific notation.)

Number of Blocks Number of blocks generated. (Number displays in scientific notation.)

Start Time Test call start time. (dd/hh:mm).

Duration Specified Specified run time for the test call. (1-120 minutes, or blank = default of 10 seconds).

Duration of Test Run time for the test call, listed in minutes. “blank” = a default time.

Reason of Termination Reason that the test call terminates: “finished,” “canceled,” “overflow,” “no bits,” “transmission,” “internal fail,” “data corrupt,” “call dropped,” “call rejected,” and “in progress.” “finished” = the test finishes in the specified time. “canceled” = the test call cancels with the **clear isdn-testcall** command. “overflow” = the transmitted bits overflow buffer allocation. “no bits” = no bits are received because the ISDN-PRI test call circuit connection is bad. “transmission” = a data transmission interrupts, probably from a power hit. “call dropped” = the call drops due to an abnormal termination, or inability to cut-through to the other side. “call rejected” = the originating call is not set up properly. “internal fail” = an internal error on the Maintenance/Test circuit pack. “in progress” = the test is still running; “data corrupt” = any other error condition.

status login

The **status logins** command displays information about all the users who are currently logged into the system. This information contains the login name, location of physical access, and their currently executing command. The screen does not update automatically and is a snapshot of the logins at the time the request is made. Users may have logged on or off or a command may have

finished executing while the status is being displayed. These updates are not reflected until the next request. The *Active Command* field shows the currently executing commands by users who are logged in. Because of the timing, a command could be terminated by the time the Status Login screen is displayed so that the screen may not always be an accurate representation of current activity.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interac-tions
status isdn-te stcall	print	Report prints to MCU-MT-linked printer. **status logins print**	none	none

Output

The following output example is a display of the **status logins** command.

```
status logins

                              USER LOGIN INFORMATION

 Login  Type      Location   Aux             Active Command                ID

 test   MGR1      01A        1                                             0
 test   IP        01A0317    135.8.18.14                                   2
 test   IP        01A0317    135.8.18.24                                   1
 cust   IP        01A0317    135.8.18.12                                   3
*test   INADS     01A        1               stat logins                   4

Command successfully completed
```

Field descriptions

Login User's login name

Type The type of connection used to login

Location The physical location of the user who is logged in

Aux Additional information about the connection, such as an IP address

Active command Currently executing command by the login

ID Login ID

status pri-endpoint

This command displays internal software state information for diagnosis and can help locate facilities with which a PRI endpoint is communicating. Status information for each of the B-channels making up the PRI endpoint display in addition to some overall PRI endpoint information.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
status pri-end point	***extension***	PRI endpoint extension to be displayed (see dial-plan).	none	none
	print	Report sent to printer		
		Examples: **status pri-endpoint 25012** **status pri-endpoint 77868** **status pri-endpoint 66078 print**		

Output

The following example shows the output for the status pri-endpoint 22501 command and assumes the following:

- PRI endpoint ports for extension 22501 are in cabinet 1, carrier B, slot 20, circuit 1 to 6.
- The ports 1 to 3 of the specified PRI endpoint are connected on an active call to ports 13 to 15 of board in location 1B19 (cabinet 1, carrier B, slot 19).
- Ports 4 and 5 of the specified PRI endpoint are idle.
- Port 6 of the specified PRI endpoint is out of service, and background maintenance testing is being performed on the port.

NOTE:
A PRI endpoint can initiate and receive a call on any one or more of the B-channels making up the PRI endpoint.

```
status pri-endpoint 22501                                page 1 of 1


                        PRI-ENDPOINT STATUS

                    Extension: 22501               Width: 6
            Signaling Group ID: 3       B-Channels Active: 3
 Originating Auto Restoration? n          B-Channels Idle: 2


  Port     Service State       Test In Progress  Connected Port
  01B2001  in-service/active          n          01B1913
  01B2002  in-service/active          n          01B1914
  01B2003  in-service/active          n          01B1915
  01B2004  in-service/idle            n
  01B2005  in-service/idle            n
  01B2006  out-of-service-NE          y


Command Successfully Completed
```

Note that the line listing of each B-channel's status may continue onto the next page. The user is prompted to press the NxtPg key to continue the display.

Field descriptions

Extension	PRI endpoint extension
Width	Administered number of B-channels associated with the specified PRI endpoint
Signaling Group ID	ID number of the signaling group that handles the signaling for the ports in the specified PRI endpoint
Originating Auto Restoration	Administered option for the auto restore feature (restores calls originated from this PRI endpoint in the case of network failure): y = restoration option enabled n = restoration option disabled
B-Channels Active	The number of B-channels active on a call
B-Channels Idle	The number of B-channels in the in-service/idle state
Port	Port locations (cabinet-carrier-slot-circuit) for each of the B-channels making up the PRI endpoint.

Service State

Service state of the B-channels:
in-service/active, in-service/idle, out-of-service-NE, out-of-service-FE, maint-NE/active, maint-FE/active, maint-NE/idle, and maint-FE/idle.

NE (Near End) and FE (Far End) refer to which "end" of the B-channel has placed the facility in the current state. NE refers to the switch and FE refers to the PRI terminal adapter (or any device that terminates the D-channel signaling on the facility).

Test In Progress

Whether or not there is any current maintenance testing on the port.

Connected Port

Connected port location (cabinet-carrier-slot-circuit) for each of the B-channels active on a call.

status signaling-group

This command displays the state, type, port location, and state of the Primary and Secondary D-channels within the group. A signaling group is a collection of B-channels signaled for by a designated single D-channel or set of D-channels over an ISDN-PRI.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
status signaling - group	***group identifier***	Administered group identifier number (1-8)	none	none
	print	Report sent to printer		
		Examples: **status signaling-group 1** **status signaling-group 2 print**		

Output

The following output example shows the output from the **status signaling-group 1** command.

```
status signaling-group 1                    Page 1 of   1   SPE A

                      STATUS SIGNALING-GROUP

       Group ID: 1
           Type: facility associated signaling
   Group State: in-service


                      Primary D-Channel

 Link: 1    Port: 01C1924  Level 3 State: in-service


                     Secondary D-Channel

 Link:    Port:      Level 3 State:
```

Field descriptions

`Group ID:`	Numerical ID of the signaling group (1-8)
`Type:`	`facility associated signaling`: all members are on a single DS-1 facility. `non-facility associated signaling`: members can be carried by multiple DS-1 facilities. The DS-1 facility is identified across the ISDN-PRI using an explicit facility identifier. One D-channel is used to signal for B-channel members.
`Group State:`	`in-service`: one of the D-channels signaling for the group is in service `out-of-service`: neither D-channel in the group is in service If there is no D-channel backup and the primary D-channel is out-of-service, the signaling group is in an out-of-service state.
`Link:`	Link transporting the D-channel
`Port:`	Address of the port transporting either the primary or secondary D-channel

`Level 3 State:`

State of the primary or secondary D-channels:

`in-service`: a D-channel is “in-service” when it is in the multiple-frame-established state at layer 2 carrying normal call-control signaling at layer 3.

`standby`: a D-channel is “standby” when it is in the multiple-frame-established state at layer 2, and not carrying any layer 3 call-control messages on logical link 0,0.

`wait`: a D-channel is in a “wait” state when an attempt has been made by one side of the interface to establish layer 3 peer communications as part of the process of going to the “in-service” state, which is transitional in nature. Only when the `ISDN SERVICE` message is sent over the interface, and the far end of the interface responds with a SERVICE ACKnowledge message is the D-channel placed in the “in-service” state.

`maintenance-busy`: a D-channel is “maintenance-busy” when it is not in the multiple-frame-established state at layer 2. This state is entered automatically when an active D-channel is declared failed. A D-channel that has been placed in the “maintenance-busy” state may be placed in the “out-of-service” state without system technician intervention.

`manual-out-of-service`: a D-channel is “manual-out-of-service” when system technician intervention has caused it to be placed in the TEI-assigned state at layer 2. System Technician intervention is required to retrieve a D-channel from this state.

`out-of-service`: a D-channel is “out-of-service” when it is in the TEI-assigned state at layer 2, but is periodically requested by layer 3 to attempt to establish the link.

`no-link`: no link is administered for the D-channel

status sp-link

This command displays a page of output summarizing the operational status of the system printer link: its link state, number of retries, and whether the link is maintenance busy.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
status sp-link	***print***	Report sent to printer Examples: **status sp-link** **status sp-link print**	none	none

Output

The following example shows the output for the **status sp-link** command.

```
status sp-link                                SPE A


                      SYSTEM PRINTER LINK STATUS

        Link State: up
 Number of Retries:
  Maintenance Busy? no
```

Field descriptions

`Link State:`	Operational mode of the link: `up`: the link is administered and a call is setup between the switch and the system printer. `down`: the link is administered, but a call is not setup between the switch and the system printer. `extension not administered`: the link (no system printer extension) is not administered
`Number of Retries:`	Number of times the switch has tried to set up the link since a request to set up the link was received (1-999); if more than 999 retries have occurred, `999` still displays. (This field displays only if the `Link State:` field is `down`.)
`Maintenance Busy?`	Whether any maintenance testing is being performed on the system printer link: `yes` and `no`: system printer link is administered blank: system printer link is not administered.

status station

This command displays the internal software state information for diagnosis and to help locate the facilities to which the station is communicating.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
status station	***extension***	Station extension (per dial-plan)	none	none
	print	Report sent to printer		
		Examples: **status station 10020** **status station 83277** **status station 83277 print**		

Output

The following example shows the output for the **status station 1002** command.

```
status station 1002


                        GENERAL STATUS

              Type: 7405D          Service State: in-service/on-hook
         Extension: 1002        Maintenance Busy? no
              Port: 01C0702        SAC Activated? no
       Call Parked? no           User Cntrl Restr: none
  Ring Cut Off Act? no          Group Cntrl Restr: none
CF Destination Ext:
   Message Waiting:
   Connected Ports:


       ACD STATUS             HOSPITALITY STATUS

  Agent Logged In   Work Mode          AWU Call At:
                                          User DND: not activated
                                        Group DND: not activated
                                      Room Status: non-guest room
      On ACD Call? no
```

Field descriptions

`Type`	Administered station type
`Extension`	Station or attendant extension
`Port`	Port location: cabinet-carrier-slot-circuit
`Call Park`	Whether the station has a call parked (`yes` or `no`)
`Ring Cut Off Activated`	Whether ring cut off is activated (`yes` or `no`)
`CF Destination Ext`	Call forwarding destination extension, if any.
`Message Waiting`	Whether there is a message waiting for the station. "AP-SPE", "AUDIX", "PMS" or blank if no messages are waiting.
`Connected Ports`	Port locations of the facilities to which the station is connected: cabinet-carrier-slot-circuit
`Agent Logged In`	Displays (underneath) the hunt groups (up to 3) that the agent is logged into
`On ACD Call?`	NA
`Work Mode`	Work mode of each hunt group that an agent is logged into
`Service State`	In service/on-hook, in service/off-hook, out of service, or disconnected.

Maintenance Busy State	Whether maintenance is testing the object (yes or no)
SAC Activated	Whether send all calls is activated (yes or no)
User Cntrl Restr	One or two of the following: none, total, stat-stat, outward or terminate.
Group Cntrl Restr	One or two of the following: none, total, stat-stat, outward or terminate.
AWU Call at	Time that Automatic Wake up Call is scheduled
User DND	Status of the do not disturb feature.
Group DND	Status of the group do not disturb feature.
Room Status	Whether a room is occupied or not (non-guest room, vacant, or occupied).

status synchronization

This command displays the location of the DS1, DI, or Tone-Clock circuit pack that is used for an on-line synchronization reference. The synchronization subsystem provides error free digital communication between the switch and other PBXs, COs, or customer premise equipment. The subsystem is made up of: TDM bus clock, DS1 or DI trunk board, maintenance and administration software resident in the SPE.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
status synchron-ization	***print***	Report sent to printer Examples: **status synchronization** **status synchronization print**	none	none

Output

Refer to the “Synchronization Plan Form” section in Chapter 5 of the MCU Administration document for details.

status system

This command displays the status, mode, and operational attributes of the SPE(s), TDM and Packet Busses, Tone-Clock circuit pack(s), expansion interface links (exp-links), and emergency transfer switch of single or all cabinets in the system.

CAUTION:

The purpose of this command is to provide general information about the cabinet status. This information may not display correctly when the cabinet is in a transient period. In this case, wait for one minute and enter the command again.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
status system	***cabinet***	***1st-cabinet***: PPN ***all-cabinets***: 3-pg. output - 1 for each cabinet * Examples: **status system 1st-cabinet** **status system 2nd-cabinet** **status system 3rd-cabinet** **status system all-cabinets**	none	none

* The status displayed for a cabinet is always related to that cabinet.

Output

The following example shows the output from the **status system all-cabinets** command.

```
status system all-cabinets                Page  1 of  3   SPE B


                        SYSTEM STATUS CABINET 1

                           SELECT  SPE ALARMS    TONE/  SERVICE SYSTEM  SYSTEM
SPE MODE                   SWITCH  MAJOR MINOR   CLOCK  STATE   CLOCK   TONE
1A  busyout/not-refreshed  auto      n     y     1A     in      active active
1B  active                 auto      n     n     1B     in      active  active


    SERVICE   CONTROL  DEDICATED       SERVICE  BUS ALARMS   BUS   OPEN BUS
TDM  STATE    CHANNEL    TONES    PKT   STATE  MAJOR MINOR  FAULTS  LEADS
1A    in         y         n      1       in     n     n       0      0
1B    in         n         y


EMERGENCY   SELECT               SERVICE        CABINET
TRANSFER    SWITCH    EXP-LINK    STATE   MODE     TYPE
1A          auto-off  01A01-02A01  out    down     SCC-MSM
1B          auto-off  01B01-02B02  in     active
                      01A02-03A01  in     active
                      01B02-03B02  in     active
```

Field descriptions

SPE	Switch Process Element (SPE) identifier: 1A or 1B
SELECT SWITCH	SPE select switch position:
	auto: the switch is in the middle position and automatically switches SPE depending upon conditions
	spe-a: spe-a position
	spe-b: spe-b position
PE ALARMS - MAJOR	Number of Major alarms associated with the SPE complex that affect the fault severity level of this SPE.
SPE ALARMS - MINOR	Number of Minor alarms associated with the SPE complex that affect the fault severity level of this SPE.
TONE/CLOCK	Location of the tone-clock circuit pack. Valid locations are 1A, 1B, 2A, 2B, 3A, and 3B.
SERVICE STATE	in: Tone-Clock is installed and is in-service
	out: Tone-Clock failed certain maintenance tests and has been removed from service
SYSTEM CLOCK	Shows which Tone-Clock supplies the system clock for the cabinet displayed:
	active: Tone-Clock active and supplying system clock
	down: Tone-Clock failed some maintenance activity and cannot supply the system clock for this cabinet.
SYSTEM TONE	Shows which Tone-Clock circuit pack supplies the system tones for the cabinet being displayed.
	active: Tone-Clock active and supplying system tones
	down: Tone-Clock failed some maintenance activity and cannot supply the system tones for this cabinet.
TDM	The TDM Bus identifier (1A, 1B, 2A, 2B, 3A and 3B)
SERVICE STATE	Operational state of the TDM Bus circuit pack:
	in: TDM Bus installed and is in-service
	out: TDM Bus failed certain maintenance tests and has been removed from service
CONTROL CHANNEL	Whether the control channel is on this TDM Bus (y or n)
DEDICATED TONES	Whether the dedicated tones are on this TDM Bus (y or n)

PKT	Packet Bus identifier (same as the cabinet number: 1, 2, or 3). If the system is running on a X75XE cabinet, all the PKT fields are blank and the following message displays: S75XE does not support Packet Refer to Packet Bus Maintenance descriptions in Chapter 9 for more information.
SERVICE STATE	The operational state of the Packet Buses: in: Packet Bus in-service and operating normally. out: Packet Bus failed certain maintenance tests and has been removed from service. <blank> System does not have the Packet Bus feature.
BUS ALARMS-MAJOR	Whether Major alarms exist for packet bus components (y or n)
BUS ALARMS-MINOR	Whether Minor alarms exist for packet bus components (y or n)
BUS FAULTS	Number of faulty bus leads (defined as shorted to another lead, stuck at some value, or an open lead: 0 - 24). This field may take on any integer between 0 and 24. This field displays blank if: Maintenance/Test circuit pack not present Packet Bus port of the Maintenance/Test circuit pack has been taken out-of-service System does not have the Packet Bus feature
OPEN BUS LEADS	Number of open bus leads between the Maintenance/Test circuit pack and bus terminator (0 - 24). This could mean physical damage to the backplane or its connectors or a missing bus terminator. This field displays blank if: Maintenance/Test circuit pack is not present Packet Bus port of the Maintenance/Test circuit pack has been taken out-of-service System does not have the Packet Bus feature.
EMERGENCY TRANSFER	NA
SELECT SWITCH	Emergency Transfer Switch position on the Processor(s): on: Designated analog phones in this cabinet are cut through to CO trunk lines only in an emergency situation. off: Emergency Transfer is off and cannot be invoked. The switch should only be in this state when a service technician is on sight. auto-on: The switch is in auto position; however, because of a serious system fault, system software has invoked Emergency Transfer. auto-off: Switch is in the auto position; because system has no serious faults, system software has not invoked Emergency Transfer
EXP-LINK	NA
SERVICE STATE	NA

MODE	blank
CABINET TYPE	MCC-MSM: Medium Carrier Cabinet (up to 5 carriers)
	SCC-MSM: Single Carrier Cabinet (up to 4 carriers)
	ESCC: Enhanced Medium Carrier Cabinet (up to 4 carriers)

SPE Modes

SPE Modes

active	1A SPE is always the active SPE
blank	No 1B SPE

Busyout Modes

busyout/idle	SPE busied out and there is no current maintenance activity. The active SPE can be either active or selected.
busyout/entering	SPE busied out and in the process of restarting the switch software on this SPE.
busyout/testing	SPE busied out; however, the switch software on this SPE has been restarted and is currently in the process of executing a **test** command.
busyout/ list-config	SPE busied out; however, the switch software on this SPE has been restarted and is currently executing a **list configuration** command.
busyout/status	SPE busied out; however, the switch software on this SPE has been restarted and is currently in the process of executing a **status card-mem** command.

Maintenance Modes

maint/init	SPE in maintenance mode (system restarted within the last 10 minutes).
maint/idle	SPE in maintenance mode, but no current maintenance activity. The active SPE can be either active or selected.
maint/entering	SPE currently restarting the switch software on this SPE.
maint/testing	SPE in maintenance mode executing a **test** command.
maint/ not-refreshed	SPE in maintenance mode executing a destructive background maintenance test that has temporarily left the standby memory not refreshed.
maint/not-tested	SPE in maintenance mode because previously the active SPE had been selected with the SPE select switches.
maint/list-config	SPE in maintenance mode and currently executing a **list configuration** command.
maint/save trans	SPE in maintenance mode and is currently executing a **save translation** command.
maint/save announce	SPE in maintenance mode and currently executing a **save announcement** command.

`maint/status`	SPE in maintenance mode and currently executing a **status card-mem** command.
`maint/periodic`	SPE in maintenance mode and currently performing periodic background maintenance
`maint/scheduled`	SPE in maintenance mode and currently performing daily scheduled background maintenance.
`maint/analysis`	SPE in maintenance mode and currently performing background maintenance testing in response to a reported trouble by some component in the SPE.
`maint/upgrade`	SPE in maintenance mode and currently performing a software upgrade.
Down Modes	
`down/bad_upgrade`	SPE in down mode (software upgrade attempt failed).
`down/idle`	SPE in down mode; however, no maintenance activity is currently taking place. The SPE could be either active or selected.
`down/entering`	SPE in down mode, but is currently trying to restart the switch software on this SPE.
`down/testing`	SPE in down mode attempting to execute a **test** command.
`down/analysis`	SPE in down mode and currently performing background maintenance testing to determine if the problem has been corrected.

status trunk

This command displays internal software state information for diagnosis and can help locate facilities to which the trunk is communicating. If a trunk group number is entered without a member number, a list showing the status for each member in the specified group displays. If both the trunk group and member numbers are entered, the status for only the specified member displays.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interac-tions
status trunk	***group***	Administered group number (1 - 99). If group number entered without a member number, a list showing the status of each member in the group displays.	none	none
	member	Administered member number within a trunk group (1 - 99)		
	print	Report sent to printer.		
		Examples: **status trunk 78** **status trunk 80** **status trunk 78/1** **status trunk 80/2** **status trunk 80/2 print**		

Output

Group/member

The following example shows the output for the **status trunk 78/1** (trunk group/member) command.

For a TN2185 circuit pack, *BRI B-channel* contains **1** or **2**.

```
status trunk 78/1


                          TRUNK STATUS

Trunk Group/Member: 078/001           Service State: in-service/idle
              Port: 01C1505         Maintenance Busy? no
Signaling Group ID:                     CA-TSC State:
   Connected Ports:
```

Field descriptions (group/member)

Trunk Group/Member	Trunk group number/group member number (1-99/1-99)
Port	Port location (cabinet-carrier-slot-circuit)
Signaling Group ID	If trunk is ISDN, then this field displays the number of the ISDN Signaling Group to which this group belongs; otherwise, the field is blank. **NOTE**: For a TN2185 circuit pack, this field is blank.
Connected Ports	Port locations (cabinet-carrier-slot-circuit) connected to the trunk
Service State	Trunk service state: in-service/active, in-service/idle, out-of-service-NE, out-of-service-FE, maint-NE/active, maint-FE/active, maint-NE/idle, and maint-FE/idle. NE (Near End; switch) and FE (Far End; PRI terminal adapter or any device that terminates the D-channel signaling) refer to which “end” of the B-channel has placed the facility in the current state.
Maintenance Busy	Whether any maintenance testing is being performed
CA-TSC State	State of the temporary signaling connection (used to pass call information over PRI signaling links) For a TN2185 circuit pack, this field contains **none**.

Group only

The following example shows the output from the **status trunk 78** (trunk group only) command.

```
status trunk 78


                        TRUNK GROUP STATUS

Member    Port     Service State     Mtce Connected Ports
                                     Busy
078/001   01C1505 in-service/idle   no
078/002   01C1506 in-service/idle   no
```

Field descriptions

Member	Trunk group number/group member number (1-99/1-99).
Port	Port location (cabinet-carrier-slot-circuit)
Service State	Trunk service state: in-service/active, in-service/idle, out-of-service-NE, out-of-service-FE, maint-NE/active, maint-FE/active, maint-NE/idle, and maint-FE/idle. NE (Near End; switch) and FE (Far End; PRI terminal adapter or any device that terminates the D-channel signaling) refer to which “end” of the B-channel has placed the facility in the current state.
Mtce Busy	Whether any maintenance testing is being performed
Connected Ports	Port locations (cabinet-carrier-slot-circuit) connected to the trunk

test access-endpoint

This command performs hardware diagnostic tests on all port circuits that are associated with the specified access endpoint extension.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interac-tions
test access-endpoint	***extension***	Access endpoint extension (# of digits determined by dial-plan)	Test sequence = short; repeat = 1	none
	short	Option for a brief series of nondestructive diagnostic tests.		
	long	Option for a longer, more comprehensive test series (includes a destructive test)		
	repeat number	How many times each test in the sequence is repeated (1-100)		
	clear	This option causes the test sequence (short or long) to repeat until the alarm (if any) is cleared or a single test in the sequence fails.*		
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.†		
		Examples: **test access-endpoint 25012** **test access-endpoint 45002 sh** **test access-endpoint 45892 l** **test access-endpoint 24389 sh r 4** **test access-endpoint 34899 l r 6** **test access-endpoint 34912 l r 5 schedule** **test access-endpoint 93483 r 2** **test access-endpoint 10022 c** **test access-endpoint 92349 schedule**		

* If no alarms are registered against the maintenance object then the test sequence is run only once. The ***long clear*** option forces a clear of all alarms if no errors are encountered during testing. The ***short clear*** option only clears alarms pertinent to tests in the short sequence.

† Refer to the Report Scheduler and System Printer feature specification for more details.

Output

The following example shows the output for the **test access-endpoint 22502** command, and assumes the access endpoint ports for extension 22502 are in cabinet 1, carrier C, slot 11, circuit 1 to 6. The responses are displayed on a port-by-port and test-by-test basis with one line of data for each test result.

```
test access-endpoint 22502 short                    page 1 of 1

                              TEST RESULTS

  Port      Maintenance Name  Alt. Name Test No. Result      Error Code
  01C1101   WAE-PORT          22502       36     PASS
  01C1102   WAE-PORT          22502       36     PASS
  01C1103   WAE-PORT          22502       36     PASS
  01C1104   WAE-PORT          22502       36     PASS
  01C1105   WAE-PORT          22502       36     PASS
  01C1106   WAE-PORT          22502       36     PASS


Command Successfully Completed
```

Field descriptions

`Port`	Port address (cabinet-carrier-slot-circuit)
`Maintenance Name`	The name of maintenance object (wideband access endpoint = WAE-PORT; single port access endpoint = TIE-DS1)
`Alt. Name`	The extension number of the access endpoint
`Test No`	The test being executed
`Result`	Test result: Pass, Abort, Fail, No Board, Disabled
`Error Code`	Numeric code explaining why the release failed or aborted. Refer to the detailed list of the codes by test number for each MO.

test board

This command performs a set of hardware diagnostic tests on a specified circuit pack. The system first validates that the board exists at the specified location. Then, based on the logical type of board (for example, digital), a series of tests perform diagnostics on the board and then return results of the test along with any possible error codes. Some of the tests can be disabled by administering forms on the administration terminal.

test board

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Inter-actions
test board	***location***	Physical location of the board **PCSS**	Test sequence = short; repeat = 1	none
	short	Option for a brief series of nondestructive diagnostic tests.		
	long	Option for a longer, more comprehensive test series (includes a destructive test)		
	repeat number	How many times each test in the sequence is repeated (1-100)		
	clear	This option causes the test sequence (short or long) to repeat until the alarm (if any) is cleared or a single test in the sequence fails.*		
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.†		
		Examples: **test board 01c11 l** **test board 01c11 l schedule** **test board 02e15 sh r 2** **test board 01c08** **test board 02d12 r 4** **test board 02d12 c**		

* If no alarms are registered against the maintenance object then the test sequence is run only once. The ***long clear*** option forces a clear of all alarms if no errors are encountered during testing. The ***short clear*** option only clears alarms pertinent to tests in the short sequence.

† Refer to the Report Scheduler and System Printer feature specification for more details.

Output

The following example shows the output from the **test board 1c07 short** command. The responses display on a test-by-test basis with one line of data for each test result.

```
test board 01C07 short


                          TEST RESULTS

  Port      Maintenance Name  Alt. Name Test No. Result       Error Code
  01C07     ANL-BD                      51       PASS
  01C07     ANL-BD                      52       PASS
  01C0703   ANL-LINE                    35       PASS
  01C0703   ANL-LINE                    48       PASS
  01C0703   ANL-LINE                    36       PASS
  01C0701   ANL-LINE                    35       PASS
  01C0701   ANL-LINE                    48       PASS
  01C0701   ANL-LINE                    36       PASS
  01C0702   ANL-LINE                    35       PASS
  01C0702   ANL-LINE                    48       PASS
  01C0702   ANL-LINE                    36       PASS


Command Successfully Completed
```

Field descriptions

`Port`	Port address (cabinet-carrier-slot-circuit)
`Maintenance Name`	The name of maintenance object
`Alt. Name`	Alternate way to identify maintenance objects. If the Object isThe field contains stationextension trunk*xxx/yyy* (where *xxx* = trunk group number and *yyy* = member number) private CO line*P/xxx* (where *xxx* = private CO line group number)
`Test No`	The test being executed
`Result`	Test result: Pass, Fail, Abort, Disabled, No Board, or Extra Board.
`Error Code`	Numeric code explaining why the release failed or aborted. Refer to the detailed list of the codes by test number for each MO.

test card-mem

This command executes a sequence of tests on the memory card in the specified SPE. The test sequences in order for both long and short options are listed in the following table:

Test	Short	Long
12 Volt Power Supply Test (#701)	X	X

test card-mem

Test	Short	Long
Memory Card Insertion Test (#695)	X	X
Memory Card Format and Read Test (#696)	X	X
Memory Card Match Test (#697)	X	X
Memory Card Write-Protected Test (#698)	X	X
Memory Card Directory Recovery Test (#699)	X	X
Memory Card Translation Data Integrity Test (#694)		X
Memory Card Erase/Write/Read Test (#693)		X
Memory Card Capacity Test (#1014)		X
Flash Data Consistency Test (#421)		X

These tests verify the sanity of the memory card device, the basic read/erase/write operations to the memory card, the integrity of the translation data stored in the memory card, the function of 12 volt power supply in the TN777B NETCON circuit pack used for memory card erase/write operations, and the translation capacity of the memory card. This command can also help troubleshoot the following hardware errors: CARD-MEM and 12V-PWR.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Inter-actions
test card-mem	***location***	Carrier location where memory card resides	Test sequence = short; repeat = 1	See next section
	short	Option for a brief series of nondestructive diagnostic tests.		
	long	Option for a longer, more comprehensive test series (includes a destructive test)		
	repeat number	How many times each test in the sequence is repeated (1-100)		
	clear	This option causes the test sequence (short or long) to repeat until the alarm (if any) is cleared or a single test in the sequence fails.*		
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.†		
		Examples: **test card-mem** **test card-mem a l** **test card-mem b sh r 2** **test card-mem a sch** **test card-mem a c**		

* If no alarms are registered against the maintenance object then the test sequence is run only once. The ***long clear*** option forces a clear of all alarms if no errors are encountered during testing. The ***short clear*** option only clears alarms pertinent to tests in the short sequence. SEE the following WARNING.

† Refer to the Report Scheduler and System Printer feature specification for more details.

WARNING:

Since the "clear long" option clears all counters if tests pass, it is possible for firmware counters to be cleared even when a problem exists. In some cases customer service might degrade since calls may be routed over defective equipment.

Feature Interactions

The **test card-mem long** command invokes the Memory Card Erase/Write/Read Test. This means that the **save translation** command is rejected while the write-to-memory-card operation is active. This test also invokes the Memory Card Capacity Test, which determines whether the memory card is more than 98% full. This test is also invoked after the **save translation** command.

Output

The following example shows the output from the **test card-mem a long** command. The responses display on a test-by-test basis with one line of data for each test result.

```
test card-mem a long                              SPE A


                 TEST RESULTS

  Port    Maintenance Name  Alt. Name Test No. Result      Error Code
  01A     12V-PWR                     701      PASS
  01A     CARD-MEM                    695      PASS
  01A     CARD-MEM                    696      PASS
  01A     CARD-MEM                    697      PASS
  01A     CARD-MEM                    698      PASS
  01A     CARD-MEM                    699      PASS
  01A     CARD-MEM                    694      PASS
  01A     CARD-MEM                    693      PASS


Command successfully completed
```

Field descriptions

Port	Port address (cabinet-carrier-slot-circuit): cabinet 1, carrier is ***A***. The slot and circuit fields in the port address for the 12V-PWR and CARD-MEM maintenance objects are always blank.
Maintenance Name	The name of maintenance object being tested: CARD-MEM for the memory card 12V-PWR for 12-volt power supply in TN777B NETCON board
Test No	The test being executed
Result	Test result: Pass, Fail, or Abort
Error Code	Numeric code explaining why the release failed or aborted. Refer to the detailed list of the codes by test number for each MO.

test cdr-link

This command first validates that the Call Detail Recording (CDR) link has been administered and exists in the switch. Then individual diagnostic tests run on the link and return results of the test along with any possible error codes.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Inter-actions
test cdr-link	***link-id***	Link-id = ***primary*** or ***secondary***	Test sequence = short; repeat = 1	none
	short	Option for a brief series of nondestructive diagnostic tests.		
	long	Option for a longer, more comprehensive test series (includes a destructive test)		
	repeat number	How many times each test in the sequence is repeated (1-100)		
	clear	This option causes the test sequence (short or long) to repeat until the alarm (if any) is cleared or a single test in the sequence fails.*		
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.†		
		Examples: **test cdr-link primary l** **test cdr-link secondary sh r 2** **test cdr-link primary** **test cdr-link secondary** **test cdr-link secondary c** **test cdr-link primary schedule**		

* If no alarms are registered against the maintenance object then the test sequence is run only once. The ***long clear*** option forces a clear of all alarms if no errors are encountered during testing. The ***short clear*** option only clears alarms pertinent to tests in the short sequence.

† Refer to the Report Scheduler and System Printer feature specification for more details.

Output

The following example shows the output for the **test cdr-link primary** command. The responses display on a test-by-test basis with one line of data for each test result.

```
test cdr-link primary short

                          TEST RESULTS

  Port    Maintenance Name  Alt. Name Test No. Result       Error Code
          PRI-CDR                     215      PASS


Command Successfully Completed
```

Field descriptions

Port	Not applicable (always blank)
MaintenanceName	The type of MO being tested: primary cdr-link= PRI-CDR; secondary cdr-link = SEC-CDR
Alt. Name	Not applicable (always blank)
Test No	The test being executed
Result	Test result: Pass, Abort, Fail, Disabled
Error Code	Numeric code explaining why the release failed or aborted. Refer to the detailed list of the codes by test number for each MO.

test customer-alarm

This command performs hardware diagnostic tests on the leads of the Processor circuit pack used for customer-provided alarms by closing the appropriate relay for one minute. Failure is verified by checking the customer alarm attached to the specified circuit pack.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Inter-actions
test customer-alarm	***location***	Extension of the data module or data channel to be tested (per dial-plan)	See next section	none
	short	Runs test number 115		
	long	Runs test number 115 (same as short test option)		
	repeat number	How many times each test in the sequence is repeated (1-100)		
	clear	This option causes the test sequence (short or long) to repeat until the alarm (if any) is cleared or a single test in the sequence fails.*		
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.†		
		Examples: **test customer-alarm** **test customer-alarm schedule** **test customer-alarm 02 r 2** **test customer-alarm 01b r 25** **test customer-alarm 01b r 25 schedule** **test customer-alarm 2a** **test customer-alarm 2a sh** **test customer-alarm 01b l schedule** **test customer-alarm 3 c**		

* If no alarms are registered against the maintenance object then the test sequence is run only once. The ***long clear*** option forces a clear of all alarms if no errors are encountered during testing. The ***short clear*** option only clears alarms pertinent to tests in the short sequence.

† Refer to the Report Scheduler and System Printer feature specification for more details.

Defaults

The default cabinet is cabinet 1. The default carrier is carrier “a”. The default for the remaining parameter is a repeat of 1.

Output

The following example shows the output from the **test customer-alarm 02a** command.

```
test customer-alarm 02A

                                TEST RESULTS

  Port    Maintenance Name  Alt. Name Test No. Result       Error Code
  02A     CUST-ALM                    115      PASS

Command Successfully Completed
```

Field Definitions

Port	The port address (cabinet-carrier-slot)
Maintenance Name	The maintenance name (always CUST-ALM)
Alt. Name	Not applicable
Test No.	The test number (always 115)
Result	Test result: Pass, Abort, or Fail
Error Code	Numeric code explaining why the release failed or aborted. Refer to the detailed list of the codes by test number for each MO.

test data-module

This command performs hardware diagnostic tests on a data module or data channel. Test results are determined by the interface to the digital switch-data line port, digital line port, or network control data channel.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Inter-actions
test data-module	***extension***	Extension of the data module or data channel to be tested (per dial-plan)	Test sequence = short; repeat = 1	none
	short	Option for a brief series of nondestructive diagnostic tests.		
	long	Option for a longer, more comprehensive test series (includes a destructive test)		
	repeat number	How many times each test in the sequence is repeated (1-100)		
	clear	This option causes the test sequence (short or long) to repeat until the alarm (if any) is cleared or a single test in the sequence fails.*		
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.†		
		Examples: **test data-module 30000 l** **test data-module 30000** **test data-module 32000 sh r 2** **test data-module 33000 l r 25** **test data-module 33000 l r 25 schedule** **test data-module 30000 c**		

* If no alarms are registered against the maintenance object then the test sequence is run only once. The ***long clear*** option forces a clear of all alarms if no errors are encountered during testing. The ***short clear*** option only clears alarms pertinent to tests in the short sequence. SEE the following WARNING.

† Refer to the Report Scheduler and System Printer feature specification for more details.

WARNING:

Since the "clear long" options clear all counters if tests pass, it is possible for firmware counters to be cleared even when a problem exists. In some cases

customer service might degrade since calls may be routed over defective equipment.

Output

The following example shows the output from the **test data-module 300** command. The responses display on a test-by-test basis with one line of data for each test result.

```
test data-module 300

                              TEST RESULTS

  Port      Maintenance Name  Alt. Name Test No. Result       Error Code
  01C1103   PDMODULE                      17     PASS

Command successfully completed
```

Field Definitions

Port	Port address (cabinet-carrier-slot-circuit)
Maintenance Name	The name of maintenance object
Alt. Name	Alternate way to identify maintenance objects. If the Object isThe field contains stationextension trunk*xxx/yyy* (where *xxx* = trunk group number and *yyy* = member number) private CO line*P/xxx* (where *xxx* = private CO line group number)
Test No	The test being executed
Result	Test result: Pass, Fail, Abort, No Board
Error Code	Numeric code explaining why the release failed or aborted. Refer to the detailed list of the codes by test number for each MO.

test environment

This command performs hardware diagnostic tests of the environment monitoring and control, and emergency transfer functions of Processor Port Network (PPN) cabinets. The Processor circuit pack is involved.

The following Maintenance Objects are involved in this testing:

- DC-POWER tests power availability, battery charging and temperature functions in SCC-MSM cabinets only.
- EXT-DEV tests external (AUDIX, for example) alarm status for both the SCC-MSM and MCC-MSM cabinet systems.
- POWER tests battery backup

NOTE:
The processor carrier is not recycled. All port carriers are recycled, and service is interrupted for each port carrier. If a carrier containing an active EI is recycled, communications with that cabinet is disrupted. If a carrier containing an active tone-clock board is recycled, all ports in the cabinet or port network are service disrupted.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Inter-actions
test environment	***location***	Cabinet 1 = PPN.	Cabinet = 1; test sequence = short; repeat = 1	See next section
	short	Option for a brief series of nondestructive diagnostic tests.		
	long	Option for a longer, more comprehensive series of both destructive and nondestructive diagnostic tests.		
	repeat number	How many times each test in the sequence is repeated (1-100)		
	clear	This option causes the test sequence (short or long) to repeat until the alarm (if any) is cleared or a single test in the sequence fails.*		
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.†		
		Examples: **test environment** **test environment schedule** **test environment 1 sh** **test environment 1 l r 25** **test environment 01 l r 25** **test environment 01 l r 25 schedule** **test environment 2 l c** **test environment 3 c**		

* If no alarms are registered against the maintenance object then the test sequence is run only once. The ***long clear*** option forces a clear of all alarms if no errors are encountered during testing. The ***short clear*** option only clears alarms pertinent to tests in the short sequence.

† Refer to the Report Scheduler and System Printer feature specification for more details.

Feature Interactions

The long test recycles power in some specified cabinet on non-SPE and maintenance board carriers and is destructive. Specifically, the 'a' carrier of PPNs does not have power recycled. All port carriers are recycled, and service is interrupted for each port carrier. If a carrier containing an active EI is recycled, communication with that cabinet is disrupted. If a carrier containing an active tone-clock board is recycled, all ports in the cabinet or port network are service disrupted.

Output

The following example shows the output for the **test environment 1** command to test a MCC/PPN cabinet. The responses display on a test-by-test basis with one line of data for each test result.

```
test environment 1


                          TEST RESULTS

  Port    Maintenance Name  Alt. Name Test No. Result       Error Code
  01      POWER                         5      PASS
  01      AC-POWER                     79      PASS
  01A     CARR-POW                    127      PASS
  01B     CARR-POW                    127      PASS
  01C     CARR-POW                    127      PASS
  01D     CARR-POW                    127      PASS
  01E     CARR-POW                    127      PASS
  01      CABINET                     122      PASS
  01      EXT-DEV                     120      PASS


Command Successfully Completed
```

Field descriptions

Port	Port address (cabinet-carrier). Only the cabinet value is displayed.
Maintenance Name	The name of maintenance object
Alt. Name	Not applicable
Test No.	The test being executed.
Result	Test result: Pass, Abort, Fail, Disabled
Error Code	Numeric code explaining why the release failed or aborted. Refer to the detailed list of the codes by test number for each MO.

The following example show the output for the **test environment 2** command, where cabinet 2 is an SCC cabinet.

```
test environment 2


                              TEST RESULTS

  Port    Maintenance Name  Alt. Name Test No. Result       Error Code
  02      DC-POWER                      5      PASS
  02      EXT-DEV                     120      PASS


Command Successfully Completed
```

test gatekeeper

This command performs a set of test to help the user determine whether or not the MCU is registered to Gatekeeper.

Table 0-1. Test Gatekeeper

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Inter-actions
Test gatekeeper	Short	Option for a brief series of nondestructive diagnostic tests	Test Sequence = short; repeat = 1	None
	Long	Option for a longer, more comprehensive test series (includes a destructive test)		
	repeat number	How may times each test in the sequence is repeated (1-100)		
	clear	This option causes the test sequence (short or long) to repeat until the alarm (if any) is cleared or a single test in the sequence fails. If no alarms are registered against the maintenance object then the test sequence is run only once. The **long clear** option forces a clear of all alarms if no error are encountered during testing. The **short clear** option only clears alarms pertinent to tests in the short sequence.		
		Examples: test gatekeeper test gatekeeper l test gatekeeper l r 5		

Feature Interactions

None

Output

The following example shows the output from the **test gatekeeper** command. This responses display on a test-by-test basis with one line data for each test.

```
test gatekeeper

                              TEST RESULTS

  Port    Maintenance Name  Alt. Name Test No. Result       Error Code
         GTKP                          1178 PASS
         GTKP                          1179 PASS


Command Successfully Completed
```

Field Descriptions

Port	Not applicable
Maintenance Name	Type of maintenance object that is busied out: GTKP
Alt. Name	Not applicable
Test No	The test being executed
Result	Test result: Pass, Abort, Fail
Error Code	Numeric code explaining why the busyout failed or aborted. Refer to the detailed list of the codes by test number for each MO.

test inads-link

This command attempts to make a call over the inads port on the maintenance board to verify the INADS alarm notification process. In the default settings, the system tests the link to the first OSS telephone number. If there is an alarm pending to be reported or the call is in progress or up, the test aborts. If the alarm origination to the OSS telephone number to be tested is disabled, then the test generates an informative error and the test continues. The test waits two minutes before dialing the call to allow the remote maintenance technician to log off, therefore freeing the line. A local MCU-MT user entering the **test inads-link** command does not need to log off for the system to place the call, but the two-minute delay still exists.

Once the call is answered by INADS, the system sends a message with a test alarm type. INADS acknowledges receipt of the message and creates a trouble ticket. The trouble ticket is closed immediately and has a “INADS LINK TEST” message entered in the description field. If an alarm is raised while the test call is up, the system does not send an alarm message over the existing link. The normal retry mechanism is followed; this means that an attempt to make a call to INADS to report the error takes place seven minutes later. An INADS trouble ticket is created only if the connection is successfully established and a message is sent to the system acknowledging that INADS received the system message.

The `Maintain Process Circuit Packs` field must be set to **yes** on the inads and technician permission forms. This provides permissions to execute the **test inads-link** command. This field can be changed by executing a **change permission login** command.

No alarms are raised on the system and attendant alarm and acknowledgment lamp states are not changed as a result of the **test inads-link** command. The test does not run during periodic or scheduled maintenance.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Inter-actions
test inads-link	1 2	First OSS telephone number Second OSS telephone number Examples: **test inads-link** **test inads-link 1** **test inads-link 2**	1st OSS number	none

Output

Command successfully completed	Test passed
Command failed	Link was up, there was an active alarm that the switch needs to report, or there was a problem with the call. An entry is made in the error log describing why the inads-link test failed.

WARNING:
Since the “clear long” options clear all counters if tests pass, it is possible for firmware counters to be cleared even when a problem exists. In some cases customer service might degrade since calls may be routed over defective equipment.

test isdn-testcall

This command starts an outgoing, asynchronous ISDN-PRI test call in the asynchronous method from a specified trunk. If the test results are PASS, the test call is started. A test result of ABORT means that a resource wasn't available (for example, B-channel or a Maintenance/Test circuit pack). A test result of FAIL denotes that the outgoing ISDN-PRI test call was not established.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Inter-actions
test isdn-testcall	group number member number minute number schedule	The administered group number associated with each trunk group The administered member number identifying a particular trunk within a trunk group. Duration of the test call in minutes (1-120) Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.* Examples: **test isdn-testcall 80/1** **test isdn-testcall 80/1 schedule** **test isdn-testcall 78/2 minutes 10** **test isdn-testcall 78/3 minutes 100 schedule**	duration = 8.4 or 9.6 sec	See next section

* Refer to the Report Scheduler and System Printer feature specification for more details.

Feature Interactions

- Use the **status isdn-testcall** command for details on how to access the additional data available after running the test.

- Only one ISDN trunk can be tested per port network at a time. Once testing is completed, another ISDN trunk can be tested in that port network.
- The maximum number of asynchronous outgoing test calls running depends upon the number of Maintenance/Test circuit packs in the system.

Output

The following example shows the output for the test **isdn-testcall 80/1** command. The responses display on a test-by-test basis with one line of data for each test result.

```
test isdn-testcall 77/1                              SPE A

                        TEST RESULTS

  Port      Maintenance Name  Alt. Name Test No. Result       Error Code
  01B1501   ISDN-TRK          077/001   258      PASS

Command Successfully Completed
```

Field descriptions

`Port`	Port address: cabinet-carrier-slot-circuit
`Maintenance Name`	The name of the maintenance object being tested.
`Alt. Name`	Alternate means of identifying the maintenance object: trunk object `xxx/yyy`, where `xxx` = trunk group number, `yyy` = member number
`Test No`	The test being executed
`Result`	Test result: Pass, Abort, Fail, No Board, Disabled, or Extra Bd.
`Error Code`	Numeric code explaining why the release failed or aborted. Refer to the detailed list of the codes by test number for each MO.

test led

This command performs a test on all the LEDs in a specified cabinet. Once the cabinet is validated and the range of circuit packs determined, the **test led** command turns on all LEDs on the circuit packs contained in each carrier until all affected carriers are lit. Once all the LEDs are on, there is a two second pause, and then all the LEDs are turned off in the same order. Once all of the repeat cycles are completed, all affected LEDs are restored to the current status.

Power Unit LEDs are NOT lighted by the **test led** command.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Inter-actions
test led	all	All LEDs in all carriers are tested	all; repeat = 1	none
	cabinet number	Cabinet number (each carrier tested sequentially)		
	short	Short and long option are identical and turn on and off all LEDs in the specified port network.		
	long	Short and long option are identical and turn on and off all LEDs in the specified port network.		
	repeat number	Number of times each test in the sequence is repeated (1-100)		
		Examples: **test led** **test led all r 2** **test led cabinet 1** **test led c 1** **test led 1 long**		

Output

If the command is successful,`Command successfully completed` displays.

test link

This command validates that a specified link is administered and then performs a set of hardware diagnostic tests on the link.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Inter-actions
test link	link-id	Link number (1-8; assigned via the communication-interface links form)	Test sequence = short; repeat = 1	none
	short	Option for a brief series of nondestructive diagnostic tests.		
	long	Option for a longer, more comprehensive series of both destructive and nondestructive diagnostic tests.		
	repeat number	Number of times each test in the sequence is repeated (1-100)		
	clear	This option causes the test sequence (short or long) to repeat until the alarm (if any) is cleared or a single test in the sequence fails.*		
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.†		
		Examples: **test link 1** **test link 1 schedule** **test link 3 l** **test link 2 sh** **test link 2 r 2** **test link 2 l c**		

* If no alarms are registered against the maintenance object then the test sequence is run only once. The ***long clear*** option forces a clear of all alarms if no errors are encountered during testing. The ***short clear*** option only clears alarms pertinent to tests in the short sequence.

† Refer to the Report Scheduler and System Printer feature specification for more details.

WARNING:

Since the "clear long" options clear all counters if tests pass, it is possible for firmware counters to be cleared even when a problem exists. In some cases

customer service might degrade since calls may be routed over defective equipment.

Output

The following example shows the output for the test link 1 long command. The responses display on a test-by-test basis with one line of data for each test result.

```
test link 1 long

                              TEST RESULTS

  Port      Maintenance Name  Alt. Name Test No. Result       Error Code
  01AXX01   PI-LINK                     182      PASS
  01AXX01   PI-LINK                     183      PASS
  01AXX01   PI-LINK                     234      PASS
  01AXX01   PI-LINK                     233      PASS


Command Successfully Completed
```

Field descriptions

Port	Port address on the Processor Interface board associated with the link-id being tested.
Maintenance Name	The name of maintenance object being tested
Alt. Name	Not applicable.
Test No	The test being executed
Result	Test result: Pass, Abort, Fail, No Board, Disabled, Extra Bd.
Error Code	Numeric code explaining why the release failed or aborted. Refer to the detailed list of the codes by test number for each MO.

test memory

This command performs hardware diagnostic tests on any or all memory circuit packs in the specified carrier. Both short and the long test are nondestructive when testing memory.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Inter-actions
test memory		Option for a brief series of nondestructive diagnostic tests.		
	short	Option for a longer, more comprehensive test series (all nondestructive for this command).		
	long			
	repeat number	Number of times each test in the sequence is repeated (1-100)		
	clear	This option causes the test sequence (short or long) to repeat until the alarm (if any) is cleared or a single test in the sequence fails.*		
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.†		
		Examples: **test memory** **test memory a** **test memory a schedule**		

* If no alarms are registered against the maintenance object then the test sequence is run only once. The ***long clear*** option forces a clear of all alarms if no errors are encountered during testing. The ***short clear*** option only clears alarms pertinent to tests in the short sequence.

† Refer to the Report Scheduler and System Printer feature specification for more details.

Defaults

The cabinet default is always 1, and the default carrier is the “a” carrier. The defaults for the remaining parameters are short with a repeat of 1.

Output

The following example show the output for the **test memory 1a** command. The responses display on a test-by-test basis with one line of data for each test result.

```
test memory short

                              TEST RESULTS

Port        Maintenance Name  Alt. Name Test No. Result          Error Code

01A         PR-MEM                      908      PASS
01A         PR-MEM                      87       PASS

Command successfully completed
```

Field descriptions

Port	The port address (cabinet-carrier)
Maintenance Name	The name of maintenance object being tested is MEMORY.
Alt. Name	Not applicable.
Test No.	The test being executed
Result	The result of the test: Pass, Abort, or Fail
Error Code	Numeric code explaining why the release failed or aborted. Refer to the detailed list of the codes by test number for each MO.

test modem-pool

This command performs hardware diagnostic tests on the specified modem pool group or an individual member of a Combined group. A Combined modem-pool group consists of pairs of Analog and Digital Line ports. One pair of Analog and Digital Line ports used for modem-pooling is called a conversion resource. Whenever a member number is specified for a Combined modem-pool group, one conversion resource is tested.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Inter-actions
test modem-pool	group number	The administered group number (1-5)	Test Sequence = short; repeat = 1	none
	member number	The administered member number (1-32). A member is a pair of analog and digital line ports.		
	short	Option for a brief series of nondestructive diagnostic tests.		
	long	Option for a longer, more comprehensive series of both destructive and nondestructive diagnostic tests.		
	repeat number	Number of times each test in the sequence is repeated (1-100)		
	clear	This option causes the test sequence (short or long) to repeat until the alarm (if any) is cleared or a single test in the sequence fails.*		
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.†		
		Examples: **test modem-pool 1** **test modem-pool 1 schedule** **test modem-pool 1/3 l r 2** **test modem-pool 1/3 l r 2 schedule** **test modem-pool 2 r 2** **test modem-pool 2 l**		

* If no alarms are registered against the maintenance object then the test sequence is run only once. The ***long clear*** option forces a clear of all alarms if no errors are encountered during testing. The ***short clear*** option only clears alarms pertinent to tests in the short sequence. SEE the following WARNING.

† Refer to the Report Scheduler and System Printer feature specification for more details.

Output

The following example shows the output for the **test modem-pool 1/3** command. The responses display on a test-by-test basis with one line of data for each test result.

```
test modem-pool 1/3 short                          SPE B


                              TEST RESULTS

  Port      Maintenance Name  Alt. Name Test No. Result       Error Code
  01C0701   MODEM-PT                    98       PASS
  01C0701   MODEM-PT                    99       PASS


Command Successfully Completed
```

Field descriptions

Port	Port address (cabinet-carrier-slot-circuit)
Maintenance Name	The name of maintenance object (always MODEM-PT)
Alt. Name	Not applicable
Test No	The test being executed
Result	Test result: Pass, Abort, Fail, No Board, Disabled, Extra Bd.
Error Code	Numeric code explaining why the release failed or aborted. Refer to the detailed list of the codes by test number for each MO.

test network-control

This command performs hardware diagnostic tests on a specified network control circuit pack.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Inter_ actions
test network-control	short	Option for a brief series of nondestructive diagnostic tests.	carrier a, test sequence repeat = 1.	
	long	Option for a longer, more comprehensive series of both destructive and nondestructive diagnostic tests.		
	repeat number	Number of times each test in the sequence is repeated (1-100)		
	clear	This option causes the test sequence (short or long) to repeat until the alarm (if any) is cleared or a single test in the sequence fails.*		
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.†		
		Examples: **test network-control**		

* If no alarms are registered against the maintenance object then the test sequence is run only once. The ***long clear*** option forces a clear of all alarms if no errors are encountered during testing. The ***short clear*** option only clears alarms pertinent to tests in the short sequence. SEE the following WARNING.

† Refer to the Report Scheduler and System Printer feature specification for more details.

WARNING:

Since the "clear long" options clear all counters if tests pass, it is possible for firmware counters to be cleared even when a problem exists. In some cases customer service might degrade since calls may be routed over defective equipment.

Output

The following example shows the output from the **test network-control a** command. The responses display on a test-by-test basis with one line of data for each test result.

```
test network-control                                              Page   1

                                TEST RESULTS

Port        Maintenance Name  Alt. Name Test No. Result          Error Code

01A         DATA-BD                     52       PASS
01AXX02     DATA-CHL          70423     109      ABORT           1000
01AXX02     DATA-CHL          70423     110      ABORT           1000
01AXX02     DATA-CHL          70423     111      ABORT           1000
01AXX03     DATA-CHL          70425     109      PASS
01AXX03     DATA-CHL          70425     110      PASS
01AXX03     DATA-CHL          70425     111      PASS
01AXX04     DATA-CHL          70427     109      PASS
01AXX04     DATA-CHL          70427     110      PASS
01AXX04     DATA-CHL          70427     111      PASS
01AXX01     DATA-CHL          70219     109      ABORT           1000
01AXX01     DATA-CHL          70219     110      ABORT           1000
01AXX01     DATA-CHL          70219     111      ABORT           1000
01A         SW-CTL                      95       PASS
01A         SW-CTL                      92       PASS
```

Field descriptions

`Port`

Port address: cabinet (always 1)-carrier-slot-circuit. For the DATA-BD, SW-CTL, 12V-PWR, and CARD-MEM maintenance objects, the `slot` and `circuit` fields of port address are blank. DATA-CHL (administered data channel) uses `XX` as the slot address and has a circuit number between 01 and 04. The carrier field has a value `A` for the control carrier A in the system.

`Maintenance Name`

The name of the maintenance object:

- DATA-BD for Network Control board
- SW-CTL for Switch Control Archangel
- DATA-CHL for administered data channel
- 12V-PWR for 12 volt power supply unit on the Network Control board
- CARD-MEM for flash memory card on Network Control board
- 12V-PWR and CARD-MEM (shown only when the Network Control board is TN777B)

`Alt. Name`

Extension number of the DATA-CHL, if administered. For other maintenance objects, this field is not applicable and, therefore, empty.

`Test No`

The test being executed.

`Result`

Test result: Pass, Abort, Fail, No Board, Disabled, Extra Bd.

`Error Code` Numeric code explaining why the release failed or aborted. Refer to the detailed list of the codes by test number for each MO.

test packet-control

This command performs hardware diagnostic tests on the specified packet-control circuit pack.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Inter-actions
test packet-control	***location***	Optional	Location optional, cabinet=1, carrier A.	See next section
	short	Option for a brief series of nondestructive diagnostic tests.		
	long	Option for a longer, more comprehensive series of both destructive and nondestructive diagnostic tests.		
	repeat number	How many times each test in the sequence is repeated (1-100)		
	clear	This option causes the test sequence (short or long) to repeat until the alarm (if any) is cleared ora single test in the sequence fails.		
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.		
		Examples: **test packet-control** **test packet-control A** **test packet-control 1A** **test packet-control a short** **test packet-control a s repeat 5**		

Output

The following example is the screen output for the **test packet-control 1B long** command. Note that carrier B is the active carrier in this example.

```
test packet-control 1A l

                              TEST RESULTS

 Port    Maintenance Name  Alt. Name Test No.  Result      Error Code

 01A      PKT-CTRL                     583      PASS
 01A      PKT-CTRL                     584      PASS
 01A      PKT-CTRL                     585      PASS


Command successfully completed
```

Field descriptions

Port	Port address (cabinet-carrier-slot-circuit)
Maintenance Name	The name of maintenance object.
Alt. Name	Not applicable
Test No.	The test number run on the packet-control.
Result	Test result: Pass, Abort, Fail, No Board, Disabled, Extra Bd.
Error Code	Numeric code explaining why the release failed or aborted. Refer to the detailed list of the codes by test number for each MO.

test pkt

The test pkt runs a series of tests on the Packet bus of the specified PPN.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Inter-actions
test pkt port-network	pn number	The Packet bus to be tested: *nn*	Test Sequence = short; Repeat = 1	none
	short	Option for a brief series of nondestructive diagnostic tests.		
	long	Option for a longer, more comprehensive series of both destructive and nondestructive diagnostic tests.		
	repeat number	How many times each test in the sequence is repeated (1-100)		
	clear	This option causes the test sequence (short or long) to repeat until the alarm (if any) is cleared or a single test in the sequence fails.*		
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.†		
		Examples: **test pkt port-network 1 l** **test pkt port-network 1 l r 25** **test pkt port-network 1 c**		

* If no alarms are registered against the maintenance object then the test sequence is run only once. The ***long clear*** option forces a clear of all alarms if no errors are encountered during testing. The ***short clear*** option only clears alarms pertinent to tests in the short sequence. SEE the following WARNING.

† Refer to the Report Scheduler and System Printer feature specification for more details.

WARNING:

Since the "clear long" options clear all counters if tests pass, it is possible for firmware counters to be cleared even when a problem exists. In some cases, customer service might degrade since calls may be routed over defective equipment.

Output

The following example is the output for the **test pkt port-network 1** command. The responses display on a test-by-test basis with one line of data for each test result.

```
test pkt port-network 1

                                TEST RESULTS

Port        Maintenance Name  Alt. Name Test No. Result           Error Code

PN 01       PKT-BUS                     572      ABORT            1142
PN 01       PKT-BUS                     573      PASS

Command successfully completed
```

Field descriptions

Port	A port network number (1-3).
Maintenance Name	The name of maintenance object being tested.
Alt. Name	Not applicable.
Test No	The test being executed.
Result	Test result: Pass, Abort, Fail, No Board, Disabled, Extra Bd.
Error Code	Numeric code explaining why the release failed or aborted. Refer to the detailed list of the codes by test number for each MO.

test port

This command performs hardware diagnostic tests on an individual port circuit. In most cases, tests are performed on hardware connected to the port.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Inter-actions
test port	location	**PCSSpp**	Test Sequence = short; Repeat = 1	none
	short	Option for a brief series of nondestructive diagnostic tests.		
	long	Option for a longer, more comprehensive series of both destructive and nondestructive diagnostic tests.		
	repeat number	How many times each test in the sequence is repeated (1-100)		
	clear	This option causes the test sequence (short or long) to repeat until the alarm (if any) is cleared or a single test in the sequence fails.*		
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.†		
		Examples: **test port 01c1101 l** **test port 01c1101 l schedule** **test port 01c1101 c**		

* If no alarms are registered against the maintenance object then the test sequence is run only once. The ***long clear*** option forces a clear of all alarms if no errors are encountered during testing. The ***short clear*** option only clears alarms pertinent to tests in the short sequence. SEE the following WARNING.

† Refer to the Report Scheduler and System Printer feature specification for more details.

WARNING:

Since the "clear long" options clear all counters if tests pass, it is possible for firmware counters to be cleared even when a problem exists. In some

cases, customer service might degrade since calls may be routed over defective equipment.

Output

The following example is the output for the **test port** command and assumes that the port in cabinet 1, carrier c, slot 7, circuit 1 is an analog port. The responses display on a test-by-test basis with one line of data for each test result.

```
test port 01c0701 short


                TEST RESULTS

  Port      Maintenance Name  Alt. Name Test No. Result       Error Code
  01C0701   ANL-LINE                     35       PASS
  01C0701   ANL-LINE                     48       PASS
  01C0701   ANL-LINE                     36       PASS


Command Successfully Completed
```

Field descriptions

Port	Port address (cabinet-carrier-slot-circuit)
Maintenance Name	The name of maintenance object.
Alt. Name	The alternate means of identifying the maintenance object. If the Object is aThe field contains stationextension trunkxxx/yyy (xxx = trunk group number and yyy = member number) private CO lineP/xxx (xxx = private CO line group number)
Test No	Test being executed.
Result	Test result: Pass, Abort, Fail, No Board, Disabled, Extra Bd.
Error Code	Numeric code explaining why the release failed or aborted. Refer to the detailed list of the codes by test number for each MO.

test processor

This command performs hardware diagnostic tests on a specified processor circuit pack.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Inter-actions
test processor	location	Cabinet number (optiona)l carrier letter (optional **a**).	See next section	none
	short	Option for a brief series of nondestructive diagnostic tests.		
	long	Option for a longer, more comprehensive series of both destructive and nondestructive diagnostic tests.		
	clear	This option causes the test sequence (short or long) to repeat until the alarm (if any) is cleared or a single test in the sequence fails.*		
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.†		
		Examples: **test processor** **test processor schedule** **test processor a** **test processor 1a** **test processor b sh** **test processor a l c**		

* If no alarms are registered against the maintenance object then the test sequence is run only once. The ***long clear*** option forces a clear of all alarms if no errors are encountered during testing. The ***short clear*** option only clears alarms pertinent to tests in the short sequence.

† Refer to the Report Scheduler and System Printer feature specification for more details.

Defaults

The location is optional and defaults to cabinet 1, carrier a. Defaults for the remaining parameters are short with a repeat of 1.

Output

The following output example is for the **test processor a** command. The responses display on a test-by-test basis with one line of data for each test result.

```
test processor a                                SPE B


                          TEST RESULTS

  Port    Maintenance Name  Alt. Name Test No. Result      Error Code
  01A     PROCR                        77      PASS
  01A     PROCR                        80      PASS
  01A     PROCR                        82      PASS
  01A     PR-MAINT                    102      ABORT       1018
  01A     PR-MAINT                    103      ABORT       1018
  01A     PR-MAINT                    106      PASS
  01A     PR-MAINT                    228      PASS
  01A     PR-MAINT                    229      ABORT       1018
  01A     MEMORY                       87      PASS
  01A     MEMORY                      631      PASS


Command successfully completed
```

Field descriptions

Port	The port address (cabinet-carrier) of the maintenance object that is being tested.
Maintenance Name	Maintenance object being tested is MEMORY.
Alt. Name	Not applicable.
Test No.	Test being executed
Result	Test result: Pass, Abort, Fail, No Board, Disabled, Extra Bd.
Error Code	Numeric code explaining why the release failed or aborted. Refer to the detailed list of the codes by test number for each MO.

test signaling-group

This command validates that the specified signaling group is administered and runs a series of diagnostic tests that return results of the test along with possible error codes. A signaling group is a collection of B-channels signaled for by a designated single D-channel or set of D-channels over an ISDN-PRI.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Inter-actions
test signaling-group	group identifier	The station extension (must conform to dial-plan)	Test Sequence = short; Repeat = 1	See next section
	short	Option for a brief series of nondestructive diagnostic tests.		
	long	Option for a longer, more comprehensive series of both destructive and nondestructive diagnostic tests.		
	repeat number	How many times each test in the sequence is repeated (1-100)		
	clear	This option causes the test sequence (short or long) to repeat until the alarm (if any) is cleared or a single test in the sequence fails.*		
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.†		
		Examples: **test signaling-group 1** **test signaling-group 1 repeat 10** **test signaling-group 2 short** **test signaling-group 4 long** **test signaling-group 4 long clear** **test signaling-group 2 schedule**		

* If no alarms are registered against the maintenance object then the test sequence is run only once. The ***long clear*** option forces a clear of all alarms if no errors are encountered during testing. The ***short clear*** option only clears alarms pertinent to tests in the short sequence. SEE the following WARNING.

† Refer to the Report Scheduler and System Printer feature specification for more details.

WARNING:
Since the "clear long" options clear all counters if tests pass, it is possible for firmware counters to be cleared even when a problem exists. In some cases customer service might degrade since calls may be routed over defective equipment.

Feature Interactions

Additional data is available after running a test. See the **status signaling-group** command for how to access the additional data.

Output

The following output example is for the **test signaling-group 1** command. The responses display on a test-by-test basis with one line of data for each test result.

```
test signaling-group 1                          SPE A

                          TEST RESULTS

  Port    Maintenance Name  Alt. Name Test No. Result       Error Code
  1       ISDN-SGR                    636      PASS
  1       ISDN-SGR                    639      PASS
  1       ISDN-SGR                    637      PASS


Command Successfully Completed
```

Field descriptions

Port	The signaling group number (1-8) of the signaling group that is being tested.
Maintenance Name	The type of maintenance object that is being tested.
Alt. Name	Not Applicable.
Test No	Test being executed
Result	Test result: Pass, Abort, Fail, No Board, Disabled, Extra Bd.
Error Code	Numeric code explaining why the release failed or aborted. Refer to the detailed list of the codes by test number for each MO.

test sp-link

The **test sp-link** command validates that the system printer link is administered and runs a series of diagnostic tests that return results of the test along with possible error codes.

The system printer link is a link from the switch to an external printer over which jobs can be printed. This link is created by administering the system printer extension and setting up a call to the system printer.

Action / Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
test sp-link	short	Option for a brief series of nondestructive diagnostic tests.	short	none
	long	Option for a longer, more comprehensive series of both destructive and nondestructive diagnostic tests.		
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.*		
		Examples: **test sp-link** **test sp-link sh** **test sp-link l** **test sp-link schedule** **test sp-link sh sch**		

* Refer to the Report Scheduler and System Printer feature specification for more details.

Output

The following output example is for the **test sp-link** command. The responses display on a test-by-test basis with one line of data for each test result.

```
test sp-link                                  SPE A

                              TEST RESULTS

  Port    Maintenance Name  Alt. Name Test No. Result       Error Code
          SYS-PRNT                    215      PASS
          SYS-PRNT                    213      PASS

Command Successfully Completed
```

Field descriptions

Port	Not applicable. Always blank.
Maintenance Name	The name of maintenance object.
Alt. Name	Alternate means of identifying the maintenance object. This field contains the extension when the object is a data module.
Test No	Test being executed
Result	Test result: Pass, Abort, Fail, No Board, Disabled, Extra Bd.
Error Code	Numeric code explaining why the release failed or aborted. Refer to the detailed list of the codes by test number for each MO.

test station

This command performs hardware diagnostic tests on an individual port circuit assigned to that extension. The technician must specify the extension and a translation is automatically done to the physical port location.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Inter-actions
test station	***extension***	The station extension (must conform to dial-plan)	Test Sequence = short; Repeat = 1	none
	short	Option for a brief series of nondestructive diagnostic tests.		
	long	Option for a longer, more comprehensive series of both destructive and nondestructive diagnostic tests.		
	repeat number	How many times each test in the sequence is repeated (1-100)		
	clear	This option causes the test sequence (short or long) to repeat until the alarm (if any) is cleared or a single test in the sequence fails.*		
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.†		
		Examples: **test station 81709 l** **test station 85136 s r 2** **test station 85036 l r 25** **test station 85036 l r 25 schedule** **test station 84297 r 4** **test station 81709 c**		

* If no alarms are registered against the maintenance object then the test sequence is run only once. The ***long clear*** option forces a clear of all alarms if no errors are encountered during testing. The ***short clear*** option only clears alarms pertinent to tests in the short sequence. SEE the following WARNING.

† Refer to the Report Scheduler and System Printer feature specification for more details.

WARNING:
Since the "clear long" options clear all counters if tests pass, it is possible for firmware counters to be cleared even when a problem exists. In some cases, customer service might degrade since calls may be routed over defective equipment.

Output

The following screen is an example of the output from the **test station 81902 short** command with the assumptions that port in cabinet 1, carrier c, slot 7, circuit 1 is an analog port and extension 81902 is connected to that port. The responses display on a test-by-test basis with one line of data for each test result.

```
test station 81902 short

                              TEST RESULTS

  Port      Maintenance Name  Alt. Name Test No. Result       Error Code
  01C0701   ANL-LINE                    35       PASS
  01C0701   ANL-LINE                    48       PASS
  01C0701   ANL-LINE                    36       PASS


Command Successfully Completed
```

Field descriptions

Port	The port address: cabinet-carrier-slot-circuit
Maintenance Name	The type of maintenance object that is being tested.
Alt. Name	Alternate means of identifying the maintenance object. This field contains the extension when the object is a station.
Test No	Test being executed
Result	Test result: Pass, Abort, Fail, No Board, Disabled, Extra Bd.
Error Code	Numeric code explaining why the release failed or aborted. Refer to the detailed list of the codes by test number for each MO.

test synchronization

This command updates all the boards with the correct synchronization source and parameters. The system sends a downlink message to the tone clock and DS1/DI boards to place them in the correct synchronization configuration, providing error-free digital communication between the system and other systems.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Inter-actions
test synch	***short***	Option for a brief series of nondestructive diagnostic tests.	Test Sequence = short; Repeat = 1	none
	long	Option for a longer, more comprehensive series of both destructive and nondestructive diagnostic tests.		
	repeat number	How many times each test in the sequence is repeated (1-100)		
	clear	This option causes the test sequence (short or long) to repeat until the alarm (if any) is cleared or a single test in the sequence fails.*		
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.†		
		Examples: **test synchronization r 3** **test synchronization sh r 1** **test synchronization sh r 1 schedule** **test synchronization l**		

* If no alarms are registered against the maintenance object then the test sequence is run only once. The ***long clear*** option forces a clear of all alarms if no errors are encountered during testing. The ***short clear*** option only clears alarms pertinent to tests in the short sequence.

† Refer to the Report Scheduler and System Printer feature specification for more details.

Output

The responses display on a test-by-test basis with one line of data displayed for each test result. The following screen is an example of the output for the **test synchronization short** command.

```
test synchronization short

                              TEST RESULTS

  Port    Maintenance Name  Alt. Name Test No. Result       Error Code
          SYNC                        417      PASS

Command Successfully Completed
```

Field descriptions

Port	Not applicable
Maintenance Name	Maintenance object name
Alt. Name	Not applicable
Test No.	Test being executed
Result	Test result: Pass, Abort, Fail, No Board, Disabled, Extra Bd.
Error Code	Numeric code explaining why the release failed or aborted. Refer to the detailed list of the codes by test number for each MO.

test tdm

This command tests all the time slots on a bus associated with a PPN.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Inter-actions
test tdm	***pn number***	*nn* = number of the port network to have its TDM bus tested. Both halves ("a" and "b") of the TDM bus are tested.	Test Sequence = short; Repeat = 1	none
	short	Option for a brief series of nondestructive diagnostic tests.		
	long	Option for a longer, more comprehensive series of both destructive and nondestructive diagnostic tests.		
	repeat number	How many times each test in the sequence is repeated (1-100)		
	clear	This option causes the test sequence (short or long) to repeat until the alarm (if any) is cleared or a single test in the sequence fails.*		
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.†		
		Examples: **test tdm port-network 1 l** **test tdm port-network 2 sh r 2** **test tdm port-network 2 sh sch** **test tdm port-network 1 l r 25** **test tdm port-network 2** **test tdm port-network 1 c**		

* If no alarms are registered against the maintenance object then the test sequence is run only once. The ***long clear*** option forces a clear of all alarms if no errors are encountered during testing. The ***short clear*** option only clears alarms pertinent to tests in the short sequence.

† Refer to the Report Scheduler and System Printer feature specification for more details.

Output

The following screen is an example of the output for the **test tdm port-network 1** command. The responses display on a test-by-test basis with one line of data for each test result.

```
test tdm port-network 1

                              TEST RESULTS

  Port    Maintenance Name  Alt. Name Test No. Result       Error Code
  PN 01A  TDM-BUS                     294      PASS
  PN 01A  TDM-BUS                     296      PASS
  PN 01A  TDM-BUS                     297      PASS
  PN 01B  TDM-BUS                     294      PASS
  PN 01B  TDM-BUS                     296      PASS
  PN 01B  TDM-BUS                     297      PASS


Command Successfully Completed
```

Field descriptions

Port	For TDM-BUS maintenance object the port network number and the bus (A or B) is displayed.
Maintenance Name	Maintenance object name
Alt. Name	Not applicable.
Test No	Test being executed
Result	Test result: Pass, Abort, Fail, No Board, Disabled, Extra Bd.
Error Code	Numeric code explaining why the release failed or aborted. Refer to the detailed list of the codes by test number for each MO.

test tone-clock

The test tone/clock command performs hardware diagnostic tests on a technician-specified tone or clock circuit pack.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Inter-actions
test tone-clock	***location***	PCSS	Test Sequence = short; Repeat = 1	none
	short	Option for a brief series of nondestructive diagnostic tests.		
	long	Option for a longer, more comprehensive series of both destructive and nondestructive diagnostic tests.		
	repeat number	How many times each test in the sequence is repeated (1-100)		
	clear	This option causes the test sequence (short or long) to repeat until the alarm (if any) is cleared or a single test in the sequence fails.*		
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.†		
		Examples: **test tone-clock 01a l** **test tone-clock 01b l** **schedule**		

* If no alarms are registered against the maintenance object then the test sequence is run only once. The ***long clear*** option forces a clear of all alarms if no errors are encountered during testing. The ***short clear*** option only clears alarms pertinent to tests in the short sequence.

† Refer to the Report Scheduler and System Printer feature specification for more details.

Output

The responses display on a test-by-test basis with one line of data for each test result. The following is the output for the **test tone-clock** 1a command.

```
test tone-clock 1a

                              TEST RESULTS

  Port    Maintenance Name  Alt. Name Test No. Result       Error Code
  01A     TONE-BD                     46       PASS
  01A     TONE-BD                     52       PASS
  01A     TONE-PT                     40       PASS
  01A     TONE-PT                     41       PASS
  01A     TDM-CLK                     148      PASS
  01A     TDM-CLK                     149      PASS
  01A     TDM-CLK                     150      PASS
  01A     TDM-CLK                     151      PASS
  01A     TDM-CLK                     574      PASS


Command Successfully Completed
```

Field descriptions

Port	The port address: cabinet-carrier-slot-circuit
Maintenance Name	Maintenance object name: TONE-BD, TONE-PT, and TDM-CLK.
Alt. Name	Not applicable.
Test No	Test being executed
Result	Test result: PASS, ABORT, FAIL, NO BOARD, DISABLED, EXTRA BD.
Error Code	Numeric code explaining why the release failed or aborted. Refer to the detailed list of the codes by test number for each MO.

test trunk

This command performs hardware diagnostic tests on an entire trunk group or an individual trunk group member, depending on the options entered.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Inter-actions
test trunk	***group number***	Administered group number (1-99)	Test Seq. = short; Repeat = 1	none
	member number	Administered number identifying a particular trunk within a trunk group (1-99).		
	short	Command executes a series of nondestructive diagnostic tests.		
	long	Command executes a more comprehensive and longer version of the both destructive and nondestructive diagnostic tests.		
	repeat number	How many times each test in the sequence is repeated (1-100)		
	clear	This option causes the test sequence (short or long) to repeat until the alarm (if any) is cleared or a single test in the sequence fails.*		
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.†		
		Examples: **test trunk 78 l** **test trunk 80/1 sh r 2** **test trunk 78/2 l r 25** **test trunk 78/2 l r 25 schedule** **test trunk 80** **test trunk 80 schedule** **test trunk 78 r 4** **test trunk 78 c**		

* If no alarms are registered against the maintenance object then the test sequence exercises once. The ***long clear*** option forces a clear of all alarms if no errors are encountered during testing. The ***short clear*** option only clears alarms pertinent to tests in the short sequence.

† Refer to the Report Scheduler and System Printer feature specification for more details.

Output

The responses display on a test-by-test basis with one line of data for each test result. The following screen is an example of the output for the **test trunk 78** command.

```
test trunk 78


                              TEST RESULTS

  Port      Maintenance Name  Alt. Name Test No. Result       Error Code
  01C1505   ISDN-TRK            078/001   3        PASS
  01C1505   ISDN-TRK            078/001   36       PASS


Command Successfully Completed
```

Field descriptions

`Port`	The port address: cabinet-carrier-slot-circuit
`Maintenance Name`	The name of maintenance object being tested.
`Alt. Name`	The alternate means of identifying the maintenance object. If the object is a trunk, the field contains `xxx/yyy` (where *xxx* = trunk group number, *yyy* = member number). If the object is a private CO line, the field contains `P/xxx` (where *xxx* = private CO line group number).
`Test No`	The test number being executed
`Result`	The result of the individual test: PASS, ABORT, FAIL, NO BOARD, DISABLED, and EXTRA BD.
`Error Code`	A system-generated number indicating the reason that the test for the named MO failed or aborted.

test tsc-administered

This command submits a switched services request to run the Temporary Signaling Connection's heartbeat test for all administered TSCs on a signaling group.

Action/ Object	Qualifier	Qualifier Description	Defaults	Feature Interactions
test tsc-administered	***signaling group number/***	Signaling group number (1–8)	repeat = 1	Additional data available after running the test. See **status tsc-administered**for how to access additional data.
	tsc index	The number associated with each TSC in a signaling group.		
	repeat number	The number of times each test in sequence is repeated.		
	schedule	Command is validated and then a scheduling form displays to schedule execution of the command. The command is then placed in the command queue and is executed at the specified time. The information displayed by the command is sent to the system printer instead of the screen.*		

* Refer to the Report Scheduler and System Printer feature specification for more details.

Output

The following is an example of the output from the **test tsc-administered 1/1** command. The responses display on a test-by-test basis with one line of data for each test result.

```
test tsc-administered 1/1


                              TEST RESULTS

  Port    Maintenance Name  Alt. Name Test No. Result       Error Code
  1/1     TSC-ADM                     604      PASS


Command Successfully Completed
```

Field descriptions

Port	Port address of the administered temporary signaling connection (format = *signaling group no./tsc index*)
Maintenance Name	The name of the maintenance object
Alt. Name	Not applicable
Test No.	The test number being executed
Result	Test result: Pass, Abort, Fail, No Board, Disabled, or Extra Bd.
Error Code	A system-generated number indicating the reason that the test for the named MO failed or aborted.

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MultiPoint Conferencing Unit
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Glossary

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Glossary

A

AAR
See *Automatic Alternate Routing*.

access endpoint
Endpoint connected to the MCU via non-signaled T1/E1, V.35, RS449, or EIA-530 connections. The ports designated for the endpoint are dedicated to the endpoint.

Access Security Gateway
A challenge/response authentication engine that is intended to provide some remote access security for the MCU.

ACD
See *Automatic Call Distribution*.

active
A reserved conference status when the conference is scheduled to begin but no conferees have joined. A dedicated conference is active at all times.

Adjust Audio Volume for Audio Add-On Party
UCC option that allows the user to increase, decrease, or reset the volume of specified endpoints within an MCU conference. The commands for this option are denied if the specified endpoint has not joined the conference or is not an Audio Add-On party.

Advanced mode
A feature of the MCU that offers Presentation and Broadcast with Auto-Scan conference modes.

American National Standards Institute
Professional and technical association in the US that supports a variety of standards.

ANI
See *Automatic Number Identification*.

ANSI
See *American National Standards Institute*.

Application Compliant flag
A per-user flag in the Conference Record that indicates which endpoints use non-compliant applications.

ARS
See *Automatic Route Selection*.

ASG
See *Access Security Gateway*.

Asymmetric
Asymmetric mode implies that the endpoint or MCU supports different encode and decode algorithms within the same connection.

Asynchronous Transfer Mode
A high-speed, connection-oriented switching and multiplexing technology that uses 53-byte cells (including a 5-byte header and a 48-byte payload) to transmit different types of traffic simultaneously, including voice, video, and data. The mode is asynchronous because information streams can be sent independently without a common clock.

ATA
ANSI AT Attachment (ATA) Interface. In this context, this refers to the part of the PC-card standard that deals with controlling disk drives and similar equipment through a PC-card interface. The term also refers to the file format that such devices typically use to store data.

ATM
See *Asynchronous Transfer Mode*.

Audio Add-On
Feature that allows the MCU to support up to six non-H.320 audio-only endpoints per non-cascaded conference and up to 12 such endpoints per cascaded conference.

Audio Add-On Echo Control
An echo canceler function implemented in the MCU to prevent echoes caused by Audio Add-On conferees who dial into a conference through an analog circuit. Echoes occur at the two- to four-wire conversion (hybrid) in the network or in PBXs and are caused by impedance mismatches at those points.

Audio port
The port used for an Audio Add-On party to join a conference. See also *port*.

Automatic Alternate Routing
Feature that sends calls to a route other than the route of first choice when facilities are unavailable.

Automatic Call Distribution
Feature that answers calls and then, depending on administered instructions, delivers messages appropriate for the caller and routes the call to an agent when one becomes available.

Automatic mode
Feature of the MCU that offers voice-activated conference mode.

Automatic Number Identification
Representation of the calling number for display or for further use to access information about the caller.

Automatic Route Selection
Feature that allows the system to choose automatically the least cost-effective way to send a toll call.

Avaya Conference Reservation and Control System
A PC-based reservation system that manages the MCU reservation system, automates the scheduling tasks, performs conflict resolution, and ensures that participating video endpoints have the proper capabilities to join the conference.

Avaya MultiPoint Conferencing Unit
Equipment that provides high-quality multimedia conferencing with video endpoints that communicate via the ITU-T H.320 standards.

Avaya Technical Assistance Center
A video technical support group that is available to help with questions about the Avaya MCU.

B

B-channel
A bearer channel provided by the network from a video endpoint to the MCU.

Bandwidth
Specifies a transfer rate or range of frequencies for an amount of data moving from one point to another. Used in context for video bandwidth rates, the more free bandwidth for video, the better the picture quality transmitted. The MCU port capacity provides for 112k/128k bandwidth (2B-channel 56k/64k), 1-channel multirate ISDN bandwidths of 1x56k, 1x64k, 112k, 128k, 168k, 192k, 224k, 256k, 280k, 320k, 336k, 384k, 448k, 512k, 672k, 768k, 1008k, 1288k, 1344k, 1472k, 1536k, 1680k, and 1920k, or BONDing bandwidths of 112/128k, 168/192k, 224/256k, 280/320k, 336/384k, 448/512k, and 672/768k.

Bandwidth on Demand
Feature that allows the Avaya MCU to establish conferences at bandwidths greater than 128k without the use of ISDN-PRI and Wideband H0 channels.

Basic Rate Interface
A standard ISDN frame format that specifies the protocol used between two or more communications systems. BRI runs at 192 Mbps and provides two 64k B-channels (voice and data) and one 16k D-channel (signaling). The D-channel connects, monitors, and disconnects all calls. It also can carry low-speed packet data at 9.6k.

Basic/Enhanced Service Flag
A flag in the Conference Record that disables commands/caps that are known to cause problems (such as crashing) to specific endpoints.

BONDing
See *Bandwidth on Demand*.

BONDing ports
The ports in an MCU conference that use one of the following BONDed bandwidths: 112/128k, 168/192k, 224/256k, 280/320k, 336/384k, 448/512k, or 672/768k.

BRI
See *Basic Rate Interface*.

BRI/DCP Direct Connect Interface
Feature that allows the user to connect BRI or DCP endpoints directly to the MCU without involving a public or private network, PBX, or MUX. The feature allows up to 12 BRI stations or up to four DCP group systems to connect directly to the MCU.

Broadcast w/Auto Scan
A conference mode where one video endpoint's video, audio and data are broadcast to all other conferees. The broadcaster views the other locations one after another for a fixed duration of time. The broadcaster is constantly viewed by all other locations.

Broadcaster
A video endpoint is considered the broadcaster when it sends the same video, audio and data signal to two or more locations.

Browse
A Universal Conference Control option that allows the broadcaster to scan endpoints in the conference without specifying an endpoint number for each scanned endpoint. With this option, only the broadcaster sees a change in video caused by the scan.

C

Call Detail Recording
Feature that uses software and hardware to record call data.

Cascading
Connecting two or more Avaya MCUs via an H.320 communications link. This feature allows endpoints connected on different MCUs to participate in the same conference.

CDR
See *Call Detail Recording*.

Centralized Multipoint Conference
A call in which all participating terminals communicate in a point-to-point fashion with an MCU.

Chair control mode
A conference mode where one site controls which endpoints are added and/or dropped during a conference.

Channel
Refers to an audio or video channel. A H.323 “port” consists of one audio and one video channel through the Media Processor.

CIF
See *Common Intermediate Format*.

C-LAN
Control LAN circuit pack TN799. Introduced in DEFINITY R7.1. The TN799 provides TCP/IP (one 10BaseT Ethernet connection) and up to 16 DSO Point-to-Point (PPP) connections. Two integrated modems provide remote PPP connectivity over analog facilities.

Class
A Conference Record has one of three classes: reserved, dedicated, or file.

Class of Restriction
Feature that allows a maximum of 96 classes of call origination and call termination restrictions for voice terminals, voice-terminal groups, data modules, and trunk groups.

Class of Service
Feature that uses a number to specify if voice-terminal users can activate any of the following features: Automatic Callback, Call Forwarding All Calls, Data Privacy, or Priority Calling.

Common Intermediate Format
An industry-standard means for encoding video signals for high-quality pictures. QCIF MPI specifies picture interval numbers. Also known as Full CIF (FCIF).

Complete
A reserved conference has a status of complete when the stop time has passed and the last conferee has dropped from the conference.

Conferee
A video endpoint participating in a multipoint video conference.

Conference Appointment Form
A form that is used to record all the information necessary to schedule and reserve a multipoint video conference.

Conference Redial flag
A flag in the Conference Record that allows an endpoint to be “redialed” during a conference (therefore, this flag is in effect for Dial-Out calls).

Continuous Presence *Plus*
A customer feature that enables a multipoint video conference to compose a picture consisting of the video from multiple sites participating in the conference. As such, the feature allows one or more conferees to see up to 16 sites in the conference at one time.

Convener
The person who schedules a conference and is responsible for distributing the Meet-Me numbers.

COR
See *Class of Restriction*.

COS
See *Class of Service*.

CPP
Continuous **P**resence **P**lus.

CRCS
Conference Reservation and Control System - a PC based software solution for addressing customer needs for conference and room reservations (ResCenter) and conference management, status and control (OpCenter).

D

DA
See *Dedicated Access*.

Data Communication Equipment
Equipment that provides the functions to establish, maintain, and terminate a connection, the signal conversion, and coding required for communication between the Data Terminal Equipment (DTE) and the data circuit.

Data Terminal Equipment
Equipment comprising the data source, data sink, or both the source and sink.

DCE
See *Data Communication Equipment*.

DCP
See *Digital Communications Protocol*.

Decentralized Multipoint Conference
A conference in which the participating terminals multicast to all other participating terminals without an MCU.

Dedicated
A conference class that reserves a specified number of MCU ports for a multipoint video conference at any time.

Dedicated Access
A feature that enables endpoints to participate in multipoint audio and video conferences via non-signaled T1 facilities. For this feature, the MCU connects to a Multiplexer (MUX), a Digital Access Crosspoint System (DACS), or to H.320 endpoints via DS1 facilities. A maximum of 20 DS1 connections to the MCU are supported.

Dial-Out
A feature that allows H.320 calls to originate (dial out) from the MCU in addition to receiving dial-in calls. Therefore, conference participants can join conferences by receiving calls from the MCU.

DiffServ
Differentiated **Serv**ices - A method for indicating a type of service (TOS) for level 3 (IP) packets, described in IETF RFC 2474.

Digital Communications Protocol
Proprietary protocol used to transmit both digitized voice and digitized data over the same communications link. A DCP link is made up of two 64k information (I-) channels and one 8k signaling (S-) channel. The DCP protocol supports two information-bearing channels and, therefore, two telephones or data modules.

DTE
See *Data Terminal Equipment*.

Dynamic Conference Resizing
A feature that allows the user to add and remove conference participants before the conference starts as well as during the conference.

E

E.164
Address format for ISDN Networks. *See ITU Recommendation E.164 (1991).*

EC
Executive **C**onferencing. New Video Processing Mode introduced in R6.0 highlighting three key broadcasters and “no-self-view.

ECS
Enterprise Communications Server. The Product Name for today’s DEFINITY PBX with it’s full suite of product features and functions.

Electronic tandem network
Tandem tie-trunk network that has automatic call-routing capabilities based on the number dialed and the most preferred route available. Each switch in the network is assigned a unique private network office code (RNX), and each voice terminal is assigned a unique extension.

Encoding
Changing video and/or audio signals into digital form for more efficient and accurate transmission (movement) from one entity to another.

Endpoint
A video unit such as a camera, PC, video recorder, speakers, and other equipment used for transmitting multimedia (voice, audio, full-motion video, and graphics) during an MCU conference. The video capabilities of an endpoint can be linked to a specific site.

Entry tone
A tone that alerts conferees already on a conference that another conferee has joined in the conference.

ETN
See *electronic tandem network*.

Executive Conferencing
A customer option that enables a conference to compose a picture of two or three “other” sites (endpoints) for each conference participant. With this feature, no endpoint ever sees itself.

Exit tone
A tone that alerts conferees on a conference that a conferee has left the conference.

F

FAC
Facility Access Code.

Far end
When troubleshooting problems on the MCU, the video endpoint is often referred to as being on the far end of the connection.

Far-End Camera Control
A feature that allows a site that requests far-end camera control to control the camera of the far-end site that it is currently viewing.

FCIF
See *Common Intermediate Format*.

FECC
See *Far-End Camera Control*.

File
A conference class that saves a copy of a Conference Record for future use.

G

G.711 Audio
See *Pulse Code Modulation*.

G.722 Audio
An audio mode that enables the system to bridge G.722 (7kHz) audio. 7kHz is the audio bandwidth provided by G.722. This bandwidth allows for a more natural sounding voice conference. The MCU supports G.722-conferenced audio at 48k or 56k, as defined in ITUT-T Recommendation G.722.

G.728 Audio
See *LD-CELP*.

GCC
See *Generic Conference Control*.

Generic Conference Control
A high-level framework for conference management encompassing conference establishment and termination, conference roster, application roster, remote actuation, conductorship, bandwidth control, and registry services.

Gatekeeper (GK)
An H.323 entity that provides address translation, control access and sometimes bandwidth management to the LAN for H.323 terminals, Gateways and MCUs.

Gateway (GW)
An H.323 entity that provides real-time, two-way communications between H.323 terminals on the LAN and other ITU terminals on a WAN (like H.320) or to another Gateway.

H

H0
A one-channel 384k bandwidth call.

H11
A one-channel 1472k or 1536k bandwidth call.

H12
A one-channel 1920k bandwidth call.

H.320
The multipoint conferencing standard adopted by the ITU-T. This standard includes some of the other H-series standards governing the definition of multimedia equipment and equipment transmission (movement of data) capabilities and methods.

H.323
An umbrella recommendation from the ITU that sets standards for multimedia communications overall Local Area Networks (LANs) that do not provide a guaranteed quality of Service (QoS)

H.323 Gateway
Device that enables an Internet protocol-based H.323 terminal to communicate with an H.320 terminal and with a regular telephone on a switched network.

H-series
See *H.320*.

Handshake
An expression relating to the establishment of communications between the MCU and a video endpoint.

Heterogeneous conference
A conference in which the endpoints are expected to be either H.261 or H.263 video capable.

Homogeneous conference
A conference in which all the endpoints are expected to have the same video mode (for example, H.263 video).

I

IETF
Internet **E**ngineering **T**ask **F**orce - the maintainers of the Internet standards.

IMUX
See *Inverse Multiplexor*.

In use
A conference status when a reserved conference has begun and at least one conferee has joined the conference.

Inactive
A conference status when a conference is reserved but has not begun and when a conference has a class of file.

INADS
See *Initialization and Administration System*.

Initialization and Administration System
An asynchronous modem that originates alarms to a remote maintenance system and allows remote technicians to run maintenance and administration commands.

International Telecommunications Union-Telecommunications
An international group established in 1993 to develop standards to allow video endpoints to communicate with each other.

Inverse Multiplexor
Device used to create a single higher-speed data channel by combining and synchronizing two or more lower-speed data channels. This device is used primarily with video codecs and data bridges/routers for speeds up to 2 Mbps.

IP
Internet **P**rotocol - see RFC 791 for the definition of version 4.

ISDN-BRI Trunk Interface
A feature that provides ISDN-BRI connections to the public network. This feature is intended primarily for customers with relatively small line sizes in countries and geographic locations where BRI lines are less expensive than PRI lines.

ITU-T
See *International Telecommunications Union-Telecommunications*.

L

LAN
Local **A**rea **N**etwork. A Shared or switched medium, peer-to-peer communication network which may include inter-networks composed of LANs connected by bridges and routers.

LD-CELP (G.728)
A means of encoding audio so a smaller portion of bandwidth is allocated to audio. This results in greater bandwidth for video, thus improving picture quality.

LEC
Local **E**xchange **C**arrier.

Lip Synchronization
Feature that provides additional or no audio delay within an MCU CPP conference.

Login
A keyword assigned to a user to access the MCU.

Login password
A code word that can be customized by the user that corresponds with the user's login.

Low-/High-Speed Interworking
A feature that allows 56k or 64k endpoints to join higher-speed conferences as Audio Add-On endpoints via conventional dial-in H.320 ports. Multiple H.320 ports in a conference can implement this feature simultaneously

M

MAC
Media **A**ccess **C**ontrol - part of the layer 2 LAN protocol

Management Terminal
A 715GBCS terminal used primarily for administration and maintenance functions.

Manipulate Most Recently Joined Endpoint
UCC option that allows the user to perform various operations on the endpoint that most recently joined the MCU conference. These operations include broadcasting, muting, unmuting, and dropping the most recently joined endpoint; performing Solo Audio on the most recently joined endpoint; and setting the most recently joined endpoint into a quadrant.

Manufacturer and Product Information Exchange
The MCU exchanges ns-caps with each endpoint that joins the conference. Besides information regarding capabilities, ns-cap messages contain manufacturer and product information for the MCU or endpoint. Such information received by the MCU from the endpoint is displayed on the Status Conference form.

MC
Multipoint **C**ontroller. An entity which provides for the control of three or more terminals in a multipoint conference.

MCU
MultiPoint Conferencing Unit. An H.320/H.3XX compliant multipoint bridge for conferencing voice, video and data for multimedia terminals.

MCU-extension
An extension on the MCU that corresponds to the number a conferee dials to join a multipoint video conference.

MCU-Extensions and Numbers to Dial Form
A list of all MCU-extensions, supported bandwidth, and corresponding Meet-Me numbers that conferees dial to join a conference.

MCU Express
A process that focuses on installing and provisioning the MCU more expediently. Components include customer self-installation and self-maintenance, improved customer training, firmware upgrade, and CRCS ease-of-use enhancements.

MCU-MT
See *Management Terminal*.

MCU-ST
See *Scheduling Terminal*.

Meet-Me number
A number a conferee dials to join a multipoint video conference.

Mixed conference mode
Feature that allows the MCU to support both Meet-Me and Dial-Out endpoints in the same conference.

Modem pooling
Capability that provides shared conversion resources (modems and data modules) for cost-effective access to analog facilities by data terminals. When needed, modem pooling inserts a conversion resource into the path of a data call. Modem pooling serves both outgoing and incoming calls.

MSM
Multimedia **S**erver **M**odule.

MP
Multipoint **P**rocessor. An entity which provides for the processing of audio, video and/or data streams in a multipoint conference. The MP provides for mixing, switching or other processing of media streams under the control of the MC. (i.e. the TN2237 Video Processing Plus board and the VC board (with controlling software) provide traditional MP functionality.

MultiCast
MultiCast sends a single packet to a subset of destinations on the network without replication. MultiCast transmissions uses network bandwidth more efficiently since all stations in the multicast group read a single data stream.

Multimedia
The use of a variety of media, including audio, data, graphics, and full-motion video.

Multimedia Collaboration Center (MCC)
A video technical support group that is available to help with questions about the Avaya MCU.

Multipoint video conferencing
A technique of combining video, audio, and data from three or more video endpoints onto a single video conference call.

Multirate bandwidths
Bandwidths of one channel that use an ISDN-PRI facility from an endpoint that provides the appropriate size bandwidth. These bandwidths include 112k, 128k, 168k, 192k, 224k, 256k, 280k, 320k, 336k, 384k, 448k, 512k, 672k, 768k, 1008k, 1288k, 1344k, 1472k, 1536k, 1680k, and 1920k. The 56k increments can be multirate only when the endpoint is directly connected to a Data Interface circuit pack.

N

NetPkt
Network Control/Packet Interface Circuit Pack TN794. Introduced in the DEFINITY Release 7.1.

Network service
The telephone company that provides the trunks and Meet-Me numbers to access the MCU.

Network type
Specifies whether a video endpoint is connected to a private network (behind a PBX) or a public network.

Non-transcoded conference
A conference that does not support transcoding between H.263 video and H.261 video.

Notification tones
The entry, exit, and warning tones available with some of the MCU models.

O

OneNumber Access
Feature that allows multiple endpoints in a conference to access the MCU from the same external extension. A OneNumber Access extension is a duplicated MCU-extension within a single conference. Endpoints sharing a OneNumber Access extension are not preassigned to a specific conference endpoint number; instead, these endpoints share a pool of endpoint numbers and receive a conference endpoint ID based on when they join the conference.

P

PacketStar Access Concentrator- (AC-) 60
A component that provides an ATM interface to the MCU The AC-60 aggregates H.320 video traffic at premises on the user side, adapts this traffic to ATM format, and then transmits it over an ATM network on the network side.

Panoramic
Continuous Presence *Plus* configuration in which a video image appears within each of the two lower quadrants of and the upper half of the screen. The user can therefore see up to three participants. Also known as “three-image.”

Paper-based scheduling system
A method of recording and tracking conference reservations to prevent overbooking of the MCU.

PC-based scheduling
A scheduling method that uses the Avaya Conference Reservation and Control System to accept reservations and qualify video endpoints to participate in a multipoint video conference.

PCM
See *Pulse Code Modulation*.

Per-conference password
A password for a conference that is provided by the customer at conference reservation time. Conferees are prompted for the password when they join the conference.

Per-user password
A feature that allows individual passwords to be assigned to each dial-out H.320 endpoint as well as to the Audio Add-On port (if present) in the conference. Therefore, the feature provides a higher level of security than does the per-conference password feature.

PHB
Per-**H**op **B**ehavior - level 3 router treatment specified by DiffServ.

Point-to-point
A conference involving only two sites whose video endpoints are not connected through the MCU.

Port
A logical entity where the video call terminates on the MCU. It provides a specific bandwidth (data rate) capacity, such as 56k, 64k, etc.

Presentation
A conference mode where a video endpoint's video is constantly broadcast to the other locations. However, the audio portion of the conference switches according to who is speaking. Any conferee can be a speaker. The video endpoint that is the presenter views endpoints determined by voice-activated switching.

PRI
See *primary rate interface*.

Primary rate interface
A standard ISDN frame format that specifies the protocol used between two or more communications systems. PRI runs at 1.544 Mbps and, as used in North America, provides 23 64k B-channels (voice or data) and one 64k D-channel (signaling). The D-channel is the 24th channel of the interface and contains multiplexed signaling information for the other 23 channels.

Protocol
A set of international industry-standard rules governing the exchange of data between two entities.

Pulse Code Modulation
A means of encoding audio by assigning less bandwidth to video. G.711 audio mode is used.

PVC
See *permanent virtual circuit*.

Q

Q.931
Call signaling protocol for set up and termination of calls.

QCIF
See *Quarter Common Intermediate Format*.

QoS
Quality of **S**ervice - guarantees (or improves) network bandwidth and availability for applications.

Quarter Common Intermediate Format
An industry-standard means of encoding video signals to produce medium-quality pictures by encoding only a quarter of the video resolution of CIF.

R

Rate Adaptation
Feature that allows the Avaya MCU to interwork endpoints operating with 2B-channels that are on both 56k and 64k networks.

RBS
Robbed-Bit Signaling.

Real-Time Conference Status
Feature that allows the real-time status of a conference and its associated conferees to be displayed on the MCU-MT. The **monitor conference** command is used for this purpose. Once the command is issued, the display is automatically updated approximately once every 30 seconds. Accordingly, this feature is intended for troubleshooting purposes.

Recurring meeting
A meeting that occurs more than once in a definite pattern, such as every Thursday.

Reservations agent
The person responsible for accepting multipoint conference reservations, making reservations on the MCU-ST or CRCS, and resolving minor problems.

Reserved
A conference class that indicates a conference will begin and end within the next 24 hours.

RFC
Request **F**or **C**omments. The standard document of the internet.

RFS
Alternative acronym to CAPP 5.0's R/FS acronym indicating a Requirements/Feature Specification document.

RNX
See *Route-Number-Index*.

Rollcall
A Universal Conference Control option that allows the broadcaster to scan endpoints in the conference without specifying an endpoint number for each scanned endpoint. With this option, all endpoints in the conference see a change in video caused by the scan.

Rotation scan time
The number of seconds that a broadcaster views each location before viewing the next location in the rotation.

Route-Number-Index
Private network office code.

RS-232C
A physical interface specified by the Electronic Industries Association (EIA). RS-232C transmits and receives asynchronous data at speeds of up to 19.2k over cable distances of up to 50 ft.

RS366
EIA standard for interconnecting data terminal equipment and automatic calling equipment for data communications.

RS366 Dialing
Feature that allows H.320 codecs that are directly connected to the MCU via a V.35/RS449/EIA-530 interface to dial into multimedia, multipoint conferences. This allows endpoints to join conferences after the conference start time and to drop from conferences early. Also allows the aforementioned codecs to place and receive spontaneous 2B and multirate point-to-point calls with other endpoints directly connected to the MCU and other endpoints anywhere in the network. Finally, allows H.323 endpoints connected behind H.323 gateways to participate in multimedia, multipoint conferences for which there is a V.35/RS449/EIA-530 connection between the gateway and the MCU. The H.323 endpoints can dial into MCU conferences.

RSC
Regional Support Center.

S

Scan time
See *rotation scan time*.

Scheduling terminal
Also known as the MCU-ST. A 715 Business Communications Terminal (BCT) used for reserving conferences on the MCU and for checking the status of conferences and availability of MCU ports.

SCI
Switch **C**ommunication **I**nterface.

SCO
System **C**ontrol **O**ffice.

SDN
Software **D**efined **N**etwork.

SIP
Session **I**nitiation **P**rotocol. SIP is a simple signaling protocol (RFC 2453) for Internet Conferencing and Telephony developed with the Internet Engineering Task Force (IETF).

Site profile
A list of video endpoints that may participate in multipoint video conferences and their location, time zone, bandwidth, and network type.

SM
See *Speed Match*.

SPE
See *Switch Processing Element*.

Speed Match
Feature that enables endpoints with varying audio modes, video formats, and transfer rates to participate in the same MCU conference. The feature enables low-speed desktop video endpoints to interwork with high-speed group system video endpoints in a multipoint conference with full video and audio capabilities.

Status
The current state of a conference. A reserved conference status can be active, in use, or complete. A file conference status is always inactive. A dedicated conference status is always active.

Switch Processing Element
A complex of circuit packs (including the processor, memory, and bus interface cards) that are mounted in a control carrier. The SPE serves as the control element for the MCU.

System administrator
The on-site telecommunications manager who administers the MCU trunks, maintenance alarm terminals, dial plan, passwords, MCU-extensions and numbers, and system time. The system administrator can request system reports to check on MCU performance and also has access to all conference-related forms.

T

T.120
The suite of standards defined by the ITU-T in support of data conferencing. The Avaya MCU includes support for the T.120 infrastructure recommendations, including T.123 (transport), T.122/T.125 (MCS), T.124 (GCC), T.126, and T.127.

TCP
Transmission **C**ontrol **P**rotocol. A reliable networking layer on top of IP.

TDM
See *time division multiplexing*.

Terminal
An endpoint which provides for real-time, two-way communications with another Terminal, Gateway or MCU. A terminal must provide audio and may also provide video and/or data.

Terminal Names
A feature that enables the MCU to poll and ascertain “naming/identification” parameters from endpoints and to pass the information onto other endpoints. Therefore, conference participants whose endpoints display this information can identify other conference participants.

Time division multiplexing
Multiplexing that divides a transmission channel into successive time slots.

Tones
See *Notification Tones*.

TOS
Type **O**f **S**ervice.

U

UCC
Universal **C**onference **C**ontrol.

UDP
See *Uniform Dial Plan*.

Uniform Dial Plan
A feature that allows a unique 4- or 5-digit number assignment between the MCU and another MCU or PBX.

Universal Conference Control
A customer feature that enables an endpoint to manage an H.320 conference out-of-band. UCC is intended to provide a number of powerful services similar to, and in lieu of, H.243 Chair Control. The controlling terminal for UCC *Star* is a regular touchtone telephone, such as that used by an Audio Add-On party. The terminal does not receive audio, video, or data from the conference it is managing, and it does not transmit this media to the H.320 conference multiplex. UCC *P&C* (Point and Click) provides an alternative user interface to UCC *Star*; namely, a graphical-user interface (GUI) on a PC.

V

VAS
See *Voice-Activated Switching*.

Video endpoint
A video codec, with camera, speakers, screen, and other equipment required for multimedia conferencing.

Video-Switching Mode and Broadcaster Notification
A feature used by the MCU to announce to all the conference endpoints the current video-switching mode and broadcaster. The feature is also used whenever the endpoint initiates a See-Me (User-Activated Presentation) request that cannot be honored.

Voice-Activated Switching
A conference mode where the video image of the person speaking is seen by all other conferees. The speaker sees the video image of the previous speaker. When a new speaker begins talking, the video switches to the new speaker.

VoIP
Voice **o**ver **IP**.

W

Warning tone
A tone that sounds when only 10 minutes remain in a conference.

Web Pak
An Internet tool with two separate components and options which allow qualified users to request meeting rooms and video conferences as well as control of live video conferences using the Microsoft® Internet Explorer 4.x web browser.

Z

Zone

A collection of all terminals, gateways and MCUs managed by a single Gatekeeper. A zone must include at least one terminal and may include LAN segments connecting routers.

The Former Enterprise Networks Group
of Lucent Technologies

MultiPoint Conferencing Unit
Release 7.1

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