

Lucent Technologies
Bell Labs Innovations



MultiPoint Conferencing Unit (MCU)

Release 6.0

Maintenance

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Federal Communications Commission Statements

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:

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Acknowledgment

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About This Document

This manual describes the maintenance procedures, commands, and alarms for the Lucent Technologies MultiPoint Conferencing Unit (MCU) Release 6.0. It is intended for use by Lucent Technologies technicians and telecommunications managers.

Related Information

Use this manual in conjunction with the following Lucent Technologies MCU documents and information sources:

- *Lucent Technologies MultiPoint System Guide for the MultiPoint Conferencing Unit/Conference Reservation and Control System*, 555-027-214

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.
- *Lucent Technologies MultiPoint Conferencing Unit Administration*, 555-027-502

Provides detailed information and instructions that an MCU telecommunications manager can use for ongoing administration, troubleshooting, and reports.

- *Lucent Technologies MultiPoint Conferencing Unit Seminar*, BM1068U
A Lucent Technologies course offering that provides an overview of the Lucent Technologies MCU administration and scheduling functions.
- *Lucent Technologies Conference Reservation and Control System Installation*, 555-027-109
Describes how to install the Conference Reservation and Control System (CRCS).
- *Lucent Technologies Conference Reservation and Control System User's Guide and Quick Tour*, 555-027-755
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.
- *715GBCS-2 Terminal User's Guide and Service Manual*, 555-230-876
Discusses how to install, configure, operate, and troubleshoot the 715GBCS-2 terminal, which is used as an MCU management terminal (MCU-MT) or an MCU scheduling terminal (MCU-ST).
- *BCS Products Security Handbook*, 555-025-600
Discusses security risks and measures that help prevent external telecommunications fraud involving Lucent Technologies products.
- *BCS Products: Insights into Securing Against Toll Fraud*, BG9054W
Provides an individualized learning program on insights into securing against toll fraud involving Lucent Technologies products. Using passwords and monitoring various reports are discussed, among other topics.
- *Lucent Technologies BCS Toll Fraud Overview*, 015-338-100
Provides an explanation of the industry-wide toll fraud problem and the actions needed to protect your telecommunications system.

Organization

This 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 manual also has a glossary and an index.

Typographic Conventions

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

- This *typeface* is used for references of 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:



indicates information you need to prevent equipment damage.

- The following icon:

 CAUTION:

emphasizes information that is important to your safety.

- 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 Video Technical Center (VTC)/Customer Care Center at 800 242-2121. If you are a customer in Australia or the United Kingdom, call the International Technical Assistance Center (ITAC) at 303 804-3777.

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 troubleclearing 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, resynchronization 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*
Current Limiter	928LS
Data Interface (DI)	TN2236B
Dial-out Accelerator	TN744D
Digital Line	TN754B
Digital Line (24-port, 2-wire DCP)	TN2224
DS1	TN767E
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
Network Control	TN777B
PACCON Circuit Pack	TN778
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	TN790
Processor Interface	TN765
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 Lucent Technologies AT250 UPS (international) and the Lucent Technologies 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 Lucent Technologies AT250 UPS (international) and the Lucent Technologies 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 to the MCU-MT, follow these procedures:

1. Verify that the MCU-MT displays: `Login :`
2. Enter your login.
3. Verify that the screen displays: `password :`
4. Enter **your password**.

NOTE:

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

5. The software version is displayed.
6. When the screen displays: `Terminal Type (Enter 715, 513, 4410, or 4425): [513]` press RETURN.
7. The screen should now display `command :` unless a craft command is used. In such a case, another message, such as `suppress alarms :`, is displayed.

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

Maintenance functions can be performed from the remote MCU-ST. To log in to the MCU-ST, perform the following procedure:

1. Enter **at**.
2. When the OK prompt appears, enter **atdtcode**, where **code** is the access code provided by your technical center when the MCU is installed.
3. Verify that the MCU-ST displays: Login :
4. Enter your login.
5. Verify that the screen displays: password :
6. Enter **your password**.



NOTE:

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

7. The software version is displayed.
8. When the screen displays: Terminal Type (Enter 715, 513, 4410, or 4425): [513] press 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 Lucent Technologies to leave messages on the system. The bulletin board feature makes it easy for the customer to communicate with Lucent Technologies (and vice-versa). For example, when a new load is installed on a customer's MCU, Lucent Technologies can leave the customer messages that describe new functionality. This feature also allows Lucent Technologies 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 Lucent Technologies 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 Lucent Technologies 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 !@#\$%^ &*()_ -+=[]{};'<>./?.

 **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 Lucent Technologies and a customer who is having trouble with trunk group translations:

display bulletin-board		Page 1 of 3
Messages (* indicates high-priority)		Date
* Lucent 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.



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

4	Initialization and Recovery	
	Reset System 5 (Reboot and Run 24-Hour Tests)	4-5

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) Network Control
MEM_BUS	1) Processor 2) Network Control
PROC_MEM	1) Processor
OFFBD_MEM	1) Processor 2) Network Control
INVALID_ERR	1) Processor 2) Network Control
MAINT_BD	1) Processor 2) Network Control
NETCON_ABSENT	1) Network Control 2) Processor
NO_CARTRIDGE	1) Memory Card 2) Network Control 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.

4 Initialization and Recovery

ESM-Related System Technician Commands

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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).

4	Initialization and Recovery	
	ESM-Related System Technician Commands	4-12

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:

change system parameters maintenancePage 1 of 3

MAINTENANCE-RELATED SYSTEM PARAMETERS

OPERATIONS SUPPORT PARAMETERS

Product Identification: 1000000000

First OSS Telephone Number:Abbrev Alarm Report? y

Second OSS Telephone Number:Abbrev Alarm Report? n

Alarm Origination to OSS Number: neither

Cleared Alarm Notification? nSuspension Threshold: 5

Restart Notification? n

Test Remote Access Port? n

CPE Alarm Activation Level: none

Sch Adj Alarm Activation Level: none

Packet Bus Activated? n

Customer Access to INADS Port? n

Repeat Dial Interval (mins): 7

SCHEDULED MAINTENANCE

Start Time: 01 : 00Stop Time: 06 : 00

Daily Maintenance: dailySave Translation: daily

Figure 5-1. Maintenance-Related System Parameters Form (Page 1)

change system-parameters maintenancePage 2 of 3

MAINTENANCE-RELATED SYSTEM PARAMETERS

MINIMUM MAINTENANCE THRESHOLDS (Before Notification)

TTRs: 4_CPTRs: 1Call Classifier Ports: _

ISDN MAINTENANCE

ISDN_PRI Test Call Extension: ____ ISDN BRI Service SPID: ____

DS1 MAINTENANCE

DS0 Loop-Around Test Call Extension: ____

Figure 5-2. Maintenance-Related System Parameters Form (Page 2)

change system-parameters maintenancePage 3 of 3

MAINTENANCE-RELATED SYSTEM PARAMETERS

Modem Connection: internal
Data Bits: 8
Parity: none

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.

5 Routine Maintenance Procedures

Maintenance-Related System Parameters Form

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■ *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**.

■ *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.

5 Routine Maintenance Procedures

Maintenance-Related System Parameters Form

5-7

■ *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.

■ *Packet Bus Activated?*

Indicates whether the TN778 PACCON circuit pack is inserted and the packet bus is activated. Values include **y** and **n**.

■ *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 Lucent Technologies 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.

5 Routine Maintenance Procedures

Maintenance-Related System Parameters Form

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- *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.

- *MMIs*

Shows minimum number of ports on Multimedia Interface circuit packs. Values include **1** through **128**.

- *VCs*

Shows minimum number of ports on Voice Conditioner circuit packs. Values include **1** through **128**.

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.

5 Routine Maintenance Procedures

Maintenance-Related System Parameters Form

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- *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 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.

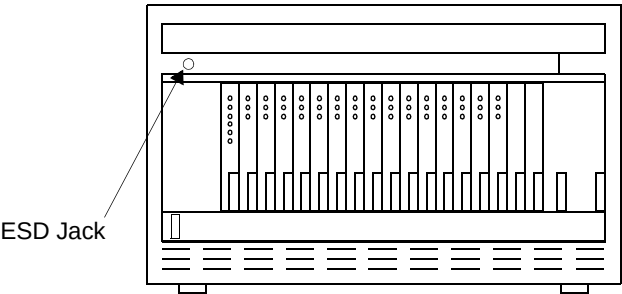


Figure 5-4. ESD Wrist Strap Grounding Locations

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 reseal 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.

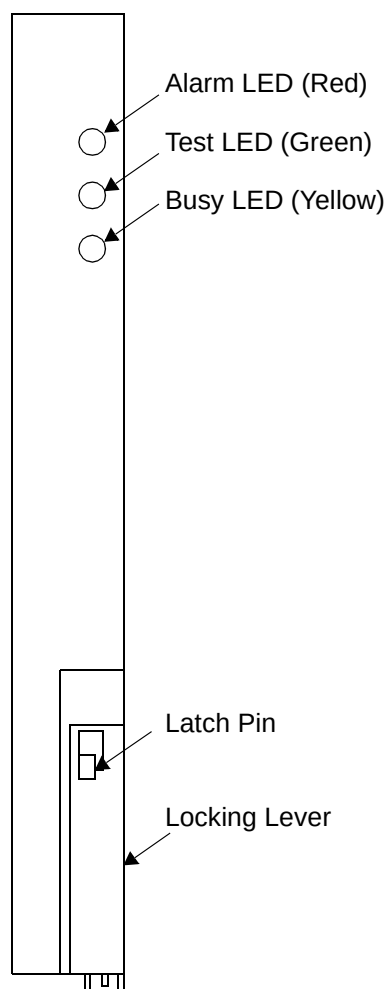


Figure 5-5. Typical TN-Coded Circuit Pack

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 reseal 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."
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 reseal 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 reseal 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."
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 Control Circuit Pack."

Installing a New Control Circuit Pack

To install a new control 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 TN777B Network Control 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 TN777B Network Control 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

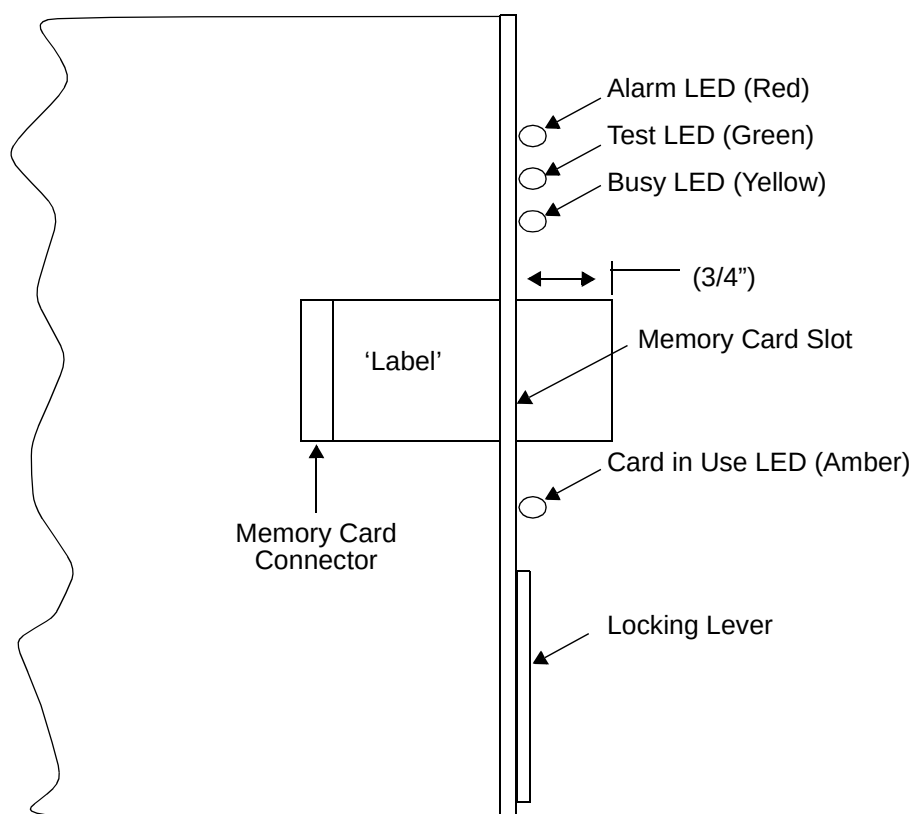


Figure 5-6. Inserting a Memory Card

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 TN777B Network Control 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 TN777B Network Control 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 TN777B Network Control 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 TN777B Network Control 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 daiily 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 TN777B Network Control circuit pack.
2. Insert the backup memory card into the Network Control circuit pack.
3. Log on and enter **save translation**.



NOTE:

If an error code appears, refer to the next section on "Memory Card Errors."

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 Network Control circuit pack.	Test the 12-volt power supply by entering test card-mem . If the test fails, replace the Network Control 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 Network Control 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.

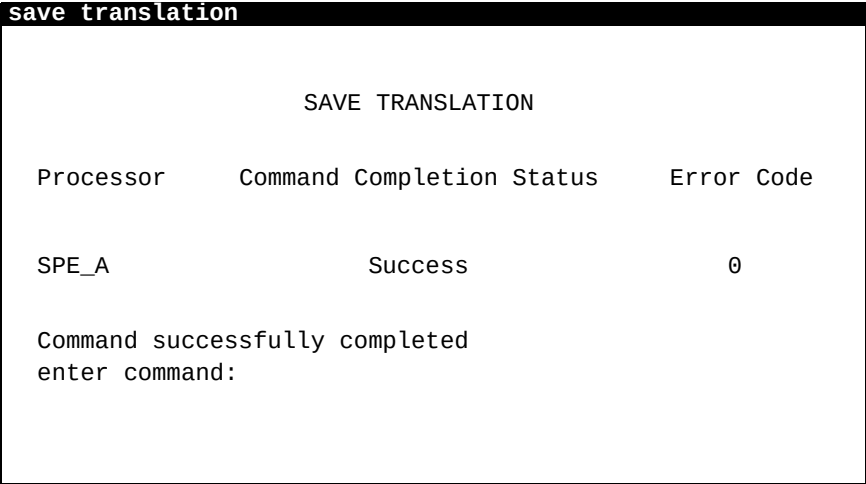


Figure 5-8. Save Translation Screen

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. This procedure takes approximately 30 minutes, 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 Meg generic card containing the MCU software (orange label)
-  **NOTE:**
If the circuit pack ships from the factory as an MCU upgrade, the software will be already loaded.
- 10 Meg firmware download card containing the firmware for the TN2237C, TN787K and TN2236B circuit packs. (white label)
 - TN788C Voice Conditioner circuit packs if ClearPresence™ @716 is being added as part of the upgrade
2. If the MCU has a CRCS adjunct, log out and exit from the CRCS. The CRCS release must also be upgraded to match the MCU release.
 3. If the MCU has an ESM adjunct, follow the ESM shutdown procedures that are provided within the "Using the Esmhut Command" section in Chapter 10 of this document.
 4. Log in at the MCU-MT. (Verify that your MCU-MT is connected to the "term" connector on the back of the A carrier.)
 5. Issue the **save translations** command; verify that the command completes successfully.
 6. Remove the current translation card.
 7. Insert the new software memory card (20 meg, orange label).
 8. Issue the **status card-mem** command; verify with your technical center that the correct software version is present.
 9. Issue the **reset system 4** command.
 10. After about five minutes, you are prompted for the translation card. Replace the 20 meg orange card with the translation card that you save earlier. (The system will complete the reboot.)
 11. Log into the system. Be patient to allow the DS1 circuit packs to come back into service.
 12. Insert the firmware flash card; then issue the **status card** command to confirm the appropriate firmware levels with your technical center.

13. Use the **upgrade firmware** commands to upgrade any TN2237C (VPP), TN787K (MMI), or TN2236B (DI) circuit packs. Information on the **upgrade firmware** commands is included within the "Firmware Upgrade" section in this chapter.
14. Check for system sanity. (Issue the **list mmi** command for the TN787K circuit pack and the **list video** command for the TN2237C circuit pack.) Ensure that all alarms are cleared. (It may take up to 10 minutes for all alarms to resolve.)
15. Power up the ESM, and verify that the ESM connection comes up via the **status esm** command.
16. Remove the firmware upgrade card and insert the white 10 meg translation card.
17. If ClearPresence @716 was purchased, administer *ClearPresence@716* to **y** on the Customer-Options form.
18. Execute the **save translations** command.
19. Replace the TN788B circuit packs with TN788C circuit packs.
20. Reboot the system by issuing the **reset system 3** command.
21. Log in and check for system sanity by issuing the following commands: **list mmi**, **list video**, **status signal-group x**, **status esm**, **status trunk-group x**, **list configuration all**, and **display alarm**.
22. Contact your technical center and inform the representative there that the upgrade is completed.

Firmware Upgrade

The technician can upgrade and/or modify the TN787, TN2236, and TN2237 circuit packs at the customer location. The commands for doing so are issued from the MCU-MT. Command feedback is returned to this terminal as well as to the system Maintenance Terminal (MT). The craft logins have access to all of the commands for firmware download.

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.

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 Network Control circuit pack. To display firmware information, use the **status card** 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:

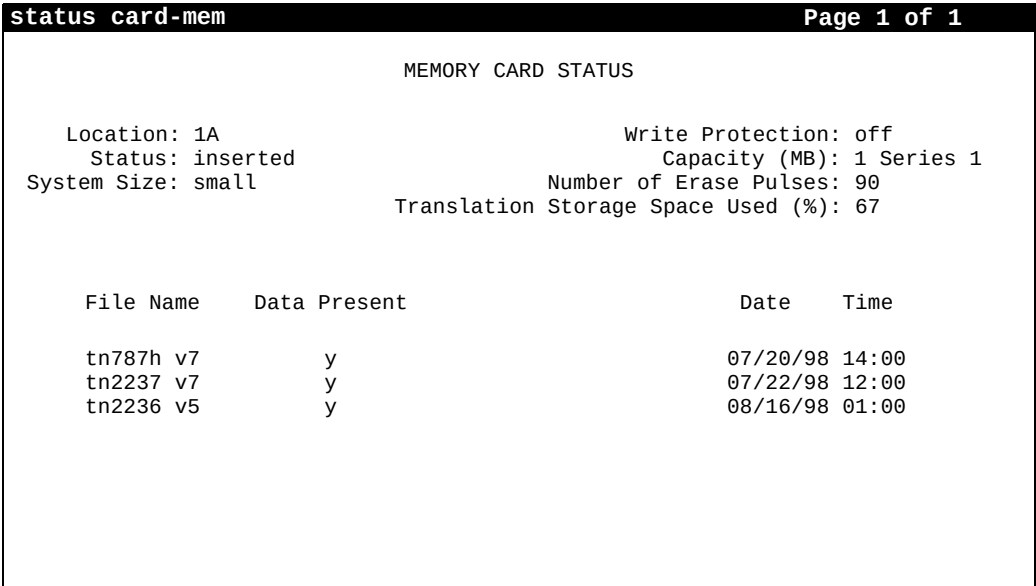


Figure 5-9. Memory Card Status Report

Upgrading Specific Circuit Packs

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**, **mmi**, or **vpp**) and **ppss** is the circuit pack location (for example, **upgrade firmware mmi 0112**). 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 Megabytes
- Firmware file is on a 10 meg 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 contains three 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

Firmware File No.	MCU Circuit Pack Type		
	TN2236 Data Interface	TN787 Multimedia Interface	TN2237 Video Processor Plus
1	340 Boot Code	340 Boot Code	340 Boot Code
2	340 Application Code	340 Application Code	340 Application Code
3	FPGA Code	TSI DSP Code	TSI DSP Code
4		H221 Code	Video DSP Code
5		ESM Code	TSI FPGA Code
6			Multi-Image FPGA Code
7			Single-Image FPGA Code
8			AVP 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 you 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 suffix and/or 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	Description/ Recommendation
3329	any	Minor	On	upgrade firmware	The circuit pack could not be reset and is still running in its boot code. 1) Physically reseal 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.

5	Routine Maintenance Procedures
	Firmware Upgrade

5-28

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.
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 reseal 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 reseal 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 reseal 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 reseal 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 reseal 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 reseal 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 reseal 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.	

Table 5-5. Troubleshooting the Upgrade Firmware Command — Continued

Error Code	Test Result	Description	Recommendation
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 reseal 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.
2726X	ABORT	The circuit pack failed to reset. The circuit pack is running in its boot code.	1) Physically reseal 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 reseal 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
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.
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.

Table 5-5. Troubleshooting the Upgrade Firmware Command — Continued

Error Code	Test Result	Description	Recommendation
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 reseal 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. 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 should 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

After performing a circuit pack upgrade, be sure to modify the hardware vintage numbers to reflect the new vintages. This information is available as output from entering the **list configuration [all]** or **[board ppss]** command. The vintages are reported in three fields.

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.

MCU Upgrade Procedure

To upgrade from a prior release, the MCU must have Release 5.0.26 software before you can upgrade to Release 6.0. Use the following instructions to upgrade from Release 5.0.26 or greater to Release 6.

1. Verify that you have received the necessary hardware, firmware and software, including the following:
 - Required TN790 circuit pack
 - 10 Meg translations card (white label)
 - 20 Meg generic card containing the MCU software (orange label)



NOTE:

If the circuit pack ships from the factory as an MCU upgrade, the software will be already loaded.

- 10 Meg firmware download card containing the firmware for the TN2237C, TN787K and TN2236B circuit packs. (white label)
 - TN788C Voice Conditioner circuit packs if ClearPresence™ @716 is being added as part of the upgrade
2. If the MCU has a CRCS adjunct, log out and exit from the CRCS. The CRCS release must also be upgraded to match the MCU release. The R6.0 CRCS supports the R5.0.26 or greater MCU as well as the R6.0 MCU.
 3. If the MCU has an ESM adjunct, follow the ESM shutdown procedures that are provided within the "Using the Esmhut Command" section in Chapter 10 of this document.
 4. Log in at the MCU-MT. (Verify that your MCU-MT is connected to the "term" connector on the back of the A carrier.)
 5. Issue the **save translations** command; verify that the command completes successfully.
 6. Remove the current translation card and "write-protect" the card. This card contains R5 translations and should be retained until after the upgrade is successful.
 7. Insert the new software memory card (20 meg, orange label).
 8. Issue the **status card-mem** command; verify with your technical center that the correct software version is present.
 9. Log off of the MCU-MT.
 10. Power down the system.
 11. Remove the TN786B Processor and CPP1 circuit packs from the system.
 12. Install the TN790 circuit pack into the processor slot. Place the blank plate where the CPP1 circuit pack was inserted.
 13. If you have purchased any additional common control hardware, you must install it at this point.

14. Power up the system. Observe the MT for errors during the upgrade.
15. After approximately five minutes, you are prompted for the translation card. Replace the 20 Meg orange card with the R5 translation card that you saved earlier. The system will complete the reboot.
16. Log into the system. Be patient to allow the DS1 circuit packs to come back into service.
17. Insert the firmware flash card; then issue the **status card** command to confirm the appropriate firmware levels with your technical center.
18. Use the **upgrade firmware** commands to upgrade any TN2237C (VPP), TN787K (MMI), or TN2236B (DI) circuit packs. Information on the **upgrade firmware** commands is included within the "Firmware Upgrade" section in this chapter.
19. Check for system sanity. (Issue the **list mmi** command for the TN787K circuit pack and the **list video** command for the TN2237C circuit pack.) Ensure that all alarms are cleared. (It may take up to 10 minutes for all alarms to resolve.)
20. Log in and check for system sanity. Ensure that all alarms are cleared. (It may take up to 10 minutes for all alarms to resolve.)
21. Power up the ESM, and verify that the ESM connection comes up via the **status esm** command.
22. Remove the firmware upgrade card and insert the *new white 10 meg translation card*.
23. If ClearPresence @716 was purchased, do the following:
 - a. Administer *ClearPresence@716* to **y** on the Customer-Options form.
 - b. Change the TN788B circuit packs to TN788C circuit packs.
 - c. Reboot the system using the **reset system 3** command.
24. Execute the **save translations** command.
25. Reboot the system by issuing the **reset system 3** command.
26. Log in and check for system sanity by issuing the following commands: **list mmi**, **list video**, **status signal-group x**, **status esm**, **status trunk-group x**, **list configuration all**, and **display alarm**.
27. Upgrade CRCS, and verify that it can communicate with the MCU.
28. Contact your technical center and inform the representative there that the upgrade is completed. The old translation card can be formatted for use with the R6. The capacity of the old card is less than that for the new card; therefore, the old card can be used only as a secondary backup until the customer's translations exceed its capacity. The old card is ideal for off-site storage for disaster recovery purposes, and it must be updated whenever the system is expanded. The card may be formatted by issuing the **format card-mem translations** command.

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 Lucent Technologies 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 Lucent Technologies 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)

<i>P</i>	Port network number	1 for PPN
<i>C</i>	Carrier number	A=1, B=2
<i>SS</i>	Slot number	0 through 20
<i>pp</i>	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)

<i>P</i>	Port network number	1 for PPN
<i>C</i>	Carrier number	A=1, B=2
<i>SS</i>	Slot number	00 through 20
<i>pp</i>	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 Table 5-5.

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.

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*
20	Chime
21	350 Hz*
22	440 Hz*
23	480 Hz*
24	620 Hz*
25	2025 Hz*
26	2225 Hz*

Table 5-9. System Access Tones for Facility Test Calls — *Continued*

Two-Digit Code	Tone
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
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

Table 5-9. System Access Tones for Facility Test Calls — *Continued*

Two-Digit Code	Tone
57	Disable Echo Supervision Dia
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
Ring 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 manufactuer(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.

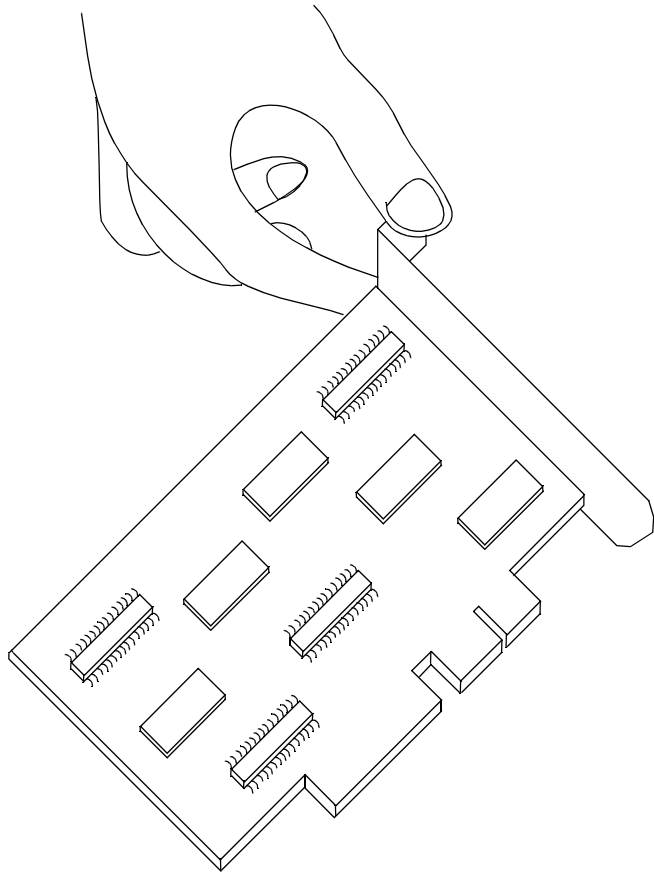


Figure 5-11. Holding a Short Circuit Card

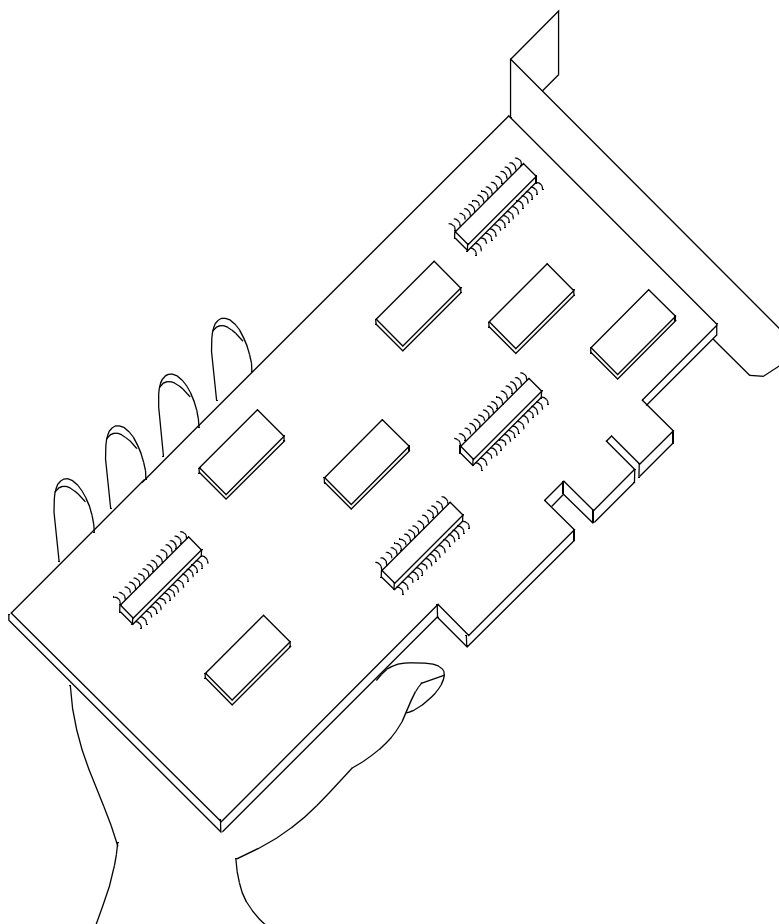


Figure 5-12. Holding a Large Circuit Card



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.

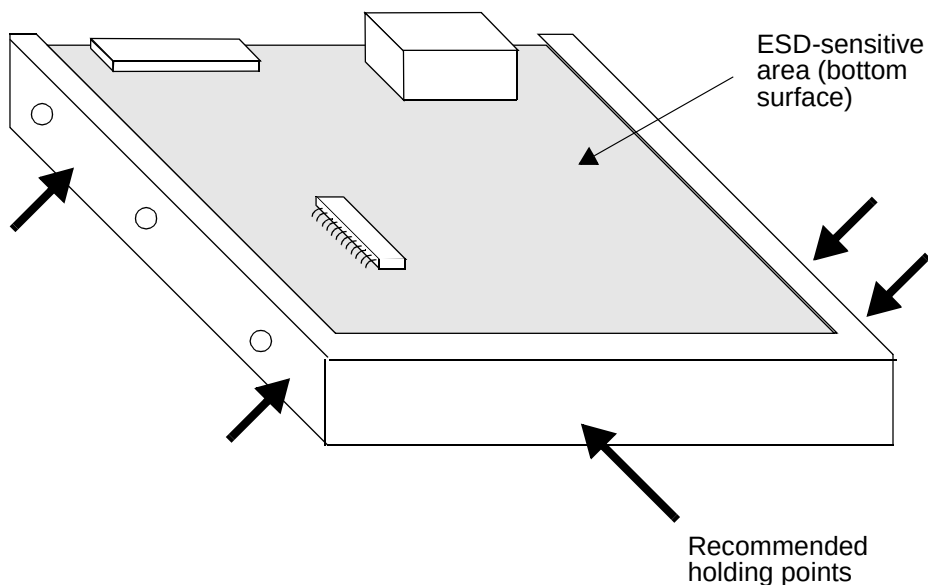


Figure 5-13. Electrical Component ESD-Sensitive Area

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.

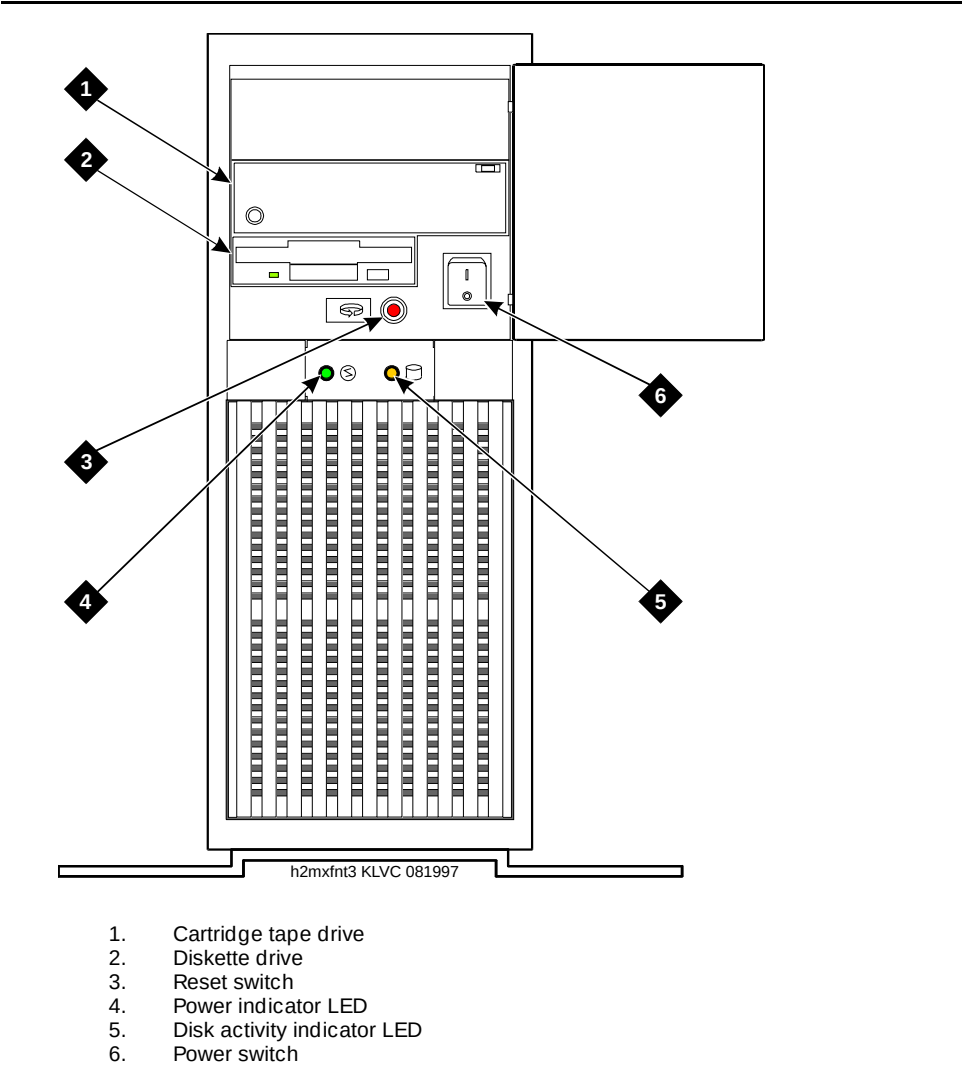


Figure 5-14. Front View of the ESM

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.

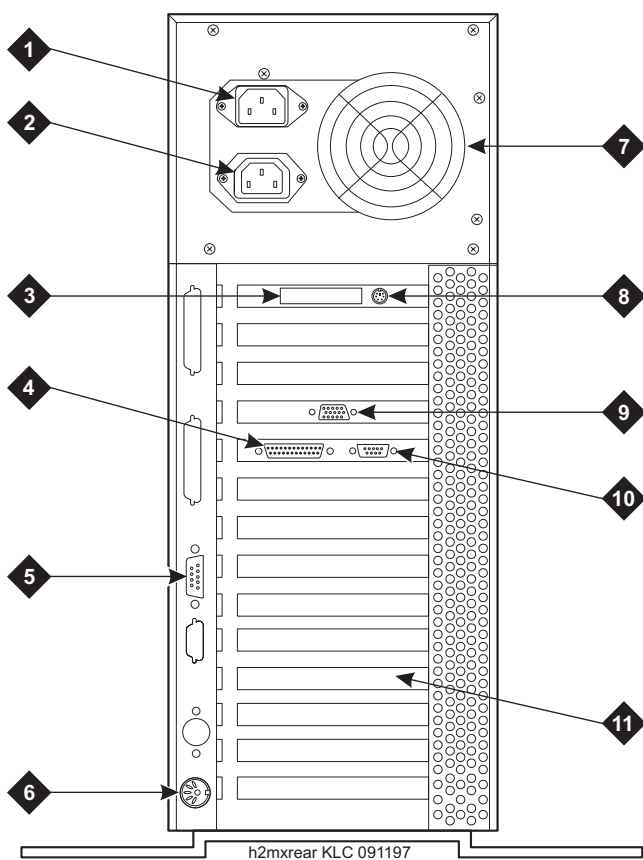
The fans maintain air flow in the unit to prevent components from overheating. Overheating can cause a component to malfunction. Air flows from the front through the vents of the bezel cover, and it exits through vents in the back of the unit. Maintain clearance around the unit so that air can circulate.

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 5-15. 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.

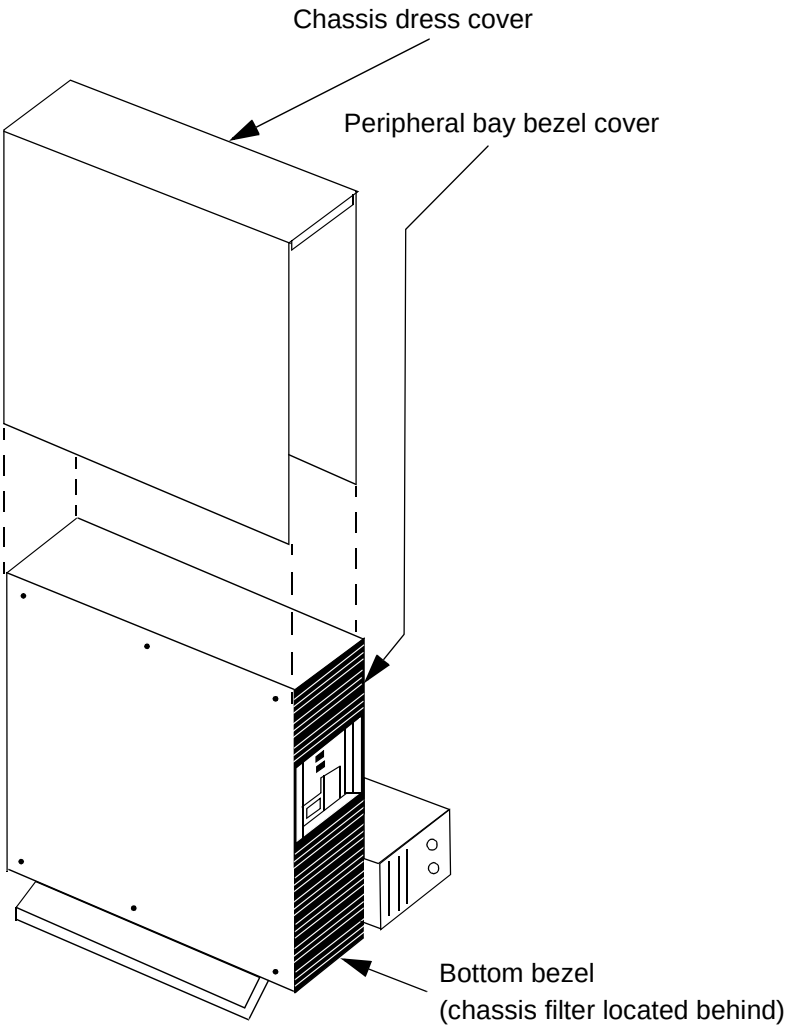


Figure 5-16. Removing the Dress Cover

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.

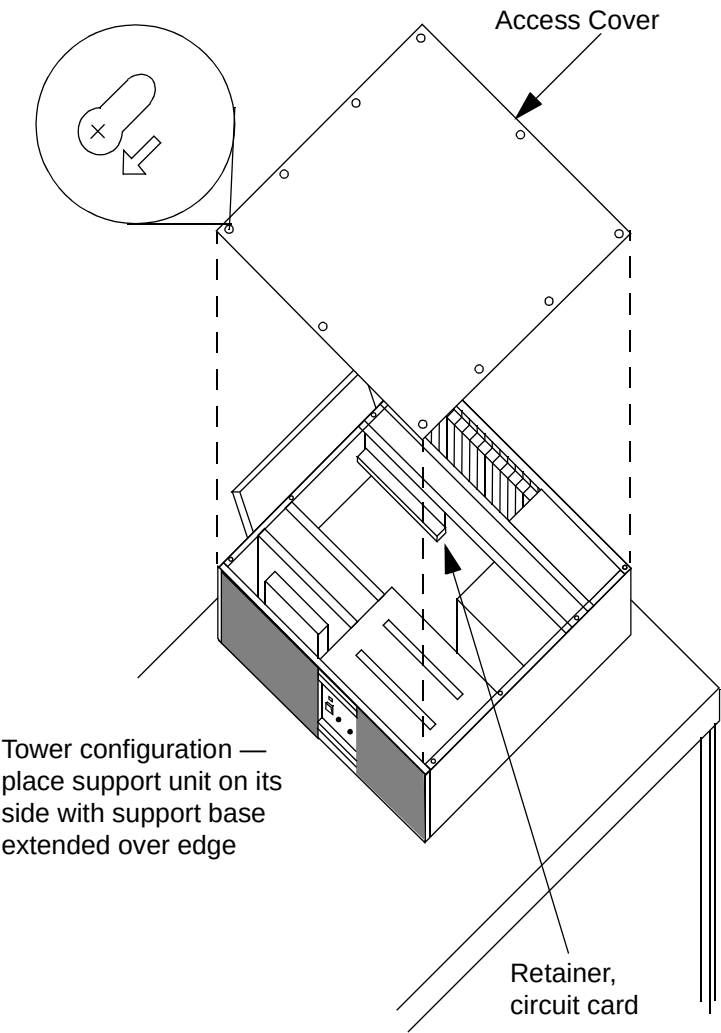


Figure 5-17. Removing the Access Cover

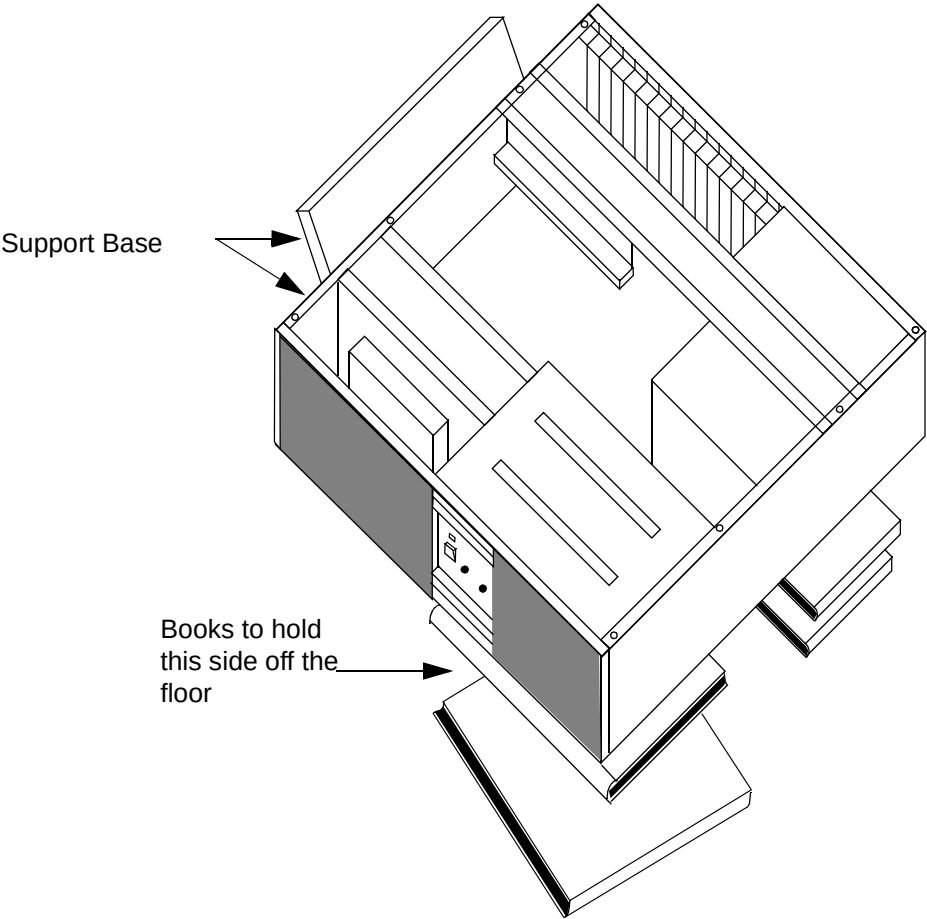


Figure 5-18. Working Within the Card Cage

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.

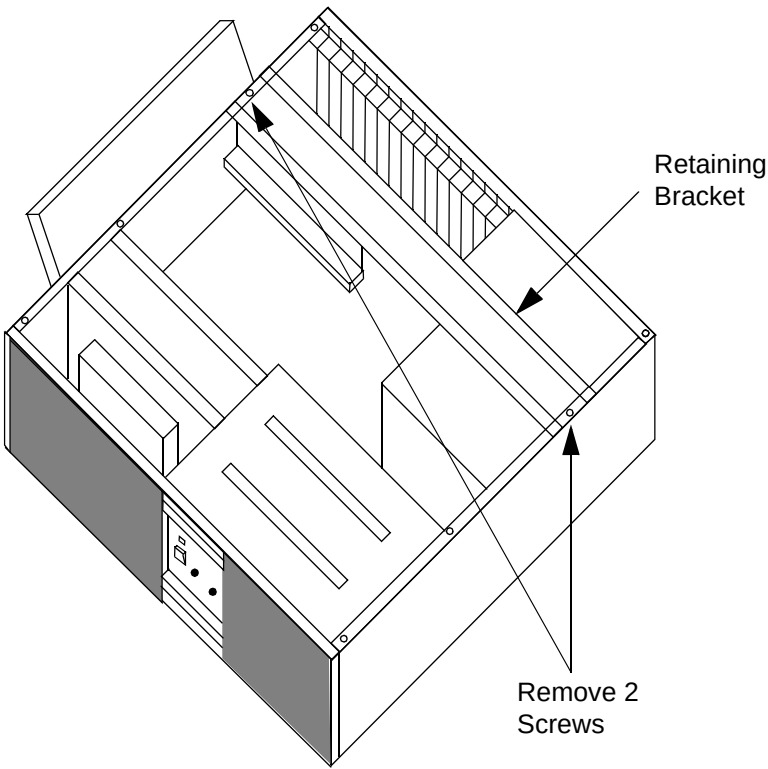


Figure 5-19. Removing Screw in Retaining Bracket

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

esmsht

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 **esmsht** 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 Lucent Technologies 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 Lucent Technologies 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.

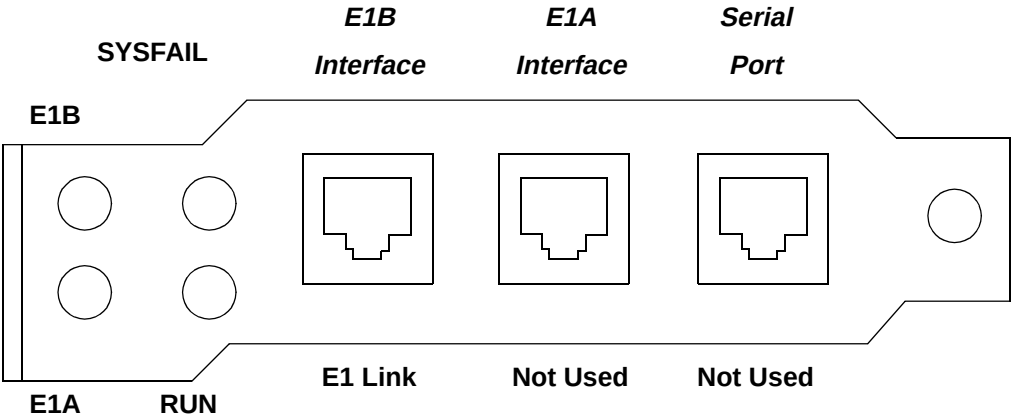


Figure 5-20. Rear Bracket of the MSM Interface Card

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.

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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
data	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
inads-link	INADS
infc	ISDN-LNK, PI-BD, PI-LINK, PI-PT, PI-SCI
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
netcon	DATA-BD, DATA-CHL, SW-CTL
procr	PROCR, PR-MAINT
cdr	PRI-CDR
stabd	DIG-BD, DIG-LINE
stacr	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
trkcr	ISDN-LNK, ISDN-TRK, TIE-DS1

Table 6-2. Errors/Alarms Category List (Alphabetized by Category) — Continued

Category	MO Name
trunks	ISDN-LNK, ISDN-TRK, TIE-DS1
vc	VC-BD, VC-DSPPT, VC-SUMPT, VC-LEV
video	VPP-BD, VPP-PT
vsp	VC-BD, VC-DSPPT, VC-SUMPT, MMI-BD, MMI-PT, VC-LEV, MMI-LEV

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	data
DI-PT	data
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
INADS	inads-link
ISDN-LNK	infc, trkcrk, trunks
ISDN-TRK	trkbd, trkcrk, trunks
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

Table 6-3. Errors/Alarms Category List (Alphabetized by MO Name) — *Continued*

MO Name	Category
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, vsp
VC-DSPPT	vc, vsp
VC-LEV	vc, vsp
VC-SUMPT	vc, vsp
VPP-BD	video
VPP-PT	video

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	Network Control
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
PI-PT	Major	On	Processor Interface Port

Table 6-4. List of Alarms in Order of Urgency — *Continued*

Maintenance Name	Alarm Level	On/Off Board [*]	Circuit Pack Name
PR-MAINT	Minor	On	Maintenance/Tape Processor
PR-MAINT	Minor	Off	Maintenance/Tape Processor
TDM-BUS	Minor	On	TDM Bus
SW-CTL	Minor	On	Network Control
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	Network Control
DATA-CON	Minor	On	Network Control
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
ISDN-TRK [†]	Minor	On	DS1 ISDN Trunk

Table 6-4. List of Alarms in Order of Urgency — *Continued*

Maintenance Name	Alarm Level	On/Off Board [*]	Circuit Pack Name
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 unalarmed 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:* status 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



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.

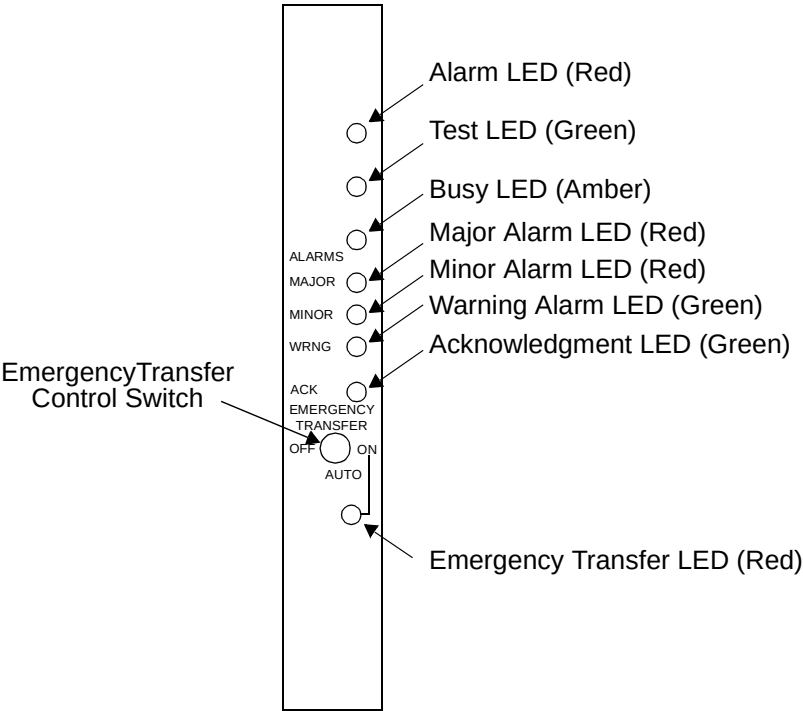


Figure 7-1. LEDs on the Processor Circuit Pack

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 be 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 <i>Card in use</i> 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.

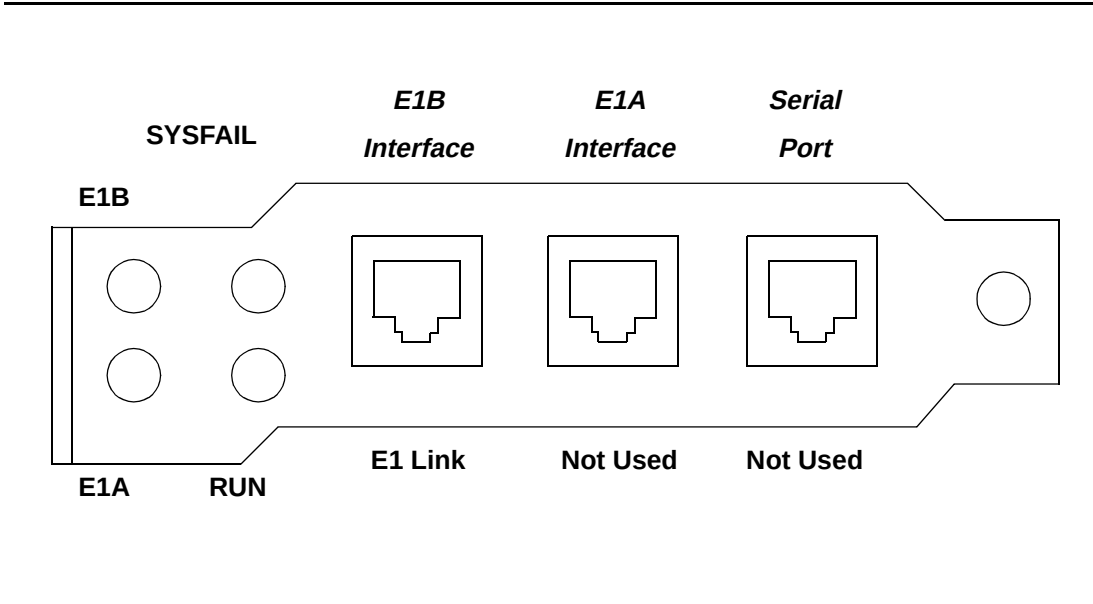


Figure 7-2. Rear Bracket of the MSM Interface Card

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:

- a. 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.
- b. 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.

7 LED Interpretation
MSM Interface Card's Status LEDs

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- c. 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 Lucent Technologies 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.

7	LED Interpretation MSM Interface Card's Status LEDs	7-10

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.

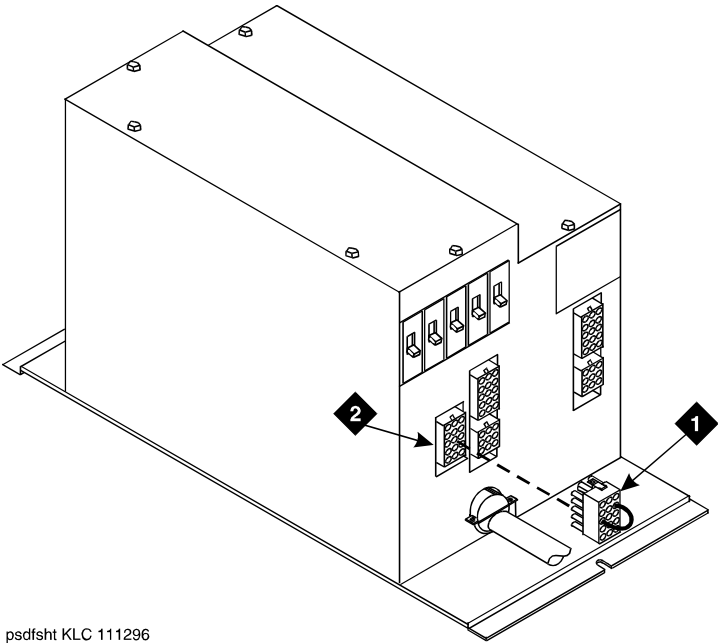
The environment maintenance strategy to be used depends on both the cabinet configuration and the type of powering. Also refer to DC-POWER (DC Power) for environment maintenance strategy.

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.



psdfsht KLC 111296

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 Type	Aux Data	Associated Test	Alarm Level	On/Off Board	Test to Clear Value
0*	0	Any	Any	Any	test environment P sh r 1
513	Any	AC Power Query Test (#78)	WARNING	OFF	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.

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.

Continued on next page

Table 8-2. AC Power Query Test #78 — Continued

Error Code	Test Result	Description / Recommendation
1	FAIL	 NOTE: For a Global AC MCC (J58890CH) use the procedures outlined in step 2. The switch is currently without AC power.  WARNING: <i>Turn off power to the 397C Battery Charger before removing Fuse F5.</i> 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.

Table 8-2. AC Power Query Test #78 — Continued

Error Code	Test Result	Description / Recommendation
100	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.
	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

Error Type	Aux Data	Associated Test	Alarm Level	On/Off Board	Test to Clear Value
0*	0	Any	Any	Any	test environment P sh r 1
513	Any	AC Power Query Test (#78)	WARNING	OFF	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.

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	Short Test Sequence	Long Test Sequence	D/ND*
Battery & Battery Charger Query Test (#5) (a)	X	X	ND
AC Power Query Test (#78)	X	X	ND
Power Unit Query Test (carrier E) (#127) (b)	X	X	ND
Power Unit Query Test (carrier D) (#127) (b)	X	X	ND
Power Unit Query Test (carrier A) (#127) (b)	X	X	ND
Power Unit Query Test (carrier B) (#127) (b)	X	X	ND
Power Unit Query Test (carrier C) (#127) (b)	X	X	ND
Emergency Transfer Query Test (#124) (c)	X	X	ND
Cabinet Temperature Query Test (#122) (d)	X	X	ND
External Alarm Lead Query Test (#120) (e)	X	X	ND
Analog Ring Generator Initialization Test (#117) (f)	X	X	ND
Analog Ring Generator Query Test (#118) (f)	X	X	ND

* D = Destructive, ND = Non-destructive

- 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.
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.
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 <i>N</i> *
Minor	status administered-connection <i>N</i>
Warning	status administered-connection <i>N</i>

* *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 Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Reason for Error
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	Any	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.

Table 8-7. ADM-CONN Error Log Entries — *Continued*

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Reason for Error
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.
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.

Table 8-7. ADM-CONN Error Log Entries — *Continued*

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Reason for Error
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.

Table 8-7. ADM-CONN Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Reason for Error
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-CONNns 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-CONNns 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 — *Continued*

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Reason for Error
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 <i>Originator</i> and <i>Destination</i> 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.

Table 8-7. ADM-CONN Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Reason for Error
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 — *Continued*

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Reason for Error
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.

Table 8-7. ADM-CONN Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Reason for Error
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-CONNns 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-CONNns 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-CONNns.

Table 8-7. ADM-CONN Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Reason for Error
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 — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Reason for Error
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.

Table 8-7. ADM-CONN Error Log Entries — *Continued*

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Reason for Error
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.

Table 8-7. ADM-CONN Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Reason for Error
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-CONNnS 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-CONNnS 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 <i>BCC</i> 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-CONNnS, check whether the destination number is correct.
91, 95, or 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.
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.

Table 8-7. ADM-CONN Error Log Entries — *Continued*

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Reason for Error
98 or 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.

Table 8-7. ADM-CONN Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Reason for Error
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.
196	Any	None	Any	OFF	None	NOTE: This error is applicable only to dial-out ADM-CONNS. No network facilities were available.

Table 8-7. ADM-CONN Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Reason for Error
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.

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

Table 8-8. 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 8-9. Analog Line 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 sh r 1
1 (a)	40960 40977 40975	None			
15 (b)	Any	Audits and Updates Test (#36)			
18	0	busy-out station <i>extension</i>	WARNING	OFF	release station <i>extension</i>
130 (c)		None	WARNING	ON	test port UUCSSpp sh
257 (d)		Station Present Test (#48)	WARNING	OFF	test port UUCSSpp sh r 3
513		Battery Feed Test (#35)	MIN/WRN* *	ON	test port UUCSSpp sh r 2
769 (e)		Loop-Around and Conference Test (#47)			test port UUCSSpp l r 3
1025		NPE Crosstalk Test (#6)	MIN/WRN* *	ON	test port UUCSSpp l r 3
1281 (f)					
1793 (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 8-10. System Technician-Demanded Tests: ANL-LINE

Order of Investigation	Short Test Sequence	Long Test Sequence	Is Test Destructive?
Battery Feed Test (#35)	X	X	No
Station Present Test (#48)	X	X	No
NPE Crosstalk Test (#6)		X	No
Loop-Around and Conference Test (#47)		X	No
Station Status and Translation Audits and Updates Test (#36)	X	X	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 8-11. 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 8-11. NPE Crosstalk Test #6 — *Continued*

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 <i>Test</i> 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 8-11. NPE Crosstalk Test #6 — *Continued*

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.
	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 8-12. Battery Feed Test #35

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 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.	

Table 8-12. Battery Feed Test #35 — *Continued*

Error Code	Test Result	Description	Recommendation
1018	ABORT	Test disabled via administration.	To enable the test for a particular station, enter change station extension and set the <i>Test</i> 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 <i>not</i> 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.	
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. Battery Feed Test #35 — *Continued*

Error Code	Test Result	Description	Recommendation
	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 8-13. Station Status and Translation Audits and Updates Test #36

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 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.	

Table 8-13. Station Status and Translation Audits and Updates Test #36 — Continued

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 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.
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.

Table 8-13. Station Status and Translation Audits and Updates Test #36 — Continued

Error Code	Test Result	Description	Recommendation
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.	

Table 8-13. Station Status and Translation Audits and Updates Test #36 — Continued

Error Code	Test Result	Description	Recommendation
8	FAIL	This does not indicate a hardware problem, but it may be an internal software error. The ringer update failed.	
	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 8-14. Loop-Around and Conference Test #47

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 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.

Table 8-14. Loop-Around and Conference Test #47 — Continued

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. 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.
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 <i>Test?</i> 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 <i>not</i> 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.

Table 8-14. Loop-Around and Conference Test #47 — Continued

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.	
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 8-14. Loop-Around and Conference Test #47 — Continued

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.	
	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.	

Table 8-14. Loop-Around and Conference Test #47 — Continued

Error Code	Test Result	Description	Recommendation
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 8-15. Station Present (Ringing Application) Test #48

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 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.	

Table 8-15. Station Present (Ringing Application) Test #48 — Continued

Error Code	Test Result	Description	Recommendation
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 <i>Test?</i> field on the Station Form to y .
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.	

Table 8-15. Station Present (Ringing Application) Test #48 — Continued

Error Code	Test Result	Description	Recommendation
	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 <i>Test</i> 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.

Table 8-15. Station Present (Ringing Application) Test #48 — Continued

Error Code	Test Result	Description	Recommendation
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 I
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 8-16. BRI-BD Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
0*	0	Any	Any	Any	test board PCSS sh r 1	
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, then follow the instructions for “Red (alarm)” in the “Control and Port Circuit Pack Status LEDs” section in Chapter 7, “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		Port(s) has(have) been administered on this circuit pack but the circuit pack is not physically present.

Table 8-16. BRI-BD Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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.
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.

Table 8-16. BRI-BD Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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.

Table 8-16. BRI-BD Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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	On		See Note a.
1794	46094		Minor	On		See Note a.
1795	46085		Minor	On		See Note a.
2306		#595				See Note a.

Table 8-16. BRI-BD Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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					See Note b.
3843	46097					See Note c.
3999	Any	None				See Note d.

* 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.

Notes:

- a. These errors indicate that the circuit pack is having problems transmitting data to the Packet Bus.

1793	Parity errors are detected when transmitting data to the Packet Bus.
1794	Overflow of Packet Bus transmit buffers has occurred.
1795	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.
2306	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.

- b. 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

c. This error is not service-affecting. No action is required.

3843

Bad translation RAM detected, but call continues by using another translation location.

d. 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.

Table 8-17. 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 8-18. 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.	

Table 8-18. LANBIC Receive Parity Error Counter Test #595 — Continued

Error Code	Test Result	Description	Recommendation
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 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 Lucent 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.

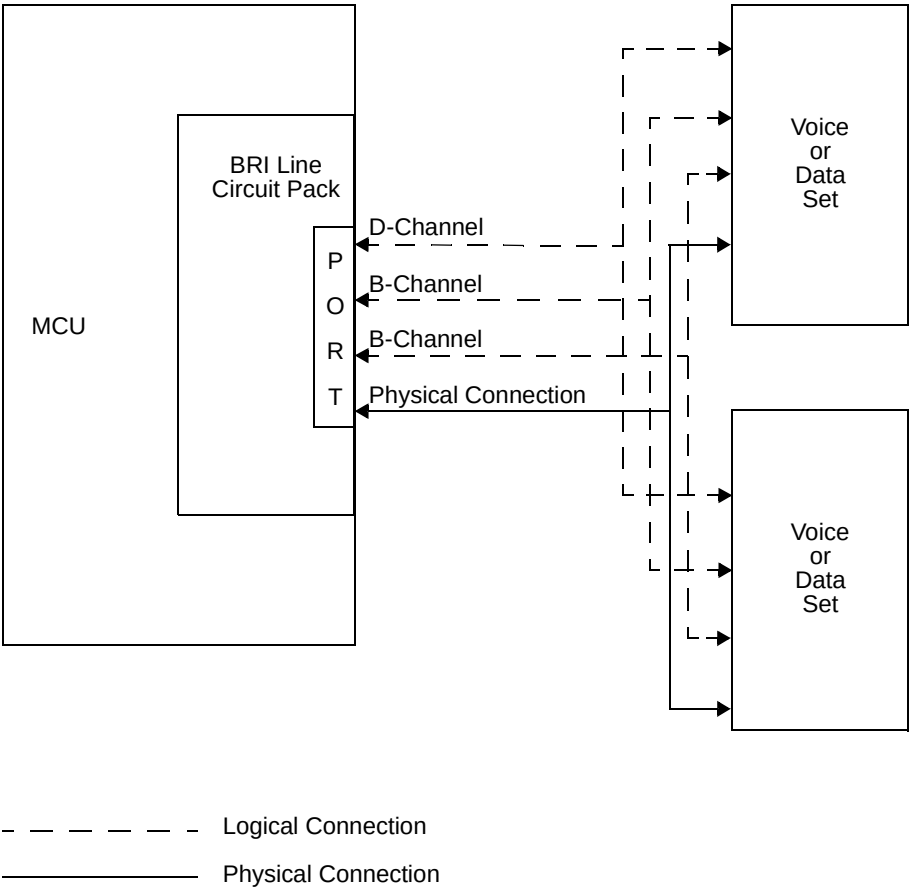


Figure 8-2. ISDN-BRI Port Interactions

Hardware Error Log Entries

Table 8-19. ISDN-BRI Port Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level BRI-PORT	On/Off Board	Test to Clear Value	Description
0*	0	Any	Any	Any	test port PCSSpp sh r 1	
1	Note a	#621	Warning	Off	test port PCSSpp sh r 2	Note a
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	Note b	#622	Warning	Off	test port PCSSpp sh r 1	Note b
513	46222	none	Minor/Warning †	On		Note c
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	Note d
1537	46210	#623	Warning	Off		Note e
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.

Table 8-19. ISDN-BRI Port Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level BRI-PORT	On/Off Board	Test to Clear Value	Description
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).

Table 8-19. ISDN-BRI Port Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level BRI-PORT	On/Off Board	Test to Clear Value	Description
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.

- * 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.
- ** Major and Minor alarms on this MO may be downgraded to Warning on alarms based on the value used in the **set options** command.

Notes:

- a. 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.Refer to the repair procedures for Test #621.
- b. 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.

- c. 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."
- d. 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.
- e. 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.

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 8-20. 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 8-21. 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.

Table 8-21. NPE Crosstalk Test #617 — Continued

Error Code	Test Result	Description	Recommendation
2012	ABORT	Internal system error	
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. NPE Crosstalk Test failed on Channel B1.	1) Replace the circuit pack.
	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.

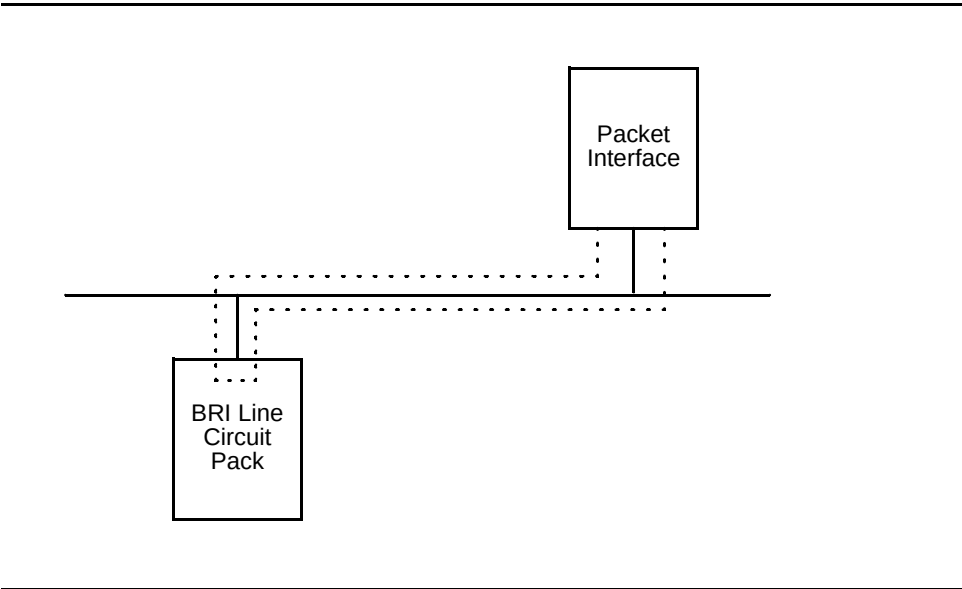


Figure 8-3. Path of the BRI Port LAN Loop-Around

Table 8-22. 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.  WARNING: <i>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.</i>
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.	

Table 8-22. BRI Port LAN Loop-Around Test #618 — Continued

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.
	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.

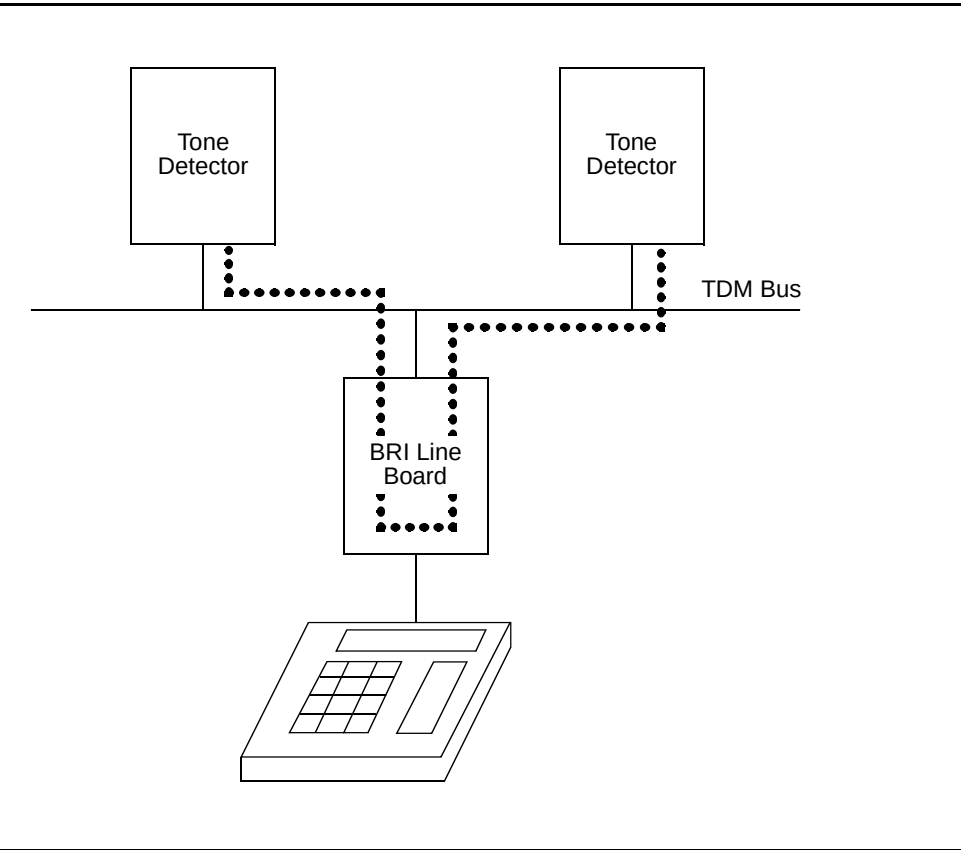


Figure 8-4. Path of the BRI Port Local TDM Loop-Around

Table 8-23. 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.

Table 8-23. BRI Port Local TDM Loop-Around Test #619 — Continued

Error Code	Test Result	Description	Recommendation
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.
2012	ABORT	Internal system error.	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.
2100	ABORT	Could not allocate the necessary resources to run this test.	
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.

Table 8-23. BRI Port Local TDM Loop-Around Test #619 — Continued

Error Code	Test Result	Description	Recommendation
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.	
	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 8-24. Electronic Power Feed Restoral Test #620

Error Code	Test Result	Description	Recommendation
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.
	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 8-25. 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.	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.	

Table 8-25. Level 1 Status Inquiry Test #621 — Continued

Error Code	Test Result	Description	Recommendation
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 8-25. Level 1 Status Inquiry Test #621 — Continued

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 manufacuters' 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.
	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 8-26. Electronic Power Feed Inquiry Test #622

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 2100	ABORT ABORT	Internal system error. 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.
	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 8-27. 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.
	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 8-28. 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.
	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 8-29. 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.
	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 I, 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 "Maintenance of the Packet Bus" section of [Chapter 9, "Packet Bus Fault Isolation and Correction."](#)

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 Lucent 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.

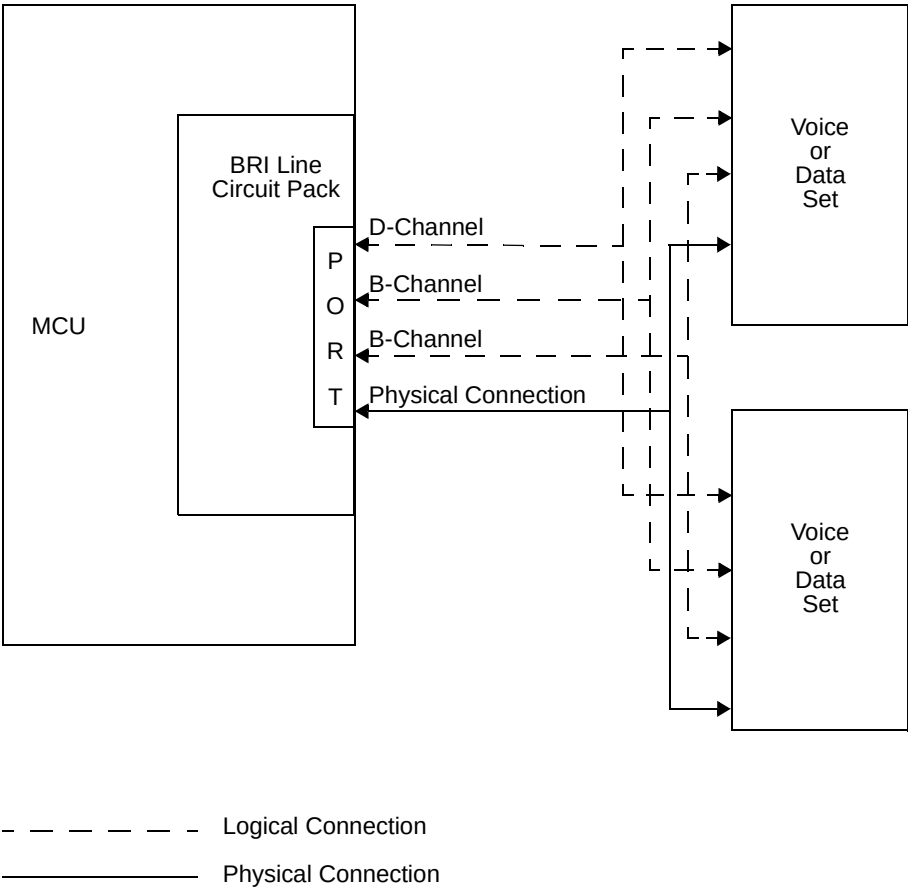


Figure 8-5. ISDN-BRI Set Interactions

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 8-30. BRI-SET Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level BRI-SET	On/Off Board	Test to Clear Value	Description
0*	0	Any	Any	Any	test BRI-SET	
2	2-102	None				Note a
18	0		Warning	Off	release station <ext>	
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	Any	#629	Warning	Off	test station ext r 2 test data-module ext r 2	Note b
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.

Table 8-30. BRI-SET Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level BRI-SET	On/Off Board	Test to Clear Value	Description
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.
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.

Table 8-30. BRI-SET Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level BRI-SET	On/Off Board	Test to Clear Value	Description
3584	0.1	#626				
3585-3839	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.
3840-4095	0	None				Notes c and d

- * 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.
- † Major alarms on this MO may be downgraded to Warning alarms based on the value used in the **set options** command.

Notes:

- a. 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 Lucent 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)

Aux Data	Timer Type
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.

- b. 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.

- c. 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 Lucent ISDN-BRI Specification (Lucent PUB 801-802-100). In addition, the Aux Data field of the Error Log entry contains additional diagnostic information.

- d. Error 3847 indicates that sets on the port do not support level 3 initialization. Consult the Set Service documentation.
-

Table 8-31. 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 8-31. ISDN-BRI Cause Values — Continued

Code	Explanation	Recommendation
65	SERVICE OR OPTION NOT IMPLEMENTED 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 8-32. 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 8-33. 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 8-33. Signaling Link Status Test #626 — *Continued*

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.	

Table 8-33. Signaling Link Status Test #626 — Continued

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.
	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 8-34. 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 8-34. BRI Remote Loop-Back Test #627 — Continued

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 8-34. BRI Remote Loop-Back Test #627 — *Continued*

Error Code	Test Result	Description	Recommendation
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.	
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.

Table 8-34. BRI Remote Loop-Back Test #627 — Continued

Error Code	Test Result	Description	Recommendation
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.	
	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.

Table 8-35. 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.

Table 8-35. BRI XID Test #628 — Continued

Error Code	Test Result	Description	Recommendation
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 XID Test #628 — Continued

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.

Table 8-35. BRI XID Test #628 — Continued

Error Code	Test Result	Description	Recommendation
2012 2100	ABORT ABORT	Internal system error. 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.
	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 8-36. 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 8-36. BRI Layer 3 Query Test #629 — Continued

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.
2100	ABORT	Could not allocate the necessary system resources to run this test.	2) If the test continues to abort, escalate the problem.

Table 8-36. BRI Layer 3 Query Test #629 — Continued

Error Code	Test Result	Description	Recommendation
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.”
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.
	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 8-37. 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 8-37. BRI Set Audits Test #630 — Continued

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.

Table 8-37. BRI Set Audits Test #630 — *Continued*

Error Code	Test Result	Description	Recommendation
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.	
	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 8-38. 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 8-39. 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° C (149° 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 Processo 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.

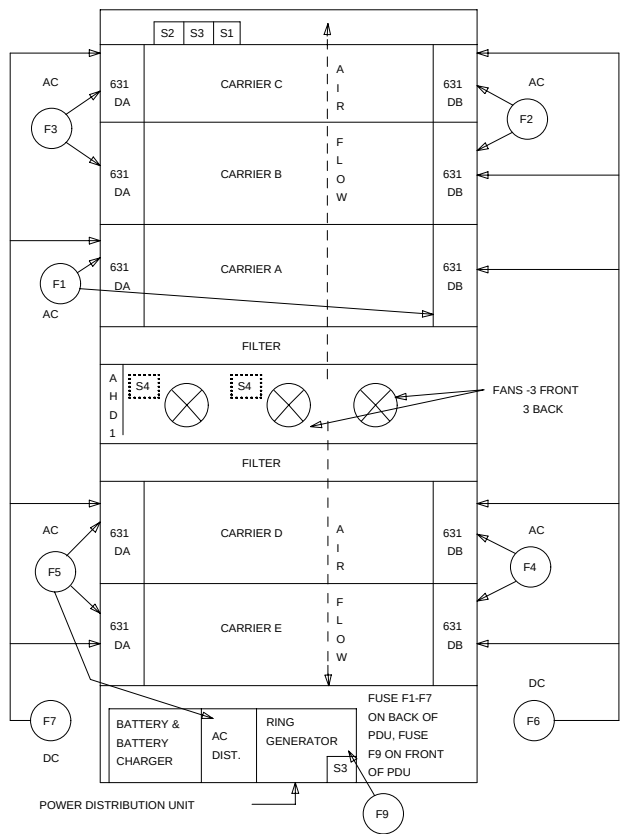


Figure 8-6. Multicarrier Cabinet Environment Components (CABINET)
[Non-Variable Speed Fan Option]

Sensor S1 informs the Maintenance/Tape Processor when the temperature at the top of the cabinet reaches 65° C (149° F). Sensor S2 is not monitored by any circuit pack. However, when the temperature at the top of the cabinet reaches 70° C (158° 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 °C (27 °F) air temperature difference between the air exhaust and air intake, **and** if the air exhaust temperature is greater than 50 °C (122 °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.

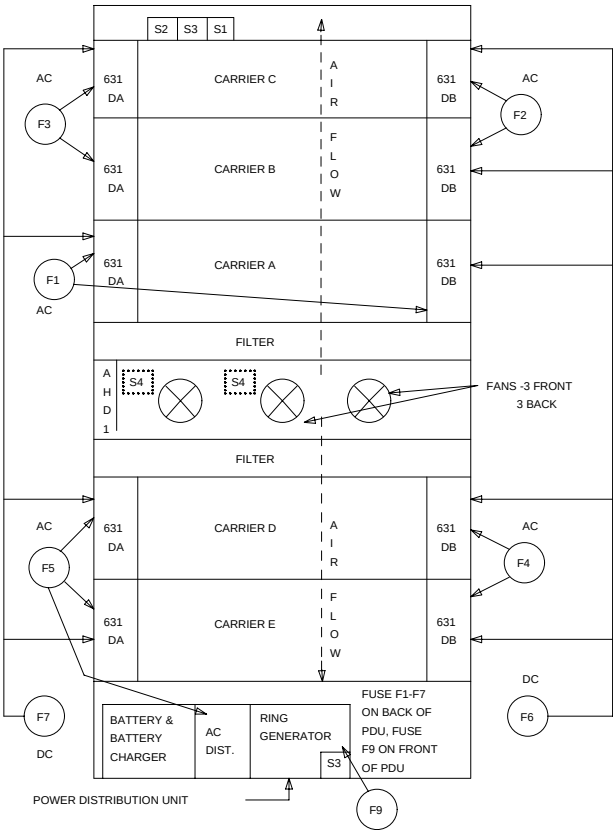


Figure 8-7. Multicarrier Cabinet Environment Components (CABINET)
[Variable Speed Fan Option]

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 vice 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 8-40. Cabinet Sensors Error Log Entries

Error Type	Aux Data	Associated Test	Alarm Level	On/Off Board	Test to Clear Value
0*	0	Any	Any	Any	test environment P sh r 1
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

* 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.

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 8-41. System Technician-Demanded Tests: CABINET

Order of Investigation	Short Test Sequence	Long Test Sequence	D/ND*
Battery & Battery Charger Query Test (#5) (a)	X	X	ND
AC Power Query Test (#78) (b)	X	X	ND
Power Unit Query Test (carrier E) (#127) (c)	X	X	ND
Power Unit Query Test (carrier D) (#127) (c)	X	X	ND
Power Unit Query Test (carrier A) (#127) (c)	X	X	ND
Power Unit Query Test (carrier B) (#127) (c)	X	X	ND
Power Unit Query Test (carrier C) (#127) (c)	X	X	ND
Emergency Transfer Query Test (#124) (d)	X	X	ND

Table 8-41. System Technician-Demanded Tests: CABINET — *Continued*

Order of Investigation	Short Test Sequence	Long Test Sequence	D/ND*
Cabinet Temperature Query Test (#122)	X	X	ND
External Alarm Lead Query Test (#120) (e)	X	X	ND
Analog Ring Generator Initialization Test (#117) (f)	X	X	ND
Analog Ring Generator Query Test (#118) (f)	X	X	ND

* D = Destructive, ND = Non-destructive

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 8-42. 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.
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 ⁰ C (27 ⁰ F) and the absolute temperature at the top of the cabinet is at least 50 ⁰ C (122 ⁰ F) (referred to as the 15 ⁰ C/50 ⁰ 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.

Table 8-42. Cabinet Temperature Query Test #122
[Non-Variable Speed Fans] — Continued

Error Code	Test Result	Description/ Recommendation
1	FAIL (cont'd.)	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 6. 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.

Continued on next page

Table 8-42. Cabinet Temperature Query Test #122
[Non-Variable Speed Fans] — Continued

Error Code	Test Result	Description/ Recommendation
1	FAIL (cont'd.)	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.
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.

Continued on next page

Table 8-42. Cabinet Temperature Query Test #122
[Non-Variable Speed Fans] — Continued

Error Code	Test Result	Description/ Recommendation
2	FAIL (cont'd.)	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.
	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 8-43. Memory Card Capacity Error Log Entries

Error Type	Aux Data	Associated Test	Alarm Level	On/Off Board	Test to Clear Value
1 (a)	112	Memory Card Capacity Test (#1014)	MINOR/ WARNING (b)	OFF	test card-mem long

- Notes:
- a. The memory card translation storage space is at least or more than 98% full.
 - b. 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 8-44. System Technician-Demanded Tests: CAP-MEM

Order of Investigation	Short Test Sequence	Long Test Sequence	D/ND*
12 Volt Power Supply Test (#701) (a)	X	X	ND
Memory Card Insertion Test (#695) (b)	X	X	ND
Memory Card Format and Read Test (#696) (b)	X	X	ND
Memory Card Match Test (#697) (b)	X	X	ND
Memory Card Write-Protected Test (#698) (b)	X	X	ND
Memory Card Directory Recovery Test (#699) (b)	X	X	ND
Memory Card Translation Data Integrity Test (#694) (b)		X	ND
Memory Card Erase/Write/Read Test (#693) (b)		X	ND
Memory Card Capacity Test (#1014)		X	ND

* D = Destructive; ND = Nondestructive

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 8-45. 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 NETCON circuit pack is not a TN777B circuit pack. 1. Follow the Standard Repair Procedures for repairing the NETCON circuit pack with the TN777B 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 TN777B NETCON 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 TN777B NETCON 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 8-46. Recommended Size of Memory Card

Memory Card Size	Usage	File Names
1 megabytes	saving translations	translation
20 megabytes	maintenance	translation core_dump
20 megabytes	system upgrade	MCU software
10 megabytes	firmware	firmware

Customers can have either a 4- or 20-Mb memory card for normal operations. A 20-Mb memory card can also be used for maintenance and software upgrades. The software upgrade memory card cannot be used for saving translations.

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 TN777B NETCON 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 TN777B NETCON circuit pack. If the 12-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 TN777B NETCON 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 TN777B NETCON 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 TN777B NETCON 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 8-47. CARD-MEM Error Log Entries

Error Type	Aux Data	Assoc Test #	Alarm Level	On/Off Board	Test to Clear Value	Reason for Error
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 TN777B NETCON 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 <i>Aux Data</i> 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 8-47. CARD-MEM Error Log Entries — *Continued*

Error Type	Aux Data	Assoc Test #	Alarm Level	On/Off Board	Test to Clear Value	Reason for Error
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 <i>Aux Data</i> 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 8-47. CARD-MEM Error Log Entries — Continued

Error Type	Aux Data	Assoc Test #	Alarm Level	On/Off Board	Test to Clear Value	Reason for Error
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.

Table 8-47. CARD-MEM Error Log Entries — Continued

Error Type	Aux Data	Assoc Test #	Alarm Level	On/Off Board	Test to Clear Value	Reason for Error
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 8-47. CARD-MEM Error Log Entries — Continued

Error Type	Aux Data	Assoc Test #	Alarm Level	On/Off Board	Test to Clear Value	Reason for Error
3841	Any	None	Minor	Off	save translation	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. NETCON is not a TN777B 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. 109. Standby SPE does not respond. 124. Cannot access standby SPE for saving translation. A Minor/Off-Board alarm is raised when two consecutive save translation operations fail. The alarm is resolved when the translations are saved successfully.
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 8-48. System Technician-Demanded Tests: CARD-MEM

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 12V-PWR for a description of this test.

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 8-49. 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 TN777B circuit pack.	1. Replace the circuit pack with a TN777B 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 TN777B NETCON 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 TN777B NETCON 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 8-49. Memory Card Erase/Write/Read Test #693 — Continued

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 8-49. Memory Card Erase/Write/Read Test #693 — Continued

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 TN777B NETCON circuit pack. 3. Reenter the command at one-minute intervals up to five times. 4. If the test continues to fail, escalate the problem.
	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 8-50. 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.
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 TN777B circuit pack.	1. Replace the circuit pack with a TN777B 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 TN777B NETCON 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 TN777B NETCON 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 8-50. Memory Card Translation Data Integrity Test #694 — Continued

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.
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.
	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 TN777B NETCON circuit pack and also whether the MCU detects its existence.

Table 8-51. 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 TN777B circuit pack.	1. Replace the circuit pack with a TN777B circuit pack. 2. Reenter test card-mem .

Table 8-51. Memory Card Insertion Test #695 — 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.
Any	FAIL	No memory card is inserted in the TN777B NETCON circuit pack or the inserted memory card has a bad connection.	1. Insert a memory card into the slot in the TN777B NETCON 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 TN777B NETCON circuit pack. 7. If the problem is still unresolved, escalate it.
	PASS	A memory card is inserted in the TN777B NETCON 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 8-52. 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.
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 TN777B circuit pack.	1. Replace the circuit pack with a TN777B 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 TN777B NETCON 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.

Table 8-52. Memory Card Format and Read Test #696 — 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.
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.
	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 8-53. 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 NETCON circuit pack is not a TN777B circuit pack.	1. Replace the circuit pack with a TN777B 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 TN777B NETCON 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 TN777B NETCON circuit pack. 2. Rerun the test.
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.

Table 8-53. Memory Card Match Test #697 — Continued

Error Code	Test Result	Description	Recommendation
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 8-53. 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 8-54. Memory Card Write-Protection Test #698

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 TN777B circuit pack.	1. Replace the circuit pack with a TN777B 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 TN777B NETCON 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 TN777B NETCON circuit pack. 2. Retry the command at one-minute intervals up to five times.

Table 8-54. Memory Card Write-Protection Test #698 — 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.
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.
	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 8-55. 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.
2108	ABORT	The NETCON circuit pack is not a TN777B circuit pack.	1. Replace the circuit pack with a TN777B 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 TN777B NETCON 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 TN777B NETCON 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 8-55. Memory Card Directory Recovery Test #699 — Continued

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.
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.
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 8-55. Memory Card Directory Recovery Test #699 — Continued

Error Code	Test Result	Description	Recommendation
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 TN777B NETCON circuit pack. 3. Reenter the command at one-minute intervals up to five times. 4. If the test continues to fail, escalate the problem.
	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	165V	Cabinet Position
631 WA	yes	no	no	no	Left Side
631 WB	no	yes	no	no	Right Side
631 AR	yes	no	no	no	Left Side
631 BR	no	yes	no	no	Right Side
631 DA	yes	no	no	no	Left Side
631 DB	no	yes	yes	no	Right Side
TN736	no	no	yes	no	-
TN752	no	no	yes	yes	-
TN755B	no	no	no	yes	-

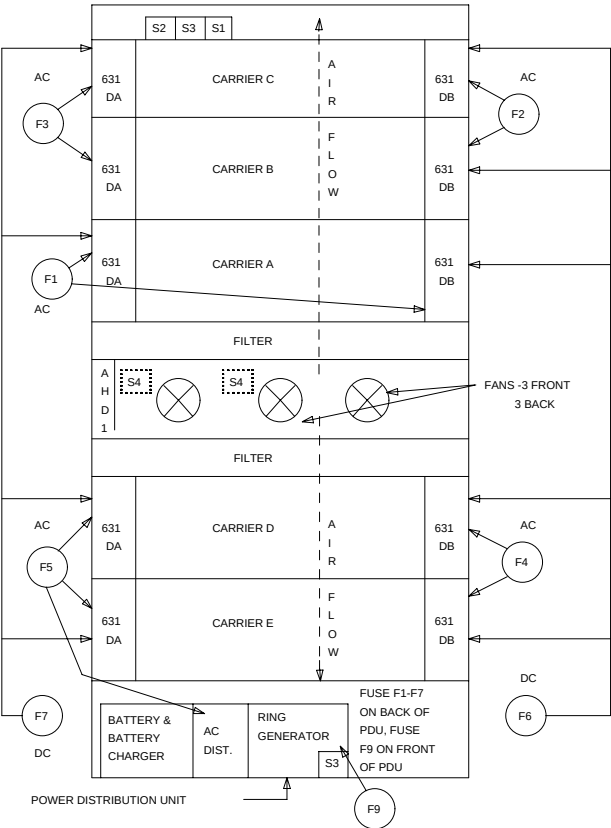
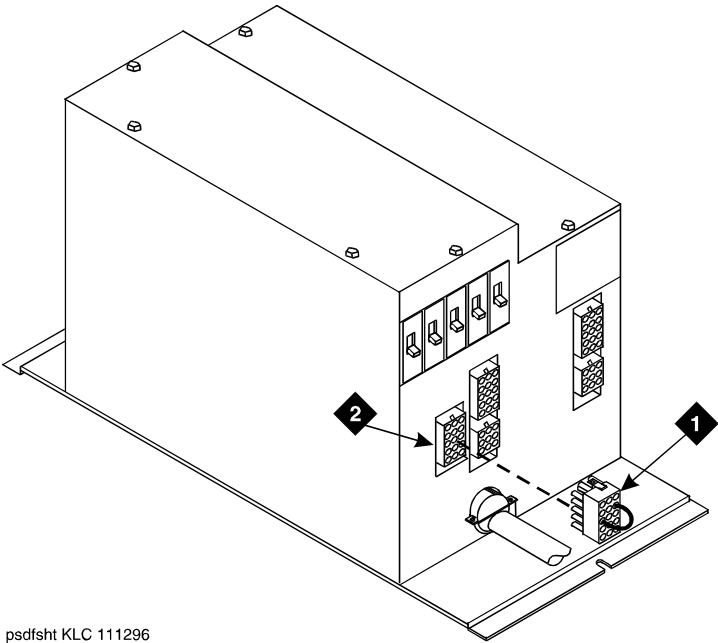


Figure 8-8. Multicarrier Cabinet Environment Components (CARR-POW)

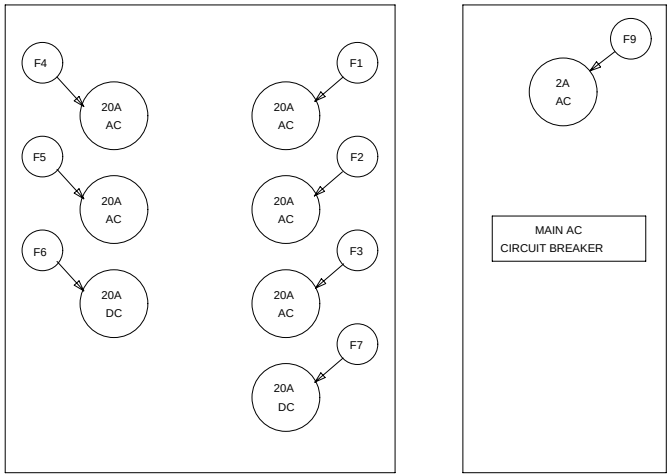


psdfsht KLC 111296

Figure Notes

1. Shorting Cable (H600-442-G1) (If
Battery Charger is Not Installed)
2. J11

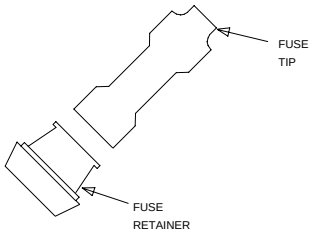
Figure 8-9. Small Cabinet Environment Components (CARR-POW)



BACK OF POWER DISTRIBUTION UNIT

FRONT OF POWER DISTRIBUTION UNIT

FUSE F8 (5A AC) IS LOCATED ON THE BACK OF THE PDU ABOVE THE CONVENIENCE OUTLET AND IS NOT SHOWN



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

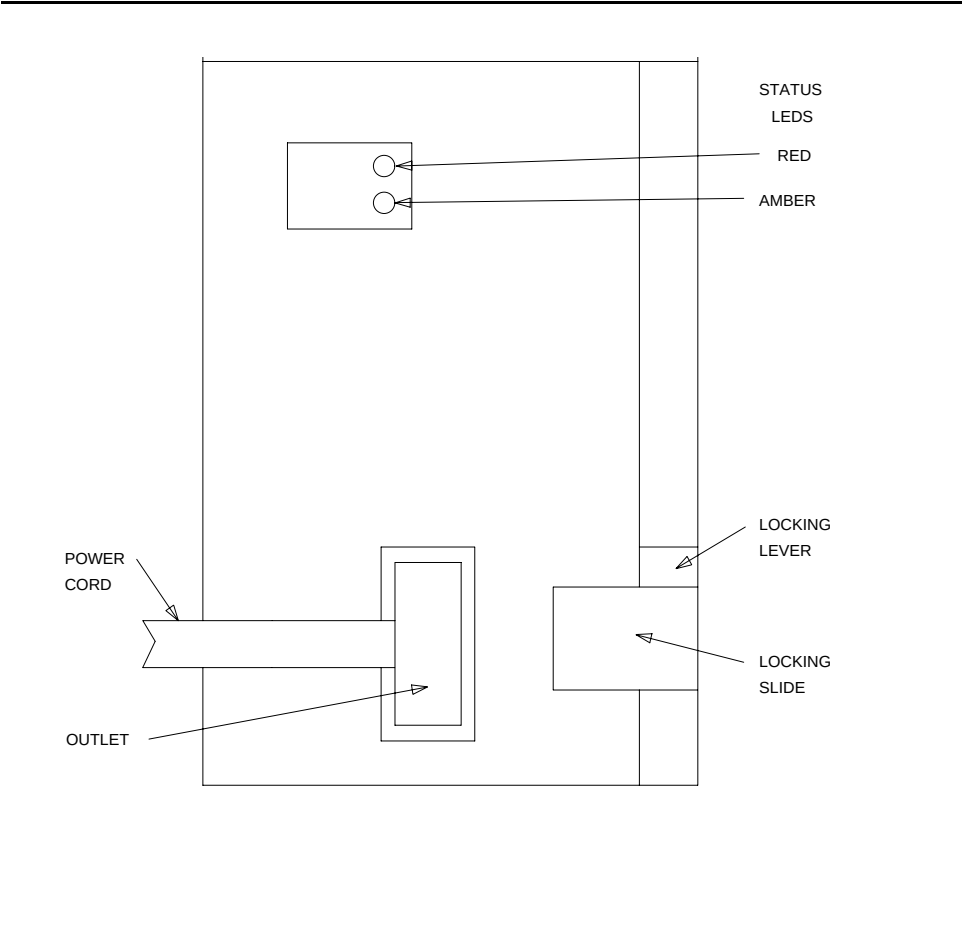


Figure 8-11. 631WA or 631WB AC Power Unit

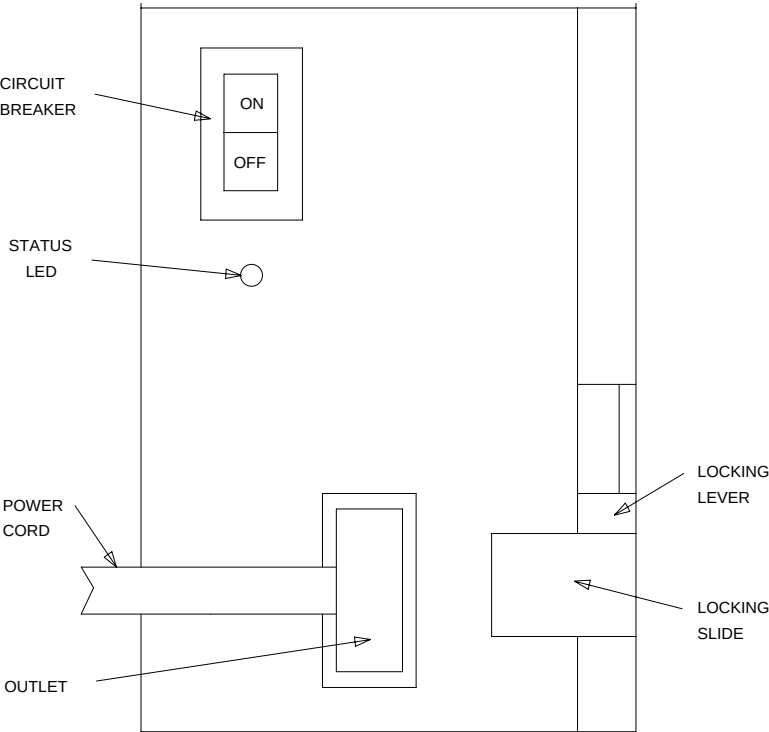


Figure 8-12. 631AR or 631BR AC Power Unit

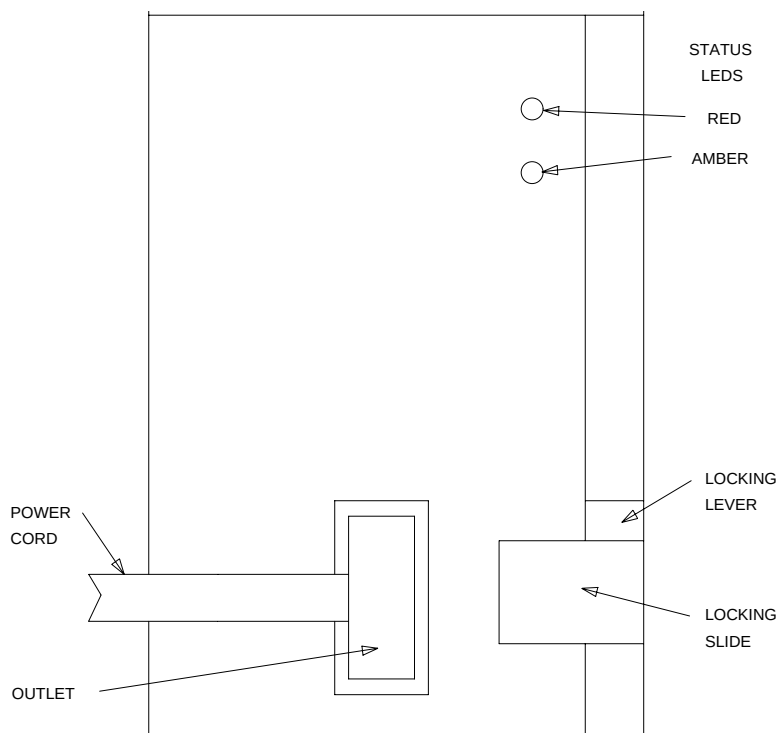


Figure 8-13. 631DA or 631DB AC Power Unit

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 leftmost 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 8-56. Carrier Port Power Unit (AC) Error Log Entries

Error Type	Aux Data	Associated Test	Alarm Level	On/Off Board	Test to Clear Value
0*	0	Any	Any	Any	test environment P sh r 1
1(a)(b)	0 or 1	Power Unit Query Test (#127)	MAJOR	ON	test environment P r 2

* 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.

Notes:

- 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 8-57. System Technician-Demanded Tests: CARR-POW (AC)

Order of Investigation	Short Test Sequence	Long Test Sequence	D/ND*
Battery & Battery Charger Query Test (#5) (a)	X	X	ND
AC Power Query Test (#78) (b)	X	X	ND
Power Unit Query Test (carrier E) (#127)	X	X	ND
Power Unit Query Test (carrier D) (#127)	X	X	ND
Power Unit Query Test (carrier A) (#127)	X	X	ND
Power Unit Query Test (carrier B) (#127)	X	X	ND
Power Unit Query Test (carrier C) (#127)	X	X	ND
Emergency Transfer Query Test (#124) (c)	X	X	ND
Cabinet Temperature Query Test (#122) (d)	X	X	ND
External Alarm Lead Query Test (#120) (e)	X	X	ND
Analog Ring Generator Initialization Test (#117) (f)	X	X	ND
Analog Ring Generator Query Test (#118) (f)	X	X	ND

* D = Destructive; ND = Nondestructive

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 8-58. 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 8-59. 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.

Continued on next page

Table 8-59. Power Unit Query Test #127 — Continued

Error Code	Test Result	Description/ Recommendation
	FAIL	There is a problem with one or both power units on the tested carrier. - 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 (see). 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. - 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. - 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.

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Table 8-59. Power Unit Query Test #127 — Continued

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	-

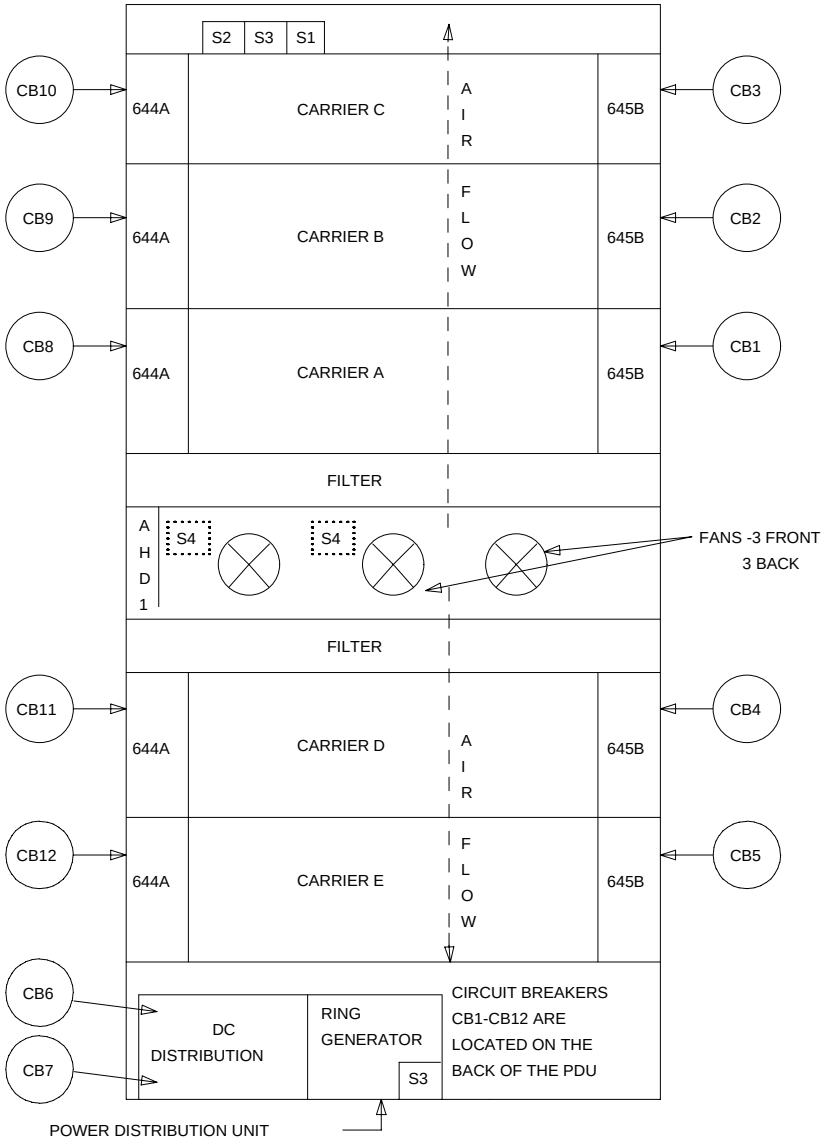


Figure 8-14. Power Distribution Unit for DC-Powered Systems (PDU8890CF)

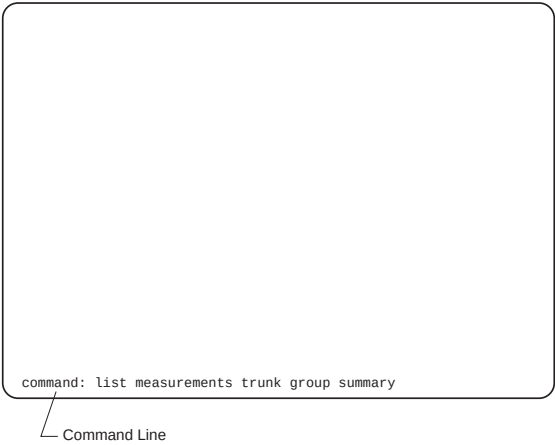


Figure 8-15. Power Distribution Unit for DC-Powered Systems (PDU 58890CF)

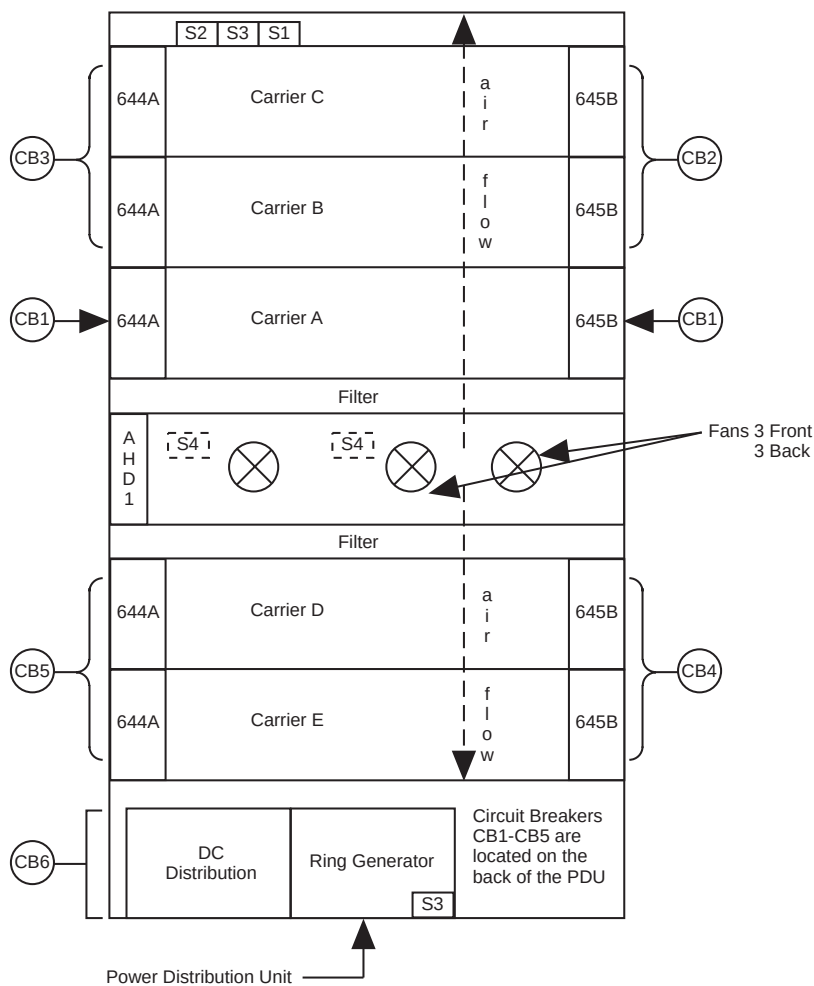


Figure 8-16. Power Distribution Unit for DC-Powered Systems (PDU8890CF-1)

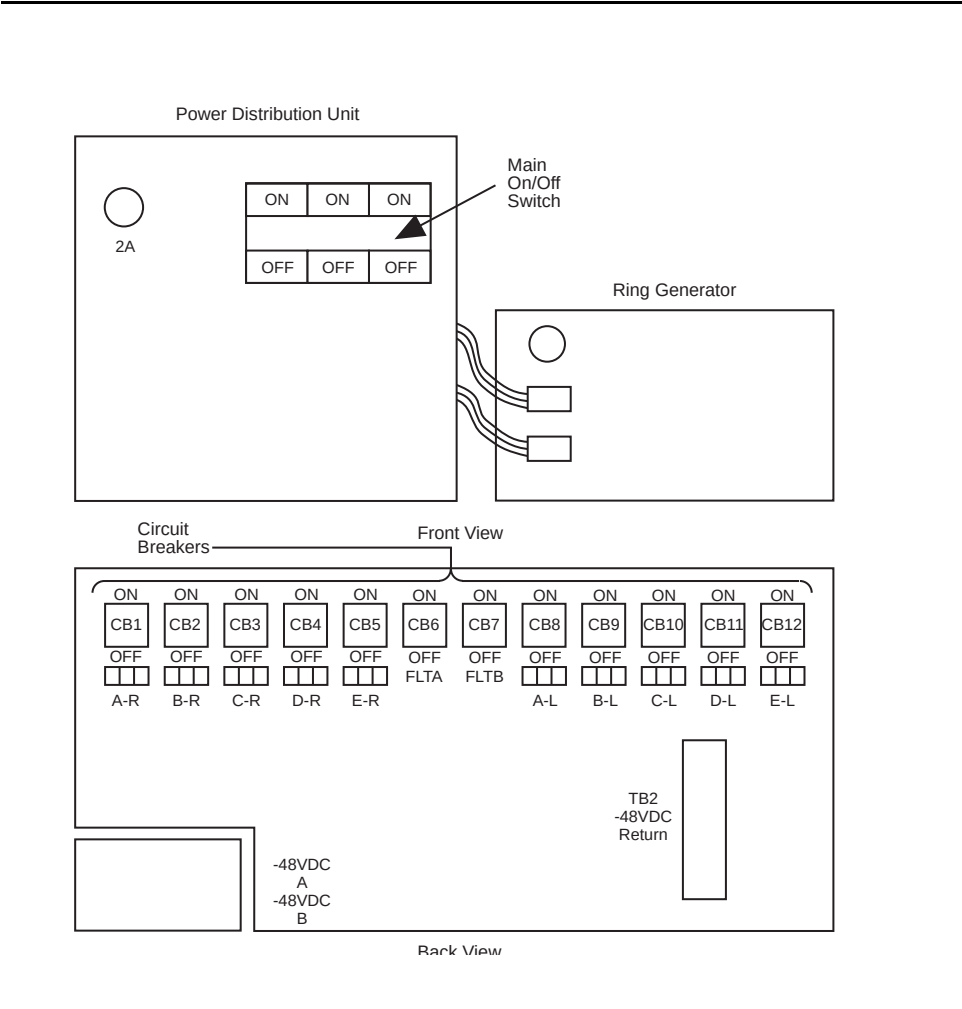


Figure 8-17. Power Distribution Unit for DC-Powered Systems (PDU 58890CF-1)

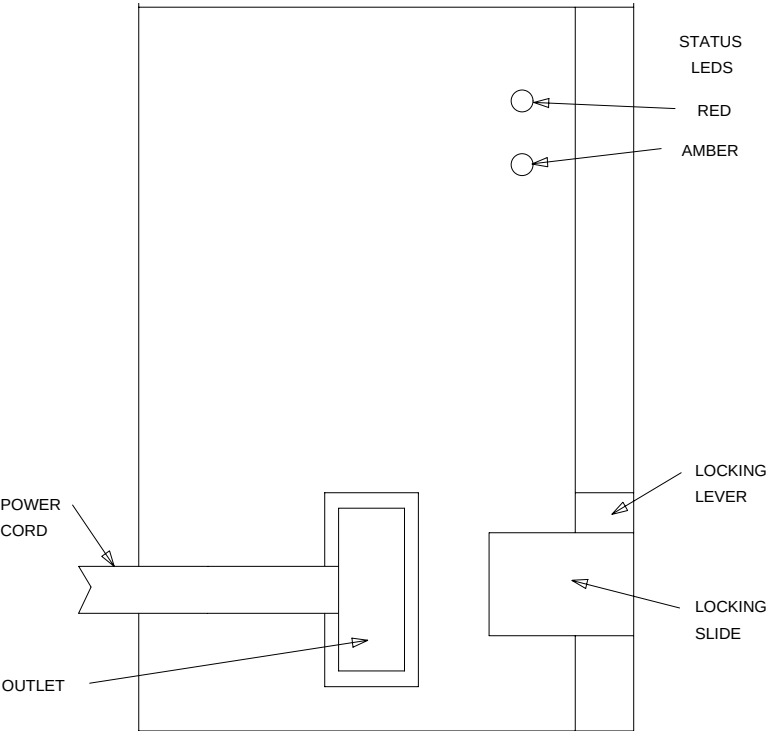


Figure 8-18. 644A Port Carrier Power Unit for DC-Powered Systems

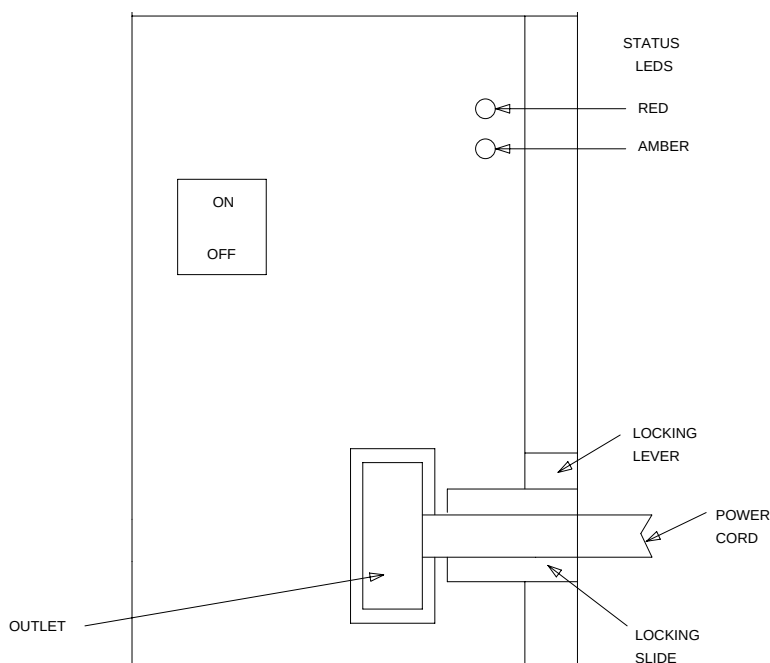


Figure 8-19. 645B Port Carrier Power Unit for DC-Powered Systems

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 8-60. Carrier Port Power Unit (CD) Error Log Entries

Error Type	Aux Data	Associated Test	Alarm Level	On/Off Board	Test to Clear Value
0*	0	Any	Any	Any	test environment P s h r 1
1(a)(b)	0 or 1	Power Unit Query Test (#127)	MAJOR	ON	test environment P r 2

* 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.

Notes:

- 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 8-61. System Technician-Demanded Tests: CARR-POW (DC)

Order of Investigation	Short Test Sequence	Long Test Sequence	D/ND*
Battery & Battery Charger Query Test (#5) (a)	X	X	ND
AC Power Query Test (#78) (b)	X	X	ND
Power Unit Query Test (carrier E) (#127)	X	X	ND
Power Unit Query Test (carrier D) (#127)	X	X	ND
Power Unit Query Test (carrier A) (#127)	X	X	ND
Power Unit Query Test (carrier B) (#127)	X	X	ND
Power Unit Query Test (carrier C) (#127)	X	X	ND
Emergency Transfer Query Test (#124) (c)	X	X	ND
Cabinet Temperature Query Test (#122) (d)	X	X	ND
External Alarm Lead Query Test (#120) (e)	X	X	ND
Analog Ring Generator Initialization Test (#117) (f)	X	X	ND
Analog Ring Generator Query Test (#118) (f)	X	X	ND

* D = Destructive; ND = Nondestructive

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 8-62. 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.
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.

Table 8-62. Power Unit Recycle Test #126 — *Continued*

Error Code	Test Result	Description/ Recommendation
	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 8-63. 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.

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Table 8-63. Power Unit Query Test #127 — Continued

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"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.

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Table 8-63. Power Unit Query Test #127 — Continued

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.

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 <i>PCSS sh</i>
Warning	test board <i>PCSS sh</i>

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 <i>PCSSpp sh</i>
Minor	test board <i>PCSSpp sh</i>
Warning	release port PCSSpp

Hardware Error Log Entries

The following table shows the error log entries and related information.

Table 8-64. CLSFY-PT Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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."

Table 8-64. CLSFY-PT Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
18		(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.
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 8-65. 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 is put into the R2-MFC mode. During this portion of the test, each port's ability to accurately detect and generate all forward and backward MFC tones is verified.

Table 8-66. 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.	
1001	1002	The system was unable to put the Call Classifier port 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, 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 8-66. Tone Detection Verification Test #42 — Continued

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.	
1-3	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 to 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).
	PASS	Tone Detection Verification is successful. The Call Classifier Port (CLSFY-PT) is able to detect and/or generate all necessary tones.	

Table 8-67. 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.	
	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 8-68. CONFIG Error Log Entries

Error Type	Aux Data	Assoc Test #	Alarm Level	On/Off Board	Test to Clear Value	Reason for Error
0	0	Any	Any	Any	none	Run the short test sequence first. If all tests pass, run the long test sequence.
2 to 117	0-1	none				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 <i>Error Type</i> and <i>Aux Data</i> fields specify the location of the port circuit pack that caused the error as indicated in the following table.
257		none				This error indicates that less than 25% of the trunk group is available.
1002 to 1117	0-1	none				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 <i>Error Type</i> field (for example, Error Type 1059 would be listed under 59 in the <i>Error Type</i> 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 8-69. System Configuration Error Log Entries

Error Type	Aux Data	Port Circuit Pack Location
1	0	GAMUT Circuit Pack*
1	1	GAMUT Circuit Pack*
2	0	1E01
3	0	1E02
4	0	1E03
5	0	1E04
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
24	0	1B Network Control
25	0	1B Network Control
26	0	1A Network Control
26	1	Maintenance Circuit Pack
27	0	1A Network Control
28	0	1A Tone-Clock
29	0	1A Tone-Clock
30	0	1A01
31	0	1A02

Table 8-69. System Configuration Error Log Entries — Continued

Error Type	Aux Data	Port Circuit Pack Location
32	0	1A2 Processor Interface
33	0	1B2 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
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

Table 8-69. System Configuration Error Log Entries — Continued

Error Type	Aux Data	Port Circuit Pack Location
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
80	0	1B15
81	0	1B16
82	0	1B17
83	0	1B18
84	0	1B19
85	0	1B20
93	0	1B Tone-Clock
94	0	1A1 Processor Interface
95	0	1B1 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

Table 8-69. System Configuration Error Log Entries — Continued

Error Type	Aux Data	Port Circuit Pack Location
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

* for 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 8-70. 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 8-71. Customer-Provided Alarming Device Test #115

Error Code	Test Result	Description	Recommendation
blank	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.
	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

(Network Control Circuit Pack)

The TN777B Network Control circuit pack contains the following objects: the Switch Control (SW-CTL), four Network Control Data Channels (DATA-CHLs), the Network Control 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 Network Control 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 Network Control circuit pack. Because the Network Control 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 Network Control 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 Network Control 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 8-72. Network Control Circuit Pack Error Log Entries

Error Type	Aux Data	Assoc Test #	Alarm Level	On/Off Board	Test to Clear Value	Reason for Error
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.
1	0	#107	Minor	On	test data-module <ext> l	The DATA-BD portion of the Network Control circuit pack stopped functioning. Since the Network Control 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 Network Control 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.

Table 8-72. Network Control Circuit Pack Error Log Entries — Continued

Error Type	Aux Data	Assoc Test #	Alarm Level	On/Off Board	Test to Clear Value	Reason for Error
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.
1538		#107	Minor	On	test data-module<ext> I	The DATA-BD portion of the network control 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 NETCON.

Table 8-72. Network Control Circuit Pack Error Log Entries — Continued

Error Type	Aux Data	Assoc Test #	Alarm Level	On/Off Board	Test to Clear Value	Reason for Error
						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 test 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.

Table 8-72. Network Control Circuit Pack Error Log Entries — Continued

Error Type	Aux Data	Assoc Test #	Alarm Level	On/Off Board	Test to Clear Value	Reason for Error
3840	Any	None				No action required.
3841	Any	None				The vintage number of the TN777B Network Control circuit pack must be greater than or equal to 17. The aux value for error code 3841 indicates the vintage of the current TN777B 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

(Network Control Data Channel)

The TN777B Network Control circuit pack contains the following objects: the Switch Control (SW-CTL), four Data Channels (DATA-CHLs), the Network Control Driver (DATA-CON) , and the generic hardware that interfaces with the TDM Bus (DATA-BD). The Network Control Driver (DATA-CON) is the subject of this section. Network Control 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 Network Control 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 Network Control 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.

Network Control 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 Network Control 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 Network Control 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 vice versa.

1. Determine if CDR and the system printer are using the DATA-CHLs and busy out these links before issuing **test network-control long**.
2. Before executing **test network-control long**, see Switch Control (SW-CTL) to determine the consequences of running the Switch Control Reset Test (#93).

Status of Network Control 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 Network Control Data Channel (DATA-CHL) is identified by a "type" value of "netcon."

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 Network Control 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 8-73. Network Control Data Channel Error Log Entries

Error Type	Aux Data	Assoc Test #	Alarm Level	On/Off Board	Test to Clear Values	Reason for Error
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		Warn	Off	release data-module <ext>	The DATA-CHL has been busied out.

Table 8-73. Network Control Data Channel Error Log Entries — Continued

Error Type	Aux Data	Assoc Test #	Alarm Level	On/Off Board	Test to Clear Values	Reason for Error
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 Network Control 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 8-74. 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)*	long		Yes
Data Channel Dual Port Ram Test (#108)*	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

* 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**.

The second craft test (**test network-control**) tests each administered DATA-CHL that resides on the Network Control circuit pack.

Table 8-75. 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)*	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
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)†	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)‡	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

Table 8-75. System Technician-Demanded Tests: DATA-CHL (Second Craft Test) — Continued

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
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

* See DATA-BD (Network Control circuit pack) for a description of this test.

† See SW-CTL (Switch Control) for a description of this test.

‡ See 12V-PWR (12-Volt Power Supply) for a description of this test.

§ See CARD-MEM (Memory Card) for a description of this test.

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 8-76. 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 TN777B Network Control circuit pack. 3. After the circuit pack has been replaced, use set time to reset the time-of-day clock.
	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 8-77. 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.
	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 TN777B Network Control 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 Network Control 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 8-78. 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 8-78. Data Channel Remote Mtce Loop-Around Test #109 — Continued

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.

Table 8-78. Data Channel Remote Mtce Loop-Around Test #109 — Continued

Error Code	Test Result	Description	Recommendation
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.
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 8-78. Data Channel Remote Mtce Loop-Around Test #109 — Continued

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. 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 TN777B Network Control 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 TN777B Network Control 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 TN777B Network Control 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 8-78. Data Channel Remote Mtce Loop-Around Test #109 — Continued

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. 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 TN777B Network Control 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 TN777B Network Control 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 TN777B Network Control 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 8-78. Data Channel Remote Mtce Loop-Around Test #109 — Continued

Error Code	Test Result	Description	Recommendation
	PASS	The target DATA-CHL, DATA-CON, TN777B Network Control 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 Network Control 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 8-79. 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.

Table 8-79. Data Channel Crosstalk Test #110 — Continued

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 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.	
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 8-79. Data Channel Crosstalk Test #110 — Continued

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 TN777B Network Control 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 TN777B Network Control circuit pack at the customer's convenience. 7. If both tests pass, enter remove data-module <ext> for the target DATA-CHL. Replace the TN777B Network Control circuit pack. NOTE: Use set time to reset the time of day after you replace the circuit pack. 12. Restore any busied-out function.

Table 8-79. Data Channel Crosstalk Test #110 — Continued

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 TN777B Network Control 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 TN777B Network Control circuit pack at the customer's convenience. 7. If both tests pass, enter remove data-module <ext> for the target DATA-CHL. Replace the TN777B Network Control circuit pack. NOTE: Use set time to reset the time of day after you replace the circuit pack. 12. Restore any busied-out function.
	PASS	The target DATA-CHL, DATA-CON, TN777B Network Control 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 8-80. 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.
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.

Table 8-80. Data Channel Local Loop-Back Test #111 — Continued

Error Code	Test Result	Description	Recommendation
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.
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 8-80. Data Channel Local Loop-Back Test #111 — Continued

Error Code	Test Result	Description	Recommendation
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 Network Control 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 TN777B Network Control 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 TN777B Network Control 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 TN777B Network Control circuit pack. NOTE: Use set time to reset the time of day after you replace the circuit pack. 12. Restore any busied-out function.

Table 8-80. Data Channel Local Loop-Back Test #111 — Continued

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 Network Control 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 TN777B Network Control 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 TN777B Network Control 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 TN777B Network Control circuit pack. NOTE: Use set time to reset the time of day after you replace the circuit pack. 12. Restore any busied-out function.
	PASS	The target DATA-CHL and DATA-CON are functioning. Connections can be established over the DATA-CHLs.	

DATA-CON (Network Control Driver)

The TN777B Network Control circuit pack contains the following objects: the Switch Control (SW-CTL), four Data Channels (DATA-CHLs), the Network Control Driver (DATA-CON), and the generic hardware that interfaces with the TDM Bus (DATA-BD). The Network Control Driver (DATA-CON) is the subject of this section. Network Control 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 Network Control 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 vice versa. Likewise, if DATA-CHL 3 is defective, DATA-CHL 4 is likely to be, and vice versa.

Hardware Error Log Entries

Refer to the appropriate test description and follow the recommended procedures.

Table 8-81. Network Control Driver Error Log Entries

Error Type	Aux Data	Assoc Test #	Alarm Level	On/Off Board	Test to Clear Values	Reason for Error
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.

Table 8-81. Network Control Driver Error Log Entries — Continued

Error Type	Aux Data	Assoc Test #	Alarm Level	On/Off Board	Test to Clear Values	Reason for Error
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 (Network Control 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 <i>P</i> *

* 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 8-82. Cabinet Power Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Values	Reason for Error
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 8-83. 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
External Alarm Lead Query Test (#120)	short	long	no
Analog Ring Generator Initialization Test (#117)*	short	long	no
Analog Ring Generator Query Test (#118)*	short	long	no

* 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.

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 8-84. 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.
	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 <i>PCSS</i> *
Warning	test board <i>PCSS</i> *

* 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 <i>PCSS</i> l r#
Warning**	test board <i>PCSS</i> 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 8-85. DI-BD Error Log Entries

Error Type	Aux Data	Assoc.Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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					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.

Table 8-85. DI-BD Error Log Entries — Continued

Error Type	Aux Data	Assoc.Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
513	4352 to 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 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.
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.

Table 8-85. DI-BD Error Log Entries — Continued

Error Type	Aux Data	Assoc.Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
1281	Any	SCOTCH/ NPE uplink error from pack	Minor	On		Note a.
1537	46082	software- detected error	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.
3329	Any	upgrade firmware 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 firmware 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.

Notes:

- a. 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.

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.

Table 8-86. System Technician-Demanded Tests: DI-BD

Order of Investigation	First Test Sequence	Second Test Sequence	Reset Board Sequence	Is Test Destructive?*
Control Channel Loop-Around Test (#52)	short	long		No
FPGA Status Query Test (#1154)	short	long		No
SAKI Sanity Test (#53)			Yes	Yes

* Refer to the repair procedure described in the XXX-BD (Common Port Circuit Pack) section of this document for a description of this test.

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 8-87. FPGA Status Query Test #1154

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.
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.
	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 8-88. DI-PT Error Log Entries

Error Type	Aux Data	Assoc.Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
0*	0	Any	Any	Any	test port PCSS sh r 1	
18		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.

Table 8-88. DI-PT Error Log Entries — Continued

Error Type	Aux Data	Assoc.Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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			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.
2305	Any	None	None			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			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.

Table 8-89. System Technician-Demanded Tests: DI-PT

Order of Investigation	First Test Sequence	Second Test Sequence	Reset Board 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 8-90. SCOTCH/NPE Loop-Around Test #1156

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, 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 8-90. SCOTCH/NPE Loop-Around Test #1156 — 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.
	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 8-91. SCOTCH/NPE 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.
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 8-91. SCOTCH/NPE Crosstalk Test #6 — Continued

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.
	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 8-92. 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 8-92. Data Loop-Around Test #1157 — 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.
	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 8-93. Loss Of Signal Query Test #1158

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.
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.
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 8-93. Loss Of Signal Query Test #1158 — *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.
	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 endpoint 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 8-94. 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 8-94. Slip Alarm Query Test #1159 — 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.
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.
	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 8-95. Translation Audits and Updates Test #36

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 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.
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

Table 8-95. Translation Audits and Updates Test #36 — Continued

Error Code	Test Result	Description	Recommendation
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.
	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 <i>PCSS</i> * sh
Warning	test board <i>PCSS</i> * 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).

See the following table and figure for information on switch settings for the TN2207 circuit pack.

Table 8-96. 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

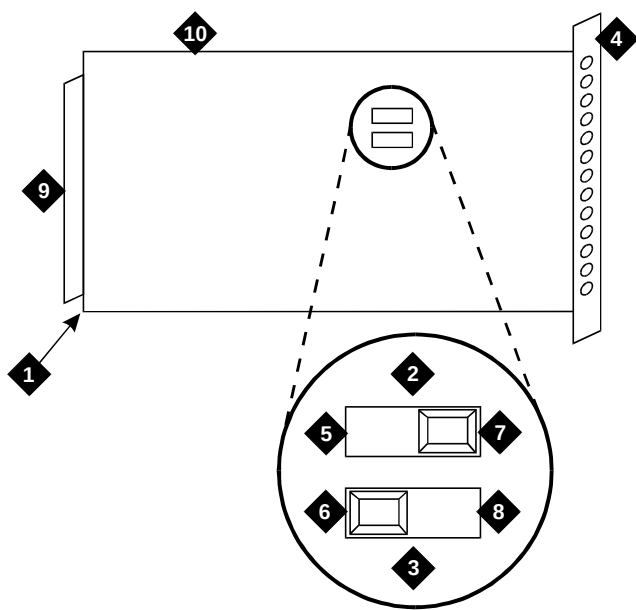


Figure Notes:

1. Backplane Connectors	6. 120 Ohm (shown selected)
2. 24/32 Channel Selector	7. 24 Channel (shown selected)
3. 75/120 Ohm Selector	8. 75 Ohm
4. Faceplate	9. Connector
5. 32 Channel	10. TN2207

Figure 8-20. TN2207 Option Settings

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 *Lucent 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 8-97. Digital Line Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Reason for Error
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 <i>Error Type</i> and <i>Aux Data</i> 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.

Table 8-97. Digital Line Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Reason for Error
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.
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.

Table 8-97. Digital Line Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Reason for Error
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	

Table 8-97. Digital Line Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Reason for Error
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 .
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.

Table 8-97. Digital Line Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Reason for Error
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 8-98. 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 DTD 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 8-99. Digital Terminal Remote Loop Around Test #1201

Error Code	Test Result	Description/ Recommendation
	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 8-99. Digital Terminal Remote Loop Around Test #1201 — Continued

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.

Continued on next page

Table 8-99. Digital Terminal Remote Loop Around Test #1201 — Continued

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.
	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 8-100. 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.
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.

Table 8-100. Digital Line NPE Crosstalk Test #9 — *Continued*

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.
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.
	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 8-101. Digital Line Electronic Power Feed Test #11

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. 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	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 8-102. 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.
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.

Table 8-102. Voice and Control Channel Local Loop Test #13 — Continued

Error Code	Test Result	Description	Recommendation
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 8-102. Voice and Control Channel Local Loop Test #13 — Continued

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.
	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 8-103. 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 8-103. 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 8-104. 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 8-104. 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.

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 <i>PCSS /</i>
Warning	test board <i>PCSS sh</i>

The following table indicates the circuit packs and capabilities supported by DS1-BD or UDS1-BD:

Table 8-105. 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 (Lucent 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 8-106. 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

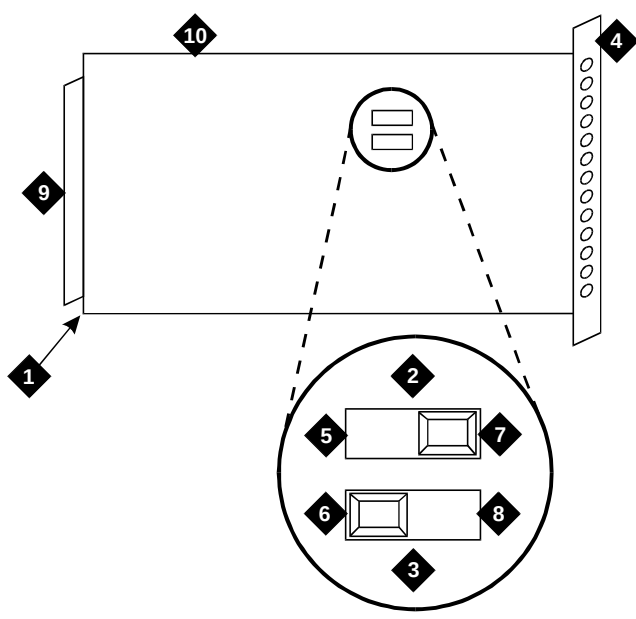


Figure Notes:

1. Backplane Connectors	6. 120 Ohm (shown selected)
2. 24/32 Channel Selector	7. 24 Channel (shown selected)
3. 75/120 Ohm Selector	8. 75 Ohm
4. Faceplate	9. Connector
5. 32 Channel	10. TN2207

Figure 8-21. 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 8-107. DS1-BD Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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.

Table 8-107. DS1-BD Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 readminister 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	
257	Any	None				See XXX-BD (Common Port Circuit Pack) for details. This error is associated with Common Port Circuit Pack maintenance.

Table 8-107. DS1-BD Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 <i>Aux Data</i> 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 <i>Aux Data</i> 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 .

Table 8-107. DS1-BD Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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.
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	

Table 8-107. DS1-BD Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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.
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 8-108. System Technician-Demanded Tests: DS1-BD

Order of Investigation	First Test Sequence	Second Test Sequence	Reset Board	Is Test Destructive?
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)			Reset	Yes
Internal Loop-Around Test (#135)			Reset	Yes

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 8-109. 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 8-110. 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 8-111. 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.
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.

Table 8-111. Internal Loop-Around Test #135 — Continued

Error Code	Test Result	Description	Recommendation
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.
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 8-111. Internal Loop-Around Test #135 — Continued

Error Code	Test Result	Description	Recommendation
	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). 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.

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 8-112. 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.
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.

Table 8-112. Loss-of-Signal Alarm Inquiry Test #138 — Continued

Error Code	Test Result	Description	Recommendation
	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 8-113. 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.
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.

Table 8-113. Blue Alarm Inquiry Test #139 — Continued

Error Code	Test Result	Description	Recommendation
	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.	
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 8-114. 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.
	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.

Table 8-114. Red Alarm Inquiry Test #140 — Continued

Error Code	Test Result	Description	Recommendation
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 8-115. 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 8-115. 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 8-116. 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 8-116. Major Alarm Inquiry Test #142 — Continued

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 than $10E-3$.

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 8-117. 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.
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 8-117. Minor Alarm Inquiry Test #143 — Continued

Error Code	Test Result	Description	Recommendation
	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.	
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 8-118. 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 8-118. Slip Alarm Inquiry Test #144 — Continued

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 8-119. 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.
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 8-119. Misframe Alarm Inquiry Test #145 — *Continued*

Error Code	Test Result	Description	Recommendation
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.	
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 8-120. Translation Update Test #146

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.
	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.	
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 <i>PCSSpp</i> * sh
Minor	test port <i>PCSSpp</i> sh
Warning	release port <i>PCSSpp</i>

* 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 8-121. Dual-Tone Multifrequency Receiver Port Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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.

Table 8-121. Dual-Tone Multifrequency Receiver Port Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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.
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.

Table 8-121. Dual-Tone Multifrequency Receiver Port Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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.

Table 8-121. Dual-Tone Multifrequency Receiver Port Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 8-122. 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 8-123. 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 8-123. Tone Detection Verification Test #42 — *Continued*

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 to 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.
	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 8-124. 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 8-125. ERR-LOG (Error Log) Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 8-126. 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.

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 8-127. Enhanced Tone Receiver Port (ETR-PT) Error Log Entries

Error Type	Aux Data	Associated 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

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Table 8-127. Enhanced Tone Receiver Port (ETR-PT) Error Log Entries — Continued

Error Type	Aux Data	Associated Test	Alarm Level	On/Off Board	Test to Clear Value
257 (b)	17666	Tone Detection Audit Update Test (#43)	MAJOR/ MINOR (a)	ON	test port PCSSpp r 3
513 (c)	any	Tone Detection Verification Test (#42)	MAJOR/ MINOR (a)	ON	test port PCSSpp r 3

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".
- b. 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.
- c. 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.
- d. 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.

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 8-128. System Technician-Demanded Tests: ETR-PT

Order of Investigation	Short Test Sequence	Long Test Sequence	D/ND*
Tone Detection Verification Test (#42)	X	X	ND
Tone Detection Audit/Update Test (#43)	X	X	ND

* D = Destructive; ND = Nondestructive

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 8-129. 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.

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Table 8-129. Tone Detection Verification Test #42 — *Continued*

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 <i>active</i> 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.

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Table 8-129. Tone Detection Verification Test #42 — Continued

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.
	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 8-130. 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 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.
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.

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Table 8-130. Tone Detector Audit/Update Test #43

Error Code	Test Result	Description/ Recommendation
	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 <i>P</i> *
Minor	test environment <i>P</i>

* 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 8-131. External Alarm Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
0	0	Any	Any	Any	test environment Psh 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 8-132. 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 8-133. 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. 2. If the test continues to abort, escalate the problem.
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.

Table 8-133. External Alarm Lead Test #120 — *Continued*

Error Code	Test Result	Description	Recommendation
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 <i>Recommendation for Error Code 1</i> . 2. Clear the minor alarm problem with the external device by referring to the <i>Recommendation for Error Code 2</i> .
	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 <i>PCSSpp</i> * sh
Minor	test port <i>PCSSpp</i> sh
Warning	release port <i>PCsspp</i>

* 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 8-134. General-Purpose Tone Detector Port Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 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 DTMF 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.

Table 8-134. General-Purpose Tone Detector Port Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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.

Table 8-134. General-Purpose Tone Detector Port Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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.
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 8-135. 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 8-136. 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.
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.

Table 8-136. Tone Detection Verification Test #42 — Continued

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.
1 to 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 8-137. 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 GPTD port.
	PASS	The DTMR port has been successfully refreshed with its translation.	

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.

8 Maintenance Object Repair Procedures
INADS (INADS Link)

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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 8-138. INADS Link Error Log Entries Test

Error Code	Aux Data	Description	Recommendation
1	0	The call was successfully placed to INADS. No trouble was found.	NA
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 alb 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.
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.
8	0	INADS sent an unknown acknowledgment to the "test inads alarm" message.	2. Rerun the test.

Table 8-138. INADS Link Error Log Entries Test — *Continued*

Error Code	Aux Data	Description	Recommendation
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.

The ISDN-PRI Signaling Link Port itself depends on two other entities: the DS1/UDS1 Interface circuit pack it resides on, and the Processor Interface Link that provides the link to the processor. If there are problems with the ISDN-PRI Signaling Link Port, also investigate the DS1/UDS1 interface circuit pack and the Processor Interface Link.

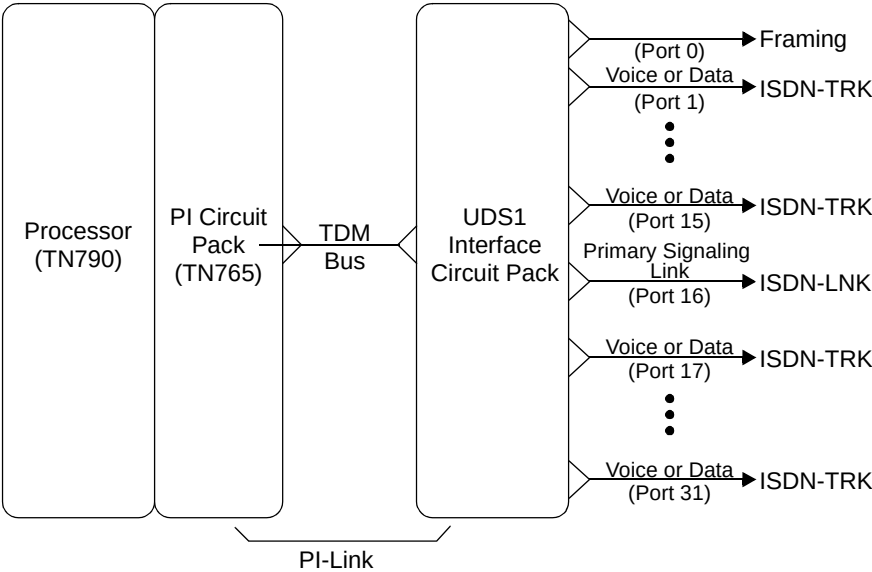


Figure 8-22. ISDN-PRI Signaling Link Port Interactions (32-Channel)

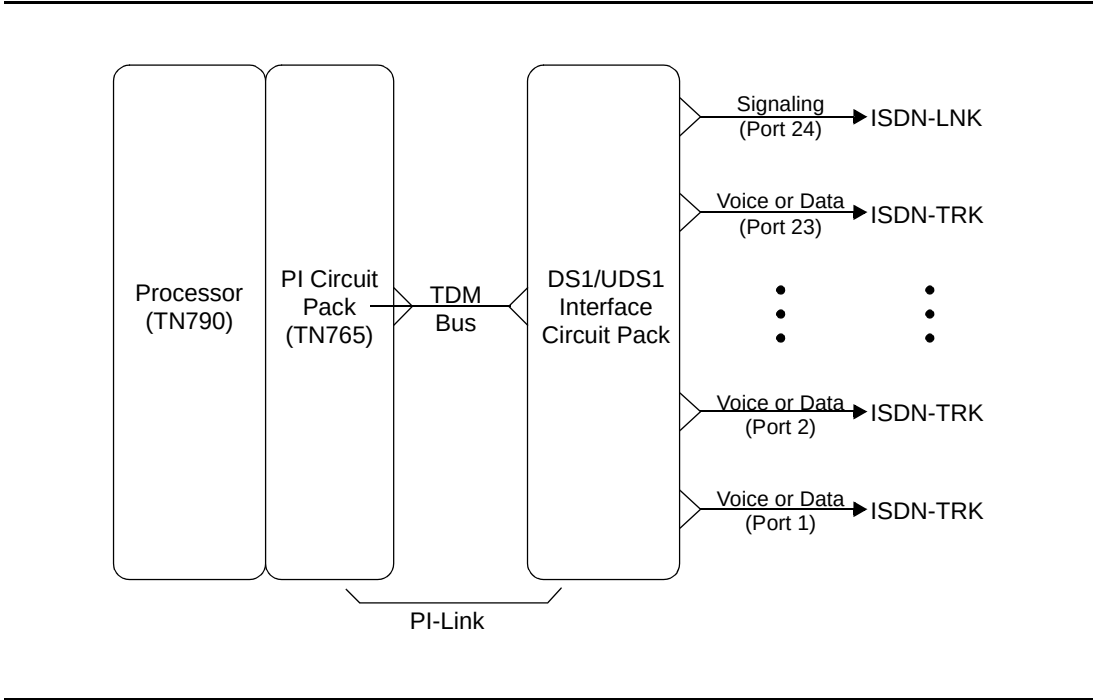


Figure 8-23. ISDN-PRI Signaling Link Port Interactions (24-Channel)

Error Log Entries and Test to Clear Values

Table 8-139. ISDN-PRI Signaling Link Port 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 PCSSpp sh r 1 (c)
18	0	busyout port PCSSpp (c)	WARNING	OFF	release port PCSSpp (c)
130 (a)		None	WARNING	ON	test port PCSSpp sh (c)
1537 (b)		NPE Crosstalk Test #6	MINOR	ON	test port PCSSpp l r 3 (c)

* 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.

- Notes:**
- a. 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.
 - b. 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).
 - c. '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 8-140. System Technician-Demanded Tests: ISDN-LNK

Order of Investigation	Short Test Sequence	Long Test Sequence	D/ND*
NPE Crosstalk Test (#6)		X	ND
Signaling Link Board Check (#643)	X	X	ND

* D = Destructive; ND = Nondestructive

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 8-141. 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 8-141. NPE Crosstalk Test #6 — Continued

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 8-142. 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 TN778 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).

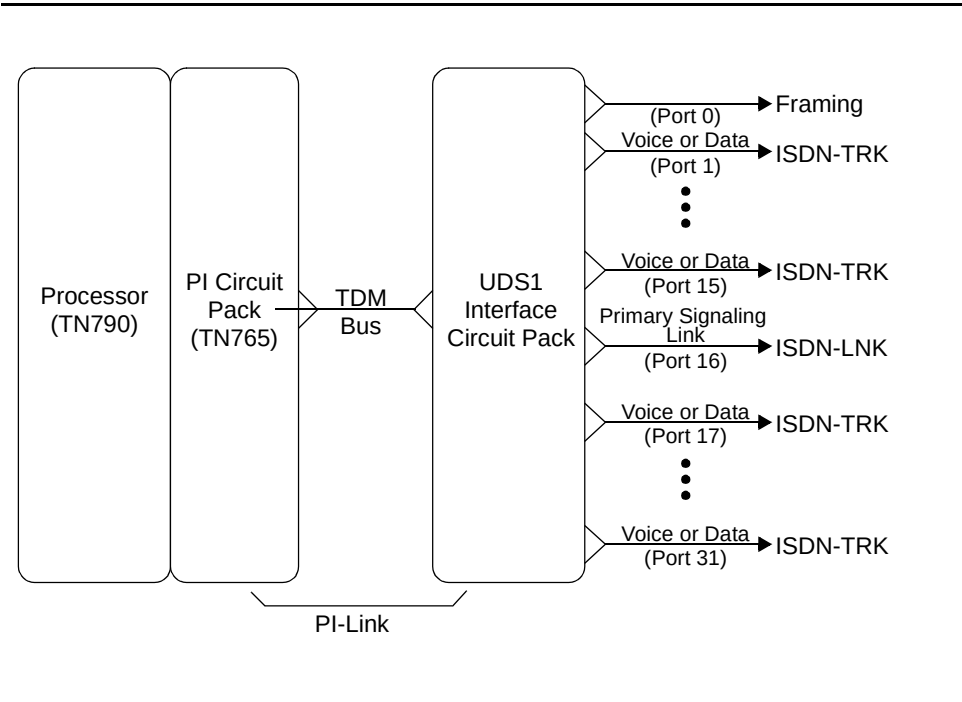


Figure 8-24. ISDN-PRI Signaling Link Port Interactions (32-Channel)

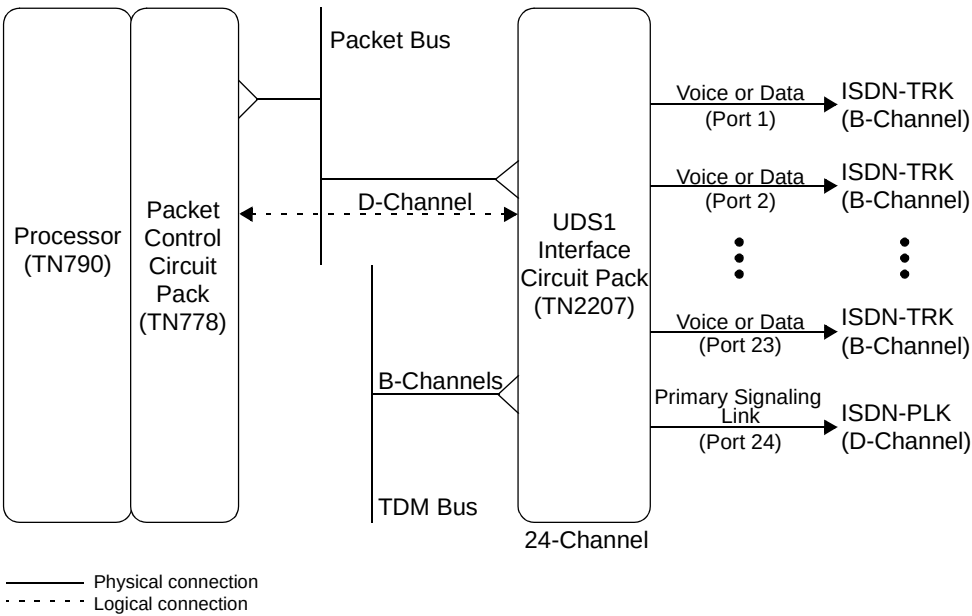


Figure 8-25. FAS ISDN-PRI Over PACCON Signaling Group (24 Channel)

Error Log Entries and Test to Clear Values

Table 8-143. ISDN-PRI Signaling Link Port 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 PCSSpp [†]
18(a)	0	busyout port PCSSpp*	WARNING	OFF	release port PCSSpp [†]
130 (b)		None	WARNING	ON	test port PCSSpp [†]
1537 (c)	46210		WARNING	OFF	
1793 (d)					test board PCSSpp [†] 1
3585 (e)	46222		MINOR	ON	
3841 (f)	46211				
3842 (g)	46223				
3843 (h)		Signaling Port Packet Bus (LAN) Loopback test (#939)			test port PCSSpp [†] 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-channel interfaces and 16 for 32-channel interfaces.

Notes:

- a. The D-channel is demand busied out. No calls can be made over this D-channel.
- b. 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.
- c. "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.
- d. The UDS1 Interface circuit pack is out-of-service. Look for and resolve UDS1-BD errors in the Hardware Error Log.

- e. "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).
- f. "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.
- g. "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.
- h. 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 8-144. System Technician-Demanded Tests: ISDN-PLK

Order of Investigation	Short Test Sequence	Long Test Sequence	D/ND*
Signaling Port Bus Loopback Test (#939)		X	D
Signaling Link Board Check (#643)	X	X	ND

* D = Destructive; ND = Nondestructive

Signaling Link Board Check (#643)

This test checks the state of the UDS1 Interface circuit pack (TN2207) transporting the ISDN-PRI Signaling Link.

Table 8-145. 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 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.
	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.

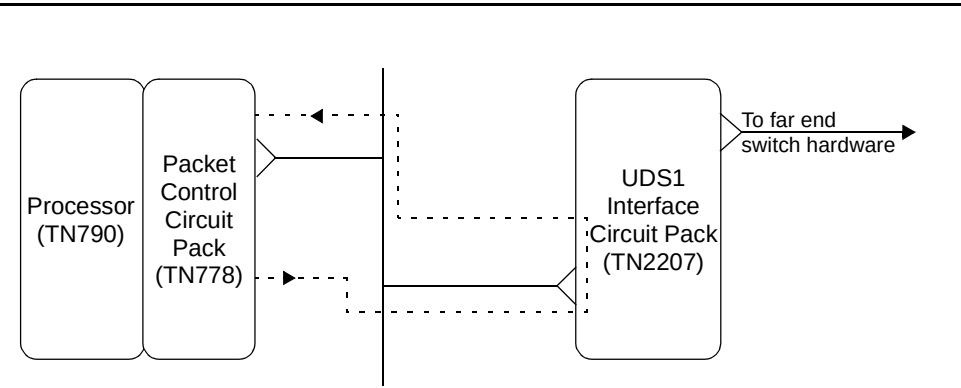


Figure 8-26. Signaling Port Packet Bus (LAN) Loopback

Table 8-146. 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 CAUTION: 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).

Table 8-146. Signaling Port Packet Bus Loop-Back Test #939 — Continued

Error Code	Test Result	Description/ Recommendation
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
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	1. 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 (either the Processor Interface Link or 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 either the Processor Interface Link or the Packet Control circuit pack.

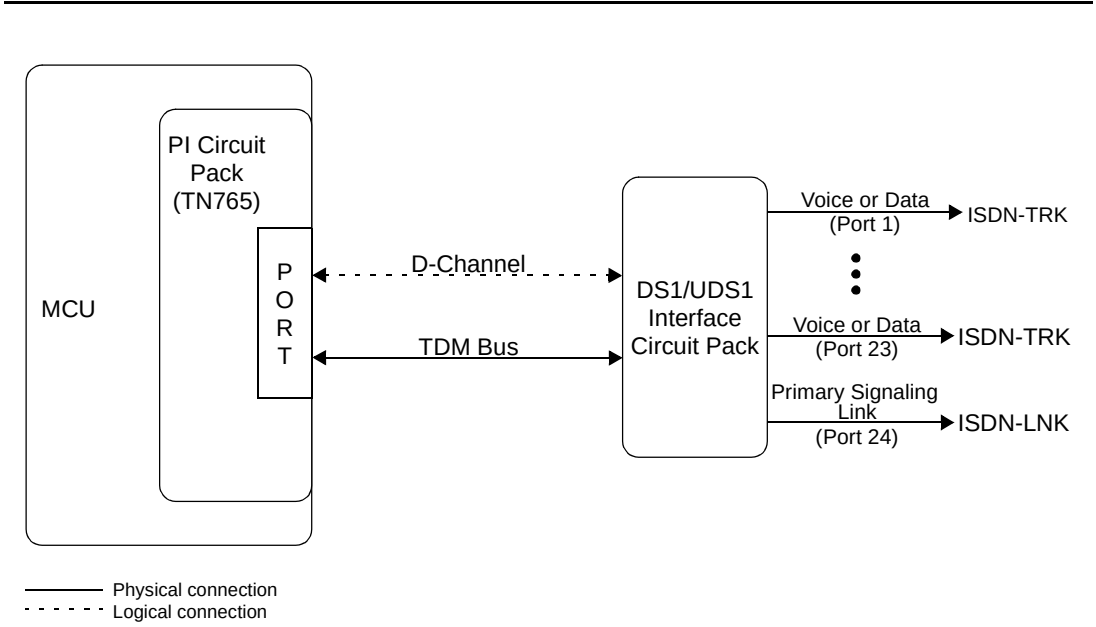


Figure 8-27. FAS ISDN-PRI Signaling Group (24 Channel) over Processor Interface

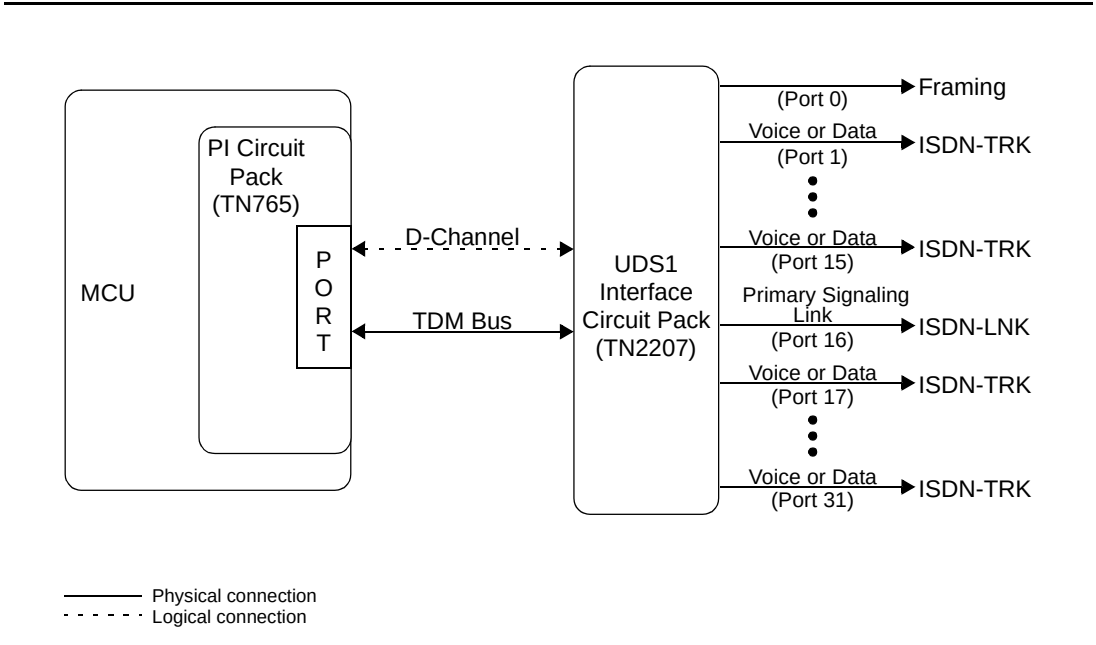


Figure 8-28. FAS ISDN-PRI Signaling Group (32 Channel) over Processor Interface

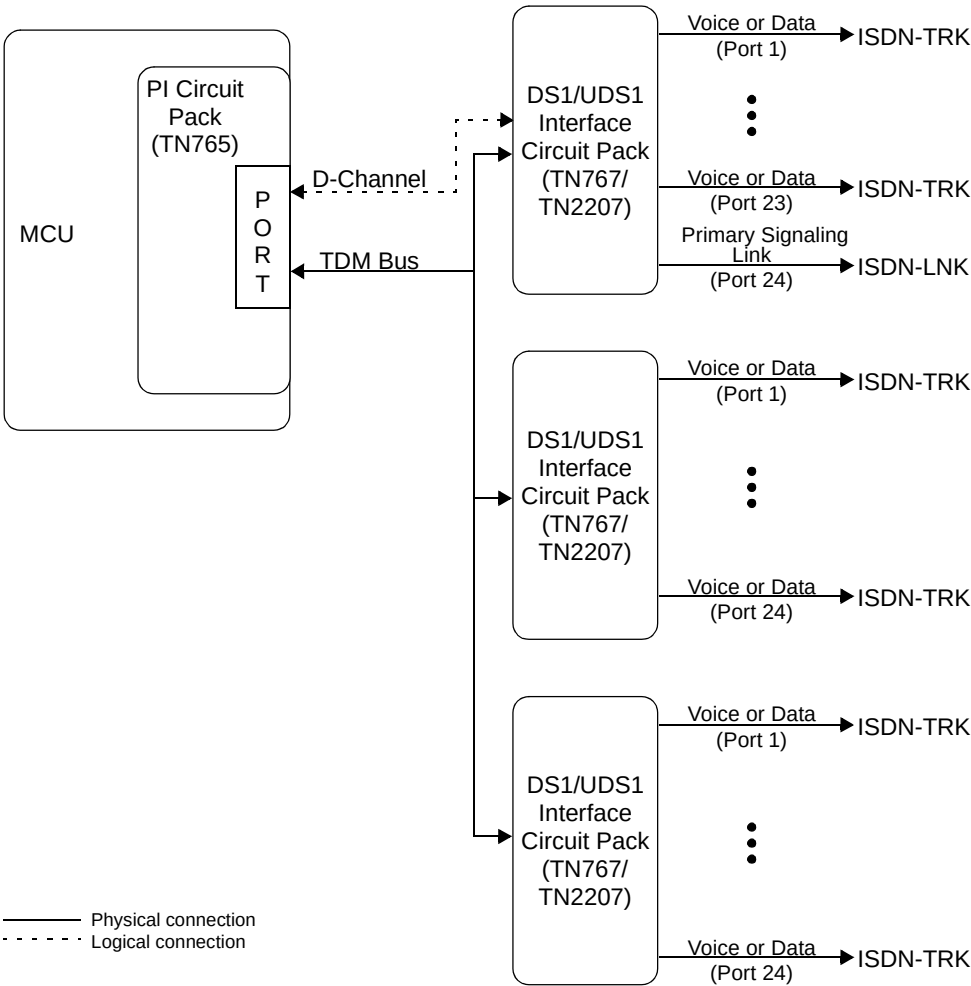


Figure 8-29. NFAS Simplex ISDN-PRI Signaling Group (24 Channel) over Processor Interface

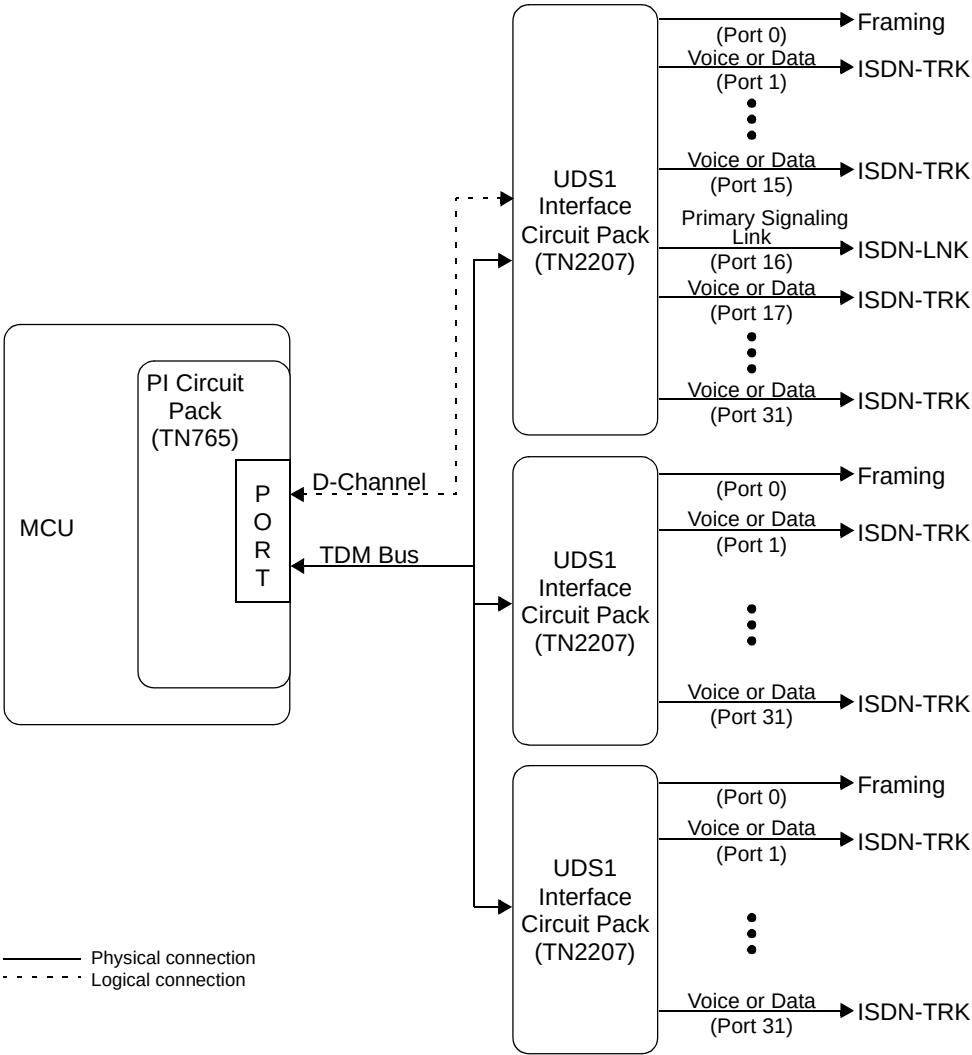


Figure 8-30. NFAS Simplex ISDN-PRI Signaling Group (32 Channel) over Processor Interface

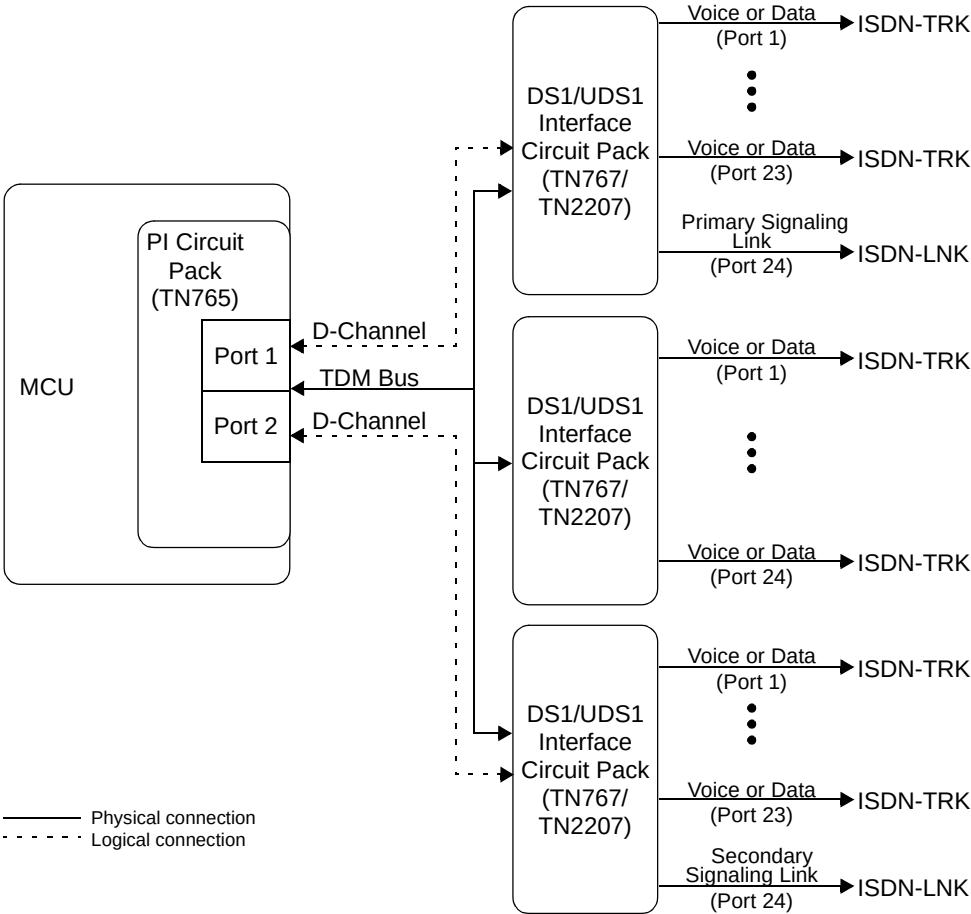


Figure 8-31. NFAS Duplex ISDN-PRI Signaling Group (24 Channel) over Processor Interface

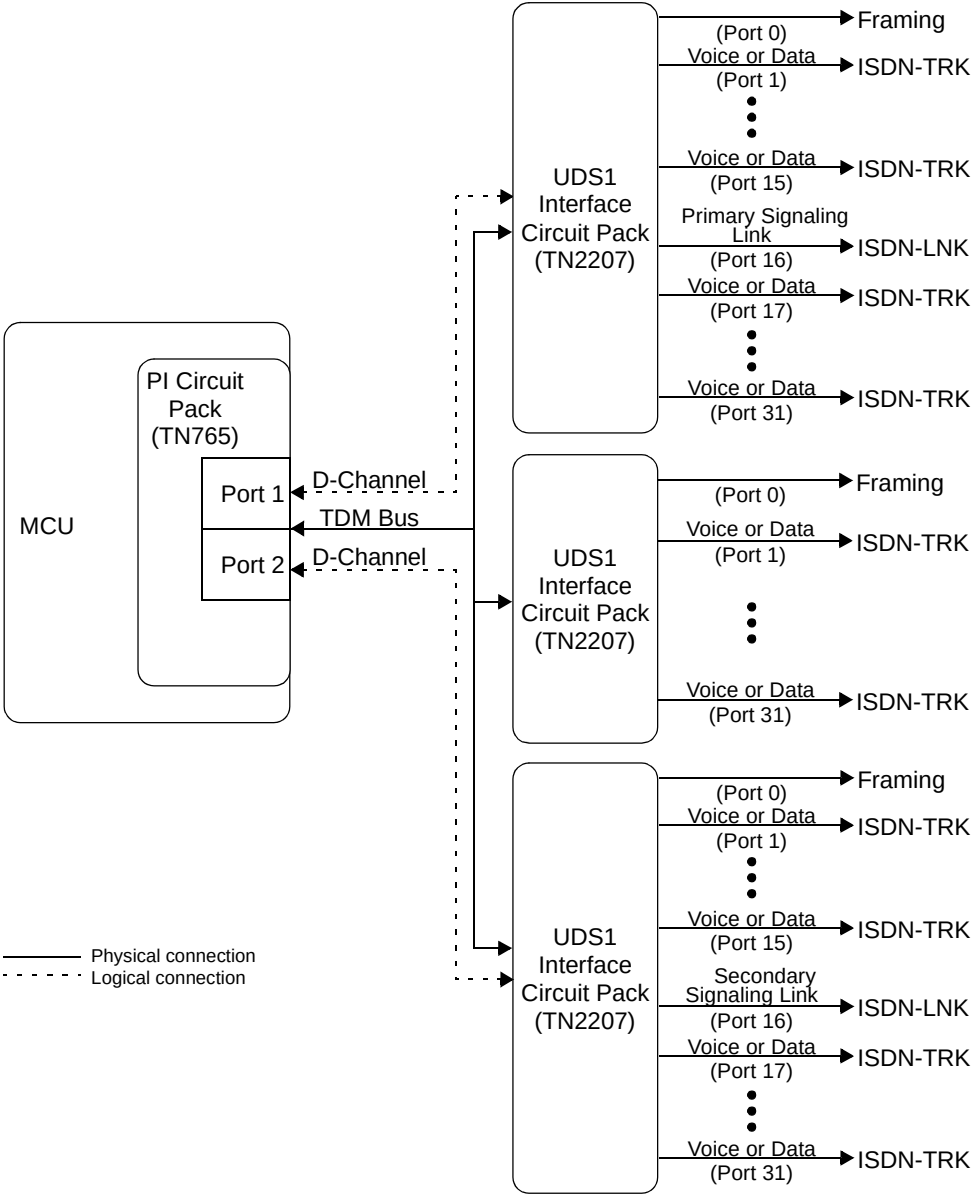


Figure 8-32. NFAS Duplex ISDN-PRI Signaling Group (32 Channel) over Processor Interface

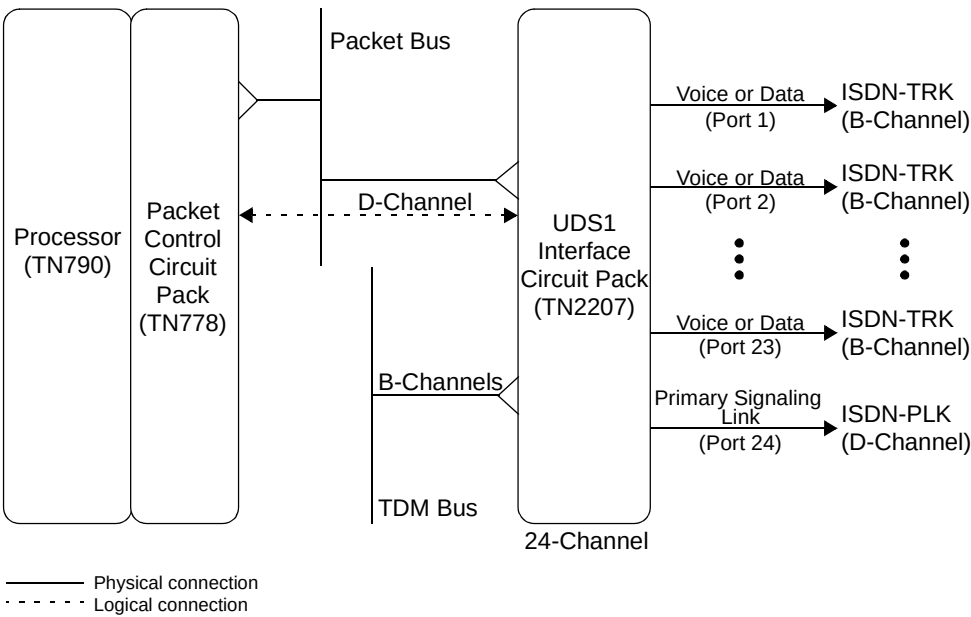


Figure 8-33. FAS ISDN-PRI Over PACCON Signaling Group (24 Channel)

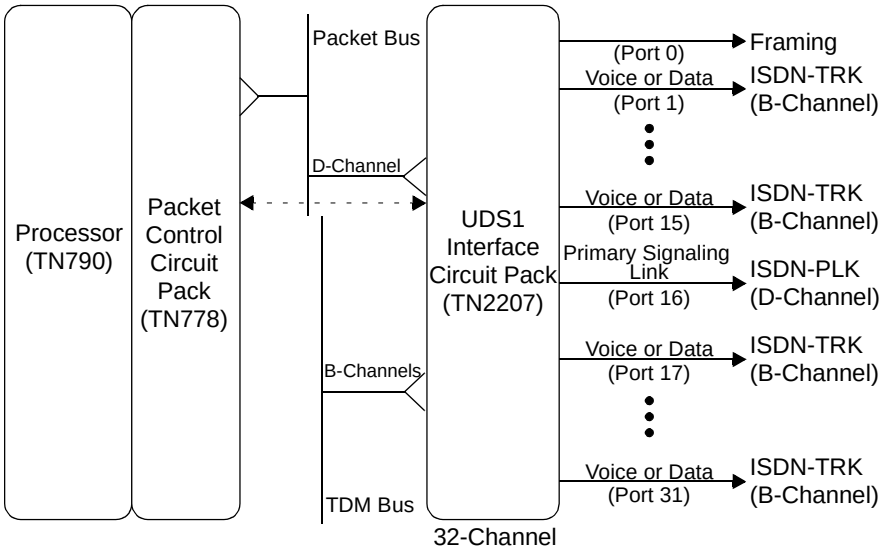


Figure 8-34. FAS ISDN-PRI Over PACCON Signaling Group (32 Channel)

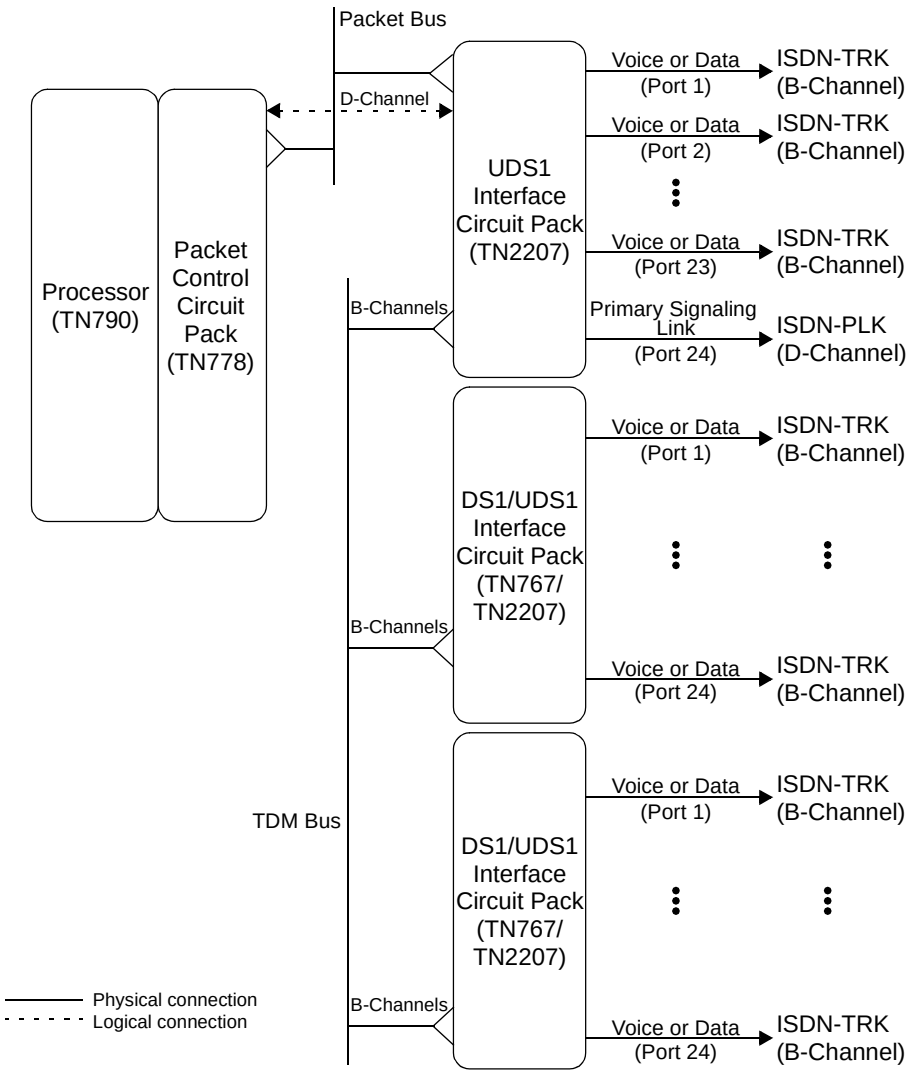


Figure 8-35. NFAS Simplex ISDN-PRI Over PACCON Signaling Group (24 Channel)

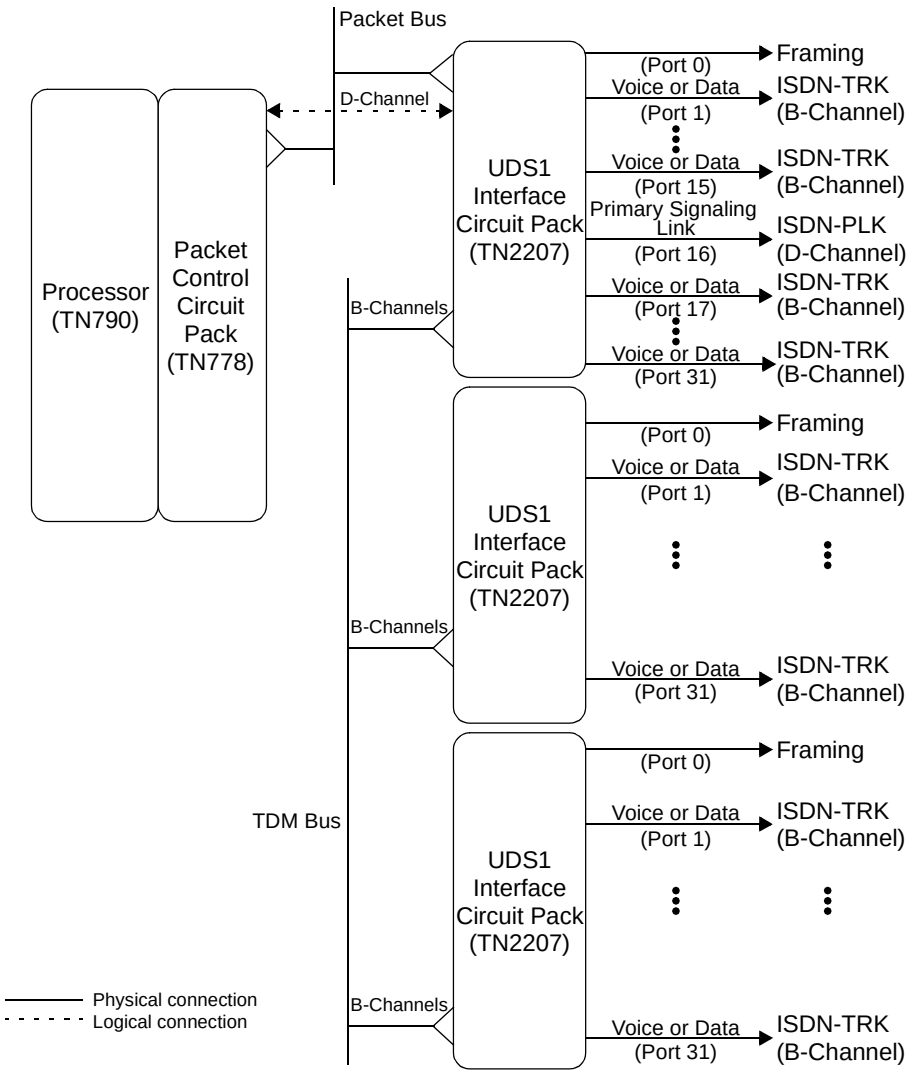


Figure 8-36. NFAS Simplex ISDN-PRI Over PACCON Signaling Group (32 Channel)

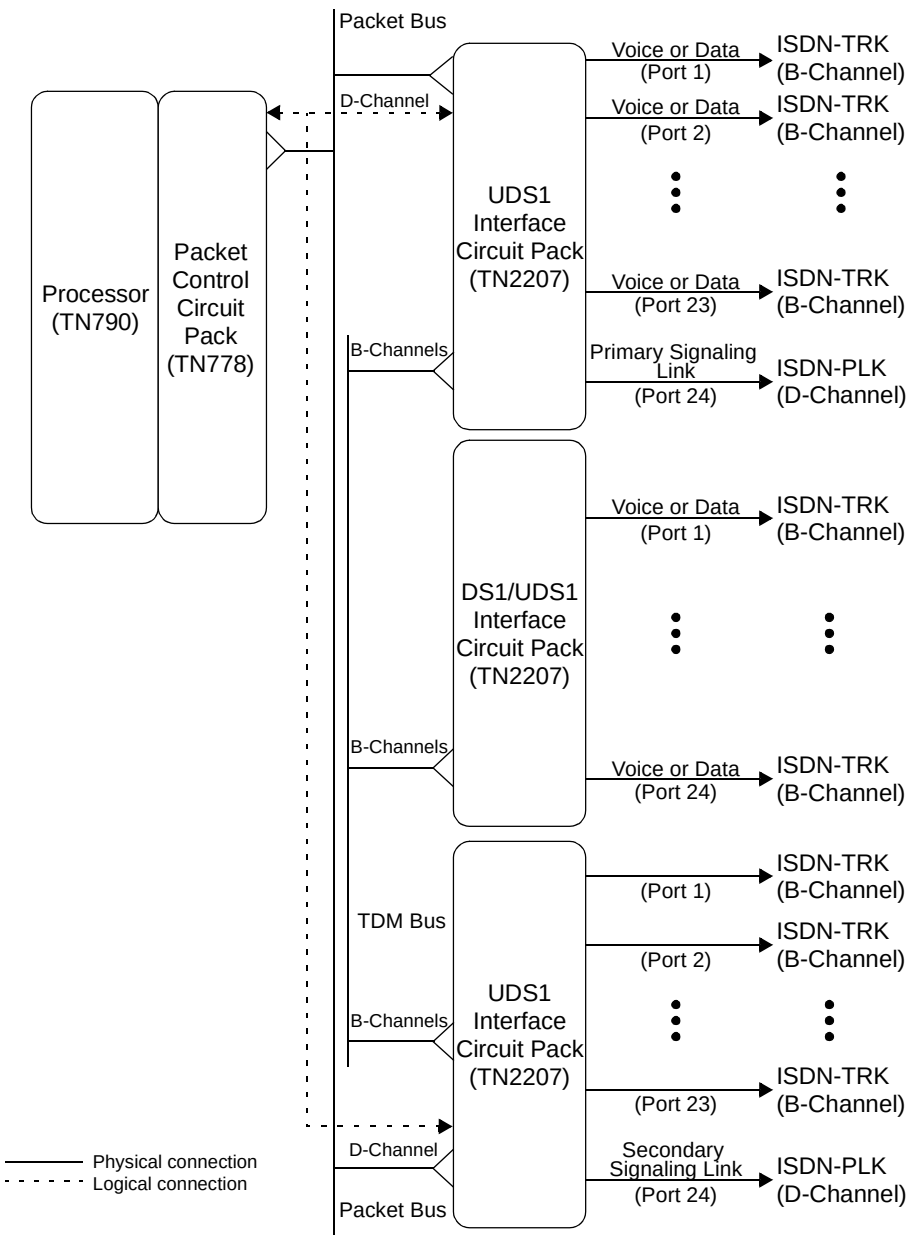


Figure 8-37. NFAS Duplex ISDN-PRI Over PACCON Signaling Group (24 Channel)



Error Log Entries and Test to Clear Values

Table 8-147. ISDN-PRI Signaling Group Error Log Entries

Error Codes	Aux Data	Associated Test	Alarm Level	On/Off Board	Test to Clear Value
0*	0	Any	Any		test sig-group <group>
1 (a)	Any	none			
257 (b)	Any	none			test sig-group <group>
513 (c)	Any	none			test sig-group <group>
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 (d)	Any	Layer 2 Status (Test #647)	WARNING	OFF	test sig-group <group>
2049 (e)	Any	Layer 2 Status (Test #647)	WARNING	OFF	test sig-group <group>
2305 (f)	Any	Remote Layer 3 Query (Test #637)	MINOR	OFF	test sig-group <group>
3585 (g)	port number	none			none
3840-3928 (h)	port number				none

* Run the Short or Long Test Sequence. Refer to the appropriate test description and follow the recommended procedures.

Notes:

- a. 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.

- b. 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).

- c. 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).

- d. This error indicates a failure of the Layer 2 Status Query Test for the primary signaling channel
- e. This error indicates a failure of the Layer 2 Status Query Test for the secondary signaling channel.
- f. 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.
- g. 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.

- h. These error codes are 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. The following table provides more information:

Table 8-148. Descriptions of Error Codes 3840-3928

Error Code	Description	Recommendation
3842	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	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	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.

Continued on next page

Table 8-148. Descriptions of Error Codes 3840-3928 — Continued

Error Code	Description	Recommendation
3878	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	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. 3. 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	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	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.

Continued on next page

Table 8-148. Descriptions of Error Codes 3840-3928 — *Continued*

Error Code	Description	Recommendation
3905	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	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	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 previously for error type 3890.
3928	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 8-149. System Technician-Demanded Tests: ISDN-SGR

Order of Investigation	Short Test Sequence	Long Test Sequence	D/ND*
Primary Signaling Link Hardware Check (#636)	X	X	ND
Secondary Signaling Link Hardware Check (#639)	X	X	ND
Layer 2 Query Test (#647)	X	X	ND
Remote Layer 3 Query Test (#637)	X	X	ND

* D = Destructive; ND = Nondestructive

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.

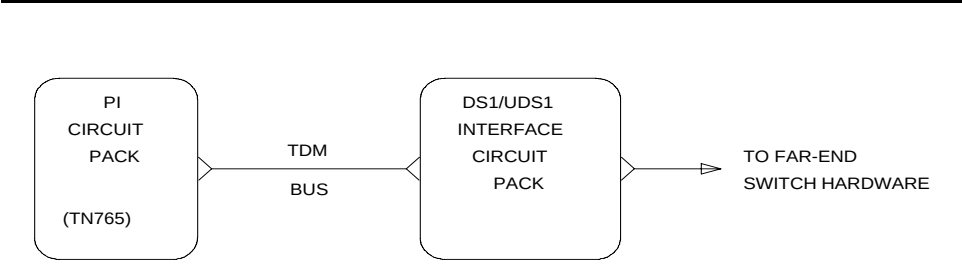


Figure 8-39. Primary Signaling Link Hardware Check (Test #636)

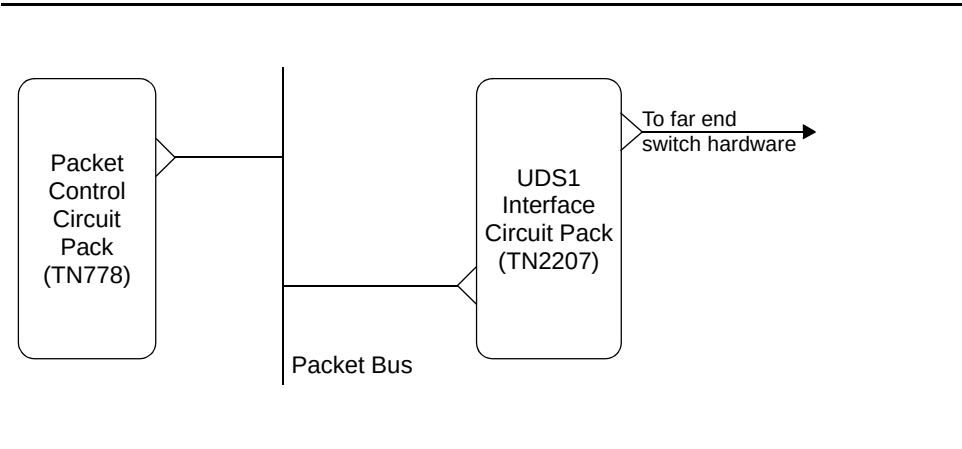


Figure 8-40. PRI over PACCON Primary Signaling Link Hardware Check (Test #636)

Table 8-150. 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" .
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.

Continued on next page

Table 8-150. Primary Signaling Link Hardware Check Test #636 — Continued

Error Code	Test Result	Description/ Recommendation
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.

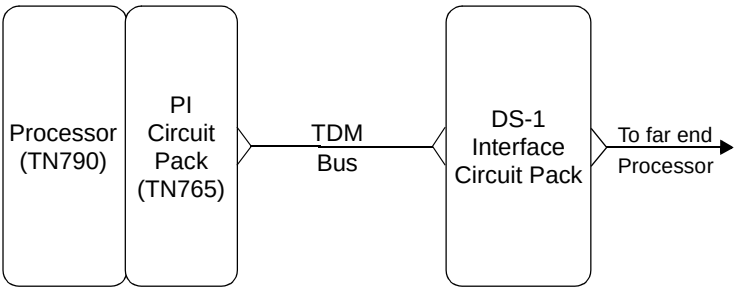


Figure 8-41. Remote Layer 3 Query (Test #637)

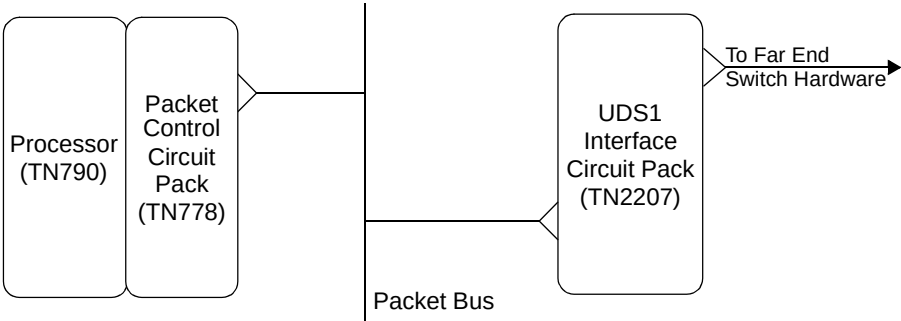


Figure 8-42. PRI Over PACON Remote Layer 3 Query (Test #637)

Table 8-151. 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.
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.

Table 8-151. Remote Layer 3 Query Test #637 — Continued

Error Code	Test Result	Description/Recommendation
	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.

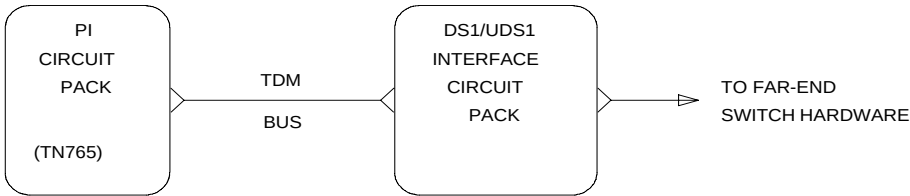


Figure 8-43. Secondary Signaling Link Hardware Check for PRI over PI (Test #639)

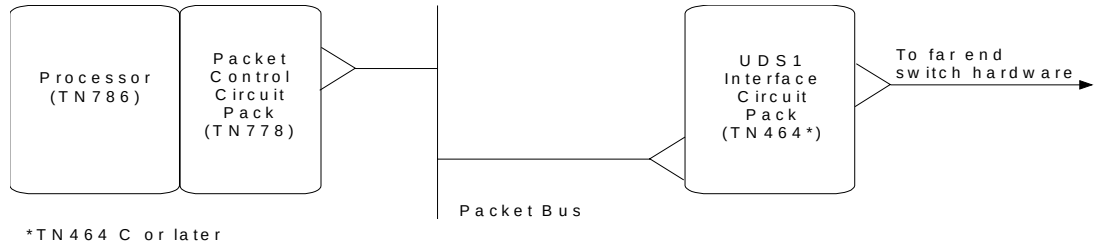


Figure 8-44. Secondary Signaling Link Hardware Check for PRI over PACCON (Test #639)

Table 8-152. 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.
	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 8-153. 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.

Continued on next page

Table 8-153. Layer 2 Status Query Test #647

Error Code	Test Result	Description/ Recommendation
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.
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.
	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.

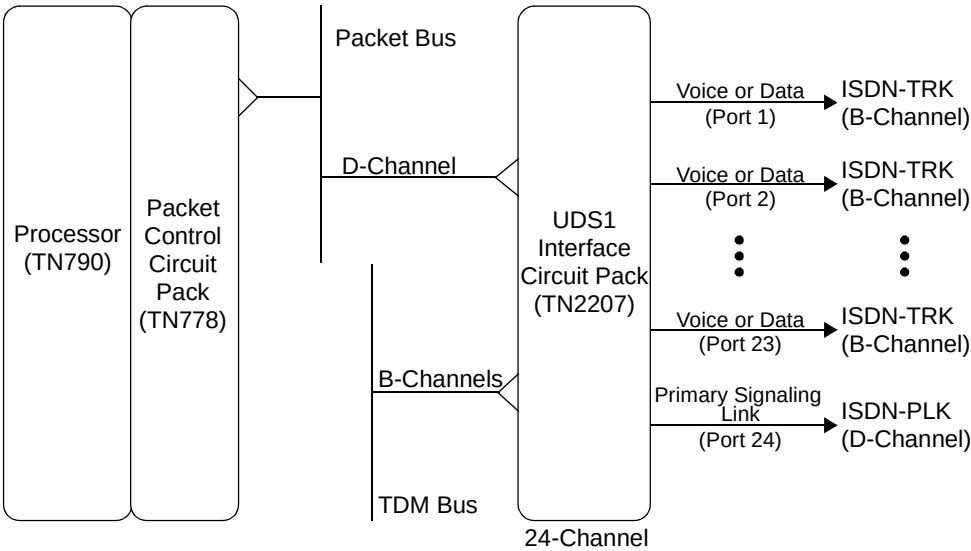


Figure 8-45. DS1 ISDN Trunk Interactions (24-channel interface)

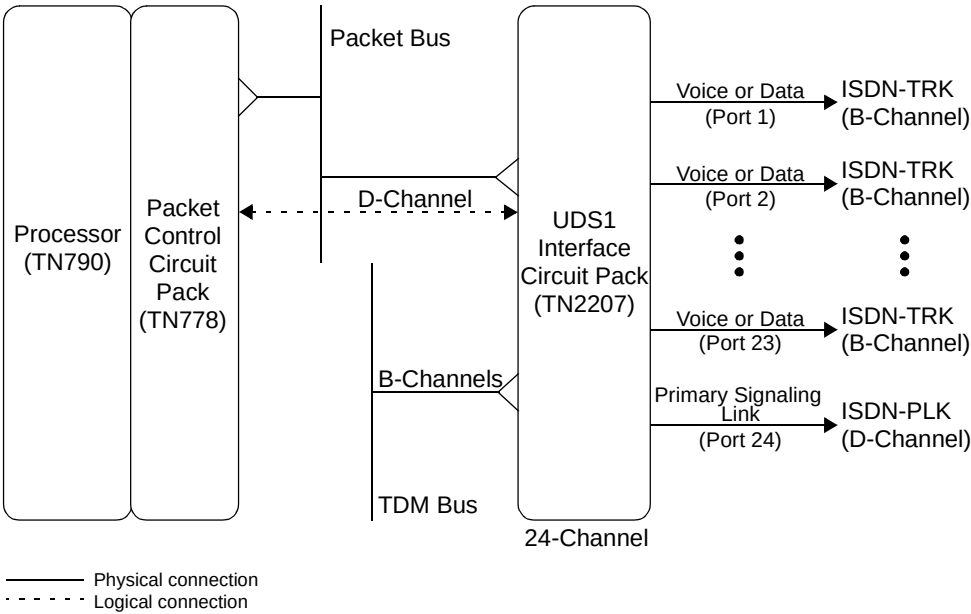


Figure 8-46. PRI Over PACCON DS1 ISDN Trunk Interactions (24-channel interface)

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 resend 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 (PMTTC) 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 PMTTC 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.

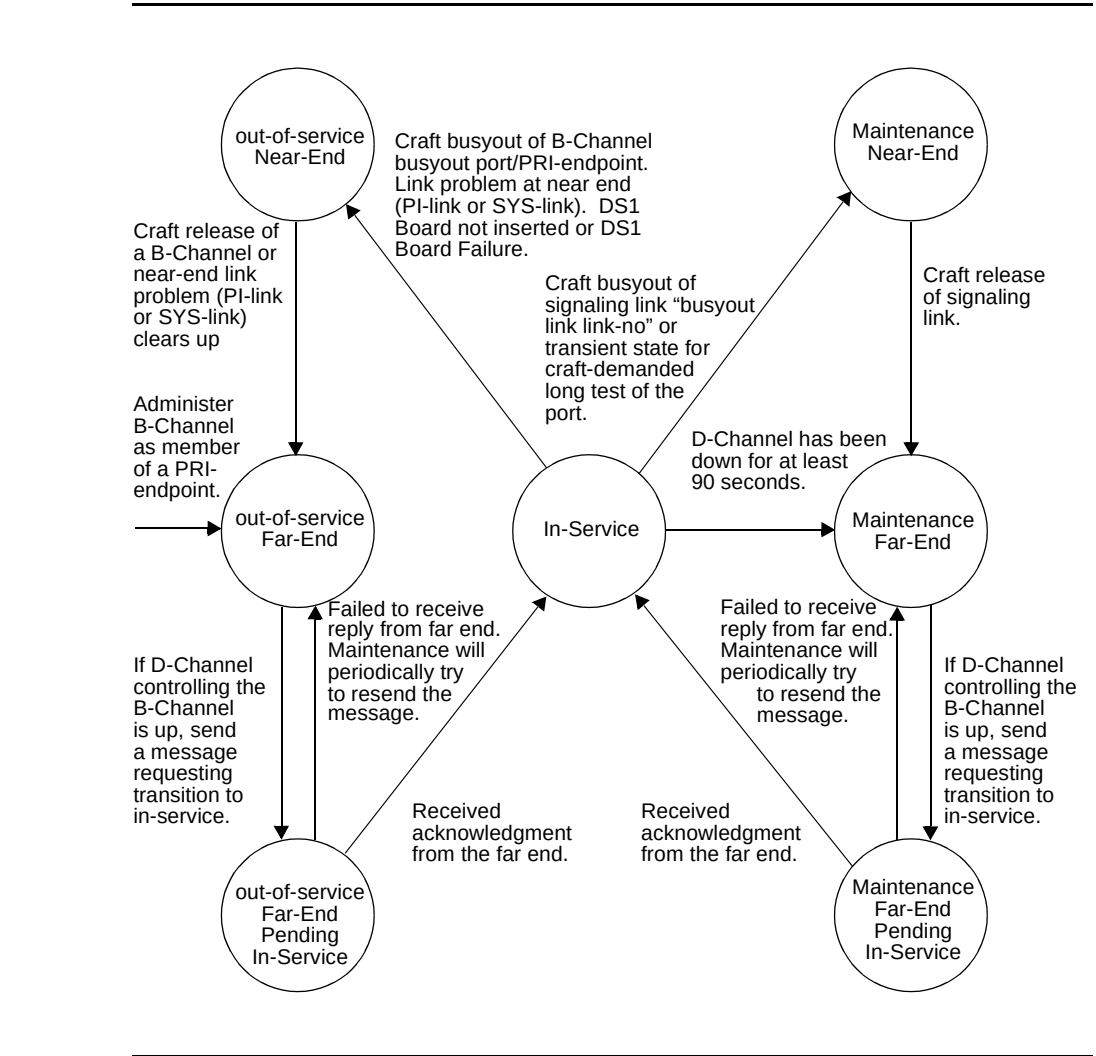


Figure 8-47. Common Progressions in Service States

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 8-154. 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 disconnected? 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.
ISDN Testcall in progress? (test trunk <trk/mbr> issued by craft)				X				Wait several minutes for test to finish; check status of trunk again.

Table 8-154. 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
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 8-155. DS1 ISDN Trunk Error Log Entries

Error Type	Aux Data	Assoc. Text #	Alarm Level	On/Off Board	Test to Clear Value	Description
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.

Table 8-155. DS1 ISDN Trunk Error Log Entries — Continued

Error Type	Aux Data	Assoc. Text #	Alarm Level	On/Off Board	Test to Clear Value	Description
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.
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.

Table 8-155. DS1 ISDN Trunk Error Log Entries — Continued

Error Type	Aux Data	Assoc. Text #	Alarm Level	On/Off Board	Test to Clear Value	Description
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.

Table 8-155. DS1 ISDN Trunk Error Log Entries — Continued

Error Type	Aux Data	Assoc. Text #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 8-155. DS1 ISDN Trunk Error Log Entries — Continued

Error Type	Aux Data	Assoc. Text #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 <i>Aux Data</i> 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 <i>Aux Data</i> values are of concern, all others can be ignored. <i>Aux Data</i> values 10 means a call in a stable, talking state was cleared. This state is called "active." <i>Aux Data</i> values 4, 7, 8, 260, and 263 mean a call was not active, but had reached a ringing state. <i>Aux Data</i> values 1, 3, 6, 9, and 265 mean a call that had not reached the ringing state was cleared. <i>Aux Data</i> 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.

Table 8-155. DS1 ISDN Trunk Error Log Entries — Continued

Error Type	Aux Data	Assoc. Text #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 <i>Aux Data</i> 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 8-156. 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
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 8-157. 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 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.
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 <i>Maintenance Tests</i> field on page 2 of the Trunk Group form.
1117	ABORT	A service state audit message is outstanding.	Wait two minutes and try again.

Table 8-157. NPE Crosstalk Test #6 — Continued

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 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.
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.
	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 8-158. 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 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.
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.
	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 8-159. 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 fail, escalate the problem.
1018	ABORT	Maintenance is disabled on this trunk.	Enable maintenance by entering value y into the <i>Maintenance Tests</i> 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.
	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 and TN765 Processor Interface Link for proper operation. This test checks the status of those critical elements.

Table 8-160. Signaling Link State Check Test #255

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.
1018	ABORT	Maintenance is disabled on this trunk.	Enable maintenance by entering value y into the <i>Maintenance Tests</i> 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.
	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.

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ISDN-TRK (DS1 ISDN Trunk)

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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 8-161. 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 <i>Maintenance Tests</i> 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.
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.
	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 8-162. 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 <i>Maintenance Tests</i> 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.
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 Network Control (NETCON) circuit pack (DATA-BD).

Table 8-163. 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 (NETCON 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.
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.

Table 8-163. ISDN Test Call Test #258 — *Continued*

Error Code	Test Result	Description	Recommendation
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 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.

Table 8-163. ISDN Test Call Test #258 — Continued

Error Code	Test Result	Description	Recommendation
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.
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.
2201 to 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.

Table 8-163. ISDN Test Call Test #258 — Continued

Error Code	Test Result	Description	Recommendation
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.
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 to 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 to 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.

Table 8-163. ISDN Test Call Test #258 — Continued

Error Code	Test Result	Description	Recommendation
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 .
	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-testcall 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 Lucent Technologies 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 Lucent Technologies 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 8-164. SVN Error Log Entries

Error Type	Aux Data	Associated 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 Lucent Technologies 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.

MEM-BD (Memory)

MO Name (in Alarm Log)	Alarm Level	Initial Command to Run	Full Name of MO
MEM-BD	MAJOR	test memory l c	Memory
MEM-BD	WARNING	test memory sh c	Memory
MEMORY	MAJOR	test memory a/b sh c	Memory

 **NOTE:**
For memory problems on systems with a TN790 RISC processor circuit pack, see “PR-MEM.”

Error Log Entries and Test to Clear Values

Table 8-165. MEM-BD (Memory) Memory Error Log Entries

Error Type	Aux Data	Associated Test	Alarm Level	On/Off Board	Test to Clear Value
0*	0	Any	Any	Any	test memory a/b l r 1
1-256	Any	Read All Memory Test (#85)	MAJOR	ON	test memory a/b l r 5
257-512 (b)	Any	Read All Memory Test (#85)	MAJOR	ON	test memory a/b l r 1
513 (c)	0	Memory Detection/ Test (#87)	MAJOR	ON	test memory a/b r 3
769 (d)	Any	Text Checksum Test (#86)	MAJOR	OFF/ON	test memory a/b l r 2
1025 (e)	Any	Memory Functional Test (#332)	MAJOR	ON	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.

Notes:

- a. The "clear" option can replace the "repeat" option in a **test memory** command. There is no need to specify the carrier.
- b. The Read All Memory Test (#85) failed. Refer to the FAIL section of this test. The error is associated with MEM-BD 1.

- c. The Memory Error Detection Test (#87) failed. Refer to the FAIL section of this test. The error is associated with MEM-BD 1.
- d. The Text Checksum Test (#86) failed. Refer to the FAIL section of this test. The error is associated with MEM-BD 1 and is an ON board alarm.
- e. There are Functional Test errors against both the Processor circuit pack and Memory. On systems with an 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 following table. 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 8-166. System Technician-Demanded Tests: MEM-BD

Order of Investigation	Short Test Sequence	Long Test Sequence	D/ND*
Processor Non-maskable Interrupt Test (#82)(a)	X	X	ND
Processor ROM Checksum Test (#80) (a)	X	X	ND
Processor Software Initiated Interrupt Test (#77) (a)	X	X	ND
Processor Sanity Timer Test (#83) (a)		X	D
MTP Outpulse Relay Test (#102) (b)	X	X	ND
MTP Analog Loop Around Test (#103) (b)	X	X	ND
MTP Sanity Handshake Test (#106) (b)	X	X	ND
MTPSAT Loop Around Test (#228) (b)	X	X	ND
MTP Aux Loop Around Test (#229) (b)	X	X	ND
MTP Reset Test (#101) (b)		X	D
MTP Dual Port Ram Test (#104) (b)		X	D
Read All Memory Test (#85)		X	ND
Memory Error Detection Test (#87)	X	X	ND
Text Checksum Test (#86)		X	ND
Memory Functional Test (#332) (c)		X	D
Memory Board Check Test (#631)	X	X	ND

* D = Destructive; ND = Nondestructive

- Notes:
- a. Refer to PROCR (Processor) Maintenance documentation for a description of these tests.
 - b. Refer to PR-MAINT (Maintenance/Tape Processor) Maintenance documentation for a description of these tests.
 - c. On an Active SPE, the test is run only via a **reset system 4** command or a **reset system 5** command.

Read All Memory Test (#85)

This test is a nondestructive test. The test reads every memory location in memory and writes it back. A failure of this test indicates a failure in the Processor or Memory circuit pack.

Table 8-167. Read All Memory Test #85

Error Code	Test Result	Description/Recommendation
1	FAIL	If the system can still provide service, this indicates that the Processor circuit pack or Memory has a problem, but can still function. The error code "1" indicates that MEM-BD 1 is failing the test. 1. Replace the PROCR (Processor circuit pack).  WARNING: <i>If the Processor circuit pack must be replaced, and if there is a blank in the Expansion Memory circuit pack slot (that is, in the slot immediately to the right of the Processor circuit pack), remove the blank before removing the circuit pack. Otherwise, the circuit pack and/or the two connectors that are used to connect the Expansion Memory circuit pack (if available) might become damaged.</i>
	PASS	The Memory is healthy.

Text Checksum Test (#86)

This test is a nondestructive test. The test computes the checksum of the DEFINITY software text module, and it validates the operation of the flash ROM. A failure of this test indicates corruption of the Text.

Table 8-168. Text Checksum Test #86

Error Code	Test Result	Description/Recommendation
	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. - Flash ROM should be reprogrammed by - 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 Chapter 5.
	PASS	The checksum is correct.

Memory Error Detection Test (#87)

This test is a nondestructive test. 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.

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" section in Chapter 4 for the recommended maintenance strategy.

Table 8-169. Memory Functional Test #332

Error Code	Test Result	Description/Recommendation
1000	ABORT	System resources required to run this test are not available. Repeat the command at 1-minute intervals a maximum of three times.

Memory Board Check Test (#631)

This test always passes.

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 8-170. MMI-BD Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 8-170. MMI-BD Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
513	4352 to 4357					Uplink error from circuit pack. An on-board angel hardware failure has been detected by the circuit pack. The <i>Aux Data</i> 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: <i>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.</i>
769	Any	#1123	None			This MMI circuit pack reported a loss of MMI synchronization. Refer to test #973 for repair procedures.

Table 8-170. MMI-BD Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 #958 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 #967 for repair procedures.

Table 8-170. MMI-BD Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
2561	Any	#1125	Minor	Off	test board PCSS l r 3	Refer to the repair procedure for test #975.
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 8-171. System Technician-Demanded Tests: MMI-BD

Order of Investigation	First Test Sequence	Second Test Sequence	Reset Board Sequence	Is Test Destructive?
Control Channel Loop-Around Test #52*	Short	Long		No
MMI Cable Status Test #1117	Short	Long		No
MMI Synchronization Status Test #1123	Short			No
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*			Reset	Yes

* 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 8-172. 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.
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.

Table 8-172. MMI to DS1/DI Cable Status Test #1117 — *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 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 a nondestructive test.

To support conferences involving multiple MMI circuit packs, the appropriate MMI circuit packs must be synchronized with one another. One such circuit pack is designated the Master. The Master provides the synchronization signal onto the TDM bus. To become synchronized, the other MMI circuit packs in the system “listen” to this signal. This test monitors this synchronization state.

The test fails if the MMI circuit pack is not in sync. On the other hand, the test passes with auxiliary code 1100 if the MMI circuit pack is in sync and is providing the signal for the system. Also, this test could pass with auxiliary code 1101 if the MMI circuit pack is in sync and is listening to the signal. MMI circuit packs usually do not lose the synchronization signal unless an MMI circuit pack is either pulled out of the system or reset via a craft command.

Two test numbers are associated with this test. Test #1122 runs 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 signal recovery 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 the problem.

Table 8-173. 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).	
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 8-174. 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.)	
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 8-175. 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 8-175. TSI Crosstalk Test #6 — Continued

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 8-176. TSI Loop-Around Test #1108

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 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 8-176. TSI Loop-Around Test #1108 — 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. 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.	

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 I 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 8-177. MMI-LEV Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 streams (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 8-178. MMI-PT Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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.
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.

Table 8-178. MMI-PT Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
513	Any	#1111	Minor	On	test port PCSSpp l r 3	Test #961 failed. Run the long test sequence and pay attention to the results of test #961.
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.

Table 8-178. MMI-PT Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 8-179. 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 8-180. 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.
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.

Table 8-180. Resource Loop-Around Test #1111 — Continued

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. 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 to 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.
	PASS	The resource is functioning normally.	

MMI-SYNC (Multimedia Interface Resource Level)

MMI-SYNC decides if a Multimedia Interface (MMI) synchronization switch is needed.

To utilize TN787K MMI circuit pack resources more efficiently, and to support larger H0 conferences, conferences must be spanned over multiple MMI circuit packs. For the conferences to be spanned, all MMIs in the MCU must be synchronized. When the MCU is booted, the first MMI circuit pack inserted is designated the Master. The Master is instructed to provide a synchronization signal onto a TDM bus time slot. As subsequent MMI packs are inserted, they are instructed to listen to this signal. Once all the MMIs are synchronized, it is rare that synchronization is lost. Technicians should be aware that arbitrarily pulling out an MMI circuit pack may cause service disruption on other MMI circuit packs if the MMI circuit pack pulled out is the provider. This can be verified by issuing a **test board** command on the MMI circuit pack before you pull it out. If the MMI circuit pack is providing the sync signal, Test #973 passes with Auxiliary Code 1100. If the MMI circuit pack is listening, it passes with Auxiliary Code 1101. If the circuit pack is out of sync, the test fails.

If a listening MMI circuit pack loses the synchronization signal, it uplinks a "Sync Lost" message to MCU software. MMI-SYNC decides if a synchronization switch is needed. If half or more of the MMIs in the MCU lose the synchronization signal, MMI-SYNC initiates a signal switch to another currently listening MMI circuit pack. The current provider is then told to listen. If the MCU has only two MMI circuit packs, MMI-SYNC initiates a switch whenever only one MMI reports the loss. If the MCU has five MMI packs, MMI-SYNC initiates the switch if only three MMI packs report the loss of synchronization.

Synchronization is switched to an MMI circuit pack only if the circuit pack is currently not alarmed. If all MMI circuit packs are alarmed, no synchronization switch is done. If this is the case, MMI-SYNC raises a minor alarm. The MMI-SYNC alarm is cleared only when the MMI-BD alarms are cleared and 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 8-181. MMI-SYNC Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
1	Any	None				An MMI synchronization switch took place successfully. Refer to MMI-BD errors for the reason why the switch took place.
2	Any	None	Minor	OFF		An MMI synchronization switch was requested, but it failed. Try resolving this alarm condition by resolving all MMI-BD alarms. If the problem is still not resolved, escalate the problem.

Craft-Demanded Tests

There are no craft-demanded tests for MMI-SYNC.

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 vice 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.

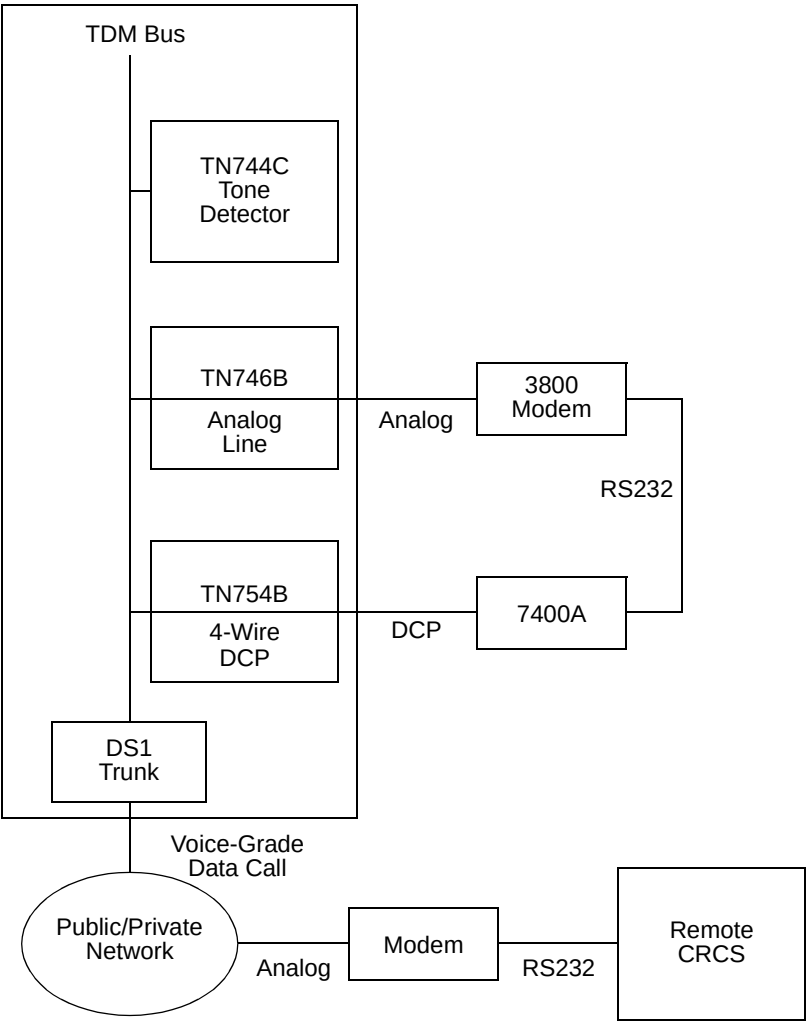


Figure 8-48. MCU/CRCS Combined Modem Pool Configuration

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.

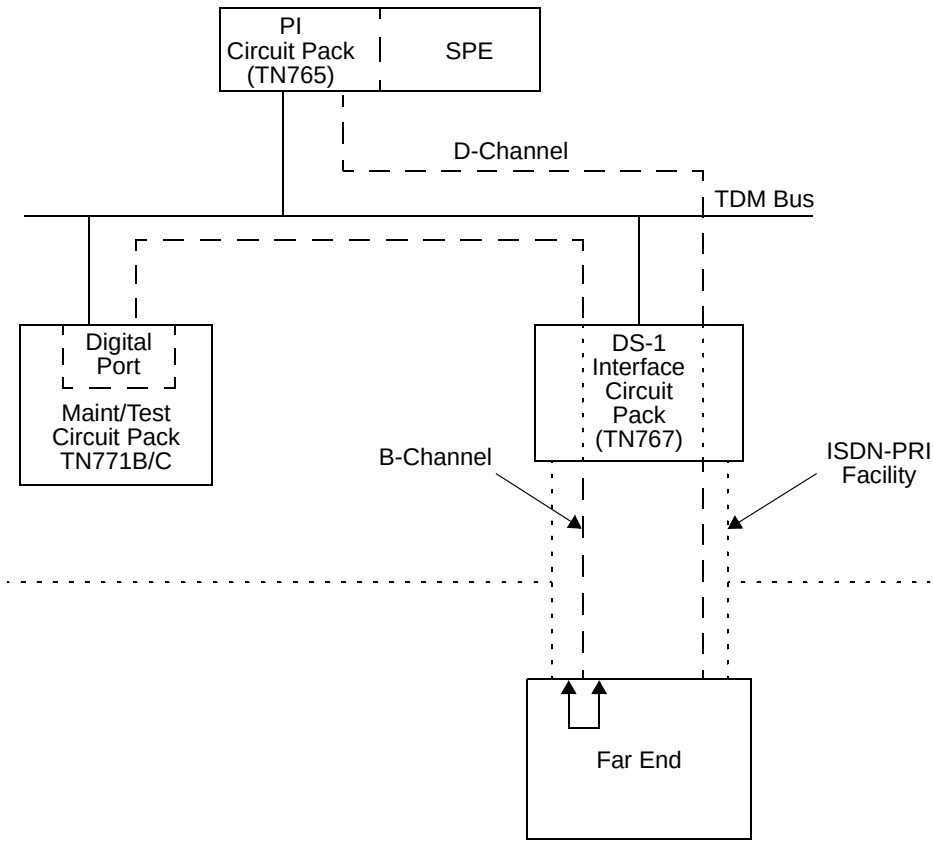


Figure 8-49. ISDN-PRI Outgoing Test Call

Hardware Error Log Entries

Table 8-182. M/T-DIG Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
0*	0	Any	Any	Any	test port PCSSpp	
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.

Table 8-182. M/T-DIG Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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.

* 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.

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 8-183. 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 8-184. 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.

Table 8-184. NPE Crosstalk Test # 9 — Continued

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 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.
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 8-185. Digital Port Loop-Around Test #13

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.
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 8-185. Digital Port Loop-Around Test #13 — *Continued*

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 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.
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.	

Table 8-185. Digital Port Loop-Around Test #13 — Continued

Error Code	Test Result	Description	Recommendation
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.
	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 8-186. 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.
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.
	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 8-187. 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.	

Table 8-187. Digital Port Sanity Test #565 — Continued

Error Code	Test Result	Description	Recommendation
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.
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 I 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 I command. 3) If the test fails again, replace the circuit pack.

Table 8-187. Digital Port Sanity Test #565 — Continued

Error Code	Test Result	Description	Recommendation
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.	
	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 8-188. 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.
	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 I
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 8-189. M/T-PKT Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
0*	0	Any	Any	Any	test port PCSSpp	
1	41018	None	Minor	On	test port PCSSpp I 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	None	Minor	On	test port PCSSpp I r 3	Note a.
513	Any	#567	Minor	On	test port PCSSpp r 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.

* 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.

Notes:

- a. 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.

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 8-190. 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 8-191. 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.
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.
	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 8-192. 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.	
	PASS	The Maintenance/Test Packet Bus Port Packet Bus fault detection capability is operating correctly.	

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.

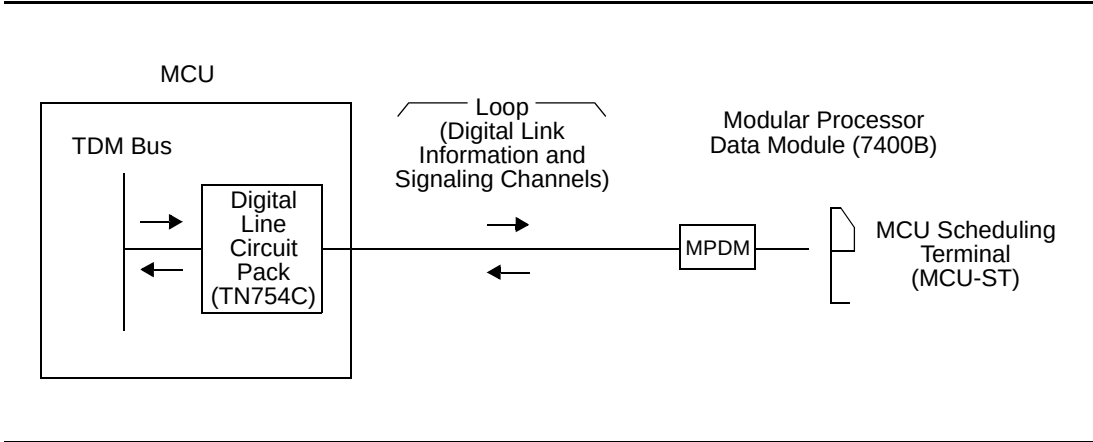


Figure 8-50. Typical Data Module Application

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 disconnected 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 8-193. PDMODULE Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 8-193. PDMODULE Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
1	1 to 20	None	Warning	Off		This <i>Error Type</i> and <i>Aux Data</i> 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.

Table 8-193. PDMODULE Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 8-193. PDMODULE Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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	

Table 8-193. PDMODULE Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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	

Craft-Demanded Tests

Investigate the tests in the following table in the order presented.

Table 8-194. 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 8-195. 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.
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.

Table 8-195. NPE Crosstalk Test #9 — Continued

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. 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.
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.

Table 8-195. NPE Crosstalk Test #9 — Continued

Error Code	Test Result	Description	Recommendation
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.
	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 8-196. 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.
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.

Table 8-196. Information and Control Channel Local Loop Test #13 — Continued

Error Code	Test Result	Description	Recommendation
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.
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.

Table 8-196. Information and Control Channel Local Loop Test #13 — Continued

Error Code	Test Result	Description	Recommendation
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 8-197. 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 8-197. Data Module Audits Test #17 — Continued

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.

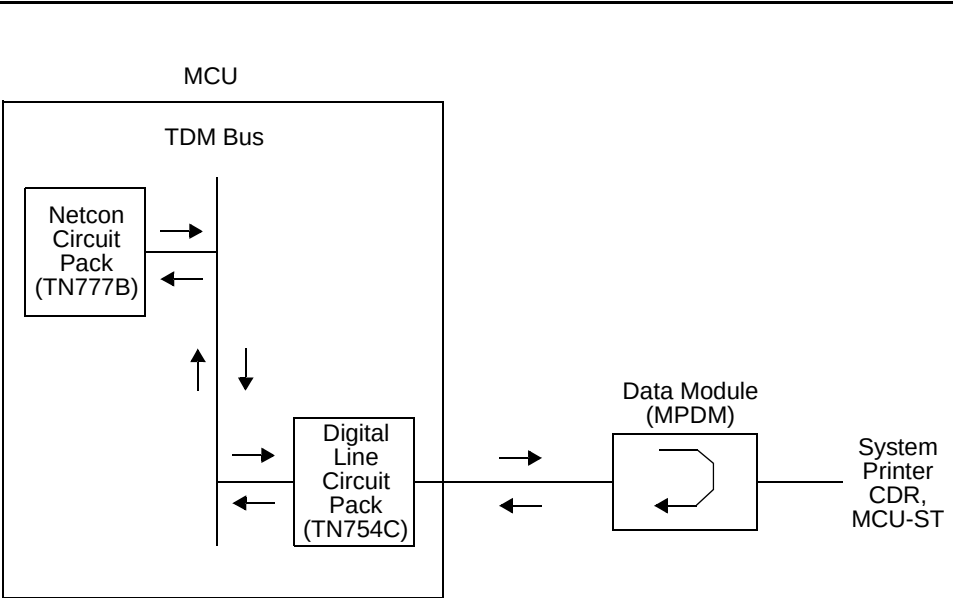


Figure 8-51. Internal Loop-Around Test

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 Network Control circuit pack (NETCON), 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 Network Control 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 network control channel from the Network Control circuit pack (up to four channels are administered as NETCON-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 8-198. 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 Network Control (NETCON) circuit pack using test data-module . 3. If the administration data is correct, escalate the problem.

Table 8-198. Data Module Internal Loop-Around Test #175 — Continued

Error Code	Test Result	Description	Recommendation
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.
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 Network Control 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 Network Control 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.

Table 8-198. Data Module Internal Loop-Around Test #175 — Continued

Error Code	Test Result	Description	Recommendation
1072	FAIL	Poor response from auxiliary channel.	1. Test the Network Control (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.
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 Network Control 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.
	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.

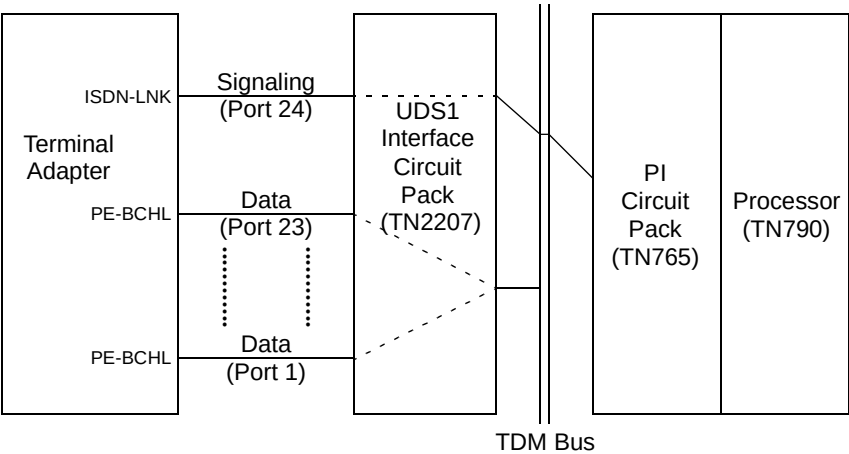


Figure 8-52. PRI Endpoint Port Interactions [INTEL]

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 I** or a **test pri-endpoint <extension> I** 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.

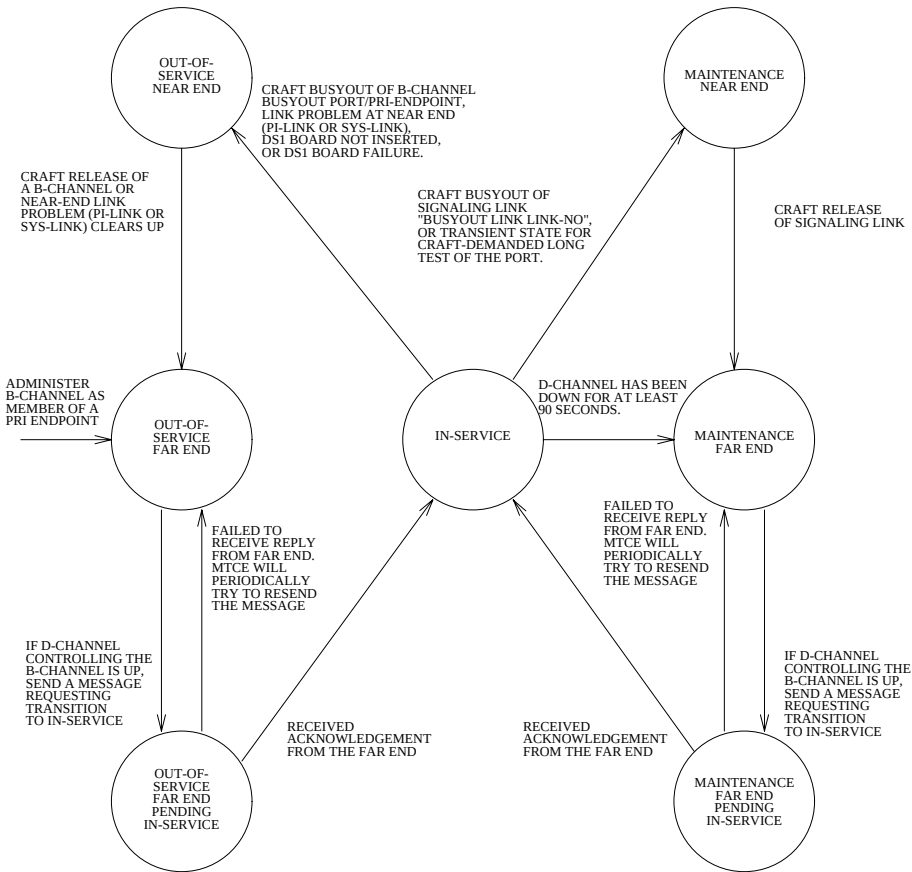


Figure 8-53. Common Progressions in Service States

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 8-199. PRI Endpoint Port Service States

Possible Problem Source	O/S-NE	O/S-FE	O/S- FE Pending	maint-NE	maint- FE	maint-FE Pending	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.
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.

Table 8-199. PRI Endpoint Port Service States — Continued

Possible Problem Source	O/S-NE	O/S-FE	O/S- FE Pending	maint-NE	maint- FE	maint-FE Pending	INS	Possible Recovery Route
Processor Interface Link busied out by system technician? Check link status. [MIPS only].				X				Release link by the release link lnk-no.
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 8-200. PRI Endpoint Port 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 PCSSpp sh r 1
1 (a)	Any	None			test port PCSSpp sh r 1
15 (b)	Any	Audit and Update Test (#36)			
18 (c)	0	busyout pri-endpoint <extension> busyout port <PCSSpp>	WARNING	OFF	release pri-endpoint <extension> release port <PCSSpp>
129 (d)		None	WARNING	OFF	test port PCSSpp sh r 1
130 (e)		None	WARNING	ON	test port PCSSpp sh
257 (f)	Any	None			test port PCSSpp sh r 1
513 (g)	Any	None	WARNING	OFF	test port PCSSpp sh r 1
76 9 (f)	Any	None			test port PCSSpp sh r 1
1281 (h)	Any	Conference Circuit Test (#7)	MINOR	ON	test port PCSSpp l r 4
1537 (i)	Any	NPE Crosstalk Test (#6)	MINOR	ON	test port PCSSpp l r 3
1793 (j)	Any	None			test port PCSSpp sh r 1
3073 (k)	Any	Service State Audit (#256)			test port PCSSpp sh r 2
3585 (l)	Any	None			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 recommended procedures.

Notes:

- a. 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).

- b. 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).
- c. 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).
- d. 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.
- e. 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.
- f. 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).

- g. 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.
- h. The Conference Circuit Test (#7) failed on this port. See Test #7 for the repair procedures.
- i. The NPE Crosstalk Test (#6) failed on this port. See Test #6 for the repair procedures.
- j. 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.
- k. 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).

- I. 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 8-201. System Technician-Demanded Tests: PE-BCHL

Order of Investigation	Short Test Sequence	Long Test Sequence	D/ND*
NPE Crosstalk Test (#6)		X	ND
Conference Circuit Test (#7)		X	ND
Audit and Update Test (#36)	X	X	ND
Signaling Link State Check Test (#255)	X	X	ND
Service State Audit Test (#256)	X	X	ND
Call State Audit Test (#257)	X	X	ND

* D = Destructive, ND = Non-destructive

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 8-202. 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 8-202. NPE Crosstalk Test #6 — Continued

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.

Continued on next page

Table 8-202. NPE Crosstalk Test #6 — Continued

Error Code	Test Result	Description/Recommendation
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 8-203. 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.

Table 8-203. Conference Circuit Test #7 — Continued

Error Code	Test Result	Description/Recommendation
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 8-204. 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.

Table 8-204. Audit and Update Test #36 — Continued

Error Code	Test Result	Description/Recommendation
	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 8-205. Signaling Link State Check Test #255

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 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."

Continued on next page

Table 8-205. Signaling Link State Check Test #255 — *Continued*

Error Code	Test Result	Description/Recommendation
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).
	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 8-206. Service State Audit Test #256

Error Code	Test Result	Description/Recommendation
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.
	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 8-207. 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 8-207. Call State Audit Test #257 — Continued

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.

PI-BD (Processor Interface Circuit Pack)

The TN765 Processor Interface (PI) circuit pack provides a front-end processor to the TN786B Processor circuit pack. The PI circuit pack implements the link layer of the ISDN-PRI protocol (ISDN links). The TN765 is a downloadable circuit pack; at reboot, system power up, or via a craft command, the processor interface firmware is downloaded to the circuit pack.

Alarm Level	Initial Craft Command to Run
Minor	test interface PCS sh
Warning	test interface PCS sh

For other restarts, a checksum test is performed on the firmware. If the checksum test fails, then the firmware is downloaded again. The firmware can be automatically downloaded at any time via the **reset interface PCS** craft command.

If System Communication Interface (PI-SCI) finds an error or alarm condition that can be associated with an on-board problem with PI circuit pack, then it alarms both the System Communication Interface and the PI circuit pack. PI circuit pack maintenance is also used to test the common circuit pack functions on the circuit pack. If these tests fail, a circuit pack level alarm is raised on the PI-BD. Port level alarms are raised against PI-PT. See Processor Interface Port (PI-PT) for details.

The PI circuit pack is tested in the PI-SCI (System Communication Interface). The test command is **test interface PCS** where **PCS** is the port network number, carrier, and slot of the PI circuit pack. There are no enabled PI links on the Communication-Interface Links form, only the XXX-BD (Common Port Circuit Pack) tests execute.

Hardware Error Log Entries

The following indicates entries that may be found in the error log for PI circuit packs. Since the PI-BD has Common Port Circuit Pack functionality, see also XXX-BD (Common Port Circuit Pack). Test #423 is the only test that is described in this section; the others are described under XXX-BD.

Table 8-208. PI-BD Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
0	0	Any	Any	Any	test interface PCS 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	#53	Minor	On		This error indicates the circuit pack totally stopped functioning or it was physically removed from the system. NOTE: The alarm is logged about 11 minutes after the circuit pack has been removed and/or SAKI 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 replace the circuit pack. See CAUTION. CAUTION: Reseating the circuit pack may cause a system restart.

Table 8-208. PI-BD Error Log Entries — *Continued*

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
23	0		Warning	Off		The circuit pack has been logically administered but not physically installed. If this alarm remains active for more than 30 minutes, follow the normal escalation procedures. The alarm is cleared when the circuit pack is installed and initialization maintenance runs on it.
54	0		Major	On	test interface PCS I	PI-SCI detected an error while trying to reset the TN765 PI circuit pack. This error indicates a loss of communication with the circuit pack. If this error continues, then replace the TN765 circuit pack. See PI-SCI for details.
124	Any		Major	On	test interface PCS I	PI-SCI logged errors that resulted in an error being logged and an alarm being raised against PI-BD. Refer to PI-SCI and resolve all alarms against PI-SCI.
125			Minor	On		A wrong circuit pack is inserted in the slot where this circuit pack is logically administered. To resolve this problem, either remove the wrong circuit pack and insert the logically administered circuit pack or use change circuit-pack to readminister this slot to match the circuit pack inserted.
257	65535	#52	Minor	On	test interface PCS	

Table 8-208. PI-BD Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
257	Other					This error indicates transient communication problems with this circuit pack. This error is not service-affecting and no action is required.
513	Any					This error, when reported with <i>Aux Data</i> in the range of 4352 to 4358, indicates the circuit pack has reported a hardware failure on the circuit pack. The circuit pack should be replaced.
769	4358					This error can be ignored, but look for other errors on this circuit pack.
1025	4363	#50			test interface PCS sh	This error is not service-affecting and no action is required.
1538	Any		Minor	On		The hyperactive circuit pack is out of service and may exhibit one or more of the following symptoms: -The common circuit pack level tests such as test #51 and/or #220 are aborting with error code 2000. -The tests run on the ports of this circuit pack are returning with a NO-BOARD. -A list configuration command shows that the circuit pack and ports are properly installed. The MCU tries to restore the circuit pack within 15 minutes. If the error recurs after 15 minutes, replace the circuit pack.

Table 8-208. PI-BD Error Log Entries — *Continued*

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
3585	Any	#423	Major	On	reset interface PCS I	PI-SCI logged errors that resulted in an alarm against PI-BD. Refer to the PI-SCI instructions to resolve all alarms against PI-SCI.
3840	4097 to 4100					This error is not service-affecting and no action is required.
3999	Any	None				See a.

Notes:

- a. 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

The following tests must be performed in the order provided.

Table 8-209. System Technician-Demanded Tests: PI-BD

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Control Channel Loop Test #52	Short	Long	No
NPE Audit Test #50	Short	Long	No

Control Channel Loop-Around Test #52

Refer to XXX-BD (Common Port Circuit Pack) for details on this test.

NPE Audit Test #50

Refer to XXX-BD (Common Port Circuit Pack) for details on this test.

PI-LINK (Processor Interface Link)

The Processor Interface (PI) Communication Link is the physical link connecting the MCU to ISDN-PRI. The system supports up to four of these links per TN765 PI circuit pack. PI-LINK maintenance actually monitors PI ports and DS1 facilities. In much of the following link documentation, the repair procedures mention various hardware configurations, choose the appropriate one for your configuration.

Alarm Level	Initial Craft Command to Run
Major	test link lnk-no l
Minor	test link lnk-no l
Warning	test link lnk-no l

 **NOTE:**
Use **display communication-interface links** to obtain the *lnk-no*.

The processor interface link can be in three different states. These states can be seen via **status link lnk-no**. If the link is in a maintenance busy state, then craft

had instructed the PI to be in that state with **busyout link lnk-no** or the PI link is not established and maintenance is trying to bring it up. This probably means an error condition is occurring somewhere on the link that keeps the link from being logically connected and carrying data.

If the link is busied out, then it can be put back into service with **release link lnk-no**. This restarts the link. The link may be in a disconnected state if the link cannot be started up. In this case, maintenance tries to establish the link periodically. If the link is up and data is being sent successfully, then the link is in the in-service state.

 **NOTE:**
When an ISDN-PRI link is busied out by craft, the associated B-channels (ISDN-TRK) are moved to the maintenance and/or far-end state. As a result, stable calls are *not* dropped, but the trunks are removed from the trunk hunt group to prevent them from being selected for outgoing calls. See the ISDN-TRK MO.

If an error or alarm is detected by PI-LINK that can be associated with a physical port on the PI circuit pack, then the PI port MO is alarmed, which indicates a defective port on the circuit pack. Refer to PI-PT for details.

Use **status processor-channel channel-no** when troubleshooting the PI-LINK. A processor channel corresponds to a processor application (also called a session). The relevant field of the status screen is the *channel status*, which can be in one to seven different states (see the following table). State 10 is a normal state for ISDN links; states 9 and 10 are applicable only to ISDN links.

Table 8-210. Channel Status States

States	Description
1	Incorrect translations or channel not assigned.
3	Attempting to reset the channel but no response from the other end. Getting stuck in this state may be caused by hardware or a DS1 synchronization problem or a DCE/DTE conflict in the Communications-Interface Link form (one end of the link must be DCE and the other DTE).
4	The other end acknowledges the channel reset (the two ends are physically connected), but a processor channel connection has not occurred yet. Getting stuck in this state may indicate translations are incorrect, such as remote processor channel mismatch. To recover from this situation, execute busyout link lnk-no and release link lnk-no . If this is unsuccessful, then use reset interface (this is a destructive command that tears down four links). This problem may also be caused by a noisy link or DS1 synchronization problems.
6	This is a normal state of a non-ISDN-PRI channel. The link is in the data transfer state which means the application is able to send data over the link.
7	One or more unexpected messages have arrived; software is attempting to resynchronize the two ends. Usually it takes up to five minutes for the software to recover once it is in this state.
9	ISDN-PRI link is currently down. It is periodically restarted or can be forced to restart with busyout link lnk-no followed with release link lnk-no .
10	ISDN-PRI link is up. This is the normal state of the channel. The link is in data transfer state, which means the ISDN data can be sent over the link.

The following figure shows the Processor Interface Communications Link (PI-LINK) interactions.

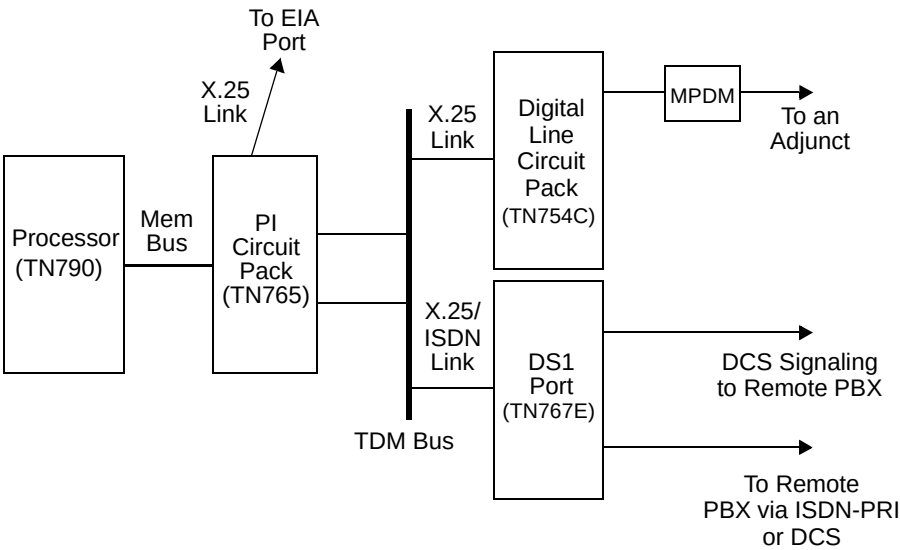


Figure 8-54. Processor Interface Link Communications Interactions

Hardware Error Log Entries

The following are the error log entries and related information, including the test to clear value.

Table 8-211. Processor Interface Link Communications Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
0	0	Any	Any	Any	test link lnk-no 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.
1	Any		Major/Warning	Off	busyout/release link lnk-no	A permanent switched call was dropped. Major alarms may be downgraded to warning alarms based on the value used in set options .
18	0		Warning	Off	release link lnk-no	The link was busied out by craft.
257	Any		Minor/Warning	Off	busyout/release link lnk-no	The TN765 Processor Interface circuit pack detected an error on a specific link via background maintenance. If the link is down, busy out then release the link. If this fails, check all connections. Major alarms may be downgraded to warning alarms based on the value set with set options.

Table 8-211. Processor Interface Link Communications Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
263	Any		Major/Warning	Off	busyout/release link lnk-no	The processor interface software or firmware detected an error condition on this link. Internal software should initiate the recovery for the link. If the link is still down, see “Link Recovery” following this table. The following <i>Aux Data</i> values are of concern; others can be ignored: 0 = the ISDN-PRI link is down. 1 = an internal software audit shows this link has been in overload for at least 20 seconds and is hung. 2 = no internal software buffers are available to process a link transition (that is, down to up or vice versa). The transition is lost. 17 = the allocation of a new software write buffer to the Processor Interface circuit pack failed. A major alarm can be reduced to warning depending on the value selected by set options.

Table 8-211. Processor Interface Link Communications Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
513	Any		Major/Warning	Off	busyout/release link lnk-no	Translation error, check all administration for the link. Possibly the destination DS1-BD is not inserted. Busy out then release the link to restart it. This is not a PI hardware problem. If the problem persists, follow normal escalation procedures. The following <i>Aux Data</i> values are of concern, ignore the others: 2 = link translations are incorrect. 8 = port not administered in software. Major alarms may be downgraded to warning alarms depending on the setting made with set options.
769	Any	#182	Warning	On	test link lnk-no l r 2	
1025	Any	#183	Warning	Off	test link lnk-no l r 2	

Table 8-211. Processor Interface Link Communications Error Log Entries — *Continued*

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
1537	Any		Warning/ Major	Off	busyout/ release link lnk-no	This error occurs when the PI link fails to be established. Check all connections and administration. This may occur as a result of another error, such as the failure of test #182. If the other error on the link is cleared, then this error may also clear. See “Link Recovery” at the end of this table. The following are <i>Aux Data</i> values of concern; ignore the others: 1,2 = system error. If the error continues to appear, escalate the problem. 7 = system error. If this error is occurring on all administered links with the same value and all links are alarmed, then execute reset interface to restore all the links. If the error continues or is not on all links, escalate the problem. 12 = one of the two loop-around tests failed. See “Link Recovery.” 13 = hardware problems with DS1 facility is affecting ISDN links. See DS1-BD. 19 = A transient state associated with the D-channel backup protocol. The link is being held in the busy state until call control is moved to the new active link. No action is needed.

Table 8-211. Processor Interface Link Communications Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
						This error type initially raises a warning alarm; if the error type persists, a major alarm is raised.
1793	Any		Warning	Off	busyout/ release link lnk-no	This error message indicates the TN765 PI circuit pack could not transmit the message the software sent to it. See “Link Recovery” at the end of this table if the error continues.
2049	Any		Warning	Off	test link lnk-no sh r 9	Excessive resets on the link. Usually indicates the remote end is down or the physical connection is broken. A warning alarm is raised initially, followed by a major alarm if the problem is not cleared. See “Link Recovery” after this table.
2305	Any		Warning	Off	test link lnk-no sh r 9	Excessive I-frame retransmission. Could indicate a noisy link. <i>Aux Data</i> values indicate the retransmission rate per minute.

Table 8-211. Processor Interface Link Communications Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
2561	Any		Warning	Off	busyout/ release link lnk-no	If the <i>Aux Data</i> value is 9, then the destination circuit pack is not inserted. Otherwise, DS1 maintenance detected a hardware failure. (DS1 cable disconnected, loss of signal, DS1-BD problems.) Not a PI link problem. Check DS1-BD. This is applicable only to ISDN links. <i>Aux Data</i> value is useless. Once the DS1 signal is restored, maintenance automatically restarts the PI link. Test the appropriate DS1 Interface circuit pack via test board PCS to shorten this process. When test #138 passes, the PI link recovers shortly.
2817	Any			Off	busyout/release link lnk-no	TN765 PI-BD determined the ISDN link went down. Check connectivity with the other end. Busy out then release the link to recover. Occurs if DS1 maintenance detected a problem or the remote end is busied out or is down. This also occurs if the ISDN link is unstable or there is excessive noise on the line.

Table 8-211. Processor Interface Link Communications Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
3073	Any		Warning	Off	test link lnk-no sh r 9	Excessive LAPD (link-access procedure on the D-channel) invalid frame errors. Could be a noisy line or problems with the TN765 PI circuit pack. Also check DS1-BD.
3585	Any		Major/Warning	Off	busyout/ release link lnk-no	Occurs 90 seconds after a 2817 error code if the link does not recover. At this time, all ISDN trunks associated with this link are put into a maintenance far-end state (see ISDN-TRK). Major alarms may be downgraded to warning alarms based on the value set under set options.

Table 8-211. Processor Interface Link Communications Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
3841	Any		Minor/Warning	Off	busyout/ release link lnk-no	The application level process associated with the link has failed to establish a data connection with the far-end. This problem prevents data from being processed. The condition may exist even if the link is in a data transfer state. Busy out then release the link to restart it. This is not a PI hardware problem. If it persists, follow normal escalation procedures. <i>Aux Data</i> value 435 means the application level process could not connect to session layer process. Other <i>Aux Data</i> values can be ignored. Minor alarms may be downgraded to warning alarms based on the setting under set options.

Link Recovery

This section describes the general procedure to recover from link errors and alarms.

1. Determine the link status using **status link** . If the link is in service, then it is operating correctly. If the link is *not* in service, go to Step 2.
2. Look for active PI-SCI alarms and follow the procedure to resolve those alarms if there are any. If there are none, go to Step 3.
3. If the link is still down, restart the link with **busyout link lnk-no** followed by **release link lnk-no**. This sequence tears down the call and then tries to bring it back up. If the link does not recover, go to Step 4.
4. Check the status of the remote endpoint. If the link is busied out, release it.
5. If the link was never brought up, use the following steps:
 - a. Enter **display ds1 PCSS** to check the compatibility of the DS1 parameters with the far-end and the CSU.
 - b. Enter **display communication-interface links**.
 - c. Enter **display communication-interface processor-channels**.
 - d. If hop channels are being used, enter **display communication-interface hop-channels**.
 - e. If DS1 is being used for DCS, enter **display trunk <group/member>**.
 - f. If DS1 is being used, enter **status sync** to make sure the primary synchronization is administered.
6. Try to isolate the problem in the link if the hardware is at fault. Use **test link lnk-no long**.
7. If test #182 fails three times, replace the TN765 PI circuit pack. If it fails when you test it again, escalate the problem.
8. If test #182 passes and test #183 fails, replace the TN767E DS1 Interface circuit pack. If test #183 fails after you retest it, escalate the problem.
9. If the preceding tests pass, check the physical transmission links as follows:
 - a. Are the circuit packs physically installed?
 - b. Are the cables still connected throughout?
 - c. Refer to DS1-BD to check for possible connectivity problems if DS1-BD is used in the link connection.
 - d. Check CSU options.

10. Restart the PI circuit pack using **reset interface PCS**. This resets the circuit pack and restarts *all* the links on it.
11. If the preceding procedure was followed and the links still do not recover, escalate the problem.

Craft-Demanded Tests

The following tests must be performed in the order presented.

Table 8-212. System Technician-Demanded Tests: PI-LINK

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
PI Loop-Around Test #182	Long		Yes
TDM Loop-Around Test #183	Long		Yes
ISDN Hardware Test #234	Long		No
Link Quality Test #233	Short	Long	No

PI Loop-Around Test #182

This test is destructive. The PI Loop-Around test is an on-board loop-around test. It requires that craft issue **busyout link lnk-no** before it is run. This means the ISDN link is torn down. It does not have access to the TDM Bus.

When the circuit pack is put into local loop-around mode, frames are looped internally on the circuit pack. If the test fails, the Pi circuit pack reports the failure. It is a good check of most of the working hardware on the PI circuit pack.

Table 8-213. Processor Interface Loop-Around Test #182

Error Code	Test Result	Description	Recommendation
1	ABORT	Link was not busied out by craft.	1. Use busyout link lnk-no to busy out the link. 2. Retry the test command. If it continues to abort, escalate the problem.
2, 4	ABORT		1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
9	ABORT		1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
13	ABORT	The TN765 circuit pack has not been reset yet or is currently being reset.	1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort with error code 13, check the status of the BX.25 and/or ISDN-PRI links on this TN765 via the status link lnk-no command. If all the links are not in service, reset the TN765 by using the test interface PCS long command. 3. If the TN765 fails to reset, refer to the PI-SCI section of this document. 4. Retry the test link lnk-no command. 5. If the test still aborts with error code 13 or from Step 2, and if some links are in service and an error code is still present, escalate the problem.
16	ABORT	Internal system error or possible TN765 PI-BD failure.	1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, reset the PI-BD with test interface PCS long . 3. If the problem persists, replace the TN765 PI-BD. 4. If the problem reappears, escalate the problem.

Table 8-213. Processor Interface Loop-Around Test #182 — Continued

Error Code	Test Result	Description	Recommendation
80	ABORT	Internal system error or possible TN765 PI-BD failure.	1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, reset the PI-BD with test interface PCS long. 3. If the problem persists, replace the TN765 PI-BD. 4. If the problem reappears, escalate the problem.
84, 85	ABORT	Internal system error or possible TN765 PI-BD failure.	1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, reset the PI-BD with test interface PCS long. 3. If the problem persists, replace the TN765 PI-BD. 4. If the problem reappears, escalate the problem.
93 to 94	ABORT	Internal system error or possible TN765 PI-BD failure.	1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, reset the PI-BD with test interface PCS long. 3. If the problem persists, replace the TN765 PI-BD. 4. If the problem reappears, escalate the problem.

Table 8-213. Processor Interface Loop-Around Test #182 — Continued

Error Code	Test Result	Description	Recommendation
102	ABORT	Internal system error or possible TN765 PI-BD failure.	1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, reset the PI-BD with test interface PCS long. 3. If the problem persists, replace the TN765 PI-BD. 4. If the problem reappears, escalate the problem.
12	FAIL	PI-BD reported that the Loop-Around Test failed.	1. Retry the test. 2. If it continues to fail, try resetting the circuit pack by test interface PCS long. This tears down <i>all</i> other links on the circuit pack. 3. If the problem persists, replace the TN765 PI-BD. 4. If the problem reappears, escalate the problem.
	PASS	The on-board loop-around test on the TN765 circuit pack passed. Most of the hardware on the circuit pack was tested except for the TDM Bus buffers.	If the problem is isolated to TN765 PI-BD and this test passes, replace it since TDM Bus buffers could be at fault.

TDM Loop-Around Test #183

This test is destructive. You must enter **busyout link lnk-no** before running it. This means the ISDN link is torn down. This test checks the health of the TN767E DS1 Interface circuit pack. The DS1 Interface circuit pack is put into loop-around mode while the PI-BD is instructed to go into remote loop-around. If this test fails, and test #182 passes, replace the DS1 Interface circuit pack.

Table 8-214. TDM Loop-Around Test #183

Error Code	Test Result	Description	Recommendation
1	ABORT	Link was not busied out by craft.	1. Enter busyout link lnk-no to busy out the link. 2. Retry the test command. If it continues to abort, escalate the problem.
2	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.
6	ABORT	The MCU 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.
8	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.
9	ABORT	The TN767E DS1 Interface circuit pack is not installed.	1. Install the circuit pack and retry the test. 2. If the test continues to abort with error code 9, escalate the problem.

Table 8-214. TDM Loop-Around Test #183 — Continued

Error Code	Test Result	Description	Recommendation
13	ABORT	The TN765 circuit pack has not been reset yet or is currently being reset.	1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort with error code 13, check the status of the BX.25 and/or ISDN-PRI links on this TN765 via the status link lnk-no command. If all the links are not in service, reset the TN765 by using the test interface PCS long command. 3. If the TN765 fails to reset, refer to the PI-SCI section of this document. 4. Retry the test link lnk-no command. 5. If the test still aborts with error code 13 or from Step 2, and if some links are in service and an error code is still present, escalate the problem.
16	ABORT	Internal system error.	1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, reset the PI-BD via test interface PCS long. 3. If the problem persists, replace the TN765 circuit pack. 4. If the problem reappears, follow normal escalation procedures.
80	ABORT	Internal system error.	1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, reset the PI-BD via test interface PCS long. 3. If the problem persists, replace the TN765 PI-BD circuit pack. 4. If the problem reappears, follow normal escalation procedures.
84 to 85	ABORT	Internal system error.	1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, reset the PI-BD via test interface PCS long. 3. If the problem persists, replace the TN765 circuit pack. 4. If the problem reappears, follow normal escalation procedures.

Table 8-214. TDM Loop-Around Test #183 — Continued

Error Code	Test Result	Description	Recommendation
93 to 94	ABORT	Internal system error.	1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, reset the PI-BD via test interface PCS long . 3. If the problem persists, replace the TN765 PI-BD circuit pack. 4. If the problem reappears, follow normal escalation procedures.
102	ABORT	Internal system error.	1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, reset the PI-BD via the test interface PCS long command. 3. If the problem persists, replace the TN765 PI-BD circuit pack. 4. If the problem reappears, follow normal escalation procedures.
12	FAIL	PI-BD reported that the loop-around test failed.	1. Retry the test. 2. If test #182 fails, see Test #182 first. 3. If test #182 passes, and Test #183 fails, replace the TN767E DS1 Interface circuit pack. 4. If test #183 still fails, replace the TN765 PI-BD circuit pack. 5. Escalate if there are further failures.
	PASS	The loop-around from the TN765 PI-BD to the DS1 Interface circuit pack back to the PI-BD passed.	

Link Quality Test #233

This test queries the TN765 Processor circuit pack for the latest error rates (number/minute) for certain counters that are kept by the TN765. The test passes if all the error rates are below a certain threshold. The counters that query are the Level 2 Reset Set Asynchronous Balanced Mode Extended [SABM(E)] counter, the Level 2 I-frame Retransmission counter, and the invalid LAPD frame counter.

Table 8-215. Link Quality Test #233

Error Code	Test Result	Description	Recommendation
3	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.
4	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.
11	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.
13	ABORT	The TN765 circuit pack has not been reset yet or is currently being reset.	1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort with error code 13, check the status of the BX.25 and/or ISDN-PRI links on this TN765 via the status link lnk-no command. If all the links are not in service, reset the TN765 by using the test interface PCS long command. 3. If the TN765 fails to reset, refer to the PI-SCI section of this document. 4. Retry the test link lnk-no command. 5. If the test still aborts with error code 13 or from Step 2, and if some links are in service and an error code is still present, escalate the problem.
24	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.
16385	FAIL	Excessive Level 2 resets (SABM) on link.	See PI-LINK.
16386	FAIL	Excessive Level 2 I-frame retransmission. Possible noisy link.	See PI-LINK.
16388	FAIL	Excessive LAPD invalid frame errors. Could be a noisy link or problems with the near-end PI circuit pack or with the far-end.	1. For DS1 Interface circuit pack problems, see DS1-BD. 2. For PI link problems, see PI-LINK.
16387	FAIL	Excessive Level 2 resets and excessive Level 2 I-frame retransmission.	See PI-LINK.

Table 8-215. Link Quality Test #233 — Continued

Error Code	Test Result	Description	Recommendation
16389	FAIL	Excessive Level 2 resets and excessive LAPD invalid frame errors.	See PI-LINK.
16390	FAIL	Excessive Level 2 I-frame retransmissions and excessive LAPD invalid frame errors.	See PI-LINK.
16391	FAIL	Excessive Level 2 I-frame retransmissions, excessive LAPD invalid frame errors, and excessive Level 2 resets.	See PI-LINK.
16392	FAIL		
	PASS	PI-LINK currently does not have any of the above errors.	

ISDN Hardware Check Test #234

This test checks the status of the ISDN hardware, which is the DS1 Interface circuit pack and cabling. Status of the DS1 port is kept by the MCU. The state of the port can be in service or out of service. This state is updated by DS1 Interface circuit pack maintenance.

If DS1 maintenance detects a problem with the physical medium near-end or far-end, PI-LINK maintenance is instructed to restart the link. Therefore, if this test fails, the port is considered out of service and the link cannot be brought up until DS1 maintenance changes the state to in-service.

This is more of a status inquiry than a test. Thus, the only recovery procedure is to refer to DS1-BD (DS1 Trunk Circuit Pack).

Table 8-216. ISDN Hardware Check Test #234

Error Code	Test Result	Description	Recommendation
	ABORT	Internal system error.	1. Retry the test at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
Any	FAIL	Indicates there is a physical problem with the DS1 facility link.	1. Cross-reference DS1 Interface circuit pack errors for possible reason. See DS1-BD. 2. Retry the test.
	PASS	DS1 facility is functioning correctly.	

PI-PT (Processor Interface Port)

PI-PT is the physical port on the TN765 PI circuit pack. If the PI Link (PI-LINK) MO raises an alarm that can be correlated to an on-board port problem, then PI-PT is alarmed. No tests run directly on the PI-PT.

The PI-LINK MO is responsible for the testing of the TN765 Processor circuit pack ports along with ISDN links. Refer to PI-LINK for details.

Alarm Level	Initial Craft Command to Run
Major	test interface PCS sh
Warning	release data-module <ext>

Hardware Error Log Entries

The following table shows the error log entries and related information.

Table 8-217. Processor Interface Port Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
0	0	Any	Any	Any	test interface PCS 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 data-module <ext>	The port has been busied out by craft.
123	Any	None	Major	On	test link lnk-no	PI-LINK raised this alarm against PI-PT. The PI Loop-Around test failed on one of the ports. Refer to PI-LINK.
130		None				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	Major	On	test link lnk-no l	PI-LINK raised this alarm against PI-PT. The PI Loop-Around test failed on one of the ports. Refer to PI-LINK.

Craft-Demanded Tests

PI-PT can be tested using **test interface PCS** on the PI circuit pack. Refer to PI-SCI (System Communication Interface) for details.

Always investigate tests in the order presented in the table below. By clearing error codes associated with the SCI Start test, for example, you may also clear errors generated from other tests in the sequence.

Table 8-218. System Technician-Demanded Tests: PI-PT

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
SCI Start #176*	Long		Yes
SCI Self Test #231*	Short	Long	No
NPE Audit Test #50†	Long		No
Control Channel Loop-Around Test #52†	Short	Long	No

* See XXX-BD (Common Port Circuit Pack) for details about this test.

† See PI-SCI (System Communication Interface) for details about this test.

PI-SCI (System Communication Interface)

The PI-SCI MO is used to put the TN765 PI circuit pack into a state such that ISDN links can be established. The TN765 PI circuit pack has downloadable firmware. It is the responsibility of PI-SCI to download the firmware to the TN765 circuit pack during initialization. Failures while communicating with the TN765 circuit pack are logged against the PI-SCI MO.

There is a one-to-one correlation of PI-SCI to the PI circuit pack. If errors against the SCI can be related to the PI circuit pack, the circuit pack MO is alarmed (PI-BD). See also PI-LINK and PI-BD.

When investigating ISDN link problems, resolve PI-SCI errors initially, since they may clear up the PI link problems.

Alarm Level	Initial Craft Command to Run
Major	test interface PCS I (See WARNING)

 **WARNING:**
The **test interface long** command resets the PI-BD and causes all ISDN-PRI links to come down.

Hardware Error Log Entries

The following table shows the error log entries and related information.

Table 8-219. PI-SCI System Communication Interface Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
0	0	Any	Any	Any	test interface PCS 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.
257	Any	None	Major	On	test interface PCS I	There is a possible hardware failure on the TN765 PI circuit pack. 1. If the error persists, and the SCI is unstable (resets often), enter test interface PCS long. The PI firmware is downloaded again if the checksum fails. 2. If the problem still exists, enter reset interface PCS 3. If Step 2 does not work, replace the TN765 PI-BD circuit pack. 4. Escalate further problems. See also PI-BD.
769	Any	None	Major/Warning	On	test interface PCS I	Error while communicating with TN765 circuit pack. The software lost handshake with the PI circuit pack. See error 257 for recovery. Major alarms may be downgraded to warning based on the value set with set options.

Table 8-219. PI-SCI System Communication Interface Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
1025	Any	None	Major/Warning	Off	test interface PCS I	Error while communicating with TN765 circuit pack. See error type 257 for recovery. Major alarms may be downgraded to warning based on the value set by set options .
1281	Any	#176	Major/Warning	Off	test interface PCS I	1. Retry test interface PCS long . 2. If the test fails again, use test #176 to recover. Major alarms may be downgraded to warning based on the value set by set options .
1793	Any	None	Major	On	test interface PCS I	Error while communicating with TN765 PI-BD circuit pack. See error type 257 for recovery. This error also raises alarms against PI-BD.
2049	90xx	#176	Major	On	test interface PCS I	Download of the PI firmware failed. If this error persists, replace the TN765 PI circuit pack. This error also raises an alarm against PI-BD if the threshold is reached.
2305	Any	#231	Major	On	test interface PCS sh r 2	Error received while communicating with TN765 circuit pack. See error type 257 for recovery.
2561	Any	None	Major/Warning	Off	test interface PCS I	An audit of the firmware failed. If ISDN links are still up, no action is needed. If the PI circuit pack is reset continuously, see error type 257 to recover.

Table 8-219. PI-SCI System Communication Interface Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
2817	Any	None	Major/Warning	Off	test interface PCS I	Error occurred communicating with TN765 PI circuit pack. System software problem internal to the process that monitors PI link activity. 1. See error type 257 for recovery. 2. Escalate the problem if the error causes the PI-BD to be reset (loss of service is noticed). Major alarms may be downgraded to warning based on the value used in set options .
2818	Any	None	Major/Warning	Off	test interface PCS I	This indicates the TN765 PI circuit pack did not clear up the overload condition within one minute of logging the initial 2817 error (overload detected). The circuit pack was reset and all PI links on that circuit pack were also reset. If this error continues to occur, escalate the problem. Major alarms may be downgraded to warning based on the value set with set options .
3073	Any	None	Major/Warning	Off	test interface PCS I	Error occurred while communicating with TN765 PI-BD circuit pack. See error type 257 for recovery. Major alarms may be downgraded to warning based on the value set in set options .

Short and Long Test Sequences

The SCI and PI circuit pack are both tested via the same craft command. The command is **test interface PCS I** or **sh** where **PCS** is an active PI circuit pack.

**WARNING:**
*The **test interface long** command resets the PI-BD and causes all ISDN-PRI links to come down.*

If the PI circuit pack has no enabled links, only XXX-BD (Common Port Circuit Pack) tests execute.

Craft-Demanded Tests

Always investigate tests in the order presented in the table below when inspecting errors. By clearing error codes associated with the SCI Start test, for example, you may also clear errors generated from other tests in the testing sequence.

Table 8-220. System Technician-Demanded Tests: PI-SCI

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
SCI Start Test #176	Long		Yes
SCI Self Test #231	Short	Long	No
Control Channel Loop Test #52*	Short	Long	No
NPE Audit Test #50*	Long		No

* Refer to XXX-BD (Common Port Circuit Pack) for information about these tests. These tests are run on the PI-BD.

SCI Start Test #176

This test is destructive. This test restarts the system communication interface. This implies all ISDN links are restarted. The checksum of the downloadable firmware is tested. If the checksum fails, the firmware is downloaded again. If it passes, SCI Start test completes and the associated ISDN links are started up.

Table 8-221. SCI Start Test #176

Error Code	Test Result	Description	Recommendation
9	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.
10	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	Could not reset the PI circuit pack.	1. Wait one minute then retry the command. 2. If the test continues to fail, replace TN765 PI circuit pack. 3. If the problem persists, escalate it.
16	FAIL	Internal system error.	1. Retry the command at one-minute intervals up to five times. 2. If the problem still exists, download firmware via reset interface . 3. If the test continues to fail, escalate the problem
23	FAIL	PI download failed.	1. Wait one minute and retry. Could be MEM-CARD problem. 2. Check to see if a memory card is inserted which contains the PI firmware. 3. If the problem persists, the cause may be either the memory card or the PI circuit pack. 4. Replace the memory card with a new one that contains the PI firmware. 5. Retry the command. 6. If it still fails, replace TN765 PI circuit pack. 7. If the problem persists, escalate it.
80	FAIL	Internal system error.	1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, download the firmware via reset interface .

Table 8-221. SCI Start Test #176 — Continued

Error Code	Test Result	Description	Recommendation
94	FAIL	Internal system error.	1. Retry the command at one-minute intervals up to five times. 2. If the problem continues, download the firmware via reset interface . 3. If the test continues to fail, escalate the problem.
102	FAIL	Internal system error.	1. Retry the command at one-minute intervals up to five times. 2. If the problem persists, download the firmware via reset interface . 3. If the test continues to fail, escalate it.
199	FAIL	PI download failed.	1. Wait one minute and retry. Could be MEM-CARD problem. 2. Check to see if a memory card is inserted which contains the PI firmware. 3. If the problem persists, the cause may be either the memory card or the PI circuit pack. 4. Replace the memory card with a new one that contains the PI firmware. 5. Retry the command. 6. If it still fails, replace TN765 PI circuit pack. 7. If the problem persists, escalate it.

Table 8-221. SCI Start Test #176 — Continued

Error Code	Test Result	Description	Recommendation
200	FAIL	Checksum of PI failed.	1. Wait one minute and retry. 2. If the test continues to fail with a checksum failure, there could be corruption on the memory card. Replace the memory card with a new memory card that contains PI firmware. 3. Retry the command. 4. If the problem continues after replacing the memory card, then replace the TN765 PI circuit pack. 5. Retry the command. 6. If the problem persists, escalate it.
9000 to 9999	FAIL	PI download failed.	1. Wait one minute and retry. Could be MEM-CARD problem. 2. Check to see if a memory card is inserted which contains the PI firmware. 3. If the problem persists, the cause may be either the memory card or the PI circuit pack. 4. Replace the memory card with a new one that contains the PI firmware. 5. Retry the command. 6. If it still fails, replace TN765 PI circuit pack. 7. If the problem persists, escalate it.
	PASS	The TN765 PI circuit pack initialized correctly. PI links (ISDN) should recover now.	See PI-LINK if links do not recover.

SCI Self-Test #231

This is an on-board test that checks the basic functionality of the TN765 PI circuit pack. This test runs in the background periodically, or it can be invoked via **test interface PCS**. If this test continuously fails, replace the TN765 PI circuit pack.

Table 8-222. SCI Self-Test #231

Error Code	Test Result	Description	Recommendation
11	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.
13	ABORT	The TN765 circuit pack has not been reset yet or is currently being reset.	1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort with error code 13, reset the TN765 by using the test interface PCS long command. CAUTION: Resetting the TN765 causes all BX.25 and ISDN links to be briefly torn down. 3. If the TN765 fails to reset, refer to the Test #176 section description.
4000	FAIL	Assigned data link hardware failure on the TN765 PI circuit pack.	1. Retry the test. 2. If it fails again, restart the Communication Interface with reset interface. 3. If the reset is successful, retry test interface. 4. If test #231 fails with an error code other than 4001, replace the TN765 PI circuit pack. 5. If test #231 fails with error code 4001, an on-board failure is associated with a non-used port on the PI circuit pack; replace the TN765 PI circuit pack if this port will be used in the future.
4001	FAIL	Unassigned data link hardware failure on the TN765 PI circuit pack.	1. Retry the test. 2. If it fails again, restart the Communication Interface with reset interface. 3. If the reset is successful, retry test interface. 4. If test #231 fails with an error code other than 4001, replace the TN765 PI circuit pack. 5. If test #231 fails with error code 4001, an on-board failure is associated with a non-used port on the PI circuit pack; replace the TN765 PI circuit pack if this port will be used in the future.

Table 8-222. SCI Self-Test #231 — Continued

Error Code	Test Result	Description	Recommendation
4002	FAIL	CPU function test failed; hardware failure.	1. Retry the test. 2. If it fails again, restart the Communication Interface with reset interface. 3. If the reset is successful, retry test interface. 4. If test #231 fails with an error code other than 4001, replace the TN765 PI circuit pack. 5. If test #231 fails with error code 4001, an on-board failure is associated with a non-used port on the PI circuit pack; replace the TN765 PI circuit pack if this port will be used in the future.
4003	FAIL	Local PI RAM memory test failed; hardware failure.	1. Retry the test. 2. If it fails again, restart the Communication Interface with reset interface. 3. If the reset is successful, retry test interface. 4. If test #231 fails with an error code other than 4001, replace the TN765 PI circuit pack. 5. If test #231 fails with error code 4001, an on-board failure is associated with a non-used port on the PI circuit pack; replace the TN765 PI circuit pack if this port will be used in the future.
4004	FAIL	Local EPROM memory test failed; hardware failure.	1. Retry the test. 2. If it fails again, restart the communication interface with reset interface. 3. If the reset is successful, retry test interface. 4. If test #231 fails with an error code other than 4001, replace the TN765 PI circuit pack. 5. If test #231 fails with error code 4001, an on-board failure is associated with a non-used port on the PI circuit pack; replace the TN765 PI circuit pack if this port will be used in the future.
	PASS	TN765 PI circuit pack passed the self-test. On-board hardware is functioning correctly.	

PKT-BUS (Packet Bus)

Table 8-223. 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 TN778 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 TN778 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 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 8-224. PKT-BUS Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
0*	0	Any	Any	Any	test pkt	
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 TN778 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.

Table 8-224. PKT-BUS Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
2305	1-24	#572			test pkt P I	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 or 1000-1007	None	Warning	On	test pkt P I	Note a.
3585	Any	Bibe	Minor	On	test pkt P I	Note b.

* 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.

 **NOTE:**
For PKT-BUS, an ON-BOARD alarm indicates a problem with the Packet Bus itself.

- Notes:**
- a. 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).

- b. 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 8-225. 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 (TN778) 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 8-226. 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.
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.

Table 8-226. Packet Control Bus Loop-Around Test #571 — Continued

Error Code	Test Result	Description	Recommendation
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 8-227. 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.

Table 8-227. Maintenance/Test Circuit Pack Query Test #572 — Continued

Error Code	Test Result	Description	Recommendation
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.
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.	

Table 8-227. Maintenance/Test Circuit Pack Query Test #572 — Continued

Error Code	Test Result	Description	Recommendation
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 8-228. 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.

Table 8-228. Packet Circuit Pack Audit Test #573 — Continued

Error Code	Test Result	Description	Recommendation
2 xxZZ	FAIL	More than one Packet circuit pack has reported Packet Bus-related in-line errors within that last minute. 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 I
Minor	test packet-control I
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 TN778 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
- TN778 Packet Control Circuit Pack

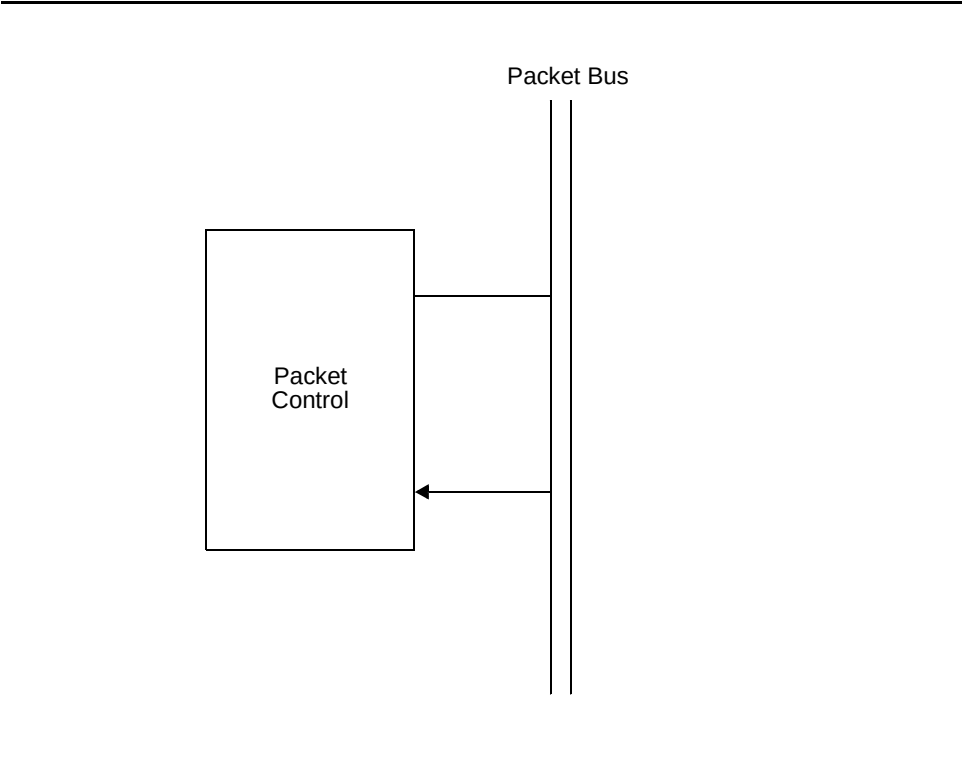


Figure 8-55. Packet Hardware Configuration

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 8-229. Packet Control Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 8-229. Packet Control Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 I	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.

Table 8-229. Packet Control Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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.

Table 8-229. Packet Control Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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.

Table 8-229. Packet Control Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 8-230. 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 8-231. 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.
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.	

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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 8-232. 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 8-232. Packet Control Parity Circuitry Test #584 — Continued

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.

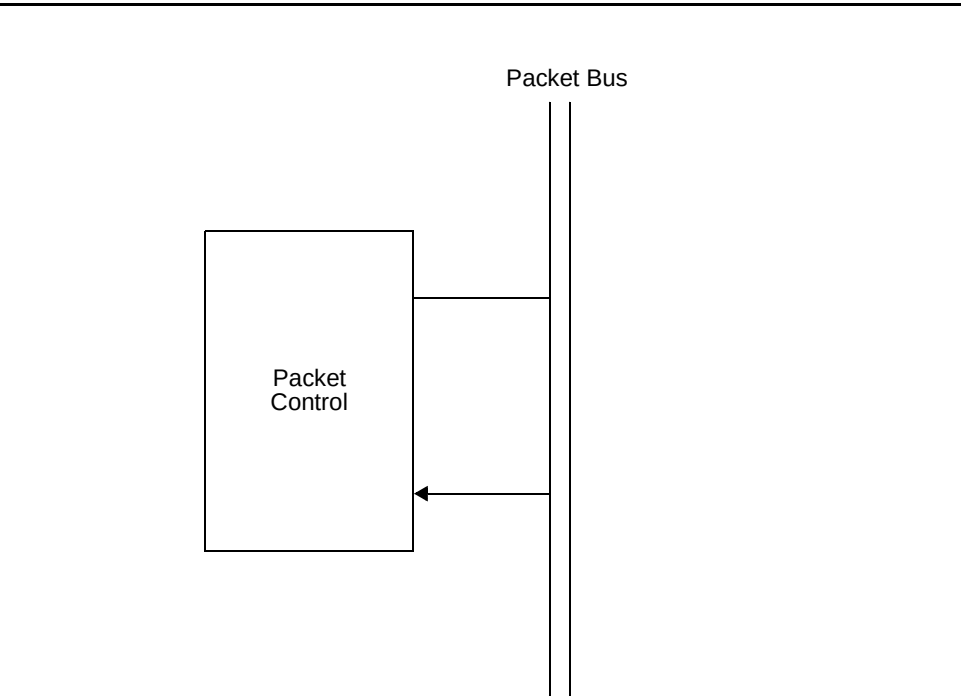


Figure 8-56. Test Configuration

Table 8-233. 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.
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 8-234. 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.
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.

Table 8-234. Packet Control Reset Test #586 — Continued

Error Code	Test Result	Description	Recommendation
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.

Table 8-234. Packet Control Reset Test #586 — Continued

Error Code	Test Result	Description	Recommendation
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 8-235. Battery & Battery Charger Error Log Entries

Error Type	Aux Data	Associated Test	Alarm Level	On/Off Board	Test to Clear Value
0*	0	Any	Any	Any	test environment P sh r 1
1	Any	Battery & Battery Charger Query Test (#5) (Error Code 8)	MINOR	ON	test environment P sh r 1
257	Any	Battery & Battery Charger Query Test (#5) (Error Code 4)	MINOR	ON	test environment P sh r 1
769	Any	Battery & Battery Charger Query Test (#5) (Error Code 2)	MINOR	ON	test environment P sh r 1
3840	1005 or 1028	Battery & Battery Charger Query Test (#5)		ON	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.
- a. 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 8-236. System Technician-Demanded Tests: POWER (AC)

Order of Investigation	Short Test Sequence	Long Test Sequence	D/ND*
Battery & Battery Charger Query Test (#5)	X	X	ND
AC Power Query Test (#78) (a)	X	X	ND
Power Unit Query Test (carrier E) (#127) (b)	X	X	ND
Power Unit Query Test (carrier D) (#127) (b)	X	X	ND
Power Unit Query Test (carrier A) (#127) (b)	X	X	ND
Power Unit Query Test (carrier B) (#127) (b)	X	X	ND
Power Unit Query Test (carrier C) (#127) (b)	X	X	ND
Emergency Transfer Query Test (#124) (c)	X	X	ND
Cabinet Sensors Query Test (#122) (d)	X	X	ND
External Alarm Lead Query Test (#120) (e)	X	X	ND
Analog Ring Generator Initialization Test (#117) (f)	X	X	ND
Analog Ring Generator Query Test (#118) (f)	X	X	ND

* D = Destructive; ND = Nondestructive

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 8-237. 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.
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.

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Table 8-237. Battery & Battery Charger Query Test #5 — Continued

Error Code	Test Result	Description/ Recommendation
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.
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.  CAUTION: Read the "Replacing the Battery and Battery Charger" section before proceeding.

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Table 8-237. Battery & Battery Charger Query Test #5 — Continued

Error Code	Test Result	Description/ Recommendation
4	FAIL (cont'd.)	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.
8	FAIL	 NOTE: 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.  WARNING: 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.

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Table 8-237. Battery & Battery Charger Query Test #5 — Continued

Error Code	Test Result	Description/ Recommendation														
8 (cont'd.)	FAIL (cont'd.)	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: <table><tr><th>Number of carriers per cabinet</th><th>Number of rectifiers per cabinet</th></tr><tr><td>----- -----</td><td></td></tr><tr><td>1</td><td>2</td></tr><tr><td>2</td><td>3</td></tr><tr><td>3</td><td>3</td></tr><tr><td>4</td><td>4</td></tr><tr><td>5</td><td>4</td></tr></table> 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.	Number of carriers per cabinet	Number of rectifiers per cabinet	----- -----		1	2	2	3	3	3	4	4	5	4
Number of carriers per cabinet	Number of rectifiers per cabinet															
----- -----																
1	2															
2	3															
3	3															
4	4															
5	4															
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.														

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Table 8-237. Battery & Battery Charger Query Test #5 — Continued

Error Code	Test Result	Description/ Recommendation
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 <i>P</i> *

* 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 8-238. POWER (DC) Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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
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 or 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 8-239. 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 8-240. 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 8-241. 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.
2000	ABORT	Response to the test request was not received within the allowable time period.	
2029	ABORT	Internal system error.	
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.	NA

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 8-242. 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.	
202	ABORT	Internal system error.	
	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.

Table 8-242. Power Unit Query Test #127 — Continued

Error Code	Test Result	Description	Recommendation
	FAIL (cont.)		3. Unplug both port carrier power units, and wait about one 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), replace the defective port carrier power unit(s). 4. 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 8-242. Power Unit Query Test #127 — Continued

Error Code	Test Result	Description	Recommendation
	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, 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 8-243. 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 8-243. Cabinet Temperature Query Test #122 [N-V Speed Fans] — Continued

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 maintenace objects first, then rerun the test. If the test still fails, escalate the problem.

Table 8-243. Cabinet Temperature Query Test #122 [N-V Speed Fans] — Continued

Error Code	Test Result	Description	Recommendation
1 (cont)	FAIL		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. 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.

Table 8-243. Cabinet Temperature Query Test #122 [N-V Speed Fans] — Continued

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. 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.
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.

Table 8-243. Cabinet Temperature Query Test #122 [N-V Speed Fans] — *Continued*

Error Code	Test Result	Description	Recommendation
	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 8-244. 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.
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 8-244. Cabinet Temperature Query Test #122 [V Speed Fans] — Continued

Error Code	Test Result	Description	Recommendation
1	FAIL		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.

Table 8-244. Cabinet Temperature Query Test #122 [V Speed Fans] — *Continued*

Error Code	Test Result	Description	Recommendation
1 (cont)	FAIL		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 8-244. Cabinet Temperature Query Test #122 [V Speed Fans] — Continued

Error Code	Test Result	Description	Recommendation
1 (cont)	FAIL		5. 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. 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 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 8-244. Cabinet Temperature Query Test #122 [V Speed Fans] — Continued

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 [TN790 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 TN790 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 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 TN790 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 8-245. PR-MAINT Error Log Entries

Error Type	Aux Data	Associated Test	Alarm Level	On/Off Board	Test to Clear Value *
0 [†]	0	Any	Any	Any	test processor a/b sh r 1
1(a)	Any	MTP Reset Test (#101)	MIN	ON	test processor a/b l r 3
257(b)	Any	MTP Sanity Handshake Test (#106)			test processor a/b r 2
513(c)	Any	MTP Analog Loop Around Test (#103)	MIN	ON	test processor a/b r 8
769(d)	Any	MTP Dual Port Ram Test (#104)	MIN	ON	test processor a/b l r 3
1025(e)	Any	MTP Outputpulse Relay Test (#102)	MIN	OFF	test processor a/b r 5
1537(f)	Any	MTP MCU-MT Loop Around Test (#228)	MIN	ON	test processor a/b r 3

Table 8-245. PR-MAINT Error Log Entries — Continued

Error Type	Aux Data	Associated Test	Alarm Level	On/Off Board	Test to Clear Value [*]
1793(g)	Any	MTP Aux Loop Around Test (#229)	MIN	ON	test processor a/b r 3
2049(h)	Any	External Modem Present Test (#230)	MIN	OFF	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. Manually repeat the command with the “long” option for the designated number of times when testing from the MCU-MT.
- † 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.

Notes:

- a. The MTP Reset Test (#101) has failed.
- b. The MTP Sanity Handshake Test (#106) has failed.
- c. The MTP Analog Loop Around Test (#103) has failed.
- d. 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.
- e. The MTP Outpulse Relay Test (#102) has failed.
- f. The MTP SAT Loop Around Test (#228) has failed.
- g. The MTP Aux Loop Around Test (#229) has failed.
- h. 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 TN790 [RISC] System.

Table 8-246. System Technician-Demanded Tests: PR-MAINT

Order of Investigation	Short Test Sequence	Long Test Sequence	D/ND*
Processor Cache Test (#895)(a)		X	ND
Processor Cache Audit (#896)(a)	X	X	ND
Processor Bus Time-out Exception Test (#82)(a)	X	X	ND
Processor BOOTPROM Checksum Test (#80)(a)	X	X	ND
Processor Write Buffer Test (#900)(a)	X	X	ND
Memory Burst Read Test (#908)(a)	X	X	ND
Read All Memory Test (#85)(a)		X	ND
Memory Parity Error Detection Test (#87)(a)	X	X	ND
Flash Memory Checksum Test (#86)(a)		X	ND
Memory Functional Test (#332) (b)(c)		X	D
MTP Outpulse Relay Test (#102)(d)	X	X	ND
External Modem Present Test (#230)(d)(e)	X	X	ND
MTP Analog Loop Around Test (#103)(d)	X	X	ND
MTP Sanity Handshake Test (#106)	X	X	ND
MTP SAT Loop Around Test (#228)	X	X	ND
MTP Aux Loop Around Test (#229)	X	X	ND
MTP Reset Test (#101)		X	D
MTP Dual Port Ram Test (#104)(d)		X	D

* D = Destructive; ND = Nondestructive

Notes:

- a. Refer to PROCRA (TN790 RISC Processor) for a description of these tests.
- b. Refer to PR-MEM (TN790 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 8-247. 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 8-248. MTP Outpulse Relay Test #102

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." (If you have an INADS line, set the field to "y." 2. 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. 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. 1. 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. 1. Enter the change system-parameters maintenance command. Verify that the "Test Remote Access Port?" field is set to "y." 2. Retry the command at 1-minute intervals a maximum of 5 times.
2500 2033		Internal system error Could not send MTP message. 1. Retry at 1-minute intervals a maximum of 5 times.

Continued on next page

Table 8-248. MTP Outpulse Relay Test #102 — Continued

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.
	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). - Retry at 1-minute intervals a maximum of 5 times. - For an external modem, if the test continues to fail: - If Test #230 failed, use the external modem recommendations listed in Test #230. - 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. - Examine the INADS trunk for connectivity, and manually check for loop current. - 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." - If the INADS trunk checks out okay, but the test still fails, check the backplane connector wiring. - If the backplane wiring checks out okay, replace the Processor circuit pack.
	PASS	MTP detected a loop current on the remote access port. 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 8-249. 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.

Table 8-249. MTP Analog Loop Around Test #103 — Continued

Error Code	Test Result	Description/ Recommendation
1000 2033	ABORT	System software resources required to run this test are not available. Internal system error 1. Retry at 1-minute intervals a maximum of 5 times.
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 8-250. 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.

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Table 8-250. MTP Dual Port Ram Test #104 — Continued

Error Code	Test Result	Description/ Recommendation
	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.
	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 8-251. 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.
	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 8-252. 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 8-253. 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.
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.
	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 8-254. 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.
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 2033	ABORT	System software resources required for this test are not available. 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.

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Table 8-254. External Modem Present Test #230 — Continued

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: <i>The fault may be on the Processor circuit pack. The circuit pack should be replaced.</i>
	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 (TN790 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	TN790 RISC Memory
PR-MEM*	MINOR	test memory a/b sh c	TN790 RISC Memory

* The MO is "PR-MEM" because all of the Memory used by the Processor is on the TN790 Processor circuit pack.

The TN790 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 TN790 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 8-255. Memory Error Log Entries

Error Type	Aux Data	Associated Test	Alarm Level	On/Off Board	Test to Clear Value
0*	0	Any	Any	Any	test memory a/b l r 1
1	Any	Flash Memory Checksum Test (#86)	MAJOR	ON	test memory a/b l r 5
3(a)	Any	Flash Memory Checksum Test (#86)	MAJOR	ON	test memory a/b l r 5
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 (b)(c)	Read All Memory (#85)	MAJOR	ON	test memory a/b l r 1
2049(d)	Any (b)(c)	Memory Functional Test (#332)	MAJOR	ON	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.

Notes:

- a. 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.
- b. 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
- c. Aux Data of 100 is an LMM Flash Checksum initialization failure.
- d. 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 8-256. System Technician-Demanded Tests: PR-MEM

Order of Investigation	Short Test Sequence	Long Test Sequence	D/ND*
Processor Cache Test (#895)(a)		X	ND
Processor Cache Audit (#896)(a)	X	X	ND
Processor Bus Time-out Exception Test (#82)(a)	X	X	ND
Processor BOOTPROM Checksum Test (#897)(a)	X	X	ND
Processor Write Buffer Test (#900)(a)	X	X	ND
Memory Burst Read Test (#908)	X	X	ND
Read All Memory Test (#85)		X	ND
Memory Parity Error Detection Test (#87)	X	X	ND
Flash Memory Checksum Test (#86)		X	ND
Memory Functional Test (#332) (b)		X	D
MTP Outpulse Relay Test (#102) (c)	X	X	ND
MTP External Modem Present Test (#230) (c)	X	X	ND
MTP Analog Loop Around Test (#103) (c)	X	X	ND
MTP Sanity Handshake Test (#106) (c)	X	X	ND
MTP SAT Loop Around Test (#228) (c)	X	X	ND
MTP Aux Loop Around Test (#229) (c)	X	X	ND
MTP Reset Test (#101) (c)		X	D
MTP Dual Port Ram Test (#104) (c)		X	D

* D = Destructive; ND = Nondestructive

- Notes:
- a. Refer to PROCR (TN790 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 8-257. 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.
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.
	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 8-258. 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 TN790 Processor circuit pack and repeat step 1.
	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 8-259. 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 TN790 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 8-260. 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 8-261. 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:

- Lucent 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 TN777B Network Control 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 TN777B Network Control 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 TN777B Network Control circuit pack is in the in-service/idle state.

Enter **list data** to find the extension numbers of data channels on TN777B Network Control 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 (Network Control 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 8-262. CDR Link Maintenance Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 I	Test #215 failed. The <i>Aux Data</i> field contains either the channel ID of data channels on the TN777 Network Control 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.

Table 8-262. CDR Link Maintenance Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 <i>Aux Data</i> field contains the channel ID of data channels on the TN777 Network Control 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-main tenance to see the start time of daily maintenance. If the error occurs and is resolved during daily maintenance, it can be ignored.

Table 8-262. CDR Link Maintenance Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 8-263. 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 8-264. 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 8-265. 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 8-266. Process Sanity Audits Error Log Entries

Error Log	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 (TN790 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	TN790 RISC Processor Circuit Pack
PROCR	MINOR	test processor a/b sh r/c	TN790 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 TN790. The TN790 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 8-267. RISC Processor Circuit Pack Error Log Entries

Error Type	Aux Data	Associated Test	Alarm Level	On/Off Board	Test to Clear Value*
0†	0	Any	Any	Any	test processor a/b r 1
1(a)	Any	BOOTPROM Checksum Test (#80)	MAJOR	ON	test processor a/b r 5
513		Processor Write Buffer Test (#900)	MAJOR	ON	test processor a/b r 1
1025(b)	Any	Processor Cache Audit (#896)	MINOR	ON	test processor a/b r 2
1281	Any	Processor Cache Test(#895)	MAJOR	ON	test processor a/b r 1
1793(c)		Processor Bus Time-out Exception Test (#82)	MAJOR	ON	test processor a/b r 2
2049(d)(e)	Any	Processor Sanity Timer Test	MINOR	ON	test processor a/b l c
2305(d)(f)	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.

† 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.

Notes:

- a. The BOOTPROM Checksum Test (#80) failed. Refer to the FAIL condition of this test for further action.
- b. 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.
- c. The Processor Bus Time-out Test (#82) failed. Refer to the FAIL condition of this test for further action.
- d. Aux Data of 100 is an LMM initialization failure.
- e. 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.
- f. 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 8-268. System Technician-Demanded Tests: PROCR

Order of Investigation	Short Test Sequence	Long Test Sequence	D/ND*
Processor Cache Test (#895)		X	ND
Processor Cache Audit (#896)	X	X	ND
Processor Bus Time-out Exception Test (#82)	X	X	ND
Processor BOOTPROM Checksum Test (#80)	X	X	ND
Processor Write Buffer Test (#900)	X	X	ND
Memory Burst Read Test (#908)(a)	X	X	ND
Read All Memory Test (#85)(a)		X	ND
Memory Parity Error Detection Test (#87)(a)	X	X	ND
Flash Memory Checksum Test (#86)(a)		X	ND
MTP Outpulse Relay Test (#102) (c)	X	X	ND
MTP External Modem Present Test (#230) (c)	X	X	ND
MTP Analog Loop Around Test (#103) (c)	X	X	ND
MTP Sanity Handshake Test (#106) (c)	X	X	ND
MTP MCU-MT Loop Around Test (#228) (c)	X	X	ND
MTP Aux Loop Around Test (#229) (c)	X	X	ND
MTP Reset Test (#101) (c)		X	D
MTP Dual Port Ram Test (#104) (c)		X	D

* D = Destructive; ND = Nondestructive

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 8-269. 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 8-270. 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, TN777B Network Control, and TN778 Packet Control circuit packs. The test should then be repeated.
	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 8-271. 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 8-272. 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 a1b 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 8-273. 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.

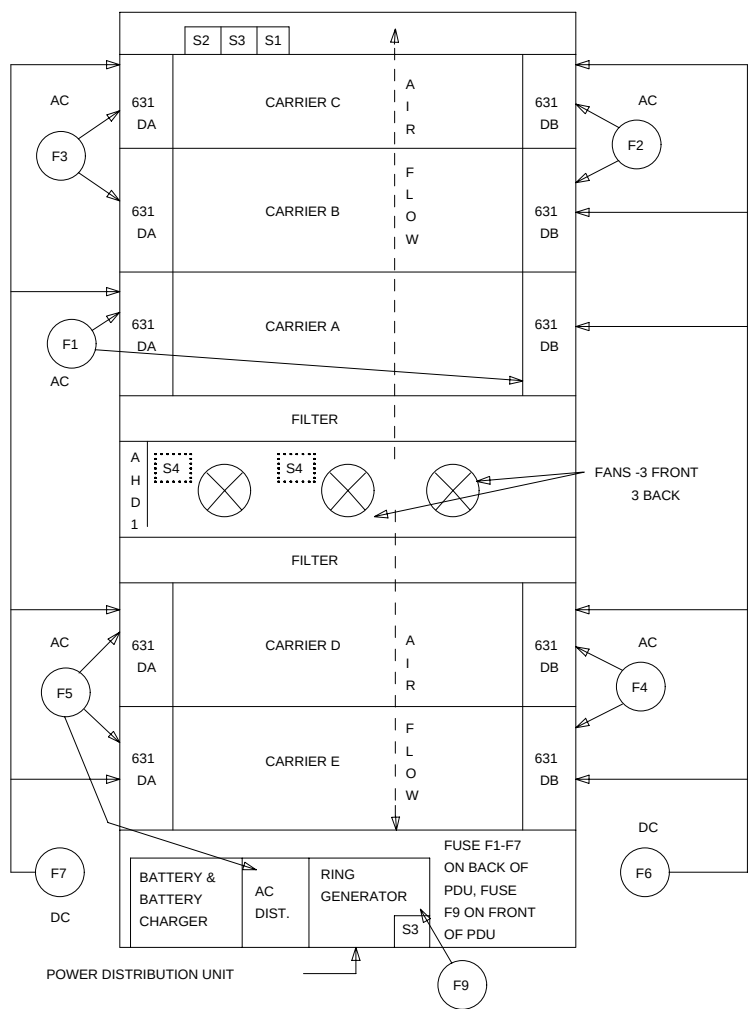
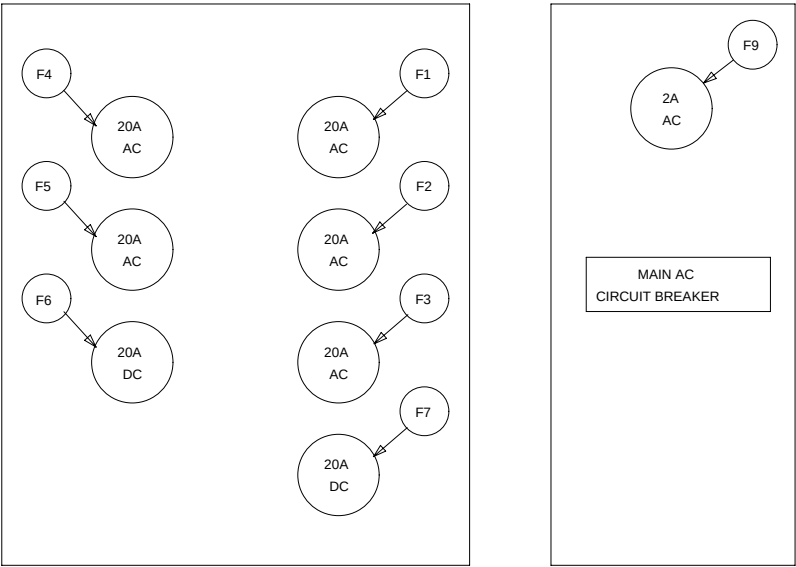


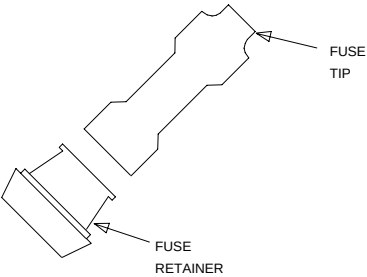
Figure 8-57. Multicarrier Cabinet Environment Components



BACK OF POWER DISTRIBUTION UNIT

FRONT OF POWER DISTRIBUTION UNIT

FUSE F8 (5A AC) IS LOCATED ON THE
BACK OF THE PDU ABOVE THE
CONVENIENCE OUTLET AND IS NOT SHOWN



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 8-58. Multicarrier Cabinet Fuse Location and Replacement

Hardware Error Log Entries and Test to Clear Values

Table 8-274. Analog Ring Generator Error Log Entries

Error Type	Aux Data	Associated Test	Alarm Level	On/Off Board	Test to Clear Value
0*	0	Any	Any	Any	test environment UU
1		Analog Ring Generator Query Test (#118)	MAJOR	ON	test environment UU r 3

* 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.

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 8-275. System Technician-Demanded Tests: RING-GEN (MCC-MSMs)

Order of Investigation	Short Test Sequence	Long Test Sequence	D/ND*
Analog Ring Generator Initialization Test (#117)	X	X	ND
Analog Ring Generator Query Test (#118)	X	X	ND
Battery & Battery Charger Query Test (#5) (a)	X	X	ND
AC Power Query Test (#78) (b)	X	X	ND
Power Unit Query Test (Carrier E) (#127) (c)	X	X	ND
Power Unit Query Test (Carrier D) (#127) (c)	X	X	ND
Power Unit Query Test (Carrier A) (#127) (c)	X	X	ND
Power Unit Query Test (Carrier B) (#127) (c)	X	X	ND
Power Unit Query Test (Carrier C) (#127) (c)	X	X	ND
Emergency Transfer Query Test (#124) (d)	X	X	ND
Cabinet Sensors Query Test (#122) (e)	X	X	ND
External Alarm Lead Query Test (#120) (f)	X	X	ND

* D = Destructive; ND = Nondestructive

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 8-276. System Technician-Demanded Tests: RING-GEN (SCC-MSMs)

Order of Investigation	Short Test Sequence	Long Test Sequence	D/ND*
Analog Ring Generator Initialization Test (#117)	X	X	ND
Analog Ring Generator Query Test (#118)	X	X	ND
Single-Carrier Power Query Test (#79) (a)	X	X	ND
Emergency Transfer Query Test (#124) (b)	X	X	ND
External Alarm Lead Query Test (#120) (c)	X	X	ND

* D = Destructive; ND = Nondestructive

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 8-277. 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 8-278. 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.
	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.

Continued on next page

Table 8-278. Analog Ring Generator Query Test #118 — Continued

Error Code	Test Result	Description/ Recommendation
	FAIL (cont'd.)	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.

Continued on next page

Table 8-278. Analog Ring Generator Query Test #118 — Continued

Error Code	Test Result	Description/ Recommendation
	FAIL (cont'd.)	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 8-279. SCH-ADJ Error Log Entries

Error Type	Aux Data	Assoc Test #	Alarm Level	On/Off Board	Test to Clear Value	Reason for Error
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 8-280. Service Slot Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 TN777B Network Control (NETCON) circuit pack. The data channels (DATA-BD and DATA-CHL) also reside on the NETCON circuit pack. Standard systems have a single NETCON circuit pack. The NETCON 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 takedown 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.

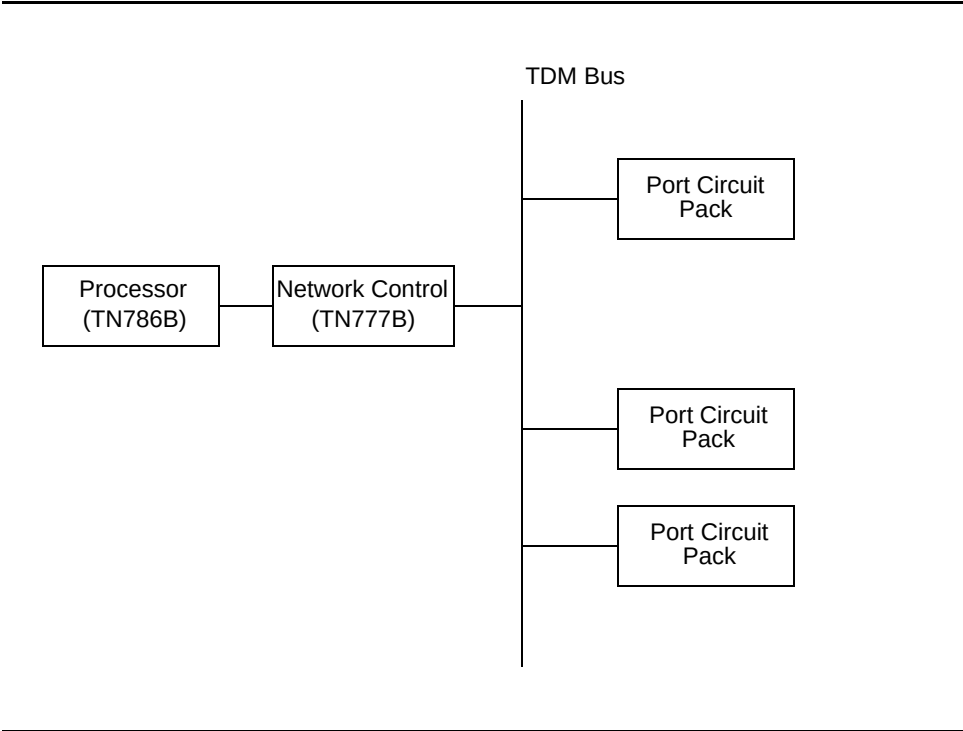


Figure 8-59. Switch Control Connectivity

Hardware Error Log Entries

The following table shows the error log entries and related information.

Table 8-281. Switch Control Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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.
257	0 or 1	None				These errors are reported to the processor by Switch Control and indicate possible hardware problems on the Network Control 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 Network Control circuit pack should be replaced.

Table 8-281. Switch Control Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
513		#95	Minor	On	test network-control l r 3	If the <i>Aux Data</i> 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 <i>Aux Data</i> field value is more than 100 or fails two out of three times with <i>Aux Data</i> less than 100, the TN777B Network Control 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	

Table 8-281. Switch Control Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 Network Control circuit pack should be replaced.
2817		#324	Major	On	test network-control r 2	
3073		#325	Major	On	test network-control r 3	
3329		None	Major	On		There is bad clock detection circuitry on the TN777B Network Control 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 8-282. 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 8-283. 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.

Table 8-283. Control Channel Interface Test #92 — Continued

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 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.	1. This failure could be due to either a Network Control circuit pack hardware failure or the loss of system timing signals. If Switch Control is alarmed, then a Network Control 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 TN777B Network Control 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 TN777B Network Control circuit pack at the customer's convenience. 5. If the MCU cannot take calls, replace the TN777B Network Control circuit pack immediately.
	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 8-284. 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 TN777B Network Control circuit pack hardware failure or the loss of system timing signals. If Switch Control is alarmed, then suspect a TN777B Network Control 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 TN777B Network Control circuit pack. If it is at fault, go to Step 1. 1. If the MCU can take calls, replace the TN777B Network Control circuit pack at the customer's convenience. 2. If the MCU cannot take calls, replace the TN777B Network Control 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 8-285. 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 TN777B Network Control 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.

Table 8-285. Control Channel Transmission Test #94 — Continued

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.
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 TN777B Network Control circuit pack at the customer's convenience. 5. If the MCU cannot process calls, replace the TN777B Network Control circuit pack immediately.
	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 8-286. 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 TN777B Network Control 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 TN777B Network Control circuit pack.
	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.

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SYNC (Synchronization)

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- 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 8-287. Synchronization Maintenance Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
0	0	Any	Any	Any	test synchroni- zation	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	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.

Table 8-287. Synchronization Maintenance Error Log Entries — *Continued*

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
						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.
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	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.

Table 8-287. Synchronization Maintenance Error Log Entries — *Continued*

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
513	Any	None	Warning/ Major*	Off	None	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 8-287. Synchronization Maintenance Error Log Entries — *Continued*

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
1793	0 to 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.

Table 8-287. Synchronization Maintenance Error Log Entries — *Continued*

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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.

* 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.

Craft-Demanded Tests

The following test helps inspect errors in the system.

Table 8-288. 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 8-289. 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 8-290. 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	
257 (b)			WARNING	OFF	test sys-link PCSSpp l cl
513 (c)			WARNING	OFF	test sys-link PCSSpp l cl
772 (d)			WARNING	OFF	test sys-link PCSSpp l cl
1025 (e)			WARNING	OFF	test sys-link PCSSpp l cl
1281 (f)			WARNING	OFF	test sys-link PCSSpp l cl
1537 (g)			WARNING	OFF	test sys-link PCSSpp l cl
1793 (h)			WARNING	OFF	test sys-link PCSSpp l cl
2049 (i)			WARNING	OFF	test sys-link PCSSpp l cl

Notes:

- a. 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.
- b. 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.

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SYS-LINK (System Links)

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- c. 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.
 - d. 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.
 - e. 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.
 - f. 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.
 - g. 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.
 - h. 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.
 - i. 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.
-

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 Network Control 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 TN777B Network Control 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 Network Control 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 Network Control circuit pack. (There are up to four 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 network control 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 8-291. SYS-PRNT Maintenance Error Log Entries

Error Log	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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		Warning	Off	release sp-link	The system printer link has been busied out by craft.

Table 8-291. SYS-PRNT Maintenance Error Log Entries — *Continued*

Error Log	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
257	1 to 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 <i>Aux Data</i> field means: 1 = unavailable system resources (too many logins). 2 = no data channels (DATA-CHL) available on the Network Control 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 8-291. SYS-PRNT Maintenance Error Log Entries — Continued

Error Log	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 8-292. 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 8-293. 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.
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 8-294. 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.
	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 8-295. System Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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	None				A System Restart Level 1 was requested.
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)

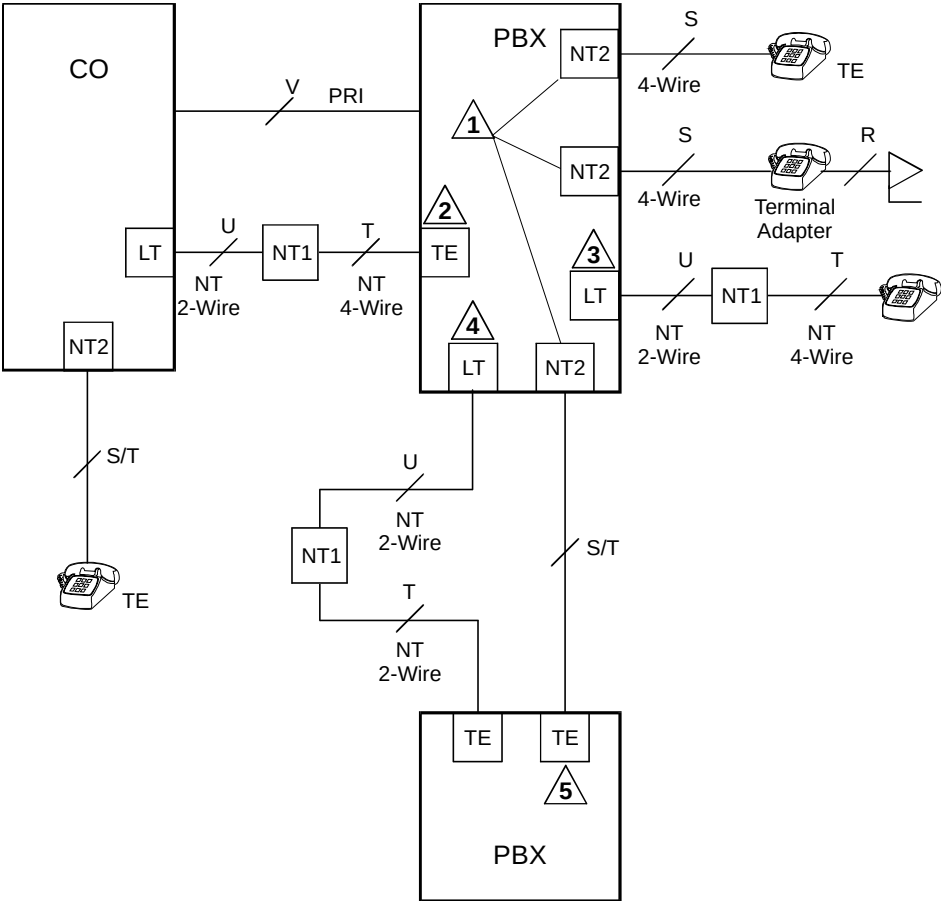
MO Name (in Alarm Log)	Alarm Level	Initial Command to Run*	Full Name of MO
TBRI-BD	MINOR	test board PCSS l r#	TBRI-BD

* 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 Kb/s 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 Network Control 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.



ISDN Interface Reference Points

cydlfisdn RPY 072397

Figure 8-60. 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-Mbps 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 8-296. TBRI-BD 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 PCSS sh r 1
1 (a)	Any	None	MINOR	ON	
257 (b)	65535	Control Channel Loop Test (#52)	MINOR	ON	test board PCSS r 20
513 (c)	4352 to 4357		None	ON	
769 (d)	4358				
1025 (e)	4363	NPE/NCE Audit Test (#50)	None	ON	
1291 (f)	4359	Clear Error Counters (#270)	MINOR	ON	
1294 (g)	46088 to 46096	SAKI Sanity Test (#53)	MINOR	ON	See (h)
1537 (h)	46082		MINOR	ON	
1793 (i)	46080		MINOR	ON	
1794 (i)	46094		MINOR	ON	

Table 8-296. TBRI-BD Error Log Entries — Continued

Error Type	Aux Data	Associated Test	Alarm Level	On/Off Board	Test to Clear Value
1795 (i)	46085		MINOR	ON	
2305 (j)	46104		None	ON	
2306 (i)	46081		None	ON	
3330 (j)	46083		MINOR	OFF	
3586 (k)			MINOR	OFF	
3840(l)	4096 to 4101				
3842 (m)	46095				
3843 (n)	46097				

* 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.

Notes:

- a. 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 note (g).

- b. 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).
- c. 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 Note (a).

- d. The circuit pack detects a program logic error. While no action is required, this error can lead to other errors against this circuit pack.
- e. 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.
- f. 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.
- g. 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.
- h. 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.
- i. The circuit pack is has 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.
- j. 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.
- 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.
- k. 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.
- l. The circuit pack received an inconsistent down-link message (a bad header, port number, data, subqualifier, or logical link) over the Control Channel.

- m. 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.

- n. 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 8-297. System Technician-Demanded Tests: TBRI-BD

Order of Investigation	Short Test Sequence	Long Test Sequence	D/ND*
Control Channel Loop-Around Test (#52)	X	X	ND
NPE/NCE Audit Test (#50)		X	ND
LAN Receive Parity Error Counter Test (#595)		X	ND

* D = Destructive; ND = Nondestructive

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 8-298. 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 Kb/s 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 Network Control 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.

- 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 8-299. TBRI-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 UCSSPP sh r 1
1 (a)		Level 1 Status Test (#1242)	MINOR	OFF	
129†					
257(b)					
513 (c)	46222	XMIT FIFO Overflow	MINOR	ON	
514 (d)		XMIT FIFO Overflow (TDM)	MINOR	ON	
769 (e)		Traffic Hyperactivity	MINOR	OFF	
1025 (f)					
1281 (g)		NPE Crosstalk Test (#617)	MINOR	ON	
1537 (h)	46210	CRC error (D-Channel)	MINOR	OFF	

Table 8-299. TBRI-PT Error Log Entries — Continued

Error Type	Aux Data	Associated Test	Alarm Level	On/Off Board	Test to Clear Value
1538 (i)		CRC error (TDM D-Channel)	MINOR	OFF	
1793 (j)		BRI Port Local TDM Looparound Test (#619)	MINOR	ON	
2049 (k)			MINOR	OFF	
2305 (l)		Layer 3 Query (#1243)	MINOR	OFF	
3073 (m)		Slip Query Test (#1244)	MINOR	OFF	
3585 (n)		Receive FIFO Overflow (TDM D-Channel)	Log Only	ON	
3586 (o)					
3587 (p)					
3588 (q)	46223				
3589 (r)					
3590 (s)	46211				
3591 (t)					
3592 (u)					
3841 to 3942 (v)					

* 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.

† The far-end switch changed the ISDN service state. This may be a temporary condition.

Notes:

- a. 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.

- b. 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.
- c. Error Type (513): On-board hardware failure. The FIFO RAM buffers have overflowed, indicating a hardware problem.
- d. 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).
- e. Error Type (769): The port is generating too many uplinks. The link is being suspended.
- f. 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

- g. 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.
- h. 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.
- i. 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 .
 - j. 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).
 - k. Error Type (2049): The Layer 2 Link Query failed. The test is repeated every 15 minutes until it passes.
 - l. Error Type (2305): The Remote Layer 3 Query failed. The test is repeated every 15 minutes until it passes.
 - m. 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.
 - n. 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.
 - o. 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.
 - p. 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.
 - q. 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).

- r. 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.
- s. 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.
- t. Error Type (3591): The port is generating too many uplinks and is taken out of service.
- u. Error Types (3841-3942): The following table 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.

Table 8-300. Cause Values for Error 3841-3942

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

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 8-301. System Technician-Demanded Tests: TBRI-PT

Order of Investigation	Short Test Sequence	Long Test Sequence	D/ND*
BRI Local LAN Port Loop Around Test (#618)		X	D
BRI TDM Port Loop Around Test (#619)		X	D
L1 State Query Test (#1242)	X	X	D
CRC Error Counter Test (#623)		X	ND
Receive FIFO Overflow Test (#625)		X	ND
Layer 3 Query Test (#1243)		X	ND
Slip Query Test (#1244)	X	X	ND
Clear Error Counters Test (#270)	X	X	ND
NPE Crosstalk Test (#617)		X	D

* D = Destructive; ND = Nondestructive

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 sucessfully send the downlink messages; the test aborts otherwise.

Table 8-302. Clear Error Counters Test #270

Error Code	Test Result	Description/ Recommendation
Any	ABORT	Maintenance could not send the downlink message.
	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 8-303. 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 Lucent Technologies 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.

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Table 8-303. NPE Crosstalk Test #617 — Continued

Error Code	Test Result	Description/ Recommendation
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.
	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 8-304. 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: <i>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.</i>
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 8-305. 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.

Continued on next page

Table 8-305. BRI Port Local TDM Loop-Around Test #619 — Continued

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 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 Lucent Technologies Adjunct Links. This is a normal condition.
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.

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Table 8-305. BRI Port Local TDM Loop-Around Test #619 — *Continued*

Error Code	Test Result	Description/ Recommendation
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 8-306. 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.
	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 8-307. 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.
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 8-308. 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.

Table 8-308. Level 1 Status Inquiry Test #1242 — Continued

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.
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.
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.

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Table 8-308. Level 1 Status Inquiry Test #1242 — Continued

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 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 8-309. 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.
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.

Table 8-309. Layer 3 Query Test #1243 — Continued

Error Code	Test Result	Description/ Recommendation
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.
	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 8-310. Slip Alarm Inquiry Test #1244

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. 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.

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Table 8-310. Slip Alarm Inquiry Test #1244 — Continued

Error Code	Test Result	Description/ Recommendation
1 to 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 Kb/s 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 Network Control 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 8-311. System Technician-Demanded Tests: TBRI-TRK

Order of Investigation	Short Test Sequence	Long Test Sequence	D/ND*
Signaling Link State Check Test (#1251)	X	X	ND
Service State Audit Test (#256)	X	X	ND
Call State Audit Test (#257)	X	X	ND
ISDN Test Call Test (#258)		X	ND

* Destructive; ND = Nondestructive

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 8-312. Signaling Link State Test #1251

Error Code	Test Result	Description/ Recommendation
	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.

Table 8-312. Signaling Link State Test #1251 — Continued

Error Code	Test Result	Description/ Recommendation
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.
	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 8-313. 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.

Table 8-313. Service State Audit Test #256 — Continued

Error Code	Test Result	Description/ Recommendation
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.
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 8-314. 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 Network Control (NETCON) 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 8-315. 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.
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 (NETCON 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. 2. Issue the status trunk command and try the test again.

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Table 8-315. ISDN TEST Call Test #258

Error Code	Test Result	Description/ Recommendation
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.
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.

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Table 8-315. ISDN TEST Call Test #258

Error Code	Test Result	Description/ Recommendation
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.
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 2202 2203 2204 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.

Table 8-315. ISDN TEST Call Test #258

Error Code	Test Result	Description/ Recommendation
2214	ABORT	Call terminated by unexpected disconnect. 1. Wait one minute and then try again.
2215 2216 2217 2218 2219	ABORT	Internal system error 1. Follow recommendations for ABORT code 2012.
2220	ABORT	Call terminated prematurely. 1. Wait one minute and try again.
2221 2222 2223 2224 2225 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 8-316. System Technician-Demanded Tests: TBRI-TRK

Order of Investigation	Short Test Sequence	Long Test Sequence	D/ND*
Control Channel Test on the Control			
Channel Bus (#296)	X	X	ND
Digit Detection Test on the Non-Control			
Channel Bus (#297)	X	X	ND
Idle Time Slot Test on TDM Bus A (#294)	X	X	ND

* D = Destructive; ND = Nondestructive

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 8-317. 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.

Table 8-317. Idle Time Slot Test on TDM Bus A or TDM Bus B Test #294 or #295 — Continued

Error Code	Test Result	Description/ Recommendation
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 the "TDM Bus Fault Detection and Isolation" procedure 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 8-318. 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.

Continued on next page

Table 8-318. Control Channel Test #296 — Continued

Error Code	Test Result	Description/ Recommendation
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 Network Control circuit pack. Refer to DATA-BD (Network Control 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 8-319. 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 8-319. Digit Detection Test #297 — Continued

Error Code	Test Result	Description/ Recommendation
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 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 8-320. System Technician-Demanded Tests: TBRI-TRK (With TN756)

Order of Investigation	Short Test Sequence	Long Test Sequence	D/ND*
SAKI Reset Test (#53) (a)		X	D
Clock Health Test (#46) (b)	X	X	ND
Control Channel Loop Around Test (#52) (a)	X	X	ND
Tone Detection Verification Test (#42) (c)	X	X	ND
Tone Detector Audit/Update Test (#43) (c)	X	X	ND

Table 8-320. System Technician-Demanded Tests: TBRI-TRK
(With TN756) — Continued

Order of Investigation	Short Test Sequence	Long Test Sequence	D/ND*
Tone Generator Crosstalk Test (#90) (d)		X	ND
Tone Generator Transmission Test (#40) (d)	X	X	ND
Tone Generator Audit/Update Test (#41) (d)	X	X	ND

* D = Destructive; ND = Nondestructive

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 8-321. System Technician-Demanded Tests: TBRI-TRK (With TN768, TN780, or TN2182)

Order of Investigation	Short Test Sequence	Long Test Sequence	D/ND*
SAKI Reset Test (#53) (a)		X	D
Clock Health Test (#46) (b)	X	X	ND
Control Channel Loop Around Test (#52) (a)	X	X	ND
Tone Generator Crosstalk Test (#90) (c)		X	ND
Tone Generator Transmission Test (#40) (c)	X	X	ND
Tone Generator Audit/Update Test (#41) (c)	X	X	ND
TDM Bus Clock Circuit Status Inquiry Test (#148)	X	X	ND
TDM Bus Clock Slip Inquiry Test (#149) (e)	X	X	ND

Continued on next page

Table 8-321. System Technician-Demanded Tests: TBRI-TRK (With TN768, TN780, or TN2182) — Continued

Order of Investigation	Short Test Sequence	Long Test Sequence	D/ND*
TDM Bus Clock PPM Inquiry Test (#150)	X	X	ND
TDM Clock Board Type (#574)		X	ND
TDM Bus Clock Parameter Update Test (#151)	X	X	ND

* D = Destructive, ND = Non-destructive

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 8-322. TDM Bus Clock Slip Inquiry Test #149

Error Code	Test Result	Description/ Recommendation
1001	ABORT	The system could not allocate the necessary resources for the test.
	ABORT	The system could not allocate the necessary resources for the test. 1. Wait 1 minute, and retry the test.

Continued on next page

Table 8-322. TDM Bus Clock Slip Inquiry Test #149 — Continued

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 1-minute intervals a maximum of 5 times.
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.
ANY (cont'd.)	FAIL	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.
	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 8-323. TDM Bus Clock PPM Inquiry Test #150

Error Code	Test Result	Description/ Recommendation
1001	ABORT	The system could not allocate the necessary resources for the test.
	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.
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

Continued on next page

Table 8-323. TDM Bus Clock PPM Inquiry Test #150 — *Continued*

Error Code	Test Result	Description/ Recommendation
ANY (<i>cont'd.</i>)	FAIL	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: <i>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.</i> 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 substrate 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 8-324. 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 8-325. 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.
	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 I
Warning	test port PCSSpp I

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 TN777B Network Control 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 8-326. Circuit Packs Essential to MCU Operation

Circuit Pack	Error Log Name
Tone Clock	TONE-BD, TONE-PT, TDM-CLK
Network Control	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 Network Control 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 Network Control circuit pack, the circuit pack must be swapped with a new one. The MCU cannot operate without the Network Control 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.

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■ **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.

Table 8-327. TDM Bus Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 to 1		Minor	On	set tdm	The TDM Bus is corrupted. Check the value in the <i>Aux Data</i> 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.
257	0	None	Major	On		The TDM Bus was switched to the other bus due to corruption. No action is required.

Table 8-327. TDM Bus Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 <i>Aux Data</i> 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 <i>Aux Data</i> field shows the number of bad time slots. No alarm is associated with this error.
1025	Any					
3872 to 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 <i>Aux Data</i> 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.

 **NOTE:**
An on-board alarm refers to a problem with the TDM-BUS itself.

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 8-328. System Technician-Demanded Tests: TDM-BUS

Order of Investigation	Short Test Sequence	Long Test Sequence	D/ND*
Control Channel Test on the Control			
Channel Bus (#296)	X	X	ND
Digit Detection Test on the Non-Control			
Channel Bus (#297)	X	X	ND
Idle Time Slot Test on TDM Bus A (#294)	X	X	ND

* D = Destructive; ND = Nondestructive

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 8-329. 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.

Table 8-329. Idle Time Slot Test #294 or #295 on TDM Bus A or TDM Bus B — Continued

Error Code	Test Result	Description/ Recommendation
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 8-330. 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.

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Table 8-330. Control Channel Test #296 — Continued

Error Code	Test Result	Description/ Recommendation
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 Network Control circuit pack. Refer to DATA-BD (Network Control 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 8-331. 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 8-331. Digit Detection Test #297 — Continued

Error Code	Test Result	Description/ Recommendation
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 8-332. System Technician-Demanded Tests: TDM-BUS (With TN756)

Order of Investigation	Short Test Sequence	Long Test Sequence	D/ND*
SAKI Reset Test (#53) (a)		X	D
Clock Health Test (#46) (b)	X	X	ND
Control Channel Loop Around Test (#52) (a)	X	X	ND
Tone Detection Verification Test (#42) (c)	X	X	ND
Tone Detector Audit/Update Test (#43) (c)	X	X	ND

Table 8-332. System Technician-Demanded Tests: TDM-BUS
(With TN756) — Continued

Order of Investigation	Short Test Sequence	Long Test Sequence	D/ND*
Tone Generator Crosstalk Test (#90) (d)		X	ND
Tone Generator Transmission Test (#40) (d)	X	X	ND
Tone Generator Audit/Update Test (#41) (d)	X	X	ND

* D = Destructive; ND = Nondestructive

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 8-333. System Technician-Demanded Tests: TDM-BUS (With TN768, TN780, or TN2182)

Order of Investigation	Short Test Sequence	Long Test Sequence	D/ND*
SAKI Reset Test (#53) (a)		X	D
Clock Health Test (#46) (b)	X	X	ND
Control Channel Loop Around Test (#52) (a)	X	X	ND
Tone Generator Crosstalk Test (#90) (c)		X	ND
Tone Generator Transmission Test (#40) (c)	X	X	ND
Tone Generator Audit/Update Test (#41) (c)	X	X	ND
TDM Bus Clock Circuit Status Inquiry Test (#148)	X	X	ND
TDM Bus Clock Slip Inquiry Test (#149) (e)	X	X	ND

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Table 8-333. System Technician-Demanded Tests: TDM-BUS (With TN768, TN780, or TN2182) — Continued

Order of Investigation	Short Test Sequence	Long Test Sequence	D/ND*
TDM Bus Clock PPM Inquiry Test (#150)	X	X	ND
TDM Clock Board Type (#574)		X	ND
TDM Bus Clock Parameter Update Test (#151)	X	X	ND

* D = Destructive, ND = Non-destructive

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 8-334. TDM Bus Clock Slip Inquiry Test #149

Error Code	Test Result	Description/ Recommendation
1001	ABORT	The system could not allocate the necessary resources for the test.
	ABORT	The system could not allocate the necessary resources for the test. 1. Wait 1 minute, and retry the test.

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Table 8-334. TDM Bus Clock Slip Inquiry Test #149 — Continued

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 1-minute intervals a maximum of 5 times.
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.
ANY (cont'd.)	FAIL	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.
	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 8-335. TDM Bus Clock PPM Inquiry Test #150

Error Code	Test Result	Description/ Recommendation
1001	ABORT	The system could not allocate the necessary resources for the test.
	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.
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

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Table 8-335. TDM Bus Clock PPM Inquiry Test #150 — Continued

Error Code	Test Result	Description/ Recommendation
ANY (cont'd.)	FAIL	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: <i>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.</i> 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 substrate 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 8-336. 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 8-337. 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.
	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 8-338. TDM Bus Clock Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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.

Table 8-338. TDM Bus Clock Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 <i>Aux Data</i> 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.

Table 8-338. TDM Bus Clock Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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.
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 8-339. 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 8-340. 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.
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.

Table 8-340. TDM Bus Clock Circuit Status Inquiry Test #148 — Continued

Error Code	Test Result	Description	Recommendation
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 8-341. TDM Bus Clock Slip Inquiry Test #149

Error Code	Test Result	Description	Recommendation
	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.
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. The incoming synchronization source can be either a DS1 Interface circuit pack or a local oscillator on a 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). 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.
	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 8-342. 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.
	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 8-343. 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.

Table 8-343. TDM Bus Clock PPM Inquiry Test #150 — Continued

Error Code	Test Result	Description	Recommendation
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 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 8-344. 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 8-345. DS1 Tie Trunk Maintenance Error Log

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 <i>Aux Data</i> 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.

Table 8-345. DS1 Tie Trunk Maintenance Error Log — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
257	57473 57474					The DS1 Interface circuit pack detects a hardware error on the DS1 tie trunk. The <i>Aux Data</i> 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.
513	57392					The DS1 Interface circuit pack detects a hardware error on the DS1 tie trunk. The <i>Aux Data</i> 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 <i>Aux Data</i> field contains the following hardware error type: 57393 = delayed external release on MCU disconnect. Escalate the error to the next tier.

Table 8-345. DS1 Tie Trunk Maintenance Error Log — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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.

Table 8-345. DS1 Tie Trunk Maintenance Error Log — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 8-345. DS1 Tie Trunk Maintenance Error Log — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 8-346. 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 8-347. 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.
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 8-347. NPE Crosstalk Test #6 — Continued

Error Code	Test Result	Description	Recommendation
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. 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. 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 8-348. 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.
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 <i>Test</i> 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.
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.

Table 8-348. Conference Circuit Test #7 — *Continued*

Error Code	Test Result	Description	Recommendation
	FAIL	The NPE of the tested port did not conference the tones correctly. This causes noisy and unreliable connections.	Replace the circuit pack.
	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. 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. 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 8-349. 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.

Table 8-349. Audit and Update Test #36

Error Code	Test Result	Description	Recommendation
	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. 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. If this is not the case, check to see that there is a valid circuit pack inserted.
	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 8-350. 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.
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 is 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 <i>Maintenance Test</i> 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 trunk 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 8-350. 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 <i>Trunk Type</i> (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: 1281 : loss of signal 1537 : hyperactivity 1793 : blue alarm 2049 : red alarm 2305 : yellow alarm	Look for these errors in the error log (see DS1-BD).
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. 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. 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 8-351. Tone-Clock LED Flashing

Condition	Tone-Clock Circuit State	Explanation
"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		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		
Other green and yellow patterns		Maintenance software is testing the active circuit pack.
Random yellow	standby	If the circuit pack is a TN2182, the yellow LED may come on and turn off intermittently as ETR-PTs on the circuit pack are used for tone detection services.

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 8-352. Tone-Clock Circuit Pack Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 Network Control 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.

Table 8-352. Tone-Clock Circuit Pack Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 <i>PORT</i> 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 <i>Aux Data</i> 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.
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.

Table 8-352. Tone-Clock Circuit Pack Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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.

Table 8-352. Tone-Clock Circuit Pack Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 to 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.
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				See a.

Notes:

- a. 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 8-353. 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 8-354. 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.
None	FAIL	This Tone-Clock circuit pack had a loss of clock.	Replace the Tone-Clock circuit pack.
	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 8-355. Tone Generator Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 8-355. Tone Generator Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
513	17666	#41	Minor	On	test tone-clock r 3	The port network specified in the <i>Port</i> 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	See a.

Notes:

- a. 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 8-356. 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 8-357. 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
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.

Table 8-357. Tone Generator Transmission Test #40 — Continued

Error Code	Test Result	Description	Recommendation
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.
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.

Table 8-357. Tone Generator Transmission Test #40 — *Continued*

Error Code	Test Result	Description	Recommendation
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.
	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 8-358. 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 8-359. Tone Generator Crosstalk Test #90

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.
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. 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.	

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 **release 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 8-360. TTR Level Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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.
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 I
Warning	test board PCSS sh
Major	test board PCSS sh

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.

Table 8-361. Voice Conditioner Circuit Pack Versions Based on 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 8-362. Voice Conditioner Circuit Pack Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 then refer to the repair procedures for test #52 described under XXX-BD.

Table 8-362. Voice Conditioner Circuit Pack Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
513	4352 to 4357					An on-board hardware failure has been detected by the circuit pack. The <i>Aux Data</i> 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.

Table 8-362. Voice Conditioner Circuit Pack Error Log Entries — *Continued*

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 test 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 8-363. System Technician-Demanded Tests: VC-BD

Order of Investigation	First Test Sequence	Second Test Sequence	Reset Board Sequence	Is Test Destructive?
Control Channel Loop around Test #52*	Short	Long		No
SAKI Sanity Test #53*			Reset	Yes

* 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 8-364. VC-DSPPT Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 #953 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 #954 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 #956 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 #955 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 8-365. System Technician-Demanded Tests: VC-DSPPT

Order of Investigation	First Test Sequence	Second Test Sequence	Reset Port Sequence	Is Test Destructive?
NPE Crosstalk Test #1103	Long			Yes
TDM Loop-Back Test #1104	Short	Long		Yes
DSP Loop-Back Test #1105	Short	Long		Yes
VC Port Reset DSP Test #1106			Reset	Yes

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 8-366. VC DSP Port NPE Crosstalk Test #1103

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.
0 to 1	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 8-367. VC DSP Port Local TDM Loop-Back Test #1104

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.
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.

Table 8-367. VC DSP Port Local TDM Loop-Back Test #1104 — *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 to 1	FAIL	The TDM Loop-Around test failed.	Replace the circuit pack.
2 to 3	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 8-368. 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.
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 8-368. VC DSP Port DSP Loop-Back Test #1105 — *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 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 8-369. 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.

Hardware Error Log Entries

The following table shows the error log entries and related information.

Table 8-370. VC-SUMPT Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
1	Any	None	Major	Off		The number of VC resources in the MCU that are in service has fallen below the calculated minimum value. This value is determined by the MCU port capacity shown on the Customer Options form. For a level error to be logged, the number of VC resources in service must drop to 12 or the same number as the MCU port capacity (half the required VC resources). If this outage continues for 15 minutes, a major alarm is raised. Only correcting the out-of-service problem resolves this alarm. See VC-DSPPT and VC-BD and resolve these alarms first. This may resolve the VC-LEV error or alarm.

Craft-Demanded Tests

There are no craft-demanded tests 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 8-371. VC-SUMPT Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 #950 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 8-372. 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 8-373. 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 8-374. 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 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.

Table 8-374. 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 8-375. VPP-BD Error Log Entries

Error Type	Aux Data	Assoc.Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
0*	0	Any	Any	Any	test board PCSS sh r 1	
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" of this document. (Also, refer to the "Handling Common Port Circuit Packs" section in Chapter 5, "Routine Maintenance Procedures.")
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 8-375. VPP-BD Error Log Entries — Continued

Error Type	Aux Data	Assoc.Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
513	4352 to 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 #998 for repair procedures.

Table 8-375. VPP-BD Error Log Entries — Continued

Error Type	Aux Data	Assoc.Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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	46082	software-detected error	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 8-375. VPP-BD Error Log Entries — Continued

Error Type	Aux Data	Assoc.Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 #996 for repair procedures.
3073	Any	#1143	Minor	On		This error represents a failure of the TSi Xtalk and Loopback Test (#993). 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.

* 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.

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.

Table 8-376. 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

* Refer to the repair procedure described in the XXX-BD (Common Port Circuit Pack) section of this document for a description of this test.

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 8-377. 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 8-377. TSI Loopback and Crosstalk Test #1136 — 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.
	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 8-378. 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.
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.

Table 8-378. VPP DSP/FPGA Status Query Test #1144 — Continued

Error Code	Test Result	Description	Recommendation
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

To support conferences involving multiple MMI circuit packs, and to support Continuous Presence *Plus* and Continuous Presence *Plus* conferences, the appropriate MMI, VP and VPP circuit packs must be synchronized with one another. One of the MMI circuit packs is designated as the Primary circuit pack. The Primary circuit pack provides the synchronization signal onto the TDM bus. To become synchronized, the other MMI, VP and VPP circuit packs in the system must “listen” to this signal. This test monitors the synchronization state.

Two test numbers are associated with synchronization. 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 MMI_SYNC that the VPP circuit pack is not synchronized. MO MMI_SYNC then analyzes the problem and attempts to resynchronize the VPP circuit pack.

Test #1148 fails if the VPP circuit pack is not in sync. On the other hand, the test passes with auxiliary code 1101 if the VPP circuit pack is in sync and is listening to the signal. VPP circuit packs usually do not lose the synchronization signal unless the providing MMI circuit pack is either pulled out of the system or reset via a craft command. Test #1148 runs whenever the user enters either the “short” or “long” 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 8-379. 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.
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).	

8	Maintenance Object Repair Procedures VPP-BD (Video Processor Plus Circuit Pack)	8-861

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 8-380. VPP-PT Error Log Entries

Error Type	Aux Data	Assoc.Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
0*	0	Any	Any	Any	test port PCSSpp sh r 1	
1	Any	uplink error from pack				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.

* 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.

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 8-381. 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 8-382. 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.
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 8-383. Video Processor Plus AVP Loop-Around Test #1174

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 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.	

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> I
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 Lucent fractional T-1 service. An example of this is the Lucent Static Integrated Network Access, where a trunk group to Lucent 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 Lucent 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

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WAE-PORT (Wideband Access Endpoint Port)

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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 *in-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 8-384. Wideband Access Endpoint Maintenance Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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.

Table 8-384. Wideband Access Endpoint Maintenance Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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.
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 8-385. 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	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 8-386. 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.
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.

Table 8-386. 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.
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 8-387. 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. 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.	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 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 8-388. 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.
2100	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 8-389. 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 8-390. Station Port Circuit Packs

Code	Description	MO Name
TN420	Tone Detector	DETR-BD
TN556	ISDN-BRI 4-Wire	BRI-BD
TN746	16-Port Analog	ANL-BD
TN754	Digital Line	DIG-BD
TN2224	ISDN-BRI Line	

Table 8-391. Service Port Circuit Packs

Code	Description	MO Name
TN744	Call-Classifier	CLSFY-BD
TN748	Tone Detector	
TN768	Tone-Clock	TONE-BD
TN786	Processor Interface	PI-BD
TN777	Network Control	DATA-BD
TN787	Multimedia Interface	MMI-BD
TN788	Voice Conditioner	VC-BD
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 8-392. Common Port Circuit Pack Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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.
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.

Table 8-392. Common Port Circuit Pack Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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.
513	Any	None	Minor	On	test board PCSS sh	This error, when reported with <i>Aux Data</i> 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.
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.

Table 8-392. Common Port Circuit Pack Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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				See a.

Notes:

- a. 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 8-393. System Technician-Demanded Tests: XXX-BD

Order of Investigation	First Test Sequence	Second Test Sequence	Reset Board Sequence	Is Test Destructive?
NPE Audit Test #50	Long			No
Control Channel Loop-Around Test #52	Short	Long		No
SAKI Sanity Test #53	Long		Reset	Yes

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 8-394. NPE Audit Test #50

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.
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.
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 8-395. 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.
	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 8-396. 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.
0	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. 3. 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 TN777B Network Control 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 TN777B Network Control 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 8-397. 12-Volt Power Supply Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 8-398. 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 TN777B Network Control 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 TN777B Network Control 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 TN777B Network Control 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 8-399. 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 NETCON circuit pack is not a TN777B circuit pack.	1. Replace the circuit pack with a TN777B 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 TN777B NETCON 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 TN777B NETCON circuit pack. 2. If the failure indicated by error code 109 persists, the TN777B NETCON circuit pack must be replaced. 3. After the new TN777B 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 TN777B NETCON 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 TN777B NETCON circuit pack. 2. If the failure indicated by error code 110 persists, replace the TN777B NETCON circuit pack during the next scheduled maintenance visit. This failure does not cause service disruption.
	PASS	The 12-volt power supply unit in the TN777B NETCON circuit pack is functioning correctly.	

8	Maintenance Object Repair Procedures
	12V-PWR (12-Volt Power Supply)

8-890

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 “The Maintenance/Test Circuit Pack” section in this chapter.)
- 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 TN778 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.

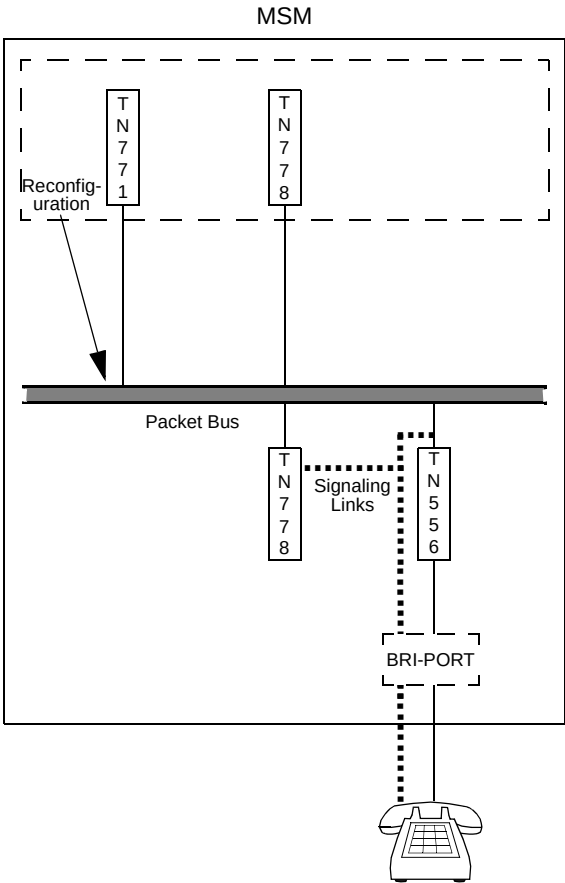


Figure 9-1. ISDN-BRI/Packet Bus Connectivity

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."

- **TN778 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.

- **TN778 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)

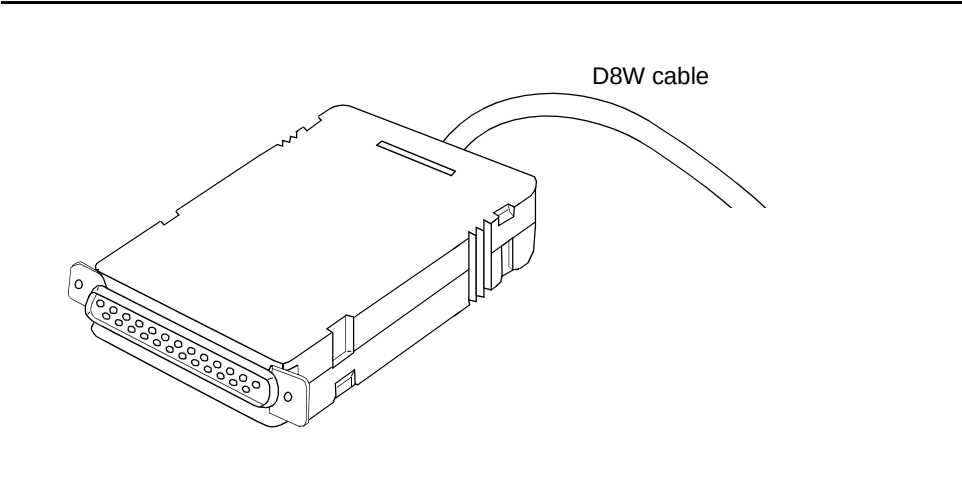


Figure 9-2. 355A EIA-232 Adapter

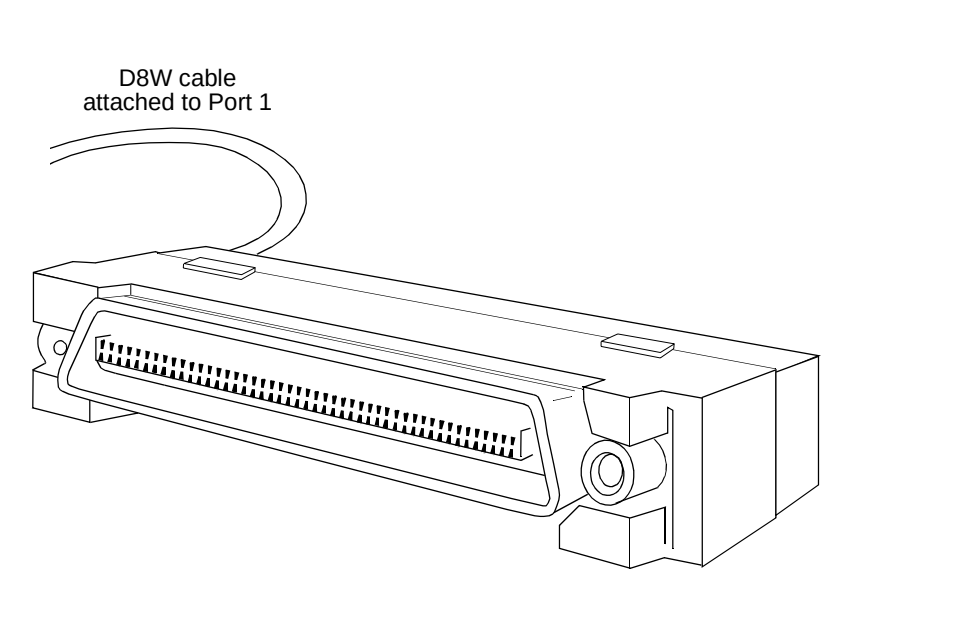


Figure 9-3. 258B Six-Port Male Amphenol Adapter

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:

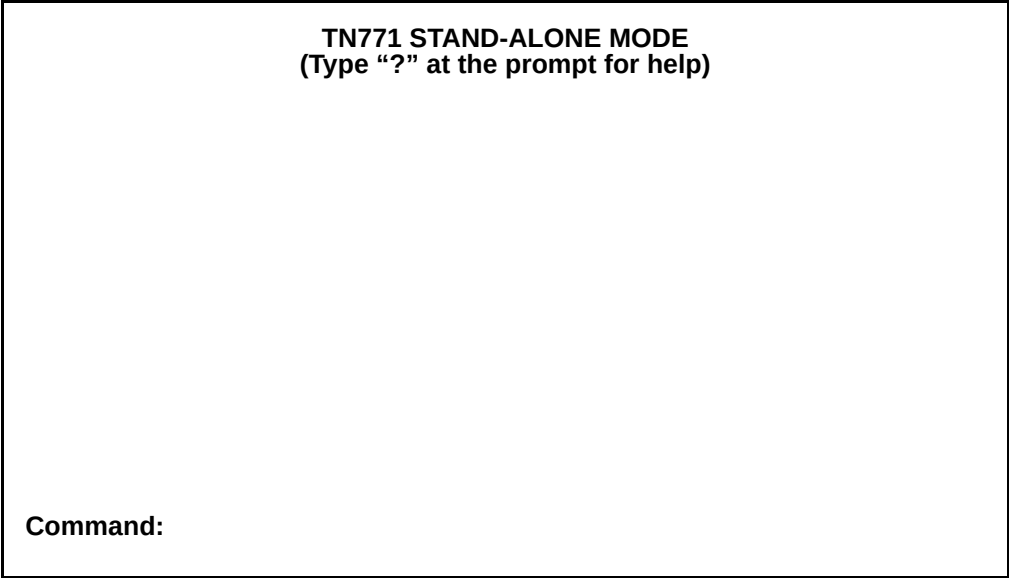


Figure 9-4. Normal Stand-Alone Mode Display

-  **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, reseal 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.

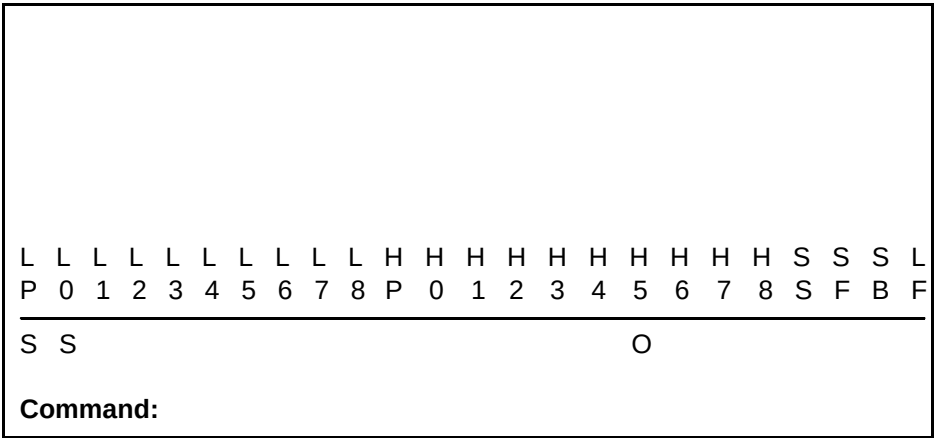


Figure 9-5. Example Stand-Alone Mode Display

9 Packet Bus Fault Isolation and Correction
Maintenance/Test Circuit Pack (TN771)

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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.

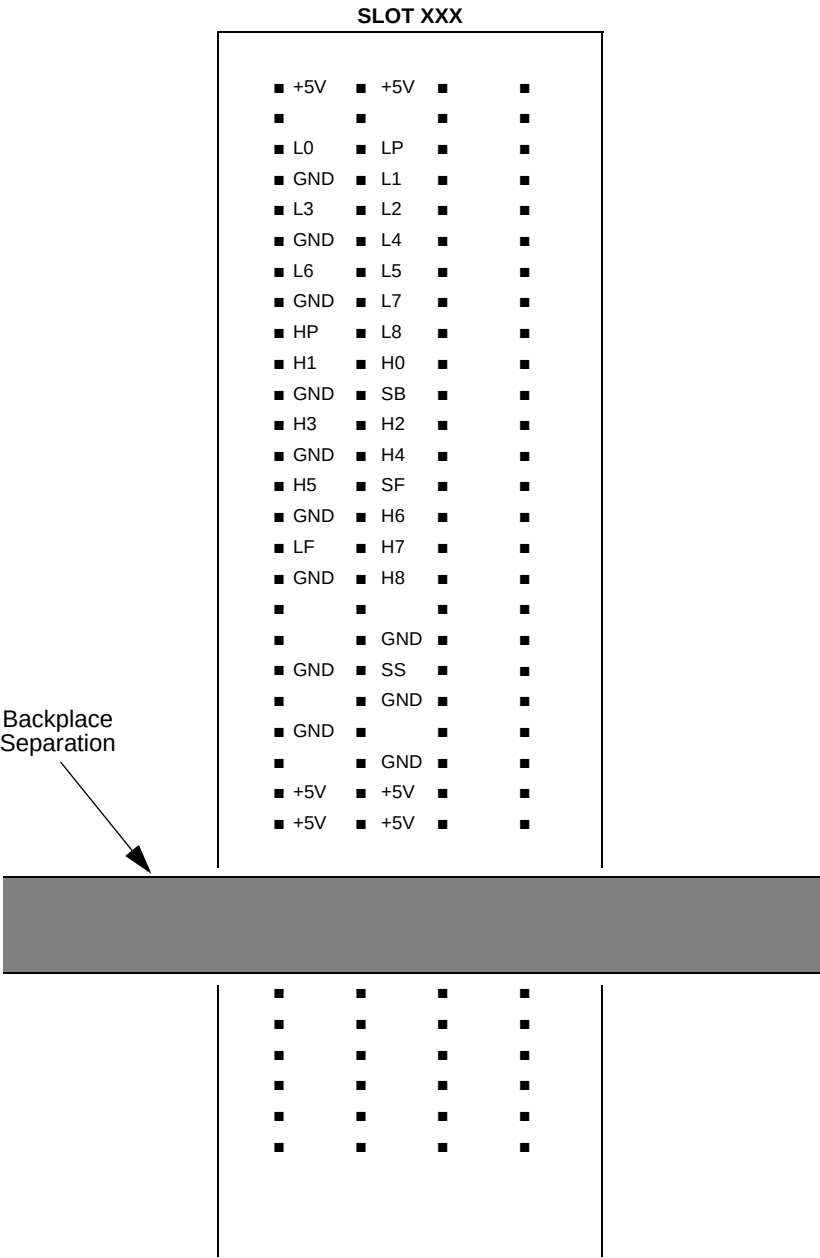


Figure 9-6. Packet Bus Leads on the Backplane—Front View

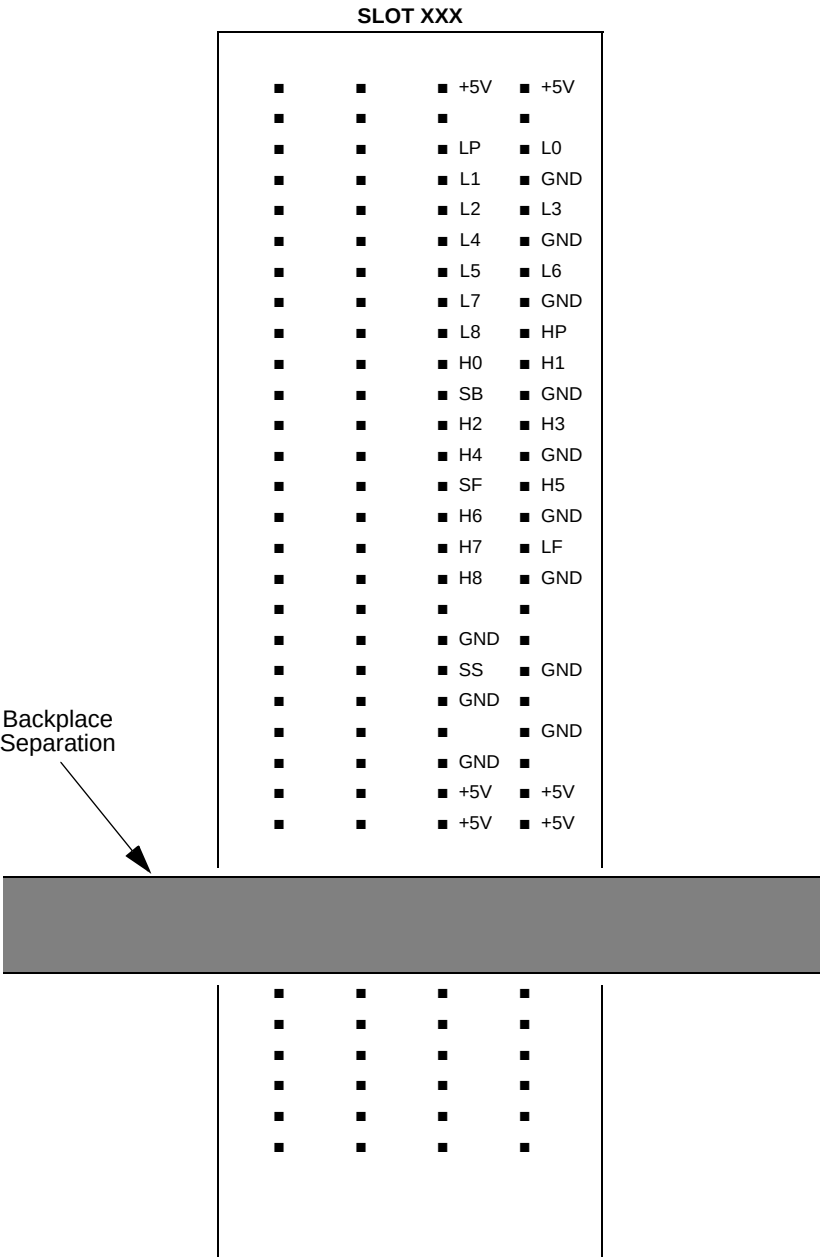


Figure 9-7. Packet Bus Leads on the Backplane—Back View

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 TN778 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."

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.

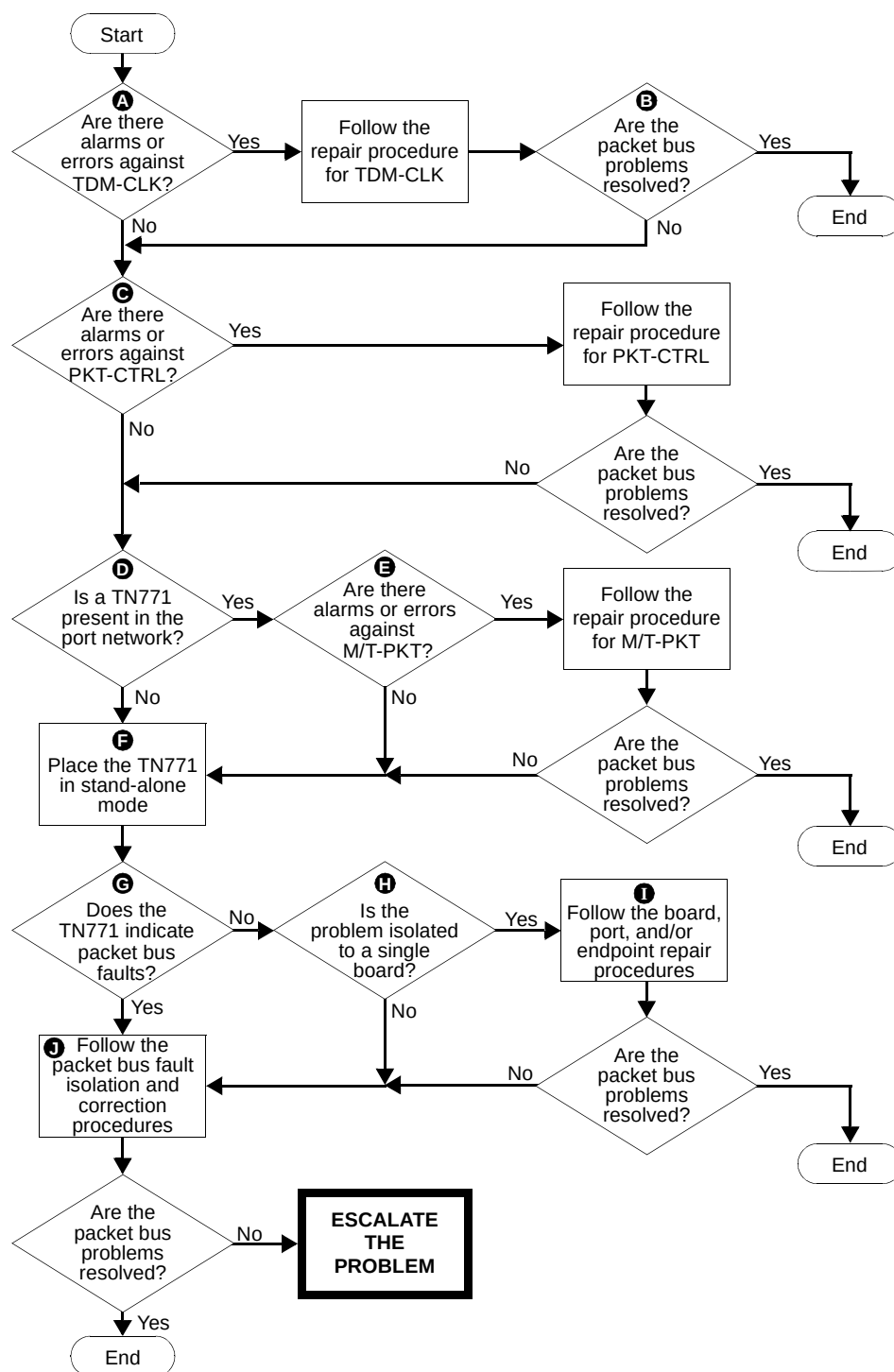


Figure 9-8. Processing of Packet Bus Problems

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 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	TN778	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" section in [Chapter 5, "Routine Maintenance Procedures"](#) straighten or replace the pins, reinsert the circuit pack, restore power (refer to the "Restoring Power" section in [Chapter 5, "Routine Maintenance Procedures"](#)), 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” section 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” section 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.

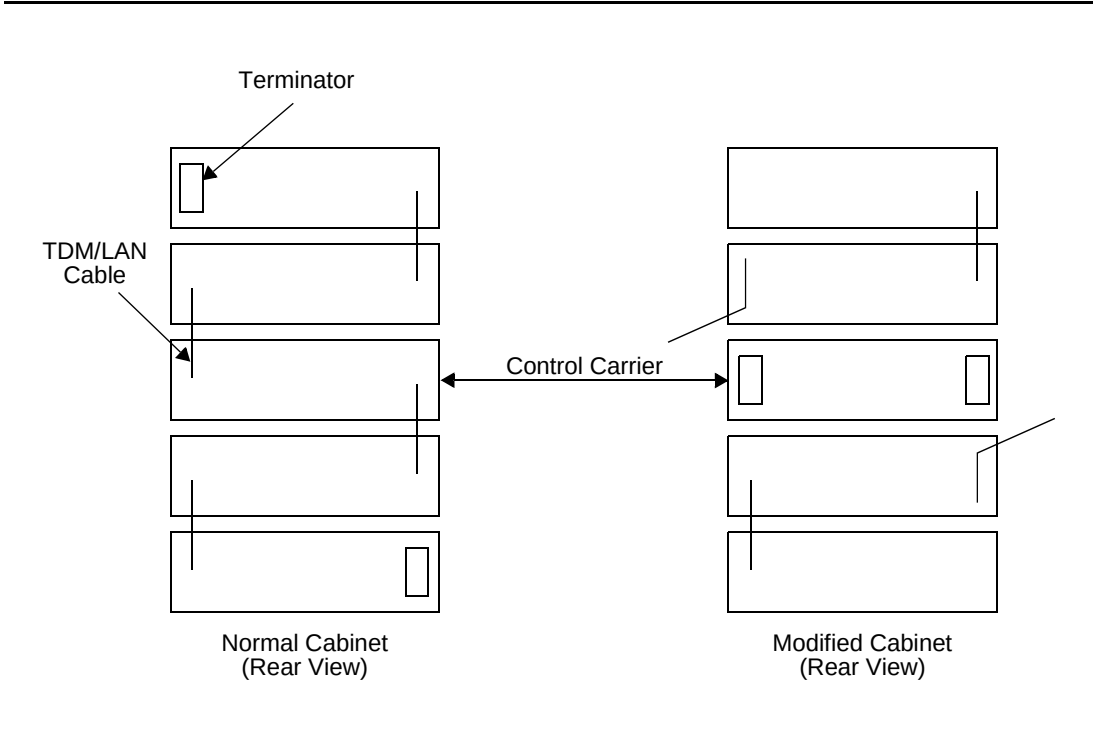


Figure 9-9. Carrier Rewiring Example



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" section 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" section 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.)

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Packet Bus Fault Correction

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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 Lucent Technologies 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 **status link** command provides the following response at the ESM MT:

<u>INFORMATION</u>	<u>POSSIBLE VALUE</u>
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

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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.

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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:

<u>Type</u>	<u>TX</u>	<u>RX</u>
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 Lucent Technologies 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**,

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<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

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- *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 10-1. 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 10-2. 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 10-3. 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 **esmshtut** 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 **esmshtut** 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 **esmshtut** 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 password 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.

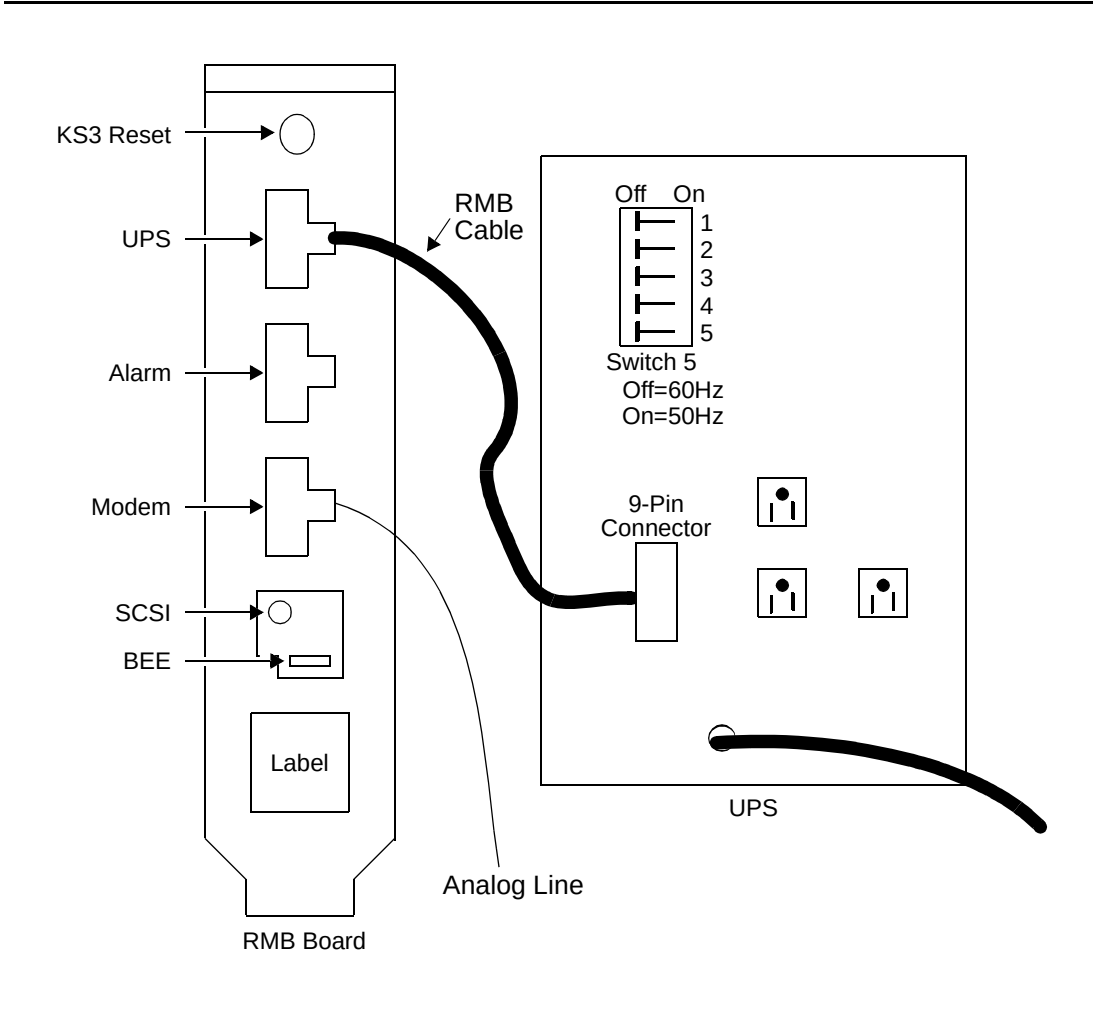


Figure 10-1. RMB-UPS Connection and RMB Faceplate Description

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.

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ESM Upgrade for 486 or Pentium Processor

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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)
- 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.

- RMB Disks 1 and 2 (domestic sites only)

 NOTE:

Only RMB diskette 1 is used during the actual installation. Diskette 2 should remain with the system for possible future trouble diagnosis.

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”; 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.

If your system does not have an RMB board, your software installation is now completed. If your system does have an RMB board, continue with the following steps. *In such a case, be careful to avoid skipping any necessary steps, many of which are repeated.*

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 the your technical center immediately and *do not continue the procedure*.
16. At the "#" prompt, type **pkgadd -d diskette1** to execute the packaging tool.
17. Insert the RMB Package Diskette (Disk 1 of 2) into the floppy drive, and press **ENTER** when you are ready to continue.

 NOTE:

You will not be using Disk 2 of 2 during this installation.

18. Press **ENTER** to install the RMB package.
19. Enter **1** for the value of the serial communication port used by the RMB.
20. Enter **y** to start the RMB daemon automatically.
21. Enter **q** to quit the packaging tool.
22. Remove the RMB Package Diskette from the floppy drive.
23. Follow the "ESM Shutdown Procedures" section earlier in this chapter.
24. Power on the ESM at the ON/OFF Switch.
25. When the system prompts for "**kernel will now be rebuilt**," press (ENTER). If you do not press (ENTER), the system times out and proceeds. The new kernel is built to incorporate the RMB enhancements, and the system reboots automatically. When the system comes up, the monitor displays a "login" prompt.
26. Log in as "root."
27. Enter the root password when prompted. The password can be obtained from your technical center.
28. At the # prompt, enter **cat /var/adm/kern.log**. If there are any suspicious messages regarding inodes, contact your technical center and *do not continue the procedure*.

29. Run the RMB configuration utility by entering **/esm/bin/rmb_config**. You are asked if you want to continue; you are then prompted for the customer's name (for example, "ESM Customer") and for the memory address of the RMB. For this address, enter **D000**.
30. Once the configuration is completed, follow the "ESM Shutdown Procedures" section earlier in this chapter.
31. Power off the ESM at the ON/OFF switch.
32. Ensure that the BEE switch located on the RMB connection faceplate is in the "on" position. Refer to ??? for a diagram of the KickStart 3 RMB faceplate and the location of the BEE switch.
33. Remove any disks from the floppy drive.
34. Power on the ESM cabinet at the ON/OFF switch.
35. When the RMB completes its initialization procedures, the following information is displayed on the monitor:

KickStart 3
Version 1.16.4
Created 9-September-1994

Press D to run diagnostics, C to continue.

36. Enter **D** to initiate diagnostic procedures on the RMB.

⇒ NOTE:

For some versions of the RMB, if you are installing on a system with a Pentium processor, the system may time out quickly and the normal boot sequence may continue (without diagnostics) after the previous prompt is displayed. If this occurs, you may still enter diagnostics mode by pressing and holding the D key as soon as the screen begins to display. If you are too late pressing the D key, allow the system boot to complete. Then follow the normal shutdown procedures and try again.

37. When prompted, enter the RMB user password "PASSWORD1."

⇒ NOTE:

If you had to hold down the D key as discussed in the previous **NOTE**, you may have to use the backspace key to erase any D's that have been inadvertently entered into the password field.

The following information is displayed on the monitor:

Loading Diagnostics

KickStart 3 - v1.16.4

Date & Time: mm/dd/yy hh:mm:ss
CPU: 486DX FPU: 486DX BUS: ISA
640 K Conv. 31744K Ext
HARD DRIVE0: CYL: 1024HD: 64 SECT: 32
FLOPPY DRIVE A: 3.5 1.44MB

LPT1 Not Available or Defective
LPT2 Not Available or Defective
LPT3 Not Available or Defective

COM1 Available at 03F8h
COM2 Available at 02F8h
COM3 Not Available or Defective
COM4 Not Available or Defective
Screen/Adapter Capabilities:
Screen Type: VGA Testing Mode: 0012h
X Max: 640 Y Max: 480 Color Max: 16
Memory Max: 153600

BIOS: (C) 1985-1989 Phoenix Technologies Ltd.
Press a key to continue.. .

NOTE:

In the previous display, "CPU" and "FPU" display as "486DX" even when a Pentium processor is being used. Also, "CYL: xxx" may appear instead of "CYL: 1024" depending on the size of the hard drive in the system.

38. Confirm that all values match the information in the previous step. Contact your technical center if the values do not match.
39. Press any key to continue.
40. Enter **SYS** at the "User" prompt to begin the RMB diagnostic procedures. Verify that all tests pass. If all tests do not pass, contact your technical center.
41. Log in as manager by entering **manager** and, when prompted, enter the level 2 password. Enter **reboot!** at the "Manager" prompt to reboot the system. If the system does not reboot automatically, power the ESM off and then on again to bring up the system.
42. When prompted to press "D" to run diagnostics or "C," press "C."

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43. Press ENTER to confirm the release of the UNIX operating system.
The system is now rebooting from the hard disk. When the system comes up, the monitor displays a "login" prompt.
44. Log in as "root."
45. Enter the "root" password when prompted. This password can be obtained from your technical center.
46. At the "#" prompt, enter **cat/var/adm/kern.log**. If there are any suspicious messages, contact your technical center immediately and *do not continue with the procedure*.

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.

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.

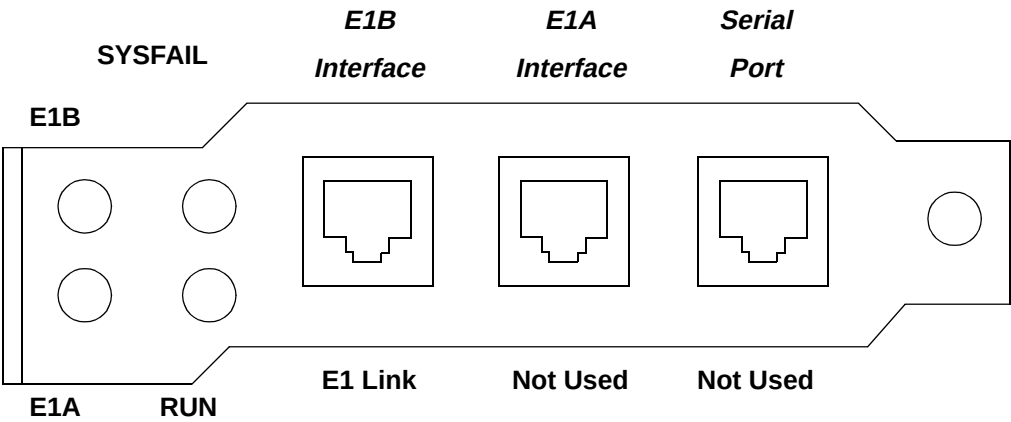


Figure 10-2. Rear Bracket of MSM Interface Card

- 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 10-4. 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.

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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."

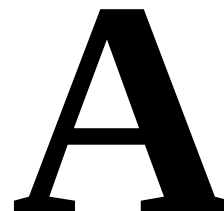
1. Once the MSM has been administered, enter the **status link n** command, where **n** is the link number of the ESM/MSM Link. If the MSM is using only packet control for D-channels, enter **status signal-group n** or **status esm** for a R6 MSM, or **status system 1** (page 2) for a R4 or R5 MSM.
2. 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.

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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



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 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	Permissions	Defaults	Feature Interactions
busyout access- endpoint	<i>extension</i>	Extension number of access endpoint (per dial-plan) Examples: busyout access-endpoint 25012 busyout access-endpoint 77868	init inads craft nms	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	Permissions	Defaults	Feature Interactions
busyout board	location	Board address (PCSSpp) Examples: busyout board 01c11 busyout board 02c15	init inads craft	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.								
	<table><tr><th>If the Object is</th><th>The field contains</th></tr><tr><td>station</td><td>extension</td></tr><tr><td>trunk</td><td>xxx/yyy (where xxx = trunk group number and yyy = member number)</td></tr><tr><td>private CO line</td><td>P/xxx (where xxx = private CO line group number)</td></tr></table>	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)
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 cdr-link

This command busyouts a maintenance object associated with the specified call detail recording (cdr) link.

Action/Object	Qualifier	Qualifier Description	Permissions	Defaults	Feature Interactions
busyout cdr-link	link-id	Link identifier (primary or secondary) Examples: busyout cdr-link primary busyout cdr-link secondary	init inads craft nms	Primary	None

Output

The following example shows the output from the busyout cdr-link primary command.

busyout cdr-link primarySPE 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. <table><tr><th>If the Object is</th><th>The field contains</th></tr><tr><td>station</td><td>extension</td></tr><tr><td>trunk</td><td>xxx/yyy (where xxx = trunk group number and yyy = member number)</td></tr><tr><td>private CO line</td><td>P/xxx (where xxx = private CO line group number)</td></tr></table>	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)
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	Permissions	Defaults	Feature Interactions
busyout data-module	extension	Extension number (per dial-plan) Example: busyout data-module 31300	init inads craft nms	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 is The field contains stationextension trunkxxx/yyy (where xxx = trunk group number and yyy = member number) private CO lineP/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 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	Permissions	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	init inads craft	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	Permissions	Defaults	Feature Interactions
busyout mis		Example: busyout mis	init inads craft cust rcust	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	Permissions	Defaults	Feature Interactions
busyout modem-pool	group	Group number = 1 – 5	init inads craft	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	Permissions	Defaults	Feature Interactions
busyout packet- control	location	Valid location = 1A. Example busyout packet-control 1A	init inads craft	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	Permissions	Defaults	Feature Interactions
busyout port	<i>location</i>	Port location: PPsspp Examples: busyout port 01c1101 busyout port 02c1501	init inads craft	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          Result     PASS
Command successfully completed

```

Field descriptions

Port	Port address (cabinet-carrier-slot-circuit)
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 lineP/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	Permissions	Defaults	Feature Interactions
busyout sp-link		Examples: busyout sp-link	init inads craft	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	Permissions	Defaults	Feature Interactions
busyout station	extension	Extension number (per dial-plan) Examples: busyout station 10020 busyout station 32770	init inads craft	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	Permissions	Defaults	Feature Interactions
busyout tdm	<i>pn number</i> <i>bus</i>	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	init inads craft	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            

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	Permissions	Defaults	Feature Interactions
busyout tone-clock	location	Physical location (PC) Examples: busyout tone-clock 01c busyout tone-clock 03d	init inads craft	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	Permissions	Defaults	Feature Interactions
busyout trunk	<i>group</i>	Trunk group number (1–99)	init inads craft	none	none
	<i>member</i>	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 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, 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	Permissions	Defaults	Feature Interactions
cancel hardware-group		Examples: cancel hardware-group	init inads	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	Permissions	Defaults	Feature Interactions
change circuit-packs	cabinet number	Cabinet number of the circuit packs Examples: change circuit-packs 1 change circuit-packs 2	init inads craft cust nms	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
01:			11:		
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

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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

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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:			

'#' indicates circuit pack conflict.

```
change circuit-packs 1                                Page 5 of 5

                CIRCUIT PACKS

    Cabinet: 1
Cabinet Layout: single-carrier
Slot Code  Sfx  Name
01: TN570      EXPANSION INTF
02: TN747  B    CO TRUNK
03: TN747  B    CO TRUNK
04: TN747  B    CO TRUNK
05: TN747  B    CO TRUNK
06: TN747  B    CO TRUNK
07:
08:
09:
10:

    Carrier: E
Carrier Type: port
Slot Code  Sfx  Name
11:
12:
13:
14:
15:
16:
17:
18:
19:
20:

'#' 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	Permissions	Defaults	Feature Interactions
change synchronization		Examples: change synchronization change synch	init inads craft cust rcust bcms	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	Permissions	Defaults	Feature Interactions
change system-parameters maintenance		Examples: change system-parameters maintenance	init inads craft cust rcust	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	Permissions	Defaults	Feature Interactions
clear errors		Examples: clear errors	init inads craft	none	none

clear interface

This command reinitializes 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	Permissions	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	init inads craft	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	Permissions	Defaults	Feature Interactions
clear isdn-testcall	group number	Trunk group number	init inads craft	none	none
	member number	Member within a trunk group Examples: clear isdn-testcall 80/1 clear isdn-testcall 78/2			

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	Permissions	Defaults	Feature Interactions
clear link	link-id	Link number (1-8) assigned through communication-interface links form. Examples: clear link 1 clear link 8	init inads craft	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	Permissions	Defaults	Feature Interactions
clear mst		Examples: clear mst	init inads	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	Permissions	Defaults	Feature Interactions
clear pkt	port network location	Physical location of the packet bus (1 - 3) Examples: clear pkt port-network 1	init inads craft	none	none

clear port

This command removes maintenance marks from a port, freeing it for use.

Action/Object	Qualifier	Qualifier Description	Permissions	Defaults	Feature Interactions
clear port	location	Port location (PCsspp) Examples: clear port 01c1102	init inads cust nms	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	Permissions	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	init inads craft cust rcust mis	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	Permissions	Defaults	Feature Interactions
disable mst		Example: disable mat	init inads	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	Permissions	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	init inads craft cust rcust	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	Permissions	Defaults	Feature Interactions
disable synchronization-switch			init inads craft	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	Permissions	Defaults	Feature Interactions
disable test-number	number	Maintenance test number	init inads	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	Permissions	Defaults	Feature Interactions
display alarms	<i>print</i> <i>schedule</i>	Report sent to printer 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	init inads craft cust rcust bcms browse	all alarms displayed	See next section

* 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? yWarning? 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 <i>prior</i> 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 <i>only</i> the group number (01-99) to display <i>all</i> members in the group. Example: 01/___ ■ Enter <i>both</i> the group number (01-99) and member number (01-99) to display a <i>specific</i> 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 Name	On Brd?	Alt Name	Alarm Type	Svc State	Ack? 1 2	Date Alarmed	Date 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	Permissions	Defaults	Feature Interactions
display cabinet	<i>print</i>	Report sent to printer	init inads craft cust rcust	none	none
	<i>schedule</i>	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 <i>or</i> 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 communication-interface

The **display communication-interface** command must contain one of the three qualifiers defined in the following paragraphs. The **display communication-interface hop-channels** command displays the translation data for hop channels. A hop channel is a bi-directional network channel between two interface links for DCS message hopping. A hop channel is used to tandem DCS messages from one interface link to another interface link.

The **display communication-interface links** command displays the translation information for each communication interface link. A link is an electronic communication channel transmitted over the Packet Bus for carrying packet-switched data. There are 16 links that terminate at one end on the Packet Interface circuit pack in the SPE. At the physical and link layers, the link terminates at the other end on a port on the PBX's switching matrix. At a higher level, the link continues over a transmission facility to another endpoint, such as a DCS node or AUDIX. The link carries application messages between the SPE and other switches or adjuncts.

The **display comm processor-channel** command displays the translation information for each of the local processor channels. A processor channel is one several data streams which are multiplexed by the X.25 protocol onto a single data link. The system has 128 total processor channels; up to 64 can be assigned to a single link.

See also ["status link"](#) for more details. (There are no feature interactions.)

Action/Object	Qualifier	Qualifier Description	Permissions	Defaults
display communication-interface	hop-channels	See explanation in a previous paragraph.	init	none
	links	See explanation in a previous paragraph.	inads	
	processor-channel	See explanation in a previous paragraph.	craft	
	print/	Report sent to printer	cust	
	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.*	rcust	

* Refer to the Report Scheduler and System Printer feature specification for more details.

Output for Hop-channels qualifier

When you enter the command **display comm hop**, the systems displays the Hop Channel Assignment screen, similar to the following figure. The number of the local processor channel, used to hop the interface link channels, is not shown.

display communication-interface hop-channels				Page	1 of	4
HOP CHANNEL ASSIGNMENT						
Link/Channel A		Link/Channel B		Link/Channel A		Link/Channel B
3	1	4	12			

Field descriptions

Link/Channel A	Identifies the first of the two link/channels joined by the hop channel. Links range from 1 to 16. Channels range from 1 to 64. The link/channel must not be assigned to a local processor channel. Also, the link must not be assigned to a PRI local processor channel.
Link/Channel B	Identifies the second of the two link/channels joined by the hop channel. Links range from 1 to 16. Channels range from 1 to 64. The link/channel pair must not be assigned to a local processor channel. Also, the link must not be assigned to a PRI local processor channel.

Output for Links qualifier

When you enter the command: **display communication-interface links**, the systems displays the Interface Links screen, similar to the following figure.

display communication-interface links						SPE A
INTERFACE LINKS						
Link	Enabled	X.25 Extension	Destination Number	Establish Connection	Connected Data Module	Identification
1:	y	5464	external	y	5460	AUDIX ID1
2:	n	5461	external	y		AUDIX-ADM-CONN1
3:	y	5466	external	y		CMS-ADM-CONN-2
4:	n					
5:	n					
6:	n					
7:	n					
8:	n					
9:	n					
10:	n					
11:	n					
12:	n					
13:	n					
14:	n					
15:	n					
16:	n					

Field descriptions

Link	The physical link number.
Enabled	A y (yes) indicates the link is enabled for normal operation. An n (no; default) indicates that the message flow over the link is suppressed. The link can be enabled only if the corresponding data module has been administered.
X.25 Extension	The extension of the TN577 Packet Gateway port through which the link is routed.
Destination Number	The entry external indicates the link goes to equipment connected locally to an external port on a Packet Gateway circuit pack. Such ports must show a y in the Establish Connection field.
Establish Connection	This field indicates whether the local switch is responsible for any part of call set-up with the far-end data module. If the physical link is through a pair of data modules, each switch terminating the link must set up a connection to its PDM/TDM. If the physical link is over a DS-1 interface, it is possible for one switch to set up the entire connection without any initiation by the other end. The ISDN signaling links must be set to y at both ends of the interface.
Connected Data Module	The extension of a PDM/MPDM directly connected to a PGATE port cable or to an adjunct in an administered connection arrangement.

Identification

This field records the type and identification number of the machine connected to this link and is for informational purposes only.

Output for Processor-Channel qualifier

When you enter the command **display communication-interface proc**, the systems displays Processor Channel Assignment screen, similar to the following figure.

display communication-interface processor-channels

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PROCESSOR CHANNEL ASSIGNMENT							
Proc Chan	Application	Interface Link	Chan	Local Port	Remote Port	Adjunct Name	Machine-ID
1:	dcs	3	1	1	1		13
2:	audix	1	1	59	11	AUDIX1	1
3:	audix	2	1	59	11	audix2	2
4:	gateway	1	10	59	10		
5:	gateway	1	9	59	9		
6:							
7:							
8:							
9:							
10:							
11:							
12:							
13:							
14:							
15:							
16:							

Field descriptions

Proc Chan	One of the processor channels on the processor link (1-16). Each interface link corresponds to a port on a PGATE board. The Processor channel is not administered. To specify a network channel to a remove machine, use this link/logical channel pair and the one specified in the interface link and interface channel field.
Application	Type of application that connects to this processor channel.
Interface Link	The interface link to which the processor channel is connected.
Interface Chan	The channel on the interface link to which the processor channel is connected.
Local Port	The switch application port used by the local session.

Remote Port	The application port used by the remote session.
Adjunct Name	The name of the adjunct connected to this processor channel. These are defined in the Adjunct Name Form. Only AUDIX and MSA channels require entries in this field: AUDIX, MSAAMWL, MSAHLWC, MSALLWC, and MSAMCS.
Machine-ID	The network machine ID for the remote machine. Machine IDs are required only for the AUDIX adjunct and DCS connections.

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	Permissions	Defaults	Feature Interactions
display disabled-tests	<i>print</i>	Report sent to printer	init inads craft cust rcust	none	none
	<i>schedule</i>	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-testsSPE 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	Permissions	Defaults	Feature Interactions
display errors	high resolution	Highlights the time stamps on the Error Report for the first and last occurrences of the error.	init inads craft cust nms browse	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

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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

- ExtensionEnter the extension number.
- TrunkEnter 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 1SPE A

HARDWARE ERROR REPORT - ACTIVE ALARMS

Port	Mtce Name	Alt Name	Err Type	Aux Data	First Occur	Last Occur	Err Cnt	Err Rt	Rt/ Hr	Al St	Ac
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

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HIGH RESOLUTION HARDWARE ERROR REPORT - ACTIVE ALARMS

Port	Mtce Name	Alt Name	Err Type	Aux Data	First Occur	Seq Cnt	Last Occur	Seq Cnt	Err Cnt	Al 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	Permissions	Defaults	Feature Interactions
display initcauses	print schedule	Report sent to printer 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	init inads craft nms	none	none

* 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

- CauseReason 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	Permissions	Defaults	Feature Interactions
display memory-configuration	print	Report sent to printer	init inads craft cust browse	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.

The following output example is for the **display memory** command.

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	Permissions	Defaults	Feature Interactions
display port	location	Port address (PCSSpp)	init	none	none
	print	Report sent to printer	inads craft		
	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	cust browse		

* 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

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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	Permissions	Defaults	Feature Interactions
display synchronization	print schedule	Report sent to printer 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	init inads craft cust rcust bcms browse	none	See next section

* 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

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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	Permissions	Defaults	Feature Interactions
display system-parameters maintenance	print	Report sent to printer	init inads craft super-user Maintain Switch Circuit Packs permissions	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	Permissions	Defaults	Feature Interactions
display time	print schedule	Report sent to printer 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	init inads craft cust browse	none	Date and time are generally used by the switch.

* 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	Permissions	Defaults	Feature Interactions
download update-file			init inads	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 redownloading 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	Permissions	Defaults	Feature Interactions
enable administered-connection	ac number	The number of the administered connection	init inads craft cust rcust mis	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	Permissions	Defaults	Feature Interactions
enable mst			init inads	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-Lucent Technologies) 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 (Lucent Technologies) 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	Permissions	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	init inads craft cust rcust	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	Permissions	Defaults	Feature Interactions
enable synchronization-switch			init inads craft	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	Permissions	Defaults	Feature Interactions
enable test-number	number	The test number to re-enable Example: enable test-number 102	init inads craft	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	Permissions	Defaults	Feature Interactions
format card-mem	translation announcements coredump firmware	Erases and formats the memory card for: translations only translations and announcements translations, announcement, and coredump translations, announcements coredump, and firmware	init inads craft cust browse system	none	none

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	Permissions	Defaults	Feature Interactions
list configuration	hardware-group print schedule	Enter a group listed in the Hardware Groups section below. Report sent to printer. 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	init inads craft cust rcust	none	none

 **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   Board Type      Code      Vintage      Assigned Ports
Number                                     u=unassigned t=tti

01C00   MAINTENANCE/TEST  TN771C    000003       u  02 03 04
01C01   AUXILIARY TRUNK     TN748C    conflict     u  u  u  u
01C02   EXPANSION INTRFC     no board
01C03   PGATE BOARD          TN577     000003       u  u  u  u
01C05   TONE DETECTOR        TN748B    000002       01 02 03 u  05 06 07
01C06   DS1 INTERFACE        TN767     000011       u  u  u  u  u  u  u
                                           u  u  u  u  u  u  u
                                           u  u  u  u  u  u  u

01C07   ANALOG LINE          TN742     000010       u  u  u  u  u  u  u
01C08   HYBRID LINE          TN762B    000004       u  u  u  u  u  u  u
01C09   ANALOG LINE          TN742     000010       u  u  u  u  u  u  u
01C11   DIGITAL LINE         TN754     000004       u  u  u  u  u  u  u
01C12   DID TRUNK            TN753     000006       u  u  u  u  u  u  u
01C13   ANALOG LINE          TN742     000010       u  u  u  u  u  u  u

press CANCEL to quit -- press NEXT PAGE to continue
```


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

Location  Code   Vintage  Signaling      Name          CSU MOD
01B05     TN464F  000002   isdn-pri              120A1
01B06     TN464D  000002   isdn-pri              n/a
01B10     TN767C  000003   none                  n/a
01B11     TN767E  000003   robbed-bit           120A1
01B12     TN767E  conflict none                  <blank>
01C06                no board  none                  <blank>
01C13     TN464E  000003   common-channel       unknown
01C16     TN767D  000024   robbed-bit           unknown
01C18     TN464F  000002   isdn-pri              none
```

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	Permissions	Defaults	Feature Interactions
list configuration software-version	<i>memory-resident</i>	Data for the active SPE.	init inads craft	none	none
	<i>long</i>				
	<i>print</i>	Report sent to printer.			
	<i>schedule</i>	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-version                                Page 1

                                SOFTWARE VERSIONS
                                SPE-A                               SPE-B

    UPDATE FILE
Creation (GMT) Date: 4:17 pm FRI NOV 3,1995                    4:17 pm FRI NOV 3, 1995
  Old Version Tape: G3V4i.03.0.044.0                          G3V4i .03.0.044.0
  Old Identifier Tape: none                                    none
  New Identifier Tape: 000010                                  000010
    Update State: new update ready to be                       entirely applied
                  applied                                       to memory

    SOFTWARE VERSION
  Memory Resident: G3V4i.03.0.044.0                            G3V4i .03.0.044.0
  Mem Card Resident: none                                       none
  Update Identifier: none                                       000010

    TRANSLATION DATE
  Memory Resident: 1:01 pm THU NOV 2, 1995
  Mem Card Resident: 1:01 pm THU NOV 2, 1995
list config log applied patch to standby

                                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 <i>not</i> 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-version

Page 2

SOFTWARE VERSIONS

SPE-A

PI FW VERSION

PI 1 Resident: 000162

PI 2 Resident: none

Flash Resident: 000162

PI 1 Resident: 000162

PI 2 Resident: none

Flash Resident: 000162

ANNOUNCEMENT DATE

Mem Card Resident: none

PKT-CTRL FW VERSION

Pkt-Ctrl Resident: 000021

Flash Resident: 000021

SPE-B

PI FW VERSION

PI 1 Resident: 000162

PI 2 Resident: none

Flash Resident: 000162

PI 1 Resident: 000162

PI 2 Resident: none

Flash Resident: 000162

ANNOUNCEMENT DATE

Mem Card Resident: none

PKT-CTRL FW VERSION

Pkt-Ctrl Resident: 000021

Flash Resident: 000021

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	Displays information related to the Packet Control firmware.
Version Section	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	Permissions	Defaults	Feature Interactions
list disabled-mos	print	Report sent to printer.	init inads	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	Permissions	Defaults	Feature Interactions
list history	print	Report sent to printer.	init inads craft cust browse nms	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.

A Maintenance Commands and Troubleclearing Aids
list isdn-testcall

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Action/Object	Qualifier	Qualifier Description	Permissions	Defaults	Feature Interactions
list isdn-testcall	print	Report sent to printer.	init inads craft	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-ChannelThe trunk in use for the ISDN-PRI test call (trunk group number/member number).
- Start TimeThe time the test call started (dd/hh:mm format).
- DurationThe expected duration of the test call.
- M/T PortThe 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	Permissions	Defaults	Feature Interactions
list marked-ports	<i>print</i> <i>schedule</i>	Report sent to printer. 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	init inads craft cust rcust bcms browse	none	none

* Refer to the Report Scheduler and System Printer feature specification for more details.

Output

```
list marked-ports

      Port      MARKED-PORT INFORMATION
      1C0101    Board-Type
      1C0601    DIG-BD
      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	Permissions	Defaults	Feature Interactions
list measurements	log	Detailed report generated	init	none	none
	summary	Summary report generated	inads		
	ds1_location	The physical location of a DS1 circuit pack entered as cabinet-carrier-slot.	craft		
	print	Report sent to printer.	cust		
	schedule	Report sent to printer. 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	rcust browse nms bcms		

* 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
Category      Worst_15-Min_Interval 24-hr 15-Min Interval
         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 "E", "B", "S", and "F". 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.

A Maintenance Commands and Troubleclearing Aids
list mst

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Action/Object	Qualifier	Qualifier Description	Permissions	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.	init inads	FIFO order	See documentation on the system printer feature.
	count number	Message count; can be used to limit the trace			
	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

- NumberThe sequence number for the message.
- Date/TimeThe Date/Time.
- TypeMST message type:
60 = ISDN uplink
62 = ISDN downlink,
6C = ISDN level 2 primitive
- MessageMessage 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 (debug)
0x24	Hardware error log
0x25	PREC message
0x26	CMS outgoing (individual)
0x27	CMS incoming (individual)

Table A-1. Summary of MST Message Types — Continued

Code	Description
0x30	CCMS uplink message
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
0xD0	X.25 Outgoing processor channel control message
0xD1	X.25 Incoming processor channel control message
0xD2	X.25 Link control message
0xD3	X.25 Link status message
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)

Table A-1. Summary of MST Message Types — Continued

Code	Description
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

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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

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

X.25 Application Data

The processor channel number is the R1/R3 term, and R2 calls it the port number. The processor channel number is equal to the Application port number in R1. In R3, the processor channel admin screen should be inspected to determine the mapping.

0xA0 - X.25 outgoing application message

- Message[1] = processor channel number
- Message[2] = sequence number
- Message[3] = buffer id
- Message[4] = 0x00
- Message[5+] = application message*

* Application messages will contain the session layer data headers and the data.

In abbreviated mode, the application message is not saved.

0xA1 - X.25 incoming application message

- Message[1] = processor channel number
- Message[2] = sequence number
- Message[3+] = application message

In abbreviated mode, the application message is not saved.

Application Control

0xA2 - X.25 application error or notification



NOTE:

The 'X.25 application error message' category contains notifications as well as errors.

0xA2, 0xF0 and 0xF2 messages will be turned on by responding 'y' to the 'Application Errors?' field.

Version 1:

Message[1] = processor channel number
Message[2] = application error/notification

Version 2:

Message[1] = processor channel number
Message[2] = application error/notification
Message[3+] = pm stimulus ignored (For message[2] == 0x10 only)

Errors/Notifications:

R1/R3:

0x01 - no outgoing buffer available
0x05 - pvc session down
0x06 - pvc session up
0x07 - pvc session connect
0x08 - pvc session restart
0x09 - message buffer overload uplink
0x0A - message buffer overload downlink
0x0B - message buffer exhaustion
0x0C - max # of outgoing msgs allowed
0x0D - bad msg type in message buffer routine
0x0E - no message buffers available
0x0F - message buffer pointer error
0x10 - pm state table stimulus ignored
0x11 - bad session connect message

Session Layer Control



NOTE:

The session layer header is considered part of the session layer message.

0xB0 - X.25 outgoing session layer control message

Message[1] = processor channel number
Message[2] = session layer message type
Message[3] = buffer id
Message[4] = 0
Message[5+] = session layer message

session layer message type:

0x00 - session connect
0x01 - session accept
0x02 - session reject
0x03 - session disconnect
0x04 - reserved
0x05 - reserved
0x06 - resynch
0x07 - reserved
0x08 - resynch acknowledge

In abbreviated mode, the session layer message is not saved.

0xB1 - X.25 incoming session layer control message

Message[1] = processor channel number
Message[2] = session message type
Message[3+] = session message

session message type:

0x00 - session connect
0x01 - session accept
0x02 - session reject
0x03 - session disconnect
0x04 - reserved
0x05 - reserved
0x06 - resynch
0x07 - reserved
0x08 - reserved

In abbreviated mode, the session layer message is not saved.

0xCF - message confirmation

This confirmation is X.25 far end confirmation.

- Message[1] = processor channel number
- Message[2] = internal buffer id
- Message[3] = count of outgoing buffers confirmed

Processor Channel Control

0xD0 - outgoing control message

- Message[1] = processor channel number
- Message[2] = message event

Message events for R1:

- 0x00 - Request Reset of Logical Channel
- 0x05 - Ack. Reset of Logical Channel
- 0x06 - Flow Control Uplink
- 0x07 - Release Uplink Flow Control
- 0x0A - Flow Control Downlink
- 0x0B - Release Downlink Flow Control

Message events for R3:

- 0x00 - Request Reset of Logical Channel
- 0x08 - Connect Processor Channel
- 0x09 - Disconnect Processor Channel
- 0xD1 - X.25 incoming control message

- Message[1] = processor channel number
- Message[2] = message event

R1 Message events:

- 0x01 - Performed Requested Reset of Logical Channel
- 0x06 - Resetting Logical Channel
- 0x0A - Level 3 Restart¹

R3 Message events:

1. If this event occurs, one restart for each logical channel will be written into the MST trace.

- 0x01 - Performed Requested Reset of Logical Channel
- 0x06 - Resetting Logical Channel
- 0x08 - processor channel connected
- 0x09 - processor channel disconnected

Link Control

0xD2 - link control

- Message[1] = interface link number
- Message[2] = message event

R1 Message events:

- 0x00 - Busy Out Link
- 0x01 - Release Busied Out Link
- 0x0A - Level 3 Restarting

R3 Message events:

- 0x00 - Stop Link
- 0x01 - Start Link
- 0x0A - Level 3 Restarting

0xD3 - link status (R3 Only)

- Message[1] = interface link number
- Message[2] = message event

R3 Message events:

- 0x02 - Session Down
- 0x03 - Session Up

Session Sanity

0xE2 - X.25 Session Timer Expirations

- Message[1] = processor channel number
- Message[2] = timer

Timers:

- 0x00 - ST2(session connect)
- 0x01 - ST3(retransmission)

Message[3] = countdown from A1

- 0x02 - ST4(resynchronization)

No count

- 0x03 - ABT1(abort session 1)

Message[3] = protocol machine state where timeout occurred

- 0x04 - ABT2(abort session 2)

Message[3] = protocol machine state where timeout occurred

- 0x05 - State Timer

Message[3] = protocol machine state where timeout occurred

- 0x06 - Message Timer

Message[3] not used

Protocol Machine States:

BAD_STATE	0x00 /* 0 is very common, don't use as a state */
PT_UNALLOC	0x01 /* port is un-allocated */
QUIESCENT	0x02 /* quiescent - allocated but not used */
ENTER_wSA	0x03 /* entering wSA - reset issued, not ABT/CON */
W_ACCEPT	0x04 /* Waiting for Session Accept*/
DATA_XFER	0x05 /* Data Transfer State*/
DATA_RESYNC	0x06 /* Resynchronization state */
PRI_ALLOC	0x07 /* pri port allocated but not yet used */
PRI_CONN	0x08 /* pri port connected */
HIGH_STATE	0x08 /* Highest value a port state can be*/

X.25 Errors

0xF0 - X.25 Error Message (Outgoing Message Lost)

Note that 0xA2, 0xF0 and 0xF2 messages will be turned on by responding 'y' to the 'Application Errors?' field.

Version 1:

- Message[1] = processor channel number
- Message[2] = sequence number
- Message[3+] = message

Version 2:

- Message[1] = processor channel number
- Message[2] = sequence number
- Message[3] = reason code
- Message[4+] = message

Reason Codes:

- 0x00 /* message lost */
/* 1 reserved */
- 0x02 /* message ignored, sequence number is within window but less
* than expected
*/
- 0x03 /* message ignored, bad sequence number */
- 0x04 /* message ignored, other port has sent a disconnect message */
- 0x05 /* message ignored, send request is rejected*/
- 0x06 /* message ignored, from ig_l3 */
- 0x07 /* message ignored, from l3_err */
- 0x08 /* sequence number is within window but less
* than expected (resync)
*/
- 0x09 /* bad sequence number (resync) */

In abbreviated mode, the application message is not saved.

0xF1 - Unrecognized X.25 Messages

- Message[1] = processor channel number
- Message[2] = Failure type
- Message[3+] = session message

Failure types:

- 0x00 - Reserved
- 0x01 - Unknown session layer message type
- 0x02 - unrecognized control message

0xF2 - BX.25 Error Message (DIP ICOM Record Aborted)

R2 only

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	Permissions	Defaults	Feature Interactions
list suspend-alm-orig	print schedule	Report sent to printer. 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	init inads craft	none	none

* 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
```

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	Permissions	Defaults	Feature Interactions
mark port	location	Physical location: PCSSpp Examples: mark port 1c0208 mark port 2a1001	init inads craft	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	Permissions	Defaults	Feature Interactions
monitor security-violations	print	Report sent to printer. Examples: monitor security-violations monitor security-violations print	init inads craft cust rcust bcms browse	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	Permissions	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	init inads craft cust nms browse	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 form 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 pnn's.

Output

Below are displays of **monitor system view 1** and **monitor system view 2**.

```
monitor system view1
      ATTENDANT STATUS
      Console no.
Activated: 1 2 3 4 5 6
      Deactivated: 7 8
      MAINTENANCE STATUS
      # of alarms for trunks: 4
      # of alarms for stations: 2
      # of alarms for other res: 1
      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:
      Hunt groups Measurement
(4 grps with highest # of qued calls)
      Grp no: 16
      Calls qued: 2
      Calls aban: 1
      Attendant Group Measurement
      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
Pnn   Bus   State *Idle Count
10     0   Maint    0
10     1   Normal  233
10     0   Maint    0
10     1   Normal  233
22     0   Maint    0
22     1   Normal  233
22     0   Maint    0
22     1   Normal  233
1      0   Maint    0
1      1   Normal  233
1      0   Maint    0
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
*Callrate: 20
*Interval: 60
*Max_callrate:45
*Next_hour: 70
```

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 pnnns 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-TN74 8 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-TN74 8 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 - TN74
4 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 - TN74
4 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 - TN74
4 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	Permissions	Defaults	Feature Interactions
monitor traffic	<i>trunk-groups</i> <i>hunt-groups</i>	see below Examples: monitor traffic trunk-groups monitor traffic trunk-groups 4 monitor traffic hunt-groups	init inads craft cust rcust bcms browse	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)
```

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	Permissions	Defaults	Feature Interactions
busyout mis	location	Physical location of desired carrier. Carrier b-e.	init inads craft	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	Permissions	Defaults	Feature Interactions
release access-endpoint	extension	number associated with desired access endpoint. Examples: release access-endpoint 25012 release access-endpoint 77868	init inads craft nms	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	Permissions	Defaults	Feature Interactions
release board	location	Physical location: PCsspp Examples: release board 01c11 release board 02c15	init inads craft nms	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
01C0702 ANL-LINE
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.								
	<table><tr><th>If the Object is</th><th>The field contains</th></tr><tr><td>station</td><td>extension</td></tr><tr><td>trunk</td><td>xxx/yyy (where xxx = trunk group number and yyy = member number)</td></tr><tr><td>private CO line</td><td>P/xxx (where xxx = private CO line group number)</td></tr></table>	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)
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 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	Permissions	Defaults	Feature Interactions
release cdr-link	<i>link-id</i>	primary secondary Examples: release cdr-link primary release cdr-link secondary	init inads craft	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	Permissions	Defaults	Feature Interactions
release data-module	extension	Extension number associated with desired data module or data channel. Examples: release data-module 310	init inads craft cust nms	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. <table><tr><th>If the Object is</th><th>The field contains</th></tr><tr><td>station</td><td>extension</td></tr><tr><td>trunk</td><td>xxx/yyy (where xxx = trunk group number and yyy = member number)</td></tr><tr><td>private CO line</td><td>P/xxx (where xxx = private CO line group number)</td></tr></table>	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)
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 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	Permissions	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	init inads craft	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	Permissions	Defaults	Feature Interactions
release modem-pool	<i>group</i> <i>member</i>	1-5. 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	init inads craft	none	none

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	Permissions	Defaults	Feature Interactions
release packet-control	location	location parameter not used. Examples: release packet-control 1A release packet-control 1B	init inads craft	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	Permissions	Defaults	Feature Interactions
release sp-link			init inads craft	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 <table><tr><td>station</td><td>extension</td></tr><tr><td>trunk</td><td>xxx/yyy (where xxx = trunk group number and yyy = member number)</td></tr><tr><td>private CO line</td><td>P/xxx (where xxx = private CO line group number)</td></tr></table>	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)
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	Permissions	Defaults	Feature Interactions
release station	extension	extension number associated with the desired voice terminal Examples: release station 10020 release station 32770	init inads craft cust	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	Permissions	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	init inads craft	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

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	Permissions	Defaults	Feature Interactions
release tone-clock	location	Physical location: PCsspp Examples: release tone-clock c	init inads craft	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             
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	Permissions	Defaults	Feature Interactions
release trunk	<i>group</i>	Group number (1–99)	init inads craft	none	none
	<i>member</i>	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.								
	<table><tr><th>If the Object is</th><th>The field contains</th></tr><tr><td>station</td><td>extension</td></tr><tr><td>trunk</td><td>xxx/yyy (where xxx = trunk group number and yyy = member number)</td></tr><tr><td>private CO line</td><td>P/xxx (where xxx = private CO line group number)</td></tr></table>	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)
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.								

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	Permissions	Defaults	Feature Interactions
reset board	location	Physical location: PCsspp	init inads craft nms	carrier = 1 repeat number = 1	none
	repeat	Number of times each board reset repeats (1– 00)			
	number	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.

Command Successfully Completed



The interface command interrupts operation of the DCS or ISDN-PRI.

Action/Object	Qualifier	Qualifier Description	Permissions	Defaults	Feature Interactions
reset interface	location	(cabinet-carrier-position) of the processor interface (PI board). The position determines cleared processor interface circuit pack. first processor interface = 1 second processor interface = 2 Examples: reset interface 01a1 reset interface a2 reset interface 01b1 reset interface 01b2	init inads craft	none	none

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	Permissions	Defaults	Feature Interactions
reset system	level health-override	See below Examples: reset system 1 reset system 2 reset system health-override	init inads craft	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
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	Permissions	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	init inads craft cust	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	Permissions	Defaults	Feature Interactions
set options			init inads	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

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	Permissions	Defaults	Feature Interactions
set signaling-group	group identifier	administered number associated with each signaling group. Examples: set signaling-group 1 set signaling-group 2	init inads craft	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	Permissions	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	init inads craft	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	Permissions	Defaults	Feature Interactions
set tdm	port network	specifies the Port Network number of the TDM bus.	init inads craft	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	Permissions	Defaults	Feature Interactions
set time			init inads craft cust rcust bcms browse	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	Permissions	Defaults	Feature Interactions
status access-endpoint	extension	extension number of the access endpoint	init inads craft cust nms browse	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	Permissions	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	init inads craft cust rcust bcms browse	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	Permissions	Defaults	Feature Interactions
status bri-port	location print	Physical location: PCsspp Report sent to printer. Examples: status bri-port 1c0701 status bri-port 1c0701 print	init inads craft cust nms browse	none	none

Output

The following example shows the output from the **status bri-port 1c1701** command.

status bri-port 1c1701Page 1 of 1SPE 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 ValueLayer 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 "l3-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-2. 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. 1. Check endpoints and wiring by following SPID Facility Test Procedures described in the BRI-SET Maintenance documentation. 2. 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.  NOTE: 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.

Table A-2. Status BRI-Port Command Interpretation — Continued

Endpoint Types	TEI Range	Layer 2 State	Voice Extension	Service SPID	Description / Recommendation
BRI	64-126	Established	blank	blank	Transitory state for automatic TEIBRI endpoints which support MIM initialization. 1. 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. 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.
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. 1. 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.

— Continued

Table A-2. 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	blank	Transitory state for BRI endpoints which support MIM initialization. 1. Wait for five seconds and repeat the command. If the state has not changed, continue with Step 2. 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. 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	0-126	L3-Assigned	ext	yes	Transitory state for BRI endpoints which support MIM initialization when SPID Facility Test initializes the station. 1. Wait for five seconds and repeat the command. If the state has not changed, continue with Step 2. 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. 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.

— Continued

Table A-2. Status BRI-Port Command Interpretation — Continued

Endpoint Types	TEI Range	Layer 2 State	Voice Extension	Service SPID	Description / Recommendation
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: 1. 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. 2. 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.

— Continued

status card-mem

Memory cards are portable, compact memory cards that contain banks of flash EPROM chips. Non-volatile memory cards are eraseable 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	Permissions	Defaults	Feature Interactions
status card-mem	location	Physical carrier position where the memory card resides Report sent to printer. Examples: status card-mem status card-mem A status card-mem b print	init inads craft cust rcust nms bcms browse	none	see next section
	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.

⇒ NOTE:

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	Permissions	Defaults	Feature Interactions
status cdr-link	print	Report sent to printer. Examples: status cdr-link status cdr-link print	init inads craft cust rcust nms bcms browse	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	Permissions	Defaults	Feature Interactions
busyout mis	extension	data module extension	init inads craft cust rcust bcms browse	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	Permissions	Defaults	Feature Interactions
status esm			init inads craft	none	none

Output

The following output example is a display of the **status esm** command.

status esmpage 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 interface

This command displays the number of counters maintained by the PI. The PI is a front end processor implementing packet layers and link layers of the BX.25 protocol and the integrated services digital network (ISDN) procedure-D protocols.

Action/Object	Qualifier	Qualifier Description	Permissions	Defaults	Feature Interactions
status interface	location	(cabinet-carrier-position) of the processor interface (PI board). 1 = the first processor interface in the carrier; 2 = the second processor interface in the carrier.	init inads craft cust rcust bcms browse	1 (one)	none
	print	Report sent to printer. Examples: status interface a1 status interface 01a2 status interface 01b1 status interface b2 status interface b2 print			

Output

The following example is a display of the **status interface a1** command.


```
status interface a1

PROCESSOR INTERFACE STATUS

Base Level Occupancy(low): 10
Base Level Occupancy(high): 25
Primary Queue Audit Error: 4
Secondary Queue Audit Error: 10
Translation Audit Error: 12
Protocol Timer Audit Error: 0
Hardware Sanity Timeout: 1
Hardware Resource Error: 12
Hardware Overload Error: 8
```

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	Permissions	Defaults	Feature Interactions
status isdn-testcall	group number	administered number associated with each trunk group.	init inads craft	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 isdn-testcall 80/1** command.

status isdn-testcall 80/1					Page 1 of 1 SPE A			
ISDN TESTCALL STATUS								
Port	Bit Error Rate	Number Of Bits	Block Error Rate	Number Of Blocks	Start Time	Duration Specified	Duration Of Test	Reason Of 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 link

The **status link** command displays the operational status associated with a specified processor interface link.

Action/Object	Qualifier	Qualifier Description	Permissions	Defaults	Feature Interactions
status link	link number print	A link number (1-8) associated with a specific link. Report sent to printer. Examples: status link 1 status link 8 status link 4 print	init inads craft cust rcust bcms browse	none	none

Definitions

Link	A synchronous connection between the system and another system. The link consists of three protocol levels. The change communications-interface links command specifies the link number.
Level 1	Physical connection of a port on a Processor Interface board to hardware that serves the same purpose on the system (for example, a PI board). Several components can exist between these two endpoints (modems, DS1 facilities, cables, and so forth).
Level 2	Logical protocol that allows data communication between two endpoints. BX.25 = LAPB (Link Access Protocol on the B-channel) protocol. Level 2 = Frames sent. Protocol establishment requires one end to send a SABM (Set Asynchronous Balanced Mode) frame and the other to respond with a UA (User Acknowledgment) frame. Both sides send SABMs until they receive a UA. (Level 2 is up and the Link Status field displays “restarting.”) This should be a temporary condition because level 3 comes up immediately.
Level 3	Logical protocol that allows multiplexing of many channels to one level 2 link. BX.25 specifies that this is the X.25 data phase protocol. Packets are sent at level 3, included in level 2 frames. This protocol establishes after level 2 establishes when one end sends a Restart packet and the other sends a Restart Confirm packet.
Processor channel	Connection of an application running inside the SPE to a specified channel on a specified link. A number on the change communication-interface processor-channel form identifies processor channels. The link and level channel numbers and the application are specified on the link (for example, dcs) that uses the processor channel.

Output

status link 1

PI LINK STATUS

Link Number: 1	Destination: ISDN-LNK	Port: 1B1624
Link Status: in-service	Dest Status: standby	Sig Grp: 8

ERROR COUNTERS

Hardware Device Check (receive): 0	Level 2 I-frames retransmitted: 0
Hardware Device Check (transmit): 0	Level 2 Reset (SABM): 3
Far-End MOOS Count: 0	Invalid Frame Count: 0
Far-End FRMR: 0	Far-End SABM(E)/DM: 0
Far-End DISC: 0	Protocol Error Detected: 0
Timeout: 0	Local Busy Out: 0
Software Initiated Link Down: 0	Firmware Initiated Link Down: 0

LOCAL/REMOTE PROCESSOR CHANNELS

1/

status link 1

PI LINK STATUS

Link Number: 1	Destination: ISDN-TRK	Port: 1B1623
Link Status: in-service	Dest Status: in-service/active	Trk/Mem: 20/01

ERROR COUNTERS

Hardware Device Check (receive): 0	Level 2 I-frames retransmitted: 0
Hardware Device Check (transmit): 0	Level 2 Reset (SABM): 3
Far-End MOOS Count: 0	Invalid Frame Count: 0
Far-End FRMR: 0	Far-End SABM(E)/DM: 0
Far-End DISC: 0	Protocol Error Detected: 0
Timeout: 0	Local Busy Out: 0
Software Initiated Link Down: 0	Firmware Initiated Link Down: 0

LOCAL/REMOTE PROCESSOR CHANNELS

1/1

status link 1

PI LINK STATUS

Link Number: 1Destination: TIE-DS1Port: 1B0123

Link Status: in-serviceDest Status: in-service/activeTrk/Mem: 02/04

ERROR COUNTERS

Hardware Device Check (receive): 0Level 2 I-frames retransmitted: 0

Hardware Device Check (transmit): 0Level 2 Reset (SABM): 3

Far-End MOOS Count: 0Invalid Frame Count: 0

Far-End FRMR: 0Far-End SABM(E)/DM: 0

Far-End DISC: 0Protocol Error Detected: 0

Timeout: 0Local Busy Out: 0

oftware Initiated Link Down: 0Firmware Initiated Link Down: 0

LOCAL/REMOTE PROCESSOR CHANNELS

1/

status link 1

PI LINK STATUS

Link Number: 1Destination: PDMODULEPort: 1C0303

Link Status: in-serviceDest Status: in-service/activeExt: 4002

ERROR COUNTERS

Hardware Device Check (receive): 0Level 2 I-frames retransmitted: 0

Hardware Device Check (transmit): 0Level 2 Reset (SABM): 3

Far-End MOOS Count: 0Invalid Frame Count: 0

Far-End FRMR: 0Far-End SABM(E)/DM: 0

Far-End DISC: 0Protocol Error Detected: 0

Timeout: 0Local Busy Out: 0

Software Initiated Link Down: 0Firmware Initiated Link Down: 0

LOCAL/REMOTE PROCESSOR CHANNELS

1/

status link 1

PI LINK STATUS

Link Number: 1	Destination: TDMODULE	Port: 1C0303
Link Status: in-service	Dest Status: in-service/active	Ext: 4002

ERROR COUNTERS

Hardware Device Check (receive): 0	Level 2 I-frames retransmitted: 0
Hardware Device Check (transmit): 0	Level 2 Reset (SABM): 3
Far-End MOOS Count: 0	Invalid Frame Count: 0
Far-End FRMR: 0	Far-End SABM(E)/DM: 0
Far-End DISC: 0	Protocol Error Detected: 0
Timeout: 0	Local Busy Out: 0
oftware Initiated Link Down: 0	Firmware Initiated Link Down: 0

LOCAL/REMOTE PROCESSOR CHANNELS

1/

Field descriptions

Link Number	Processor Interface link number (1-8).
Link Status	Valid link states: — in-service — PI link is up and providing service. — maintenance busy — system technician busies out the PI link. — disconnected — PI link is down. Check the Hardware Error Log for more information.
Destination	Character string identifying the link destination type. Valid types are: "ISDN-LNK", "ISDN-TRK", "TIE-DS1", "PDMODULE", "TDMODULE", and "EIA LINK".

Dest Status	The status of the link destination. Valid states are: "in-service", "in-service/idle", "in-service/active", and "out-of-service", "manual OOS", "awaiting call", "disconnected", "out-of-service-NE", and "out-of-service-FE".
Port	The destination port, this port is logically connected to the Processor Interface.
Destination Information Field	One of the following is present depending on the type of link destination. — Sig Grp — The signaling group number, valid for "ISDN-LNK". — Trk/Mem — The trunk group/member, valid for "ISDN-TRK" and "TIE-DS1". — Ext — The data module extension, valid for "TDMODULE".

The following fields represent counter values read from the Packet Interface board. These counters do not initialize on board insertion. To get a reliable readout, the **clear link** command should be issued for read counters.

Field descriptions

Hardware Device Check (receive)	When 40 to 80 seconds transpire without received link traffic, the timeout counter increments. This condition indicates that the link is down on the far end system. The SABM (Set Asynchronous Balance Mode) count also increments.
Hardware Device Check (transmit)	When 40 to 80 seconds transpire without received link traffic, the timeout counter increments. This condition indicates possible PI faults. The link is down and the SABM count increases. If the link is down at the near end and the far end, this counter increments along with the Hardware Device Check (receive) counter.
Far-End MOOS Count	Number of times that the switch attempts to restart the link and the Far-End responds with the link status "manual-out- of-service." This condition occurs on ISDN-PRI Nonfacility Associated Signaling (NFAS) with D-channel backup. When this occurs, contact the personnel at the Network and ask them to release the link.

Far-End FRMR	Informational only. No action is necessary. It is one of eight counters that tells the link's down history since the last clear link command.
Far-End DISC	Informational only. No action is necessary. It is one of eight counters that tells the link's down history since the last clear link command.
Timeout	Informational only. No action is necessary. It is one of eight counters that tells the link's down history since the last clear link command.
Software Initiated Link Down	Informational only. No action is necessary. It is one of eight counters that tells the link's down history since the last clear link command.
Level 2 I-frames retransmitted	Number of retransmitted frames in the LAPD (Link Access Procedure D) or X.25 layer 2. In general, this measures link quality. This count, which could indicate a very noisy link or synchronization problem, increments normally if a Hot Start PEI executes locally.
Level 2 Reset (SABM)	Number of X.25 SABMs or LAPD SABMs that are transmitted. SABMs to establish links. Every time this count increments a link establishment attempt fails. If the link is active and the count is not zero (after the clear link link-no command clears it), this condition indicates that the link goes down in that interval. Check the Hardware Error Log for additional information.
Invalid Frame Count	Number of received, invalid frames. This count measures link quality and could indicate a very noisy link or a synchronization problem. This might increment normally if a Hot Start PEI executes locally. If an administration error exists, this counter can increment with the Level 2 Reset counter. This counter may increment by message retransmissions.
Far-End SABM(E)/DM	Informational only. No action is necessary. It is one of eight counters that tells the link's down history since the last clear link command.
Protocol Error Detected	Informational only. No action is necessary. It is one of eight counters that tells the link's down history since the last clear link command.

Local Busy Out	Informational only. No action is necessary. It is one of eight counters that tells the link's down history since the last clear link command.
Firmware Initiated Link Down	Informational only. No action is necessary. It is one of eight counters that tells the link's down history since the last clear link command. Please consult SCI-BD or PROTOCOL errors to determine the cause.
LOCAL/REMOTE PROCESSOR CHANNELS	Local/remote processor channel pairs. Each pair consists of a processor channel on the local machine and a processor channel on the remote machine that is connected in the communication session.
NOTE: For "ISDN-LNK" links, no correlation between the local and remote processor channels exists. Therefore, only the local processor channel is shown (the remote processor channel is blank).	

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	Permissions	Defaults	Feature Interactions
status pri-endpoint	extension	PRI endpoint extension to be displayed (see dial-plan).	init inads craft nms browse	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 processor-channel

This command displays the status of the specified processor channel and the values of its various counters. A processor channel is one of 64 logical channels associated with an SCI link. Each processor channel terminates in the switch processing element with a session.

Action/ Object	Qualifier	Qualifier Description	Permissions	Defaults	Feature Interactions
status processor- channel	<i>channel number print</i>	Processor channel number (1-64). Report sent to printer Examples: status processor-channel 1 status processor-channel 10 status processor-channel 64 status processor-channel 64 print	init inads craft cust rcust bcms browse	none	none

Output

The following example shows the output from the **status processor-channels 1** command.

```
status processor-channels 1

PROCESSOR CHANNEL STATUS

Channel Number: 1
Channel Status: 6: In data transfer state
Reset Count: 3
Message Buffer Number: 1
Link Number: 4
Retransmission Count: 5
```

Field descriptions

Channel Number	The processor channel number 1-64.
Channel Status	State the channel is in: 1. Channel is not administered. 2. Channel is administered but not used. 3. Channel is in a state entering “wait session accept” (WSA). 4. Channel is in a state waiting for a “session accept” message from the far end. 5. Channel is waiting for action. 6. Channel is in data transfer state (channel up and running). 7. Channel is in resynchronization state. 8. Channel is waiting for acknowledge of disconnect message. 9. ISDN-PRI Channel is currently down. 10. ISDN-PRI Channel is in the data transfer state (that is, channel is up and running).
Reset Count	Number of times reset has been issued for this channel
Message Buffer Number	Number of message buffers currently used for communication on this channel.
Link Number	Physical SCI link (i1-8) associated with the channel
Retransmission Count	Number of times that message retransmission has occurred

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	Permissions	Defaults	Feature Interactions
status signaling-group	group	Administered group identifier number (1-8)	init inads craft cust browse	none	none
	identifier				
	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 ⇒ NOTE: 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	Permissions	Defaults	Feature Interactions
status sp-link	print	Report sent to printer Examples: status sp-link status sp-link print	init inads craft cust rcust bcms browse	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	Permissions	Defaults	Feature Interactions
status station	extension print	Station extension (per dial-plan) Report sent to printer Examples: status station 10020 status station 83277 status station 83277 print	init inads craft cust browse	none	none

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 Wakeup 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	Permissions	Defaults	Feature Interactions
status synchronization	<i>print</i>	Report sent to printer Examples: status synchronization status synchronization print	init inads craft cust browse	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	Permissions	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	init inads craft cust rcust bcms browse	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

SPE MODE                                SELECT  SPE ALARMS  TONE/  SERVICE  SYSTEM  SYSTEM
1A busyout/not-refreshed  auto    MAJOR MINOR  CLOCK  STATE  CLOCK  TONE
1B active                  auto    n      n      1A    in    active 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              in    n      n      0      0

EMERGENCY  SELECT  SERVICE  CABINET
TRANSFER  SWITCH  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	Permissions	Defaults	Feature Interactions
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.	init inads craft cust rcust bcms browse	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
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	Permissions	Defaults	Feature Interactions
test access- endpoint	extension	Access endpoint extension (# of digits determined by dial-plan)	init inads craft nms	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.

Action/ Object	Qualifier	Qualifier Description	Permissions	Defaults	Feature Interactions
test board	location	Physical location of the board PCSS	init inads craft nms	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. <table><tr><th>If the Object is</th><th>The field contains</th></tr><tr><td>station</td><td>extension</td></tr><tr><td>trunk</td><td>xxx/yyy (where xxx = trunk group number and yyy = member number)</td></tr><tr><td>private CO line</td><td>P/xxx (where xxx = private CO line group number)</td></tr></table>	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)
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)								
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
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	Permissions	Defaults	Feature Interactions
test card-mem	location	Carrier location where memory card resides	init inads craft	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
01A       CARD-MEM
01A       CARD-MEM
01A       CARD-MEM
01A       CARD-MEM
01A       CARD-MEM
01A       CARD-MEM
01A       CARD-MEM
01A       CARD-MEM
01A       CARD-MEM

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	Permissions	Defaults	Feature Interactions
test cdr-link	<i>link-id</i>	Link-id = primary or secondary	init inads craft	Test sequence = short; repeat = 1	none
	<i>short</i>	Option for a brief series of nondestructive diagnostic tests.			
	<i>long</i>	Option for a longer, more comprehensive test series (includes a destructive test)			
	<i>repeat number</i>	How many times each test in the sequence is repeated (1-100)			
	<i>clear</i>	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.*			
	<i>schedule</i>	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)
Maintenance Name	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	Permissions	Defaults	Feature Interactions
test customer-alarm	location	Extension of the data module or data channel to be tested (per dial-plan)	init inads craft	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	Permissions	Defaults	Feature Interactions
test data-module	extension	Extension of the data module or data channel to be tested (per dial-plan)	init inads craft cust nms	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 I test data-module 30000 test data-module 32000 sh r 2 test data-module 33000 I r 25 test data-module 33000 I 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.								
	<table><tr><th>If the Object is</th><th>The field contains</th></tr><tr><td>station</td><td>extension</td></tr><tr><td>trunk</td><td>xxx/yyy (where xxx = trunk group number and yyy = member number)</td></tr><tr><td>private CO line</td><td>P/xxx (where xxx = private CO line group number)</td></tr></table>	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)
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)								
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 ds1-loop

This command validates that the board exists at the specified location and that the board is a TN767E or later suffix DS1 Interface board. Long-duration loopback tests execute for an extended period of time until manually terminated. Short-duration loopback tests return the result of the test to the screen after executing. The **list measurements ds1 summary** command can be used to monitor the status of a long-duration loopback/span test.

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test ds1-loop

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Action/ Object	Qualifier	Qualifier Description	Permissions	Defaults	Feature Interactions
test ds1-loop	location	Physical location of board (PcSS)	init inads craft super-user other [‡]	ds1/csu- loopback - tests	See next section
	cpe-loopback-jack-test-begin	Long-duration loopback test setup through the Customer Premises Equipment (CPE) Loopback Jack. Allows user to specify a loop-up code for the CPE loopback jack if it differs from the default (0x47F). The loop-up code is entered by specifying the number of bits in the loop-up code as well as the actual hexadecimal bit-pattern.*			
	far-csu-loopback - test-begin	Long-duration loopback test setup through the far-end Channel Service Unit (CSU)			
	one-way-span-test-begin	Long-duration one-way span test			
	end-loopback/ span-test	Terminates long-duration one-way span and loopback testing			
	inject-single-bit-error	Single bit error sent within an active framed 3-in-24 test pattern used in long-duration loopback and span testing			
	ds1/csu-loopback-tests	Sequentially executes the following loopback tests: DS1 Board LoopBack, CSU Module Equipment LoopBack, and CSU Module Repeater LoopBack. [†] Examples: test ds1-loop 01c08 test ds1-loop 1-3c03 cpe-loopback-jack test ds1-loop 1-3c03 cpe test ds1-loop 10c03 end test ds1-loop 02d12 fa test ds1-loop 02d12 inj			

* For TN767E or later suffix DS1 boards only. The test aborts if the board has not been taken out of service with the busyout command.

† For TN767E or later suffix DS1 boards

‡ Logins with Maintain Switch Circuit Packs permissions enabled.

Feature Interactions

- Loopback or span tests are not allowed on DS1 boards unless the board has been busied out.
- Only one of the CPE Loopback Jack, far-end CSU, one-way span, or DS1/CSU loopback tests may be active at any given time on a DS1 span.

Output

The following example shows the output for the **test ds1-loop 1c07** command, and assumes that the board in cabinet 1, carrier c, slot 7 is a TN767E DS1 board. The responses display on a test-by-test basis with one line of data for each test result.

```
test ds1-loop 01C07 ds1/csu-loopback-tests
```

TEST RESULTS

Port	Maintenance Name	Alt. Name	Test No.	Result	Error Code
01C07	DS1-BD		1209	PASS	
01C07	DS1-BD		1210	PASS	
01C07	DS1-BD		1211	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.
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 eda-external-device-alm

This command performs a hardware diagnostic test on all ports' or a specific port's administered external device alarms. The test **PASSES** if the external device *is not* reporting an external device alarm and **FAILS** if the external device *is* reporting an external device alarm. If you are entering a specific port, it must already be administered as an external device alarm port on a maintenance or an analog line port carrier board.

Action/Object	Qualifier	Qualifier Description	Permissions	Defaults	Feature Interactions
test eda-external-device-alm	physical location	In addition to the word physical , you must enter the physical location (PCSSpp for an administered external device alarm analog line port).*	init inads craft	Repeat = 1	none
	all	Tests all administered external device alarm ports on analog line and maintenance boards.			
	repeat	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 eda-external-device-alm all test eda-external-device-alm all schedule test eda-external-device-alm physical 1major r 10 test eda-external-device-alm physical 2c1101 c			

* Since the "maintenance board" alarm connections connect to control carrier boards that are in unnumbered slots, the standard port format cannot be used to designate these alarm connections. The special ports **Pmajor** and **Pminor** are used designate the major or minor maintenance board alarm connection for cabinet **P**. The major/minor designation specifies the pair of wires, *not* the alarm level associated with the connection (the "major" port can be administered as a major, minor or warning alarm and the "minor" port can be administered as a major, minor or warning alarm).

† 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 external-device-alarm all** command. The responses display on a test-by-test basis with one line of data for each test result.

```
test eda-external-device-alm all

                                TEST RESULTS

Port      Maintenance Name  Alt. Name  Test No.  Result      Error Code

03major    EXT-DEV           CMS1       120       PASS
03A2102    EXT_DEV             CMS2       120       FAIL
01major    EXT-DEV           UPS1       120       PASS
01minor    EXT-DEV           UPS1       120       PASS
01c1201    EXT-DEV           UPS1       120       PASS
03A2101    EXT_DEV             CC temp    120       PASS
01c1202    EXT-DEV           Audix1     120       PASS
03minor    EXT-DEV           Audix2     120       FAIL
04major    EXT-DEV           unknown    120       FAIL

Command successfully completed
```

Field definitions

Port	Port address (cabinet-carrier-slot-circuit)
Maintenance Name	The name of maintenance object
Alt. Name	The alternate means of identifying the maintenance object, in this case, the administered (descriptive) name of the external device alarm.
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 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	Permissions	Defaults	Feature Interactions
test environment	location	Cabinet 1 = PPN.	init inads craft	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 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.

A Maintenance Commands and Troubleclearing Aids
test inads-link

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Action/Object	Qualifier	Qualifier Description	Permissions	Defaults	Feature Interactions
test inads-link	1	First OSS telephone number	init inads craft nms	1st OSS number	none
	2	Second OSS telephone number Examples: test inads-link test inads-link 1 test inads-link 2			

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.

 NOTE:

An entry is made in the error log describing why the inads-link test failed.

test interface

This command performs hardware diagnostic tests on the specified processor interface circuit pack. In addition to testing the PI board, the tests examine the protocol and link interface that is transmitted over the board.

Action/Object	Qualifier	Qualifier Description	Permissions	Defaults	Feature Interactions
test interface	location	Location (cabinet-carrier-position) of the processor interface (position 1 = first processor interface in the carrier, 2 = second)	init inads craft nms	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 interface 01a1 l test interface 01b2 s r 2 test interface 01b2 s r 2 schedule test interface b1 l r 25 test interface a2			

* 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 for the **test interface a1** command. The responses display on a test-by-test basis with one line of data for each test result.

```
test interface a1

                                TEST RESULTS

Port      Maintenance Name  Alt. Name  Test No.  Result      Error Code
01A1      PI-SCI              231        PASS
01A1      PI-BD              52         PASS

Command Successfully Completed
```

Field descriptions

Port	Port address: cabinet-carrier-slot (the carrier associated with the particular processor interface board)
Maintenance Name	The name of maintenance object
Alt. Name	Not applicable.
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 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	Permissions	Defaults	Feature Interactions
test isdn-testcall	group number	The administered group number associated with each trunk group	init inads craft	duration = 8.4 or 9.6 sec	See next section
	member number	The administered member number identifying a particular trunk within a trunk group.			
	minute number	Duration of the test call in minutes (1-120)			
	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 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			

* 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	Permissions	Defaults	Feature Interactions
test led	all	All LEDs in all carriers are tested	init inads craft	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	Permissions	Defaults	Feature Interactions
test link	link-id	Link number (1-8; assigned via the communication-interface links form)	init inads craft	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	Permissions	Defaults	Feature Interactions
test memory	location	Physical location of the memory circuit pack: cabinet number (optional, but always 1 if entered) and carrier letter a	init inads craft nms	See next section	none
	short	Option for a brief series of nondestructive diagnostic tests.			
	long	Option for a longer, more comprehensive test series (all nondestructive for this command).			
	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 test memory 1a2 test memory b1 sh test memory b l r 25 test memory 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 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 1b** command. The responses display on a test-by-test basis with one line of data for each test result.

```
test memory 1b

                                TEST RESULTS

Port      Maintenance Name  Alt. Name  Test No.  Result      Error Code
01B       MEM-BD           87         PASS
01B       MEM-BD           631        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.

A Maintenance Commands and Troubleclearing Aids
test modem-pool

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Action/Object	Qualifier	Qualifier Description	Permissions	Defaults	Feature Interactions
test modem-pool	group number	The administered group number (1-5)	init inads craft	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	Permissions	Defaults	Feature Interactions
test network-control	location	Network control board carrier location (a or b).	init inads craft	Cabinet 1, carrier a, test sequence 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 network-control test network-control a l test network-control b sh r 2 test network-control b l r 25 test network-control a test network-control 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” 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 a
```

TEST RESULTS					
Port	Maintenance Name	Alt. Name	Test No.	Result	Error Code
01A	DATA-BD		52	PASS	
01AXX01	DATA-CHL	4001	109	PASS	
01AXX01	DATA-CHL	4001	110	PASS	
01AXX01	DATA-CHL	4001	111	PASS	
01A	SW-CTL		95	PASS	
01A	SW-CTL		92	PASS	
01A	SW-CTL		94	PASS	
01A	SW-CTL		324	PASS	
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	

```
Command Successfully Completed
```

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	Permissions	Defaults	Feature Interactions
test packet-control	location	(Optional).	init inads craft nms	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 B test packet-control 1A test packet-control 1B test packet-control a short test packet-control a s repeat 5 test packet-control b s r 5 test packet-control b long clear test packet-control b l r 25			

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 1B l

                                TEST RESULTS

Port      Maintenance Name  Alt. Name  Test No.  Result  Error Code
01B       PKT-CTRL          583        PASS
01B       PKT-CTRL          584        PASS
01B       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	Permissions	Defaults	Feature Interactions
test pkt port-network	pn number	The Packet bus to be tested: <i>nn</i> (1-3)	init inads craft	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 2 sh r 2 test pkt port-network 2 sh schedule test pkt port-network 1 l r 25 test pkt port-network 2 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		571	PASS	
PN 01	PKT-BUS		572	PASS	
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	Permissions	Defaults	Feature Interactions
test port	location	PCSSpp	init inads craft	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 02e1502 sh r 2 test port 02d1201 r 4 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 a The field contains
	station extension
	trunk xxx/yyy (xxx = trunk group number and yyy = member number)
	private CO line P/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	Permissions	Defaults	Feature Interactions
test processor	location	Cabinet number (optional) carrier letter (optional a).	init inads craft	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	Permissions	Defaults	Feature Interactions
test signaling-group	group identifier	The station extension (must conform to dial-plan)	init inads craft	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	Permissions	Defaults	Feature Interactions
test sp-link	short	Option for a brief series of nondestructive diagnostic tests.	init inads craft	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	Permissions	Defaults	Feature Interactions
test station	extension	The station extension (must conform to dial-plan)	init inads craft cust nms	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	Permissions	Defaults	Feature Interactions
test synth	short	Option for a brief series of nondestructive diagnostic tests.	init inads craft	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	Permissions	Defaults	Feature Interactions
test tdm	<i>pn number</i>	<i>nn</i> = number of the port network to have its TDM bus tested. Both halves ("a" and "b") of the TDM bus are tested.	init inads craft	Test Sequence = short; Repeat = 1	none
	<i>short</i>	Option for a brief series of nondestructive diagnostic tests.			
	<i>long</i>	Option for a longer, more comprehensive series of both destructive and nondestructive diagnostic tests.			
	<i>repeat number</i>	How many times each test in the sequence is repeated (1-100)			
	<i>clear</i>	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.*			
	<i>schedule</i>	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	Permissions	Defaults	Feature Interactions
test tone-clock	location	PCSS	init inads craft	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	Permissions	Defaults	Feature Interactions
test trunk	group number	Administered group number (1-99)	init inads craft cust	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	Permissions	Defaults	Feature Interactions
test tsc-administered	signaling group number/	Signaling group number (1–8)	init inads craft	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
```

A	Maintenance Commands and Troubleclearing Aids	
	test tsc-administered	A-237

Field descriptions

Port	Port address of the administered temporary signaling connection (format = <i>signaling group no./tsc index</i>)
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.

A	Maintenance Commands and Troubleclearing Aids
	test tsc-administered

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.

AE

See *access endpoint*.

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*.

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.

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.

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 Lucent Technologies 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 Lucent Technologies 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*.

Chair control mode

A conference mode where one site controls which endpoints are added and/or dropped during a conference.

CIF

See *Common Intermediate Format*.

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.

ClearPresence @716 Audio Coder

Algorithm developed by Lucent Technologies that provides 7 kHz of audio bandwidth at a bit rate of 16k. This feature provides a more natural sounding voice quality than other audio modes, such as G.728 and G.711, which provide 3.5 kHz.

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**
See *Continuous Presence Plus*.
- CRCS**
See *Lucent Technologies Conference Reservation and Control System*.

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*.
- 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.
- 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

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.

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

ITU standard that governs videoconferencing over local area networks (LANs) and the Internet.

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

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.

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

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.

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

Lucent Technologies 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.

Lucent Technologies MultiPoint Conferencing Unit

Equipment that provides high-quality multimedia conferencing with video endpoints that communicate via the ITU-T H.320 standards.

Lucent Technologies Video Technical Center

A video technical support group that is available to help with questions about the Lucent Technologies MCU.

M

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.

MCU

See Lucent Technologies MultiPoint Conferencing Unit.

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 Server Module.

multimedia

The use of a variety of media, including audio, data, graphics, and full-motion video.

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

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 Lucent Technologies 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.

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

QCIF

See *Quarter Common Intermediate Format*.

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 Lucent Technologies 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.

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 Communication Interface.

SCO
System Control Office.

SDN
Software Defined Network.

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 Lucent Technologies 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.

TDM

See *time division multiplexing*.

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*.

U

UCC

See *Universal Conference Control*.

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.

VTC

See *Lucent Technologies Video Technical Center*.

W

warning tone

A tone that sounds when only 10 minutes remain in a conference.

Web.Res.Now

Web-based conference reservation system that manages dedicated MCU conferences.

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