

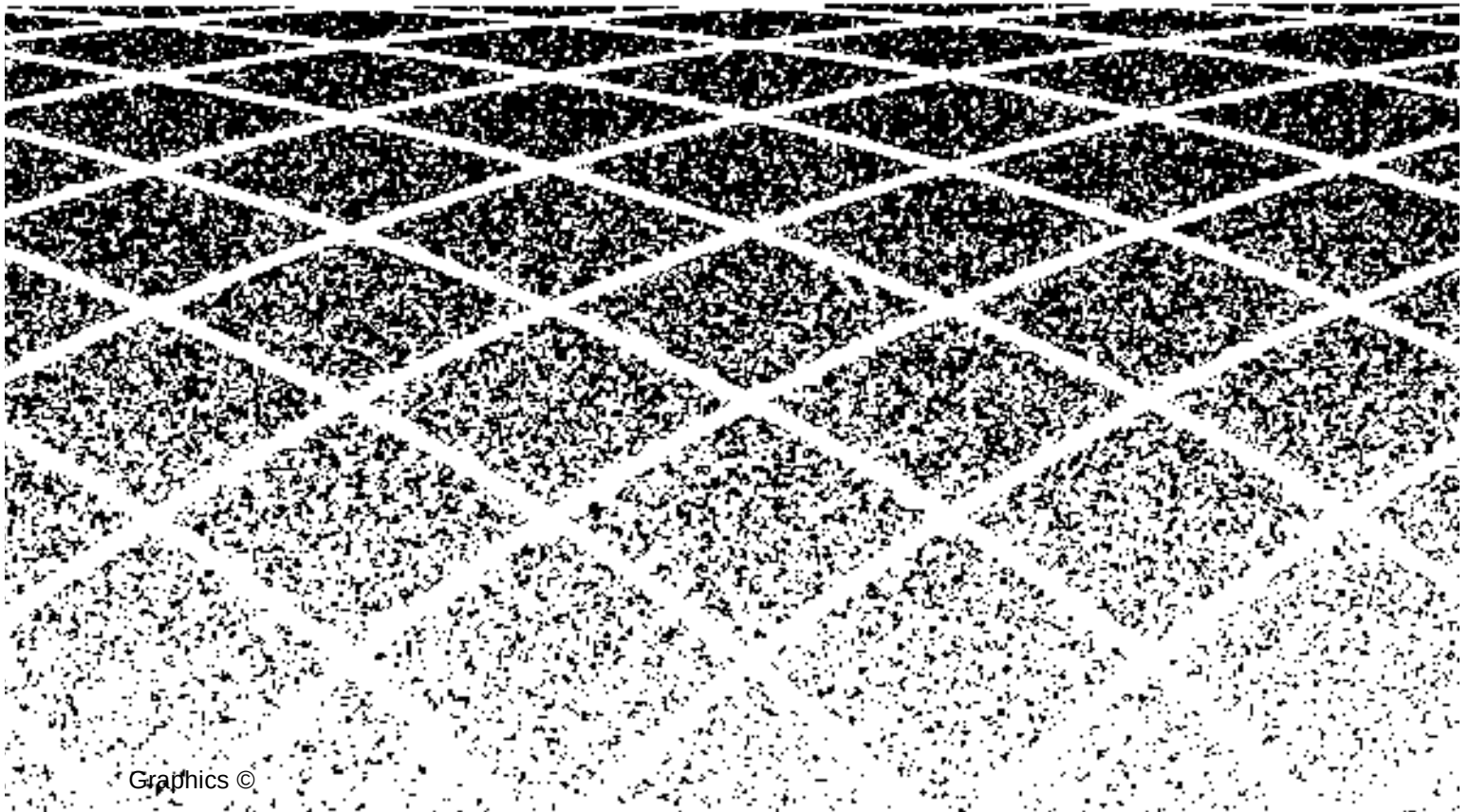


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MultiPoint Control Unit R3.0 Maintenance



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About This Document

This manual describes the maintenance procedures, commands, and alarms for the AT&T MultiPoint Control Unit (MCU) Release 3.0. It is intended for use by AT&T technicians and telecommunications managers.

Related Information

Use this manual in conjunction with the following AT&T MCU documents and information sources:

- *AT&T MultiPoint Control Unit Installation Quick Reference*, 555-027-723
Provides brief instructions on adding an AT&T MCU and components to enable video conferencing.
- *AT&T MultiPoint Control Unit System Description*, 555-027-721
Provides an introduction to the MCU, including descriptions of models, configurations, features, and facility requirements.
- *AT&T MultiPoint Control Unit System Administration and Reports*, 555-027-727
Provides detailed instructions that an AT&T MCU telecommunications manager can use for ongoing administration and reports using the MCU Management Terminal (MCU-MT).
- *AT&T MultiPoint Control Unit Reservation Agent Manual*, 555-027-725
Provides detailed instructions that an AT&T MCU reservations agent or telecommunications manager can use for scheduling and reserving conferences and troubleshooting using the MCU Scheduling Terminal (MCU-ST).

- *AT&T MultiPoint Control Unit Seminar*, BM1068U
An AT&T course offering that provides an overview of the AT&T MCU administration and scheduling functions.
- *AT&T Conference Reservation System User's Manual*, 555-230-520
Provided with the optional AT&T Conference Reservation System (CRS), gives detailed information and procedures that an AT&T CRS administrator and/or reservation agent can use to install CRS, set up and manage CRS databases, reserve conferences, and perform CRS system administration.

Organization

This manual contains the following eight 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 A, "MCU Commands" presents a quick reference of MCU administration and maintenance commands.

This manual also has a "Glossary" on page -1 and "Index" on page -1.

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:

WARNING:

emphasizes information that is important to your safety.

- The following icon:

CAUTION:

indicates information you need to prevent equipment damage.

- The following icon:

NOTE:

identifies additional information pertinent to the text preceding it.

Getting Help

If you need help with the procedures or other information in this document, and if you are a customer in the United States or Canada, be sure to call the Video Technical Center (VTC) at 800 242-2121. If you are a customer in Australia or the United Kingdom, call the Global Technical Access Center (GTAC) at 303 538-4666.

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" on page 8-196 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 the AT&T Video Technical Center (VTC) 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.

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.

 NOTE:

For information on circuit packs and equipment relevant to the Expansion Services Module (ESM), refer to the supplemental ESM documentation.

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*
Child Circuit Pack	CPP1
Current Limiter	928LS
Dial-out Accelerator	TN744B
Digital Line	TN754B
DS1	TN767E
ISDN-BRI Circuit Pack	TN556B
Maintenance/Test Circuit Pack	TN771D
Multimedia Interface (MMI) Circuit Pack	TN787D
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	TN786B
Processor Interface	TN765
TDM/LAN Bus Terminator	ZAHF4
Tone-Clock	TN768, TN780
Tone Detector	TN420C, TN748D
TDM/LAN Cable Assembly	WP91716/L3
UDS1	TN2207
Video Processor	TN2234
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 along with one port carrier. 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 Multipoint Communication Service/Multilayer Protocol (MCS/MLP) data transmissions within the MCU conference is referred to as the Expansion Services Module (ESM). The ESM is actually a MAP/40 processing unit, and it serves as a data bridge for implementing the MCS/MLP 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
- Remote Maintenance Board (RMB)
- 486 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). The cabinets and their associated power supplies can be powered by 110/208 volts AC either directly or from a Universal Power Supply (UPS) system. Alternately, the cabinets and their power supplies may be powered by -48 volts DC from a battery-type power plant (this requires DC-to-DC conversion power units).

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 MSM SCC has a three-minute battery dropout (holdover), while the MSM MCC has a 10-minute battery dropout (holdover). (See "Cabinet Power" on page 2-4.)

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 either an AC power supply (110/230 VAC) or DC power supply (-48 VDC). The AC power supply maintains 325 watts of nominal power with all outputs simultaneously at full load. The DC power supply maintains 244 such watts. A receptacle is provided at the rear of the ESM to supply power for the monitor. Other power options include the AT&T AT250 UPS (international) and the AT&T 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 397 Battery Charger Circuit immediately detects the loss of AC power. Once AC power loss is detected, an AC power alarm is generated. Included with the AC power fail alarm are several other alarms associated with the loss of power. Several maintenance objects cause a major alarm to be reported (processor interface links, external DS1 timing) but, in general, no specific power-related major or minor alarm results. If the switch is accessed during the 10 minute interval, an AC power warning alarm appears in the active alarm as "resolved."

If AC power is restored during the 10 second interval, no service interruption results. If AC power is restored between 10 seconds and 10 minutes, service to the port carriers is restored after the software "reinserts" the circuit packs. This can take up to one minute. Links that have their connectivity through the control carriers remain up unless they rely on hardware that is powered externally (for example, channel service units for DS1 facilities). If the CSU is not connected to a power reserve system, the DS1 facility is dropped.

If AC power is restored after 10 minutes (or, if the battery does not have sufficient capacity, in less than 10 minutes), the MCU must reload all software and translation data. The MCU must also "reinsert" all circuit packs. These processes can take several minutes, depending on the size of the system. All links are re-established according to their initialization requirements.

As an option, the internal battery may be omitted on MCC-MSMs that are ordered with UPS. If the battery is omitted, and if the AC from the UPS fails, the system does not report an alarm.

Critical services or services that take a long time to restore (for example, digital announcement circuit packs) should be placed in control carriers, where they can be held up the longest. If AC power interruptions of longer than 10 minutes are frequent, and if the customer's service requirements warrant, consideration should be given to equipping the system with either an external UPS system or an external DC power system.

ESM

The AT&T AT250 UPS (international) and the AT&T 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.

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.

MCU Management Terminal

The MCU-MT supplied with the MCU is a 715 Business Communications Terminal (BCT). The following terminals may also be used as the MCU-MT:

- 513 BCT
- 610 BCT
- 615 MT

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 715 BCT 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. The three types of keys are:

- 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.

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): [715] press RETURN.
7. The screen should now display: command :

MCU Scheduling Terminal

The MCU-ST supplied with the MCU is also a 715 BCT model 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

The keyboard of the 715 BCT 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. The three types of keys are:

- **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 you can add or change information 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.

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 the AT&T Video Technical Center (VTC) 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): [715] press RETURN.
9. The screen should now display: command:

Maintenance Alarm Terminal

One maintenance alarm terminal for alarm status (model 7444D) is provided with the MCU; up to two more are optional.

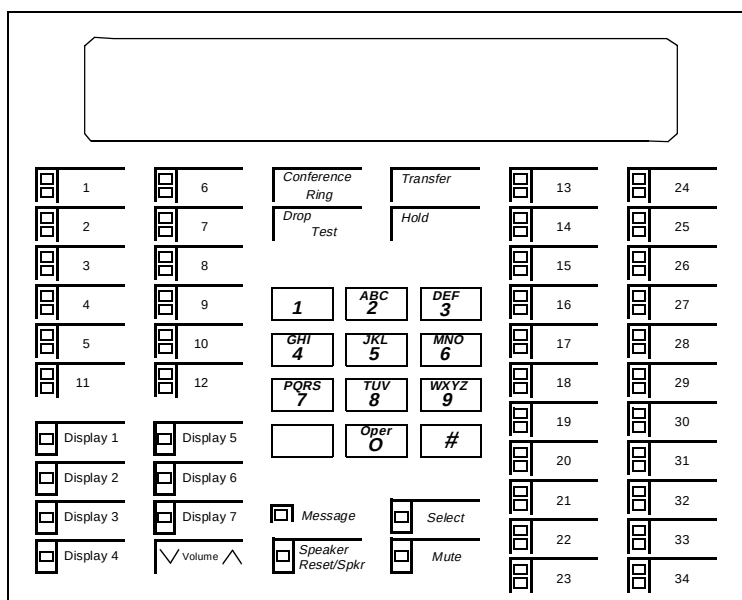


Figure 3-1. Model 7444B Maintenance Alarm Terminal

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, and the alarm has not been resolved by the time maintenance reschedules testing, the green lamp resumes its steady state.

The recommended maintenance alarm terminal button assignments are as follows:

Table 3-1. Maintenance Alarm Terminal Button Assignments

Button	Assignment	Description	Button	Assignment	Description
1	call-appr	originate/receive calls	6	ac-alarm	lights if a locally administered connection has an alarm active
2	call-appr	originate/receive calls	7	CDR1-alm	lights if there is an CDR interface failure
3	call-appr	originate/receive calls	8	pr-sys-alm	lights if the system printer has an active alarm
4			9	trk-ac-alm	lights when the facility test call feature is used
5	aca-call	identify trunk trouble	10	verify	makes test call
11			23		
12			24	link-alarm Lnk #: 1	lights if there is a link alarm
13	major-alm	lights if a major alarm is active	25	link-alarm Lnk #: 2	lights if there is a link alarm
14	minor-alm	lights if a minor alarm is active	26	link-alarm Lnk #: 3	lights if there is a link alarm
15	warn-alm	lights if a warning alarm is active	27	link-alarm Lnk #: 4	lights if there is a link alarm
16	mmi-cp-alm	lights if a MMI circuit pack has an active alarm	28		
17	vc-cp-alm	lights if the Voice Conditioner circuit pack has an active alarm	29		
18	ds1-alarm	lights if a DS1 circuit pack has an off-board alarm active	30		
19			31		

Table 3-1. Maintenance Alarm Terminal Button Assignments — Continued

Button	Assignment	Description	Button	Assignment	Description
20			32		
21			33		
22			34		

The recommended display button assignments are shown in the following table:

Table 3-2. Maintenance Alarm Terminal Display Button Assignments

Button	Assignment
1	normal
2	inspect
3	trk-id
4	trunk-name
5	date-time
6	timer
7	

System Reset

When the MCU is powered on, or when it experiences a catastrophic fault that interrupts its basic functions, it is rebooted. Several less severe resets that allow the MCU to recover from disrupting errors are available to the MCU. Reset commands are used to restart the MCU manually at various levels, depending on the required test activity.

An MCU reset occurs when power is lost and when:

- A reset command is entered.
- Maintenance software that automatically resets the MCU is loaded.



WARNING:

When the MCU is rebooted or reset at level 2, 3, 4, or 5, all conferences are dropped and must be manually reentered.

The MCU-MT display screen and MCU circuit pack LEDs indicate the progress of the recovery process. LEDs are discussed in Chapter 7, "LED Interpretation".

For each level of reset, a typical display is provided. Note that any hexadecimal numbers shown in parenthesis, such as (8B89), are only examples and are subject to change.

If any diagnostic test fails, the MCU may not function properly and the MCU restart may not proceed. In that case, the MCU goes into SPE-Down mode. In failure cases, the appropriate part (for example, the TN786B Processor circuit pack) should be replaced.

Use and check the results of the **set vector** and **get vector** commands to determine how much time should be added for the recovery levels. Also, if an update file is applied on a reset, add 30 seconds to one minute to the recovery time.

Reset System 1 (Warm Start)

For this restart, stable conferences remain stable. Also, the PACCON circuit pack and the Processor Interface (PI) circuit pack are re-downloaded. Finally, all software is reset.

RESET 1 (WARM) PERFORMED

Figure 4-1. Reset System 1 (Warm Start) Example

Reset System 2

This recovery takes about 30 seconds during which time all port circuit packs are reset. All conferences are dropped. Conferences may be reconnected (conferees must redial their Meet-Me numbers to rejoin the conference) within 30 seconds.

In this restart, all software is reset. In addition, the TDM bus and all port circuit packs are reset.

TN786 FLMM	
ROM CHECKSUM TEST (=22C4)	PASSED
SOFT INT TEST	PASSED
NMI 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.

TN786 FLMM	
INVOKING EMERGENCY TRANSFER	
ROM CHECKSUM TEST (=22C4)	PASSED
SOFT INT TEST	PASSED
NMI 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.

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)	PASSED
RESET 4 (REBOOT) PERFORMED	

Figure 4-4. Reset MCU 4 (MCU Reboot) Example

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

This reboot takes about three minutes. The LMM performs a series of diagnostics on the processor and memory. The boot image is already in the flash ROM memory. The MCU is rebooted immediately after the LMM performs a series of diagnostics on the processor and memory.

Translations are reloaded from the memory card. Depending on the translation, the reloading process takes from five to 30 seconds. Thereafter, all port circuit packs are reset and all conferences are dropped. Conferees may need to wait up to five minutes before they can rejoin a conference by redialing their Meet-Me numbers.

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
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)	PASSED
RESET 5 (EXTENDED 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 Name	On Board?	Alt Name	Alarm Type	Svc State	Ack?	Date Alarmed	Date 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 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.

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
- Preventive Maintenance Procedures
- Other Maintenance Aids
- Troubleshooting Backplane Voltage Problems

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

1. Enter **change system-parameters maintenance**. The Maintenance-Related System Parameters form is displayed.
2. Reinstatement the *Alarm Origination Activated* and *CPE Alarm Activation Level* fields to the values prior to deactivating the alarm.
3. Press ENTER and verify that the screen displays the following message:
command successfully completed.

The fields on the Maintenance-Related System Parameters form are defined in the following paragraphs. Specific entries can be obtained from the AT&T VTC.

■ *Product Identification*

Identifies the MCU to an Operations Support System (OSS), such as INADS. The number must start with "1" and contain ten digits. The last nine digits are the cabinet serial number.

■ *OSS Telephone Number*

The number the MCU uses to call INADS for alarm origination. The number must be obtained from the VTC.

■ *Alarm Origination Activated*

Indicates whether or not alarm origination is activated. If it is, all major and minor alarms result in an automatic call to INADS. If not, alarm origination is not activated. Warning alarms are not reported to INADS.

- *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.

- *Test Remote Access Port*

Indicates whether to test the remote access port on the Processor circuit pack. If a trunk for remote access and alarm origination is not provided, then running tests on the remote access port (via the **test processor** or **test maintenance** commands) results in tests failing. This unnecessarily alarms maintenance and runs additional, possibly destructive, tests.

- *CPE Alarm Activation Level*

Indicates the level at which the CPE alarm is activated. If the level is major, the CPE alarm is activated on major alarms. If the level is 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 none, the CPE does not activate for any alarm.

- *Packet Bus Activated?*

Indicates whether the system packet bus is activated. If this field is set to "yes," maintenance software assumes that there is a Packet Control circuit pack installed in the system, and maintenance testing runs on both the Packet Control circuit pack and on the Packet Bus. If this field is set to "yes" and a Packet Control circuit pack is not installed in the system, a major alarm is raised against PKT-CTRL. Also, if this field is set to "yes," packet endpoints may be administered. If the field is set to "no," administration of these endpoints is blocked.

- *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, save translation, control channel interchange, and system clocks interchange.

- *Daily Maintenance*

Displays the status **daily** to indicate the maintenance tests are automatically run each day.

- *Save Translation*

Indicates if the MCU translation data should be automatically backed up on a specified day of the week, all week (**daily**), or not at all (**no**).

- *Minimum Threshold for TTRs*

Shows the minimum number of touch-tone receivers (**1** through **40**) available before an alarm should be raised (typically, this number is 80 percent of the administered number). If fewer than this number are in service, a warning alarm is raised against TTR-LEV. (See Chapter 8, "Maintenance Object Repair Procedures" for more information.)

- *Minimum Threshold for CPTRs*

Shows the minimum number of call progress tone receivers available before an alarm should be raised (typically, the number is 80 percent of the administered number). If the threshold is exceeded, a warning alarm is raised against TTR-LEV. (See Chapter 8, "Maintenance Object Repair Procedures" for more information.)

- *ISDN 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 the extension number assigned to the ISDN test call.

- *ISDN-BRI Service SPID*

Must be enabled for the BRI/DCP Direct Connect Interface.

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 and the *OSS Telephone Number* field.
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 TN754B 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.

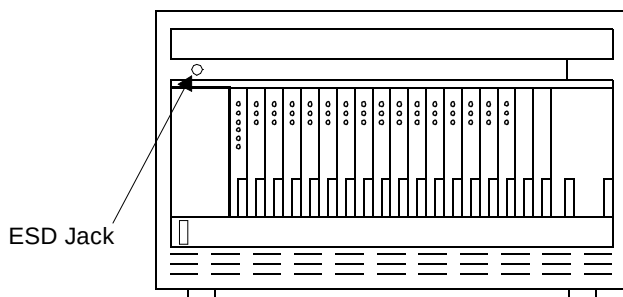


Figure 5-1. ESD Wrist Strap Grounding Locations

The following procedures are for unseating, reseating, replacing, and installing new port circuit packs. They are common to all maintenance activities involving port circuit packs.

Unseating and Reseating Port Circuit Packs

⚠ CAUTION:

Any time a circuit pack is unseated, service is interrupted if the amber (busy) LED is lighted.

⚠ WARNING:

In general, do not reseat circuit packs unless you are instructed to do so.

Each circuit pack has a latch pin and a locking lever on the lower part of its front panel. To unseat and reseal 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 reseal a circuit pack:

1. Push the unseated circuit pack back into the backplane connector.
2. Lift the locking lever until the pin engages.

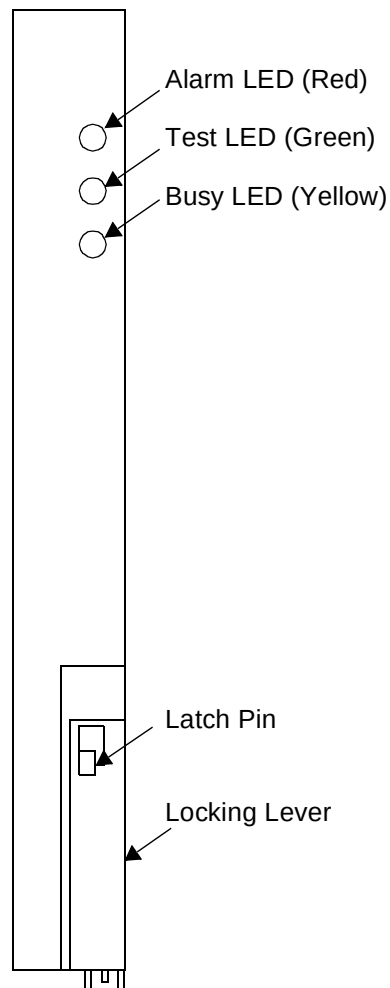


Figure 5-2. Typical TN-Coded Circuit Pack

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 TN767D 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 reseat a control circuit pack:

1. Push the unseated circuit pack back into the backplane connector.
2. Lift the locking lever until the pin engages.
3. Restore power as described in the following section, "Powering the Cabinet."

Replacing a Control Circuit Pack

Before replacing a circuit pack, unseat and reseat it to ensure the trouble is not being caused by a bad connection with the backplane.



NOTE:

When replacing a TN786B Processor circuit pack, make sure it has the current version of the MCU software.

1. Remove power as described in the following section, "Powering the Cabinet."
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

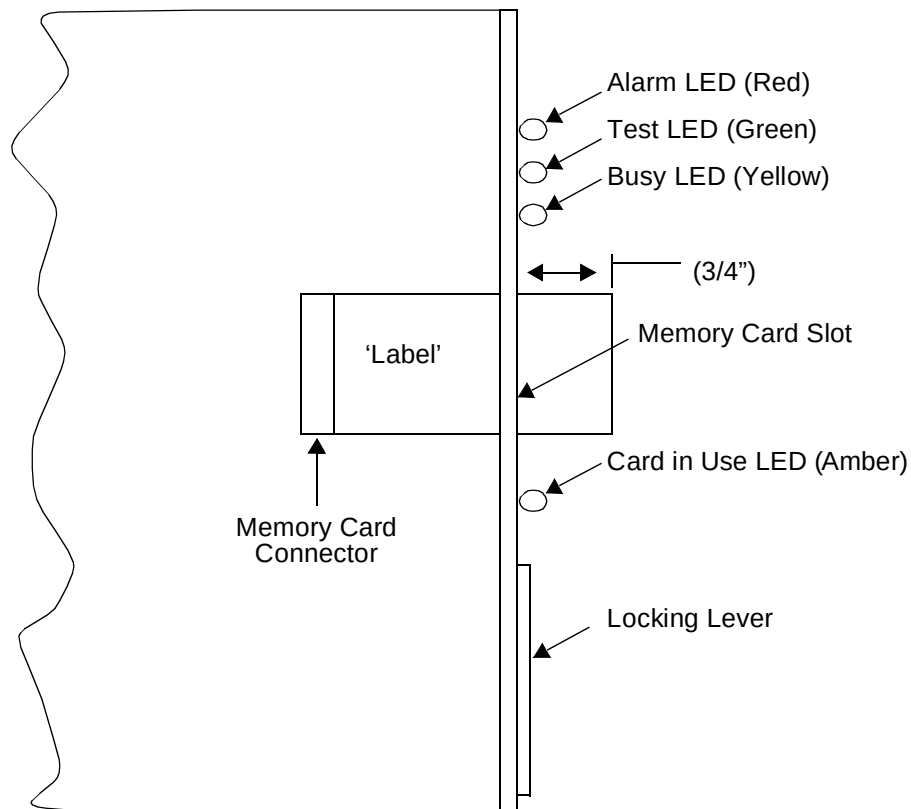


Figure 5-3. Inserting a Memory Card

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 (Memory Card)" on page 8-91 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. When removing power, error log information is lost. If you want to keep this data, enter **reset system 4**. This command restarts the MCU and may take several minutes to execute. Wait for the `login` prompt before proceeding.
4. 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 5-4. 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 daily backup of the system translation data is controlled by an entry on the Maintenance-Related System Parameters form that is defaulted to **daily** (which means the MCU automatically saves translations every 24 hours).

If many translation data changes are made, save them by entering **save translation**. This action saves the new changes on the memory card without waiting for the next automatic backup. If the translation data changes frequently, translations should be saved more frequently to ensure that the most up-to-date information is kept.

NOTE:

If possible, perform the save translation operation after business hours to avoid delays. Do not issue the **save translation** command during alarm conditions.

Keep in mind that the **save translation** command (which includes saving translations as part of scheduled maintenance), blocks all maintenance commands except some **list**, **display**, **monitor**, and **status** commands. The **status card-mem** command is also blocked during the save translation operation. This is because the MCU blocks the execution of any commands that change the translation, access a memory card, or trigger a maintenance action.

Memory Card Backup

The backup system for the MCU is saved on a formatted memory card. In case of a power failure, the system translations can be restored using the backup memory card.

Only one memory card is provided per MCU. It is recommended that additional memory cards be purchased and formatted to serve as backup or replacements. Memory cards should be alternated periodically.

It is also recommended that backup copies of the translation data be made weekly, or after many changes have been made. This minimizes the loss of recent translation data changes if the memory card becomes damaged.

1. Remove the memory card from the 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.

save translation		
SAVE TRANSLATION		
Processor	Command Completion Status	Error Code
SPE_A	Success	0
Command successfully completed enter command:		

Figure 5-5. 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. At the MCU-MT, enter **list configuration software-version** to determine if any patches have been applied.
2. Verify that you have a memory card (with an orange label) containing the current software. You also need the new software memory card with the latest version of the software.

3. Make sure you have a new PG (software) label that identifies the new software version.
4. Enter **save translation**.
5. Swap the translation memory card (white label) with the new software memory card (orange label).
6. Enter **reset system 4**.
7. At the *Replace Software Card-Mem with Translation Card-Mem* prompt, replace the software memory card (orange label) with the translation memory card (white label). You have about three minutes to replace the card while the MCU performs other upgrade tasks (the terminal beeps as a warning).

⇒ NOTE:

If the translation memory card is not replaced in time (about three minutes), the *Reset 4 (Reboot) Performed* prompt appears and the MCU reboots with default (blank) translations. If this happens, insert the translation memory card and enter **reset system 3**.

8. Verify that the system passes the FLASH TEXT CHECKSUM test.

⇒ NOTE:

If it fails, check the software memory card and initiate another upgrade.

9. When the MCU is operating properly, enter **save translation**.
10. Once Step 9 is done, the old software may not work because it may not understand the translations saved by the new software.
11. Replace the PG (software) label on the TN786B Processor circuit pack.

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 AT&T 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 AT&T 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 (see *AT&T MultiPoint*

Control Unit System Administration and Reports), the MCU measures the holding time of each call.

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 5-3. Key for 6-Digit Port Number

<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 5-4. Key for 6-Digit Port Number

<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 5-5. 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 5-6. 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 5-6. 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	Ringling
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 5-6. 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 5-7. Backplane Voltage and Tolerance Ranges

Voltage	Tolerance Ranges
Ringing Voltage	75 to 115 VAC
+12 VDC	11.4 to 12.6 VDC
+5 VDC	4.95 to 5.35 VDC
-5 VDC	-4.95 to 5.35 VDC
-48 VDC	-43 to -53 VDC
Neon Message Waiting Voltage	-80 VDC to -165 VDC

All voltages except +12 VDC and +5 VDC can be measured from any port slot. All control circuit packs should be removed from the backplane before this measurement is made.

The +5 VDC measurement must be made in two separate cabinet locations since the power unit has two independent +5 VDC outputs [+5 VDC and +5(B) VDC]. Each output supplies a different section of the cabinet with power. For the control cabinet, make one measurement in the processor slot and another in any port slot. For the port cabinet, make one measurement in any port slot from 1 to 6 and another in any port slot from 7 to 18.

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 the AT&T VTC 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 computed 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 below 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-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
stacrk	DIG-LINE
stations	DIG-LINE
sys prnt	SYS-PRNT
tdm	TDM-BUS, SW-CTL
tone	DETR-BD, DTMR-PT, GPTD-PT, TDM-CLK, TONE-BD, TTR-LEV
trkbd	DS1-BD, ISDN-TRK, TIE-DS1
trkcrk	ISDN-LNK, ISDN-TRK, TIE-DS1
trunks	ISDN-LNK, ISDN-TRK, TIE-DS1
vc	VC-BD, VC-DSPPT, VC-SUMPT, VC-LEV
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
DIG-BD	stabd
DIG-LINE	stabd, stacr, 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
PROC-SAN	misc
PROCR	mbus, procr

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

MO Name	Category
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

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-alm	any major alarm in the MCU is active
Minor	minor-alm	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-alm	the primary link has a major, minor, or warning alarm active
System Printer	pr-sys-alm	the system printer (SYS-PRNT) has a major, minor, or warning alarm active
Voice Conditioner	vc-cp-alm	a Voice Conditioner circuit pack or port has an active major, minor, or warning alarm
Warning	warn-alm	any warning alarm in the MCU is active

LED Interpretation

7

LED Overview

LED on and off conditions indicate the status of various MCU maintenance components. LEDs are located on all circuit packs in the MCU cabinet and, optionally, on the maintenance alarm terminal.

The following LEDs are included in the MCU:

- Processor circuit pack and maintenance circuit packs
- Carrier power unit
- Power distribution unit
- Control and port circuit pack

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.

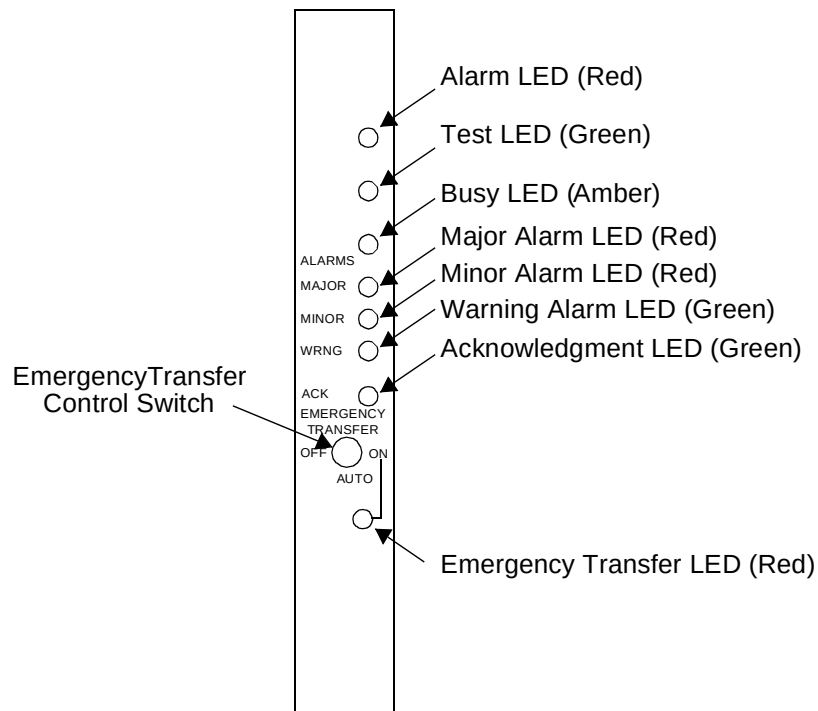


Figure 7-1. LEDs on the Processor Circuit Pack

Carrier Power Unit LEDs

For a description of carrier power unit LEDs, refer to the DC-Power MO ("Maintenance Objects" on page 1-1).

Power Distribution Unit LEDs

For a description of power distribution LEDs, refer to the DC-Power MO ("Maintenance Objects" on page 1-1).

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, "Maintenance Object Repair Procedures" 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" on page 5-9 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.

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)" on page 8-605 .

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.

Table 8-1. ADM-CONN (Administered Connection)

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-CONN regardless of the facility used to establish the call.
- Check the *Aux Data* field as follows:

Table 8-2. 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 8-3. ADM-CONN Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Reason for Error
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-CONN's 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-CONN's 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 8-3. 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.
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 8-3. 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 8-3. 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-CONNs that are not used by the dial-out feature are not retried, and the failure is alarmed immediately (that is, the alarm threshold is ignored). On the other hand, for ADM-CONNs that are used by the dial-out feature, retries continue, and an alarm is raised after four failures occur. The address of the destination endpoint has an invalid number format or is restricted from terminating calls ("Access Denied") due to Class of Restriction. Verify that the destination address is correct and that the destination endpoint is administered. The destination endpoint is not administered where this error is logged.
29	Any	None	Any	Off	None	If this is not a temporary condition, follow normal escalation procedures.

Table 8-3. 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 8-3. 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.
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 8-3. 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-CONN's 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-CONN's 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 8-3. 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-CONN's 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-CONN's 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-CONN's.

Table 8-3. 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-CONN's 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-CONN's 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 8-3. 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-CONN's 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-CONN's 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 8-3. 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 8-3. 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-CONN's 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-CONN's 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-CONN's, check whether the destination number is correct.
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 8-3. 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	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.
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 8-3. 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 PX64 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.

Table 8-3. ADM-CONN Error Log Entries — Continued

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

BRI-BD (ISDN-BRI Line Circuit Pack)

Table 8-4. BRI-BD (ISDN-BRI 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 and Test

Table 8-5. 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 LEDs" on page 7-4 in Chapter 7, "LED Interpretation". (Also, refer to the "Handling Port Circuit Packs" on page 5-6 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 8-5. 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 8-5. 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 8-5. 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 8-5. 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.

* 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.

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 8-6. Order of Investigation

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)" on page 8-605 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)" on page 8-605 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)" on page 8-605 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 8-7. Test #595 LANBIC Receive Parity Error Counter Test

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.

Table 8-7. Test #595 LANBIC Receive Parity Error Counter Test — Continued

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

Table 8-8. 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)

Table 8-9. 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" on page 9-8 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 AT&T 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.

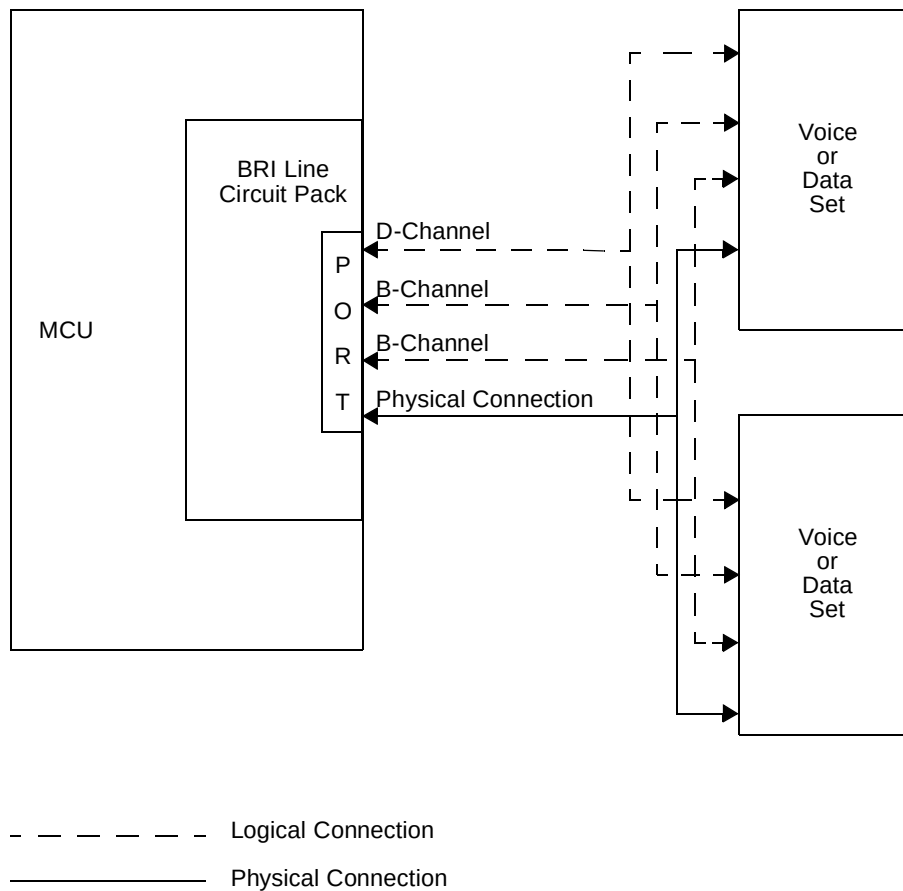


Figure 8-1. ISDN-BRI Port Interactions

Hardware Error Log Entries

Table 8-10. 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 8-10. 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 8-10. 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 "Level 1 Status Inquiry Test (#621)" on page 8-49.

- 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 "PKT-BUS (Packet Bus)" on page 8-411 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 8-11. Order of Investigation

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 8-12. 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 8-12. 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.

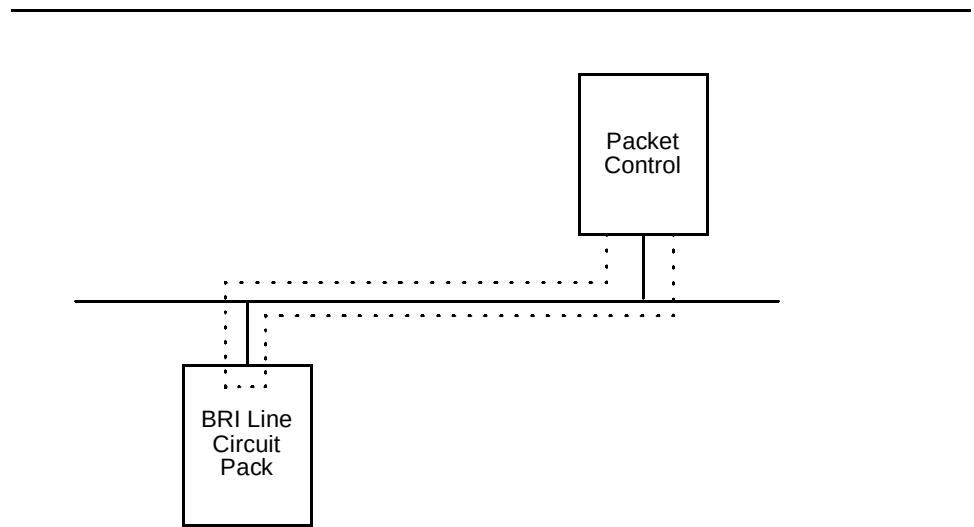


Figure 8-2. Path of the BRI Port LAN Loop-Around

Table 8-13. 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 8-13. 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.

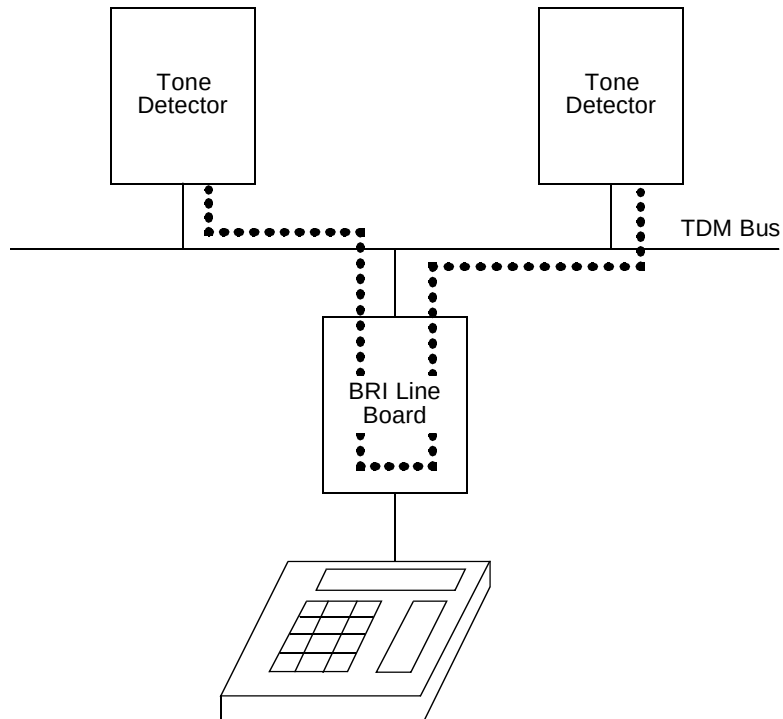


Figure 8-3. Path of the BRI Port Local TDM Loop-Around

Table 8-14. Test #619 BRI Port Local TDM Loop-Around Test

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 8-14. Test #619 BRI Port Local TDM Loop-Around Test — 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 8-14. Test #619 BRI Port Local TDM Loop-Around Test — 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 8-15. Test #620 Electronic Power Feed Restoral

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 8-16. Test #621 Level 1 Status Inquiry Test

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.	
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 8-16. Test #621 Level 1 Status Inquiry Test — 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.

Table 8-16. Test #621 Level 1 Status Inquiry Test — Continued

Error Code	Test Result	Description	Recommendation
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.
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.

Table 8-16. Test #621 Level 1 Status Inquiry Test — Continued

Error Code	Test Result	Description	Recommendation
	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 8-17. Test #622 Electronic Power Feed Inquiry

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.
2100	ABORT	Could not allocate the necessary system resources to run this test.	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 8-18. Test #624 Layer 1 Transmission Error Counter Test

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 8-19. Test #625 Receive FIFO Overflow Error Counter Test

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 8-20. Test #270 Clear Error Counters Test

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

Table 8-21. 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.

Table 8-22. BRI-DAT

Alarm Level	Initial Craft Command to Run*
	test data-module

* Where P is 1; C is the carrier designation (A, B, C, D, or E); SS is the address of the slot in the carrier where the circuit pack is located (01, 02, ... etc.); and pp is the 2-digit port number (for example, 01). The alternate name field contains the extension of the endpoint. This field is used to distinguish between endpoints on the same port.

⚠ CAUTION:

A detailed flowchart for isolating and resolving Packet Bus faults is included in Chapter 9, "Packet Bus Fault Isolation and Correction". This flowchart, along with the other information presented in the chapter, can help in resolving problems that involve more than a single station or circuit pack. Whenever the repair procedures for this Maintenance Object refer to Packet Bus and/or Packet Control maintenance, be sure to reference Chapter 9, "Packet Bus Fault Isolation and Correction", in addition to the relevant MO documentation.

⚠ WARNING:

If a significant Packet Bus failure occurs, errors and alarms may not be logged as expected for BRI-SET/BRI-DAT. Conditions under which this occurs are detailed in the "Packet Bus Maintenance" on page 9-8 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 AT&T 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.

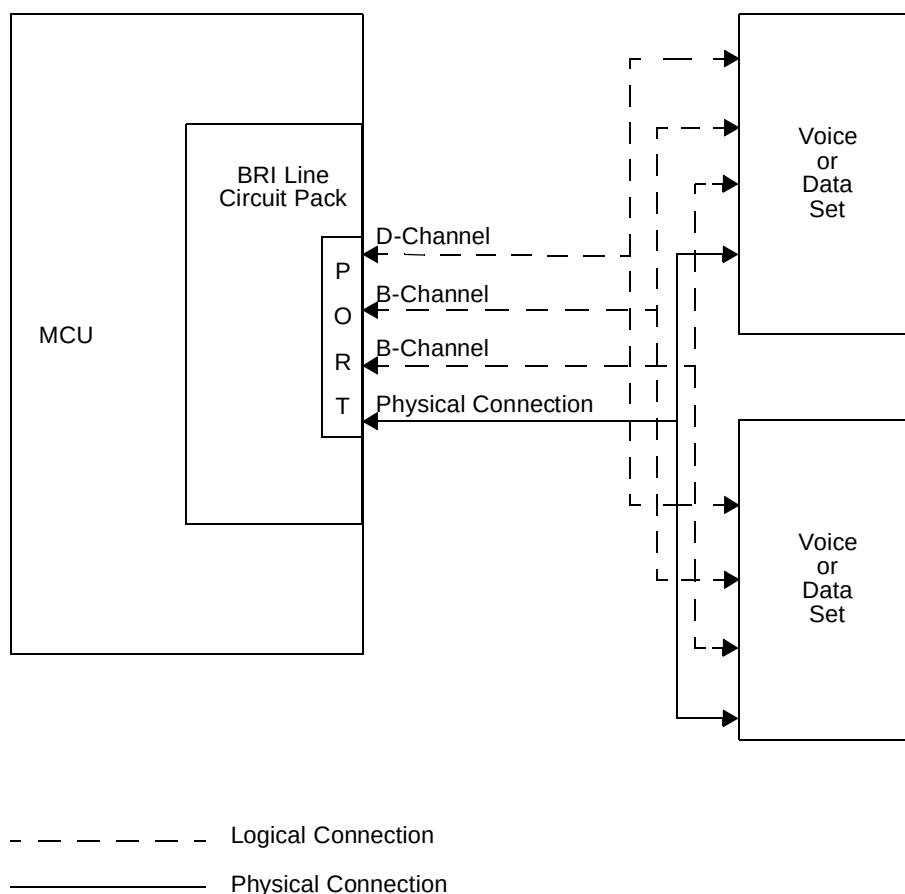


Figure 8-4. ISDN-BRI Set Interactions

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 8-23. 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.

Table 8-23. BRI-SET Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level BRI-SET	On/Off Board	Test to Clear Value	Description
769	0	none	Warning	Off		The signaling link associated with a BRI endpoint has too much link establishment related traffic. This could occur if the signaling link is bouncing between assigned and established states. Software suspends activity to this endpoint for 75 minutes when the endpoint is alarmed due to this problem. If this problem persists, replace the endpoint. If replacing the endpoint does not fix the problem follow normal escalation procedures.
2817	0	#628	Warning	Off	test station ext r 2 test data-module ext r 2	This error indicates a problem with Layer 2 over the D-channel between the switch and the endpoint. When this error occurs, an alarm is raised against the station. Execute the test station extension short command and pay particular attention to the results of the BRI XID Test (#628). If this test fails, follow the repair procedure for Test #628.
3073	0	#627	Warning	Off	test station ext l r 2 test data-module ext l r 2	This error indicates a problem with the B-channel connection between the switch and the endpoint. When this error occurs, a warning alarm is raised against the endpoint. Execute the test station extension l command and pay particular attention to the results of the BRI Remote Loop Back Test (#627). If this test fails, follow the repair procedure for Test #627.

Table 8-23. BRI-SET Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level BRI-SET	On/Off Board	Test to Clear Value	Description
3329	Any	#626	Warning	Off		This error occurs whenever the point-to-point signaling link to the endpoint goes down (except when it goes down because either the PKT-CTRL or the PKT-BUS has failed or has been busied out by system technician). When this error occurs, an alarm is raised against the endpoint or adjunct. Execute the test station extension short command and pay particular attention to the results of the Signaling Link Status Test (#626). If this test fails, follow the repair procedure for Test #626. The alarm is retired when the signaling link is reestablished to the endpoint or adjunct.
3584	0.1	#626				
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 AT&T ISDN-BRI Specification.)

Aux Data	Timer Type
2	First T303 (SETUP timer)
3	Second T303 (SETUP timer)
4	T305 (DISConnect timer)
5	First T308 (RELease timer)
6	Second T308 (RELease timer)
10	T316 (REStart timer)
12	T309 (Layer 2 Failure timer)
16	TM100 (Management Information Message timer 1)
17	TM200 (Management Information Message timer 2)

The switch sent a message to the endpoint, which did not respond in the allotted time. This can happen occasionally due to failure of the point-to-point signaling link or because of a problem in the BRI endpoint. Execute the **test station extension sh** command and pay particular attention to the results of the BRI Layer 3 Query Test (#629). If this test fails, follow the repair procedure for Test #629.

- 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 AT&T ISDN-BRI Specification (AT&T 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 8-24. 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 8-24. 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 8-25. Order of Investigation

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 8-26. Test #626 Signaling Link Status Test

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 8-26. Test #626 Signaling Link Status Test — 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 8-26. Test #626 Signaling Link Status Test — 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 8-27. Test #627 BRI Remote Loop-Back

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 8-27. Test #627 BRI Remote Loop-Back — 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 8-27. Test #627 BRI Remote Loop-Back — 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 8-27. Test #627 BRI Remote Loop-Back — 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 8-28. Test #628 BRI XID Test

Error Code	Test Result	Description	Recommendation
1000	ABORT	The BRI-SET is busy. The test cannot be executed at this time.	1) Pause momentarily (30 seconds) and re-execute at this time. 2) If this problem persists, escalate this problem. NOTE: A BRI-PORT can also be busy. When using this for BRI-PORT tests, the term "BRI-SET " can be changed to "BRI-PORT."
1005	ABORT	The endpoint is not administered to support XID testing.	1) If the endpoint documentation reflects support XID testing, use the change station extension command to change the XID Testing? field on the form to "yes."
1113	ABORT	The signaling link between the switch and the endpoint is down.	1) Use the test port PCSSpp long command to clear any errors that prevent establishment of the signaling link. 2) Examine the results of the Signaling Link Status Test (#626), which is run as part of this command. If this test aborts or fails, follow the repair procedure for Test #626. 3) If the XID test continues to abort, escalate the problem.
1139	ABORT	The Packet Bus is out of service.	1) Follow the repair procedures for the Packet Bus. 2) After completing Step 1, execute the test port long PCSSpp command, and review the results of the BRI Port LAN Loop-Around Test to verify the repair.
1141	ABORT	The PKT-CTRL is out of service.	1) Refer to PKT-CTRL Maintenance documentation. 2) If Step 1 does not resolve the problem, escalate to the next tier.
1144	ABORT	The Packet Bus is out of service.	1) Follow the repair procedures for the Packet Bus. 2) After completing Step 1, execute the test port long PCSSpp command, and review the results of the BRI Port LAN Loop-Around Test to verify the repair.

Table 8-28. Test #628 BRI XID Test — 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 8-28. Test #628 BRI XID Test — 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.
2100	ABORT	Could not allocate the necessary system resources to run this test.	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 8-29. Test #629 BRI Layer 3 Query Test

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 8-29. Test #629 BRI Layer 3 Query Test — 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 8-29. Test #629 BRI Layer 3 Query Test — 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 8-30. Test #630 BRI Set Audits Test

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 8-30. Test #630 BRI Set Audits Test — 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 8-30. Test #630 BRI Set Audits Test — 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 8-31. 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 8-32. 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

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.

Table 8-33. CARD-MEM (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 8-34. Recommended Size of Memory Card

Memory Card Size (Mb)	Usage	File Names
1	saving translations	translation
10	maintenance	translation core_dump
10	system upgrade	MCU software

Customers can have either a 1- or 10-Mb memory card for normal operations. A 10-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 8-35. 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

Table 8-35. CARD-MEM Error Log Entries — Continued

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

Table 8-35. CARD-MEM Error Log Entries — Continued

Error Type	Aux Data	Assoc Test #	Alarm Level	On/Off Board	Test to Clear Value	Reason for Error
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 (12-Volt Power Supply)" on page 8-614 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 8-35. 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.
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 8-35. 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.

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 8-36. Order of Investigation

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 (12-Volt Power Supply)" on page 8-614 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 8-37. Test #693 Memory Card Erase/Write/Read Test

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 8-37. Test #693 Memory Card Erase/Write/Read Test — 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 8-37. Test #693 Memory Card Erase/Write/Read Test — 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 (12-Volt Power Supply)" on page 8-614 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 8-38. Test #694 Memory Card Translation Data Integrity Test

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 8-38. Test #694 Memory Card Translation Data Integrity Test — 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.
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 8-39. Test #695 Memory Card Insertion Test

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.

Table 8-39. Test #695 Memory Card Insertion Test — Continued

Error Code	Test Result	Description	Recommendation
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.
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 8-40. Test #696 Memory Card Format and Read Test

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.

Table 8-40. Test #696 Memory Card Format and Read Test — Continued

Error Code	Test Result	Description	Recommendation
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.
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 8-41. Test #697 Memory Card Match Test

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 8-41. Test #697 Memory Card Match Test — 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 8-41. Test #697 Memory Card Match Test — *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 8-42. Test #698 Memory Card Write-Protection Test

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 8-42. Test #698 Memory Card Write-Protection Test — Continued

Error Code	Test Result	Description	Recommendation
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.
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 8-43. Test #699 Memory Card Directory Recovery Test

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 8-43. Test #699 Memory Card Directory Recovery Test — 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 8-43. Test #699 Memory Card Directory Recovery Test — 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 (12-Volt Power Supply)" on page 8-614 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.	

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.

Table 8-44. CLSFY-BD (Call Classifier Circuit Pack)

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 TN744 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.

Table 8-45. CLSFY-PT (Call Classifier Port)

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 8-46. 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 8-46. 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 8-47. Order of Investigation

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 8-48. Test #42 Tone Detection Verification Test

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 8-48. Test #42 Tone Detection Verification Test — 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 8-49. Test #43 Tone Detector Audit/Update Test

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 8-50. 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.
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 8-51. Port Circuit Pack Location

Error Type	Aux Data	Port Circuit Pack Location
26	0	1A Network Control
26	1	Maintenance Control
27	0	1A Network Control
28	0	1A Tone Clock
29	0	1A Tone-Clock
30	0	1A01
31	0	1A02
56	0	1A03
57	0	1A04
58	0	1A05
59	0	1A06
60	0	1A07
61	0	1A08
62	0	1A09
63	0	1A10
66	0	1B01
67	0	1B02
68	0	1B03
69	0	1B04
70	0	1B05
71	0	1B06
72	0	1B07
73	0	1B08
74	0	1B09
75	0	1B10
76	0	1B11
77	0	1B12
78	0	1B13
79	0	1B14
80	0	1B15
81	0	1B16

Table 8-51. Port Circuit Pack Location — Continued

Error Type	Aux Data	Port Circuit Pack Location
82	0	1B17
83	0	1B18
84	0	1B19
85	0	1B20
94	0	1A1 Processor Interface

CRS

CRS allows the MCU to originate an alarm to the INADS/VTC whenever the CRS fails to communicate with the MCU for a given time period. This halt in communication may occur if the user powers down the CRS, or if a problem occurs within the CRS PC. If the user has a CRS connected to the MCU, the CRS 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 CRS). Once the CRS logs into the MCU, the MCU knows that the CRS is active. If, within the hour, the CRS does not log into the MCU, an error is logged against CRS. If the CRS does not log into the MCU for three consecutive hours, an alarm is raised.

The CRS alarming feature is enabled on the System-Parameters Maintenance form. The *CRS Alarm* field may contain any one of the following entries: **none** (default), **major**, **minor**, or **warning**. Only major or minor alarms automatically notify the VTC.

Table 8-52. CRS 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	CRS failed to log into the MCU during the past hour (see the following section for a resolution).

Resolving the CRS Alarm

There are no craft-demanded tests for this MO. The most likely cause of the CRS alarm is a powered-down CRS PC. This is the first item you should check. If the CRS is powered up, verify the following:

1. PC is running and does not require rebooting.
2. CRS application is up and running.
3. Link between the CRS and MCU is up.

Refer to the *CRS User's Guide* for link troubleshooting.

Whenever the CRS 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 CRS alarm is resolved. If the CRS is functioning normally and the CRS alarm is still present, escalate the problem.

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).

Table 8-53. CUST-ALM (Customer-Provided Alarming Device)

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 8-54. Order of Investigation

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 8-55. Test #115 Customer-Provided Alarming Device Test

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]**.

Table 8-56. DATA-BD (Network Control Circuit Pack)

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 8-57. 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 8-57. 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 8-57. 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.
3840	Any	None				No action required.

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.

Table 8-58. DATA-CHL (Network Control Data Channel)

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" on page 8-141.

[†] 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 "SW-CTL (Switch Control)" on page 8-489 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 (PRI-CDR Link)" on page 8-472 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 8-59. 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 8-59. 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 8-60. Order of Investigation

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 Data-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 8-61. Order of Investigation

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 8-61. Order of Investigation — 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)" on page 8-129 for a description of test.

† See "SW-CTL (Switch Control)" on page 8-489 for a description of this test.

‡ See "12V-PWR (12-Volt Power Supply)" on page 8-614 for a description of this test.

§ See "CARD-MEM (Memory Card)" on page 8-91 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 8-62. Test #107 Data Channel Reset Test

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 8-63. Test #108 Data Channel Dual-Port RAM Test

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 (PRI-CDR Link)" on page 8-472 or "SYS-PRNT (System Printer)" on page 8-511 for details on restoring them before concluding work on the problem.

Table 8-64. Test #109 Data Channel Remote Mtce Loop-Around Test

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 8-64. Test #109 Data Channel Remote Mtce Loop-Around Test — 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 8-64. Test #109 Data Channel Remote Mtce Loop-Around Test — 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 8-64. Test #109 Data Channel Remote Mtce Loop-Around Test — 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: <i>All functions must be busied out because test #107 is destructive and terminates established connections over DATA-CHLS.</i> 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 8-64. Test #109 Data Channel Remote Mtce Loop-Around Test — Continued

Error Code	Test Result	Description	Recommendation
2000-2004	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: <i>All functions must be busied out because test #107 is destructive and terminates established connections over DATA-CHLs.</i> 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 8-64. Test #109 Data Channel Remote Mtce Loop-Around Test — 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 Looparound 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 8-65. Test #110 Data Channel Crosstalk Test

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 (PRI-CDR Link)" on page 8-472 for CDR, "SYS-PRNT (System Printer)" on page 8-511 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.
40-75	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 8-65. Test #110 Data Channel Crosstalk Test — 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 8-65. Test #110 Data Channel Crosstalk Test — Continued

Error Code	Test Result	Description	Recommendation
14-40	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 8-65. Test #110 Data Channel Crosstalk Test — Continued

Error Code	Test Result	Description	Recommendation
2000-2004	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 8-66. Test #111 Data Channel Local Loop-Back Test

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 (PRI-CDR Link)" on page 8-472 for CDR, "SYS-PRNT (System Printer)" on page 8-511 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.
40-75	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 8-66. Test #111 Data Channel Local Loop-Back Test — 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 8-66. Test #111 Data Channel Local Loop-Back Test — 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: <i>All functions must be busied out because test #107 is destructive and terminates all established connections over the DATA-CHLs.</i> 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 8-66. Test #111 Data Channel Local Loop-Back Test — Continued

Error Code	Test Result	Description	Recommendation
2000-2004	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: <i>All functions must be busied out because test #107 is destructive and terminates all established connections over the DATA-CHLs.</i> 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.

Table 8-67. DATA-CON (Network Control Driver)

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 8-68. 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 8-68. 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.

Table 8-69. DC-POWER (Cabinet Power)

Alarm Level	Initial Craft Command to Run
Major	test environment P^*

* Where P is an appropriate port network number determined from the *PORT* field of the alarm log.

Hardware Error Log Entries

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

Table 8-70. 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 8-71. Order of Investigation

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 8-72. Test #79 Cabinet Power Query Test

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 TN748 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).

Table 8-73. DETR-BD (Tone Detector Circuit Pack)

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).

DIG-BD (Digital Line Circuit Pack)

Refer to "XXX-BD (Common Port Circuit Pack)" on page 8-605 for circuit pack level errors.

See also "DIG-LINE (Digital Line)" on page 8-168 for related line information.

Table 8-74. DIG-BD (Digital Line Circuit Pack)

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).

DIG-LINE (Digital Line)

The Digital Line circuit pack (TN754B) 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 *AT&T MultiPoint Control Unit Installation Quick Reference 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 8-75. 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	40987	None	Warning	Off		This is an off-board problem detected by the port circuit. Could experience a noisy port or link. 1. Check for defective wiring or a defective alarm terminal. 2. If the problem continues, replace the circuit pack. 3. When the problem is resolved, the alarm is retired after a specified time.
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.
15	Any	None				This is an internal type error that occurs when an audit request fails. The corrective measure is automatically taken by the MCU. Ignore this error.
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 .

Table 8-75. Digital Line Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Reason for Error
130		None	Warning	On	test port <i>PCSSpp sh</i>	The circuit pack has been removed or has been insane for more than 21 minutes. To clear this error, reinsert or replace the circuit pack.
257	40971	None				There are problems transmitting to the alarm terminal. This problem can be caused by defective wiring. Defective wiring causes varying degrees of problems on different types of terminals. This can be ignored if no complaints are received from the user.
513	0	#17	Warning	Off	test port <i>PCSSpp sh r 6</i>	This circuit pack is overloaded with downlink messages. This may cause the alarm terminal to malfunction (such as ringer doesn't ring, lamp won't light). This message can be ignored or you may redistribute the digital stations to other digital boards.
767	40964	None				This is an in-line event that produces this error type when a favorable response is received from running the Digital Line Electronic Power Feed test (#11). No craft action is necessary. This alarm is resolved with time.

Table 8-75. 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	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 8-75. 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 8-75. 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 <i>PCSSpp 1 r 3</i>	Minor alarms on this MO may be downgraded to warning alarms based on the values used in set options .
2049		#9		On	test port <i>PCSSpp 1 r 3</i>	Minor alarms on this MO may be downgraded to warning alarms based on the values used in set options .
2305	32770	None				The alarm terminal went off-hook while it was in the ready-for-service state. 1. Use status station to determine the state of the station. The off-hook should have moved the alarm terminal to ready for service. 2. No craft action is necessary.
2305	40967	None				The link between the circuit pack and the alarm terminal is successfully reset. No craft action is required.

Table 8-75. Digital Line Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Reason for Error
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	0	None				The circuit pack is overloaded with downlink messages. The overload may cause the alarm terminal not to function properly (such as ringer doesn't ring, lamp won't light). This can be ignored.

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 8-76. Order of Investigation

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
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 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 8-77. Test #9 Digital Line NPE Crosstalk Test

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 8-77. Test #9 Digital Line NPE Crosstalk Test — 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 TN754B 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 8-78. Test #11 Digital Line Electronic Power Feed Test

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 8-79. Test #13 Voice and Control Channel Local Loop Test

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 8-79. Test #13 Voice and Control Channel Local Loop Test — 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 8-79. Test #13 Voice and Control Channel Local Loop Test — 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 8-80. Test #16 DIG-LINE Station Lamp Update Test

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 8-80. Test #16 DIG-LINE Station Lamp Update Test — 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 TN754 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 TN754B 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 8-81. Test #17 Station (Digital) Audits Test

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 8-81. Test #17 Station (Digital) Audits Test — 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.
2000	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	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.

Table 8-82. DS1-BD (DS1 Interface Circuit Pack)

Alarm Level	Initial Craft Command to Run
Minor	test board <i>PCSS l</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 8-83. 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 (AT&T 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)" on page 8-501 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 (DS1 Tie Trunks)" on page 8-542 for DS1 Tie Trunk, "ISDN-TRK (DS1 ISDN Trunk)" on page 8-272 for DS1 ISDN Trunk, and "ISDN-LNK (ISDN-PRI Signaling Link Port)" on page 8-248 for ISDN-PRI Signaling Link Port.

Hardware Error Log Entries

Minor alarms on this MO may be downgraded to warning alarms based on the values used in **set options**.

Table 8-84. 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, "LED Interpretation" and see "RED (Alarm)" on page 7-4. 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 8-84. 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 I r 20	
257	Any	None				See "XXX-BD (Common Port Circuit Pack)" on page 8-605 for details. This error is associated with Common Port Circuit Pack maintenance.

Table 8-84. 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)" on page 8-605 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 8-84. 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	Warning	Off	test board PCSS sh	
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 .

Table 8-84. DS1-BD Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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 8-85. Order of Investigation

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 Looparound Test (#135)			Reset	Yes
DS1 Remote Looparound Test (#160)			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 8-86. Test #50 NPE Connection Audit

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	This is normal if the test is run when the circuit pack is not installed or when the MCU is booting up. If this is not the case, the DS1 Interface circuit pack may not be administered.	1. Use the display ds1 PCSS command to see if the DS1 Interface circuit pack is not administered. 2. If it is not administered, enter add ds1 PCSS command. 3. Retry the command at one-minute intervals up to five times. 3. 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 8-87. Test #52 Control Channel Loop-Around

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	This is normal if the test is run when the circuit pack is not installed, or when the MCU is booting up. If this is not the case, the DS1 Interface circuit pack may not be administered.	1. Enter display ds1 PCSS to see if the DS1 Interface circuit pack is administered. 2. If not, administer the DS1 Interface circuit pack by entering add ds1 PCSS . 3. Retry the command at one-minute intervals up to five times. 4. If the test continues to return NO BOARD, escalate the problem.

SAKI Sanity Test #53

Refer to the "XXX-BD (Common Port Circuit Pack)" on page 8-605 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 8-88. Test #135 Internal Loop-Around Test

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 (TTR Level)" on page 8-573 for details. 2. Look for TONE-PT errors in the Error Log. If present, refer to "TONE-PT (Tone Generator)" on page 8-562 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 8-88. Test #135 Internal Loop-Around Test — 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	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.
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 8-88. Test #135 Internal Loop-Around Test — 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	This is normal if the test is run when the circuit pack is not physically installed or when the system is booting up. If this is not the case, the DS1 Interface circuit pack may not be administered.	1. Check to see if the DS1 Interface circuit pack is administered using display ds1 PCSS. 2. If it is not administered, enter add ds1 PCSS. 3. Retry the test at one-minute intervals up to five times. 4. If the test continues to return NO BOARD, escalate the problem.

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 8-89. Test #138 Loss-of-Signal Alarm Inquiry Test

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	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 the test.	1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
	FAIL	DS1 Interface circuit pack detects a loss of signal alarm. The physical link is broken or the remote DS1 endpoint is down. All trunks of this DS1 Interface circuit pack are out of service. If the DS1 Interface circuit pack is designated as the supplier of the system synchronization source, then the system synchronization maintenance adopts a source elsewhere. Refer to "SYNC (Synchronization)" on page 8-501 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	This is normal if the test is run when the circuit pack is not physically in the system, or when the system is booting up. If this is not the case, the DS1 Interface circuit pack may not be administered.	1. Check to see if the DS1 Interface circuit pack is administered by entering display ds1 PCSS. 2. Administer the DS1 Interface circuit pack by issuing the add ds1 PCSS command. 3. Retry the command at one-minute intervals up to five times. 4. If the test continues to return NO BOARD, escalate the problem.

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 8-90. Test #139 Blue Alarm Inquiry

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	Response to the test request was not received within the allowable time period.	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.
2100	ABORT	Could not allocate the necessary system resources to run this test.	1. Retry the command at one-minute intervals up to a maximum of five times. 2. If the test continues to abort, escalate the problem.
	FAIL	The remote DS1 endpoint is out of service.	1. If the DS1 Interface circuit pack connects to a T1 facility, call the vendor of the T1 carrier to diagnose the remote DS1 endpoint. 2. If the DS1 Interface circuit pack connects directly to a switch, call the system technician of the remote switch to diagnose the DS1 endpoint.
	PASS	Remote DS1 endpoint is in-service. No blue alarm is detected in the DS1 Interface circuit pack.	
0	NO BOARD	This is normal if the test is run when the circuit pack is not physically in the system, or when the system is booting up. If this is not the case, the DS1 Interface circuit pack may not be administered.	1. Check to see if the DS1 Interface circuit pack is administered by entering display ds1 PCSS. 2. Administer the DS1 Interface circuit pack by issuing add ds1 PCSS. 3. Retry the command at one-minute intervals up to five times. 4. If the test continues to return NO BOARD, escalate the problem.

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 8-91. Test #140 Red Alarm Inquiry

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	The DS1 Interface circuit pack detects a red alarm. An out-of-frame condition occurs on the DS1 Interface circuit pack. The DS1 Interface circuit pack transmits a yellow alarm to the remote DS1 endpoint until the red alarm is retired.	1. Verify that both endpoints of the DS1 link are administered using the same DMI-BOS signaling mode, framing mode, and line coding. 2. Check the physical connectivity of the DS1 Interface circuit packs and cable. 3. Replace the local DS1 Interface circuit pack and repeat the test. 4. Contact T1 Network Services to diagnose the remote DS1 endpoint. 5. If the test still fails, escalate the problem.
1	FAIL	The DS1 Interface circuit pack detects an LMA. An out-of-frame condition occurs on the DS1 Interface circuit pack. The DS1 Interface circuit pack transmits a remote multiframe alarm to the remote DS1 endpoint until the LMS is retired.	1. Verify that both endpoints of the DS1 link are administered using the same DMI-BOS signaling mode, framing mode, and line coding. 2. Check the physical connectivity of the DS1 Interface circuit packs and cable. 3. Replace the local DS1 Interface circuit pack and repeat the test. 4. Contact T1 Network Services to diagnose the remote DS1 endpoint. 5. If the test still fails, escalate the problem.
	PASS	No red alarm is detected on the DS1 Interface circuit pack.	
0	NO BOARD	This is normal if the test is run when the circuit pack is not physically in the system, or when the system is booting up. If this is not the case, the DS1 Interface circuit pack may not be administered.	1. Check to see if the DS1 Interface circuit pack is administered by entering display ds1 PCSS. 2. If it is not administered, issue add ds1 PCSS. 3. Retry the command at one-minute intervals up to five times. 4. If the test continues to return NO BOARD, escalate the problem.

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 8-92. Test #141 Yellow Alarm Inquiry

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	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.
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	This is normal if the test is run when the circuit pack is not physically in the system, or when the system is booting up. If this is not the case, the DS1 Interface circuit pack may not be administered.	1. Check to see if the DS1 Interface circuit pack is administered by entering display ds1 PCSS. 2. Administer the DS1 Interface circuit pack by issuing add ds1 PCSS. 3. Retry the command at one-minute intervals up to five times. 4. If the test continues to return NO BOARD, escalate the problem.

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 8-93. Test #142 Major Alarm Inquiry

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	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 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	This is normal if the test is run when the circuit pack is not physically in the system, or when the system is booting up. If this is not the case, the DS1 Interface circuit pack may not be administered.	1. Check to see if the DS1 Interface circuit pack is administered by entering display ds1 PCSS. 2. Administer the DS1 Interface circuit pack by issuing add ds1 PCSS. 3. Retry the test at one-minute intervals up to five times. 4. If the test continues to return NO BOARD, escalate the problem.

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 8-94. Test #143 Minor Alarm Inquiry

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	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 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	This is normal if the test is run when the circuit pack is not physically in the system, or when the system is booting up. If this is not the case, the DS1 Interface circuit pack may not be administered.	1. Check to see if the DS1 Interface circuit pack is administered by entering display ds1 PCSS. 2. Administer the DS1 Interface circuit pack by issuing add ds1 PCSS. 3. Retry the command at one-minute intervals up to five times. 4. If the test continues to return NO BOARD, escalate the problem.

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)" on page 8-520 and "SYNC (Synchronization)" on page 8-501 for details.

Table 8-95. Test #144 Slip Alarm Inquiry

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	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.
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	This is normal if the test is run when the circuit pack is not physically in the system, or when the system is booting up. If this is not the case, the DS1 Interface circuit pack may not be administered.	1. Check to see if the DS1 Interface circuit pack is administered by entering display ds1 PCSS. 2. Administer the DS1 Interface circuit pack by issuing add ds1 PCSS. 3. Retry the command at one-minute intervals up to five times. 4. If the test continues to return NO BOARD, escalate the problem.

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)" on page 8-520 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 8-96. Test #145 Misframe Alarm Inquiry

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	Response to the test request was not received within the allowable time period.	1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2100	ABORT	Could not allocate the necessary system resources to run this test.	1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1 to 17	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	This is normal if the test is run when the circuit pack is not physically in the system, or when the system is booting up. If this is not the case, the DS1 Interface circuit pack may not be administered.	1. Check to see if the DS1 Interface circuit pack is administered by entering display ds1 PCSS. 2. Administer the DS1 Interface circuit pack by issuing add ds1 PCSS. 3. Retry the test at one-minute intervals up to five times. 4. If the test continues to return NO BOARD, escalate the problem.

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 8-97. Test #146 Translation Update

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	This is normal if the test is run when the circuit pack is not physically in the system, or when the system is booting up. If this is not the case, the DS1 Interface circuit pack may not be administered.	1. Check to see if the DS1 Interface circuit pack is administered by entering display ds1 PCSS . 2. Administer the DS1 Interface circuit pack by issuing add ds1 PCSS . 3. Retry the command at one-minute intervals up to five times. 4. If the test continues to return NO BOARD, escalate the problem.

Remote Loop-Around Test #160

This test is destructive. The Remote Loop-Around test is run when the endpoint (that is, Network Circuit Terminating Equipment) to which the DS1 Interface circuit pack connects can provide a remote loop-around capability. The remote loop-around is provided by looping the received DS1 bit stream from the DS1 Interface circuit pack back to the same DS1 Interface circuit pack. The test is highly destructive and can be initiated only by a craft-demanded **reset board PCSS**.

To avoid misuse of **reset board**, the permission to run Remote Loop-Around test is disabled in the DS1 Interface circuit pack administration by default. To run this test, the *Remote Loop-Around Test* field in the DS1 Interface Administration form must be completed with "yes."

All trunks on the DS1 Interface circuit pack must be busied out via the craft **busyout board** command before running Remote Loop-Around test. When the Remote Loop-Around test is initiated, maintenance software sends appropriate messages to the DS1 Interface circuit pack to start the test. The DS1 Interface circuit pack electrically connects two conductors run to the NCTE to signal the NCTE to perform a loop-around circuit. 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 completed, the maintenance software sends a stop loop-around message to the DS1 Interface circuit pack to return the circuit pack to the normal operation mode. All trunks of the DS1 Interface circuit pack are restored to the in-service state after **release board** is entered.

Table 8-98. Test #160 Remote Loop-Around

Error Code	Test Result	Description	Recommendation
1002	ABORT	The system could not allocate time slots for the test. The MCU 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)" on page 8-520 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 MCU 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 (TTR Level)" on page 8-573 for details. 2. Look for TONE-PT errors in the Error Log. If present, refer to "TONE-PT (Tone Generator)" on page 8-562 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 DS1 Interface circuit pack to the 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.
1005	ABORT	Remote Loop-Around test cannot be executed in the current configuration. To run this test, the <i>Remote Loop-Around Test</i> field in DS1 Interface Circuit Pack Administration form must be completed with "yes." Also, at least one port of the DS1 Interface circuit pack must have been administered in a trunk group or an OPS station. This port cannot be port 24 if common channel signaling or ISDN signaling is specified.	1. Enter display ds1 PCSS to verify the DS1 Interface circuit pack administration. 2. Check the trunk group administration to verify that at least a nonsignaling port has been administered in a trunk group. 3. Retry the command. 4. If the test continues to abort, escalate the problem.
1015	ABORT	Ports on DS1 Interface circuit pack have not been busied out to out of service.	1. Enter busyout board PCSS to put all trunks of the DS1 Interface circuit pack into the out-of-service state. 2. Retry the command. 3. If the test continues to abort, escalate the problem.

Table 8-98. Test #160 Remote Loop-Around — Continued

Error Code	Test Result	Description	Recommendation
1039	ABORT	The DS1 Interface circuit pack is providing timing for the MCU. Therefore, it cannot be reset without major 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. 6. If the test aborts again, a different error code is generated. Follow the recommended procedures for that error code.
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.
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 8-98. Test #160 Remote Loop-Around — Continued

Error Code	Test Result	Description	Recommendation
	FAIL	DS1 Interface circuit pack failed in the Remote Loop-Around Test.	1. Retry the command at one-minute intervals up to five times. 2. Enter list measurement ds1-log PCSS to read the error seconds measurements. Otherwise go to Step 3. 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 Services to diagnose the remote DS1 endpoint. 7. If the test still fails, escalate the problem.
	PASS	All administered trunks of DS1 Interface circuit pack pass the Remote Loop-Around test. The Bit Pattern Consistency test is executed successfully over the path that covers a DS1 port, cable, and the external NCTE device.	
0	NO BOARD	This is normal if the test is run when the circuit pack is not physically in the system, or when the system is booting up. If not, the DS1 Interface circuit pack may not be administered.	1. Check to see if the DS1 Interface circuit pack is administered with display ds1 PCSS. 2. Administer the DS1 Interface circuit pack via add ds1 PCSS. 3. Retry the command at one-minute intervals up to five times. 4. If the test continues to return NO BOARD, escalate the problem.

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 (Common Port Circuit Pack)" on page 8-605.

Table 8-99. DTMR-PT

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 8-100. 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 8-100. 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.
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 8-100. 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 8-101 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 8-101. Order of Investigation

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 8-102. Test #42 Tone Detection Verification

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 (TDM Bus)" on page 8-520 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 8-102. Test #42 Tone Detection Verification — 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 8-103. Test #43 Tone Detector Audit/Update

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 8-104. 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.

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.

Table 8-105. EXT-DEV (External Alarm)

Alarm Level	Initial Craft Command to Run
Major	test environment P^*
Minor	test environment P

* Where P is an appropriate port network number determined via the *Port* field from the alarm log or error log.

Hardware Error Log Entries

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

Table 8-106. 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 P sh r 1	Run the short test sequence first. If all tests pass, run the long test sequence. Refer to the appropriate test description for details.
1	Any	#120	Major	Off	test environment P r 3	Two pairs of leads can be connected to an external device. Closing one pair of leads causes this major alarm.
257	0	#120	Minor	Off	test environment P r 3	Two pairs of leads can be connected to an external device. Closing one pair of leads causes a major alarm; closing the other pair of leads causes a minor alarm.

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 8-107. Order of Investigation

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 8-108. Test #120 External Alarm Lead

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 8-108. Test #120 External Alarm Lead — 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)" on page 8-605.

Table 8-109. GPTD-PT (General-Purpose Tone Detector Port)

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 8-110. 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 DTMR ports for service is administered using change system-parameters maintenance.
1	17664	#43	Minor	On	test port PCSSpp r 2	The GPTD port is having problems detecting call progress tones. If this error is constantly logged, the Tone Detector circuit pack containing the defective GPTD port should be replaced. Run the short test sequence against the GPTD port and then follow the error code procedures for the individual tests.
18	0		Warning	On	release port PCSSpp	The port was busied out by craft.

Table 8-110. 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 8-110. 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 8-111. Order of Investigation

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 8-112. Test #42 Tone Detection Verification

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 (TDM Bus)" on page 8-520 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 8-112. Test #42 Tone Detection Verification — 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 8-113. Test #43 Tone Detector Audit/Update

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.

Table 8-114. INADS (INADS Link)

Alarm Level	Initial Craft Command to Run
None	test inads-link

Hardware Error Log Entries and Test to Clear Values

The Hardware Error Log entries are described as part of the INADS Link Test description.

Short and Long Test Sequences

The test inads-link command does not have a long or short option, and the test on the INADS Link does not have an associated test number. When the **test inads-link** command is issued, the user immediately sees either the "Command successfully completed" or "Command failed" message.

INADS Link Test (no test number)

The INADS Link Test attempts to place a call to INADS (in the background) to verify the communications link to INADS. When you enter the test inads-link command, you immediately see either "Command successfully completed" or "Command failed." The "Command failed" message appears when a previously run test inads-link command is in progress, or if the system has active alarms that must be reported to INADS. The "Command successfully completed" command means the switch will attempt to call INADS in two minutes (the test still runs even if Alarm Origination is disabled). The two-minute delay allows a remote INADS technician time enough to hang up the call and, therefore, free up the INADS line so that the switch can call INADS back.

As error conditions are encountered, errors are logged against INADS. Error Codes 1 through 9 can be logged if the test result was "Command successfully completed," and Error Codes 10 and 11 can be logged if the test result was "Command failed." An error is also logged against INADS if the call to INADS finally succeeds. The INADS software (Release 3.2 or later) recognizes this special "test inads" type of alarm, and it automatically opens and then closes a trouble ticket indicating that the reason for the trouble ticket is a test inads-link command. The trouble ticket alarm contains a TESTING INADS LINK description field.

Table 8-115. 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 alj command. If PR-MAINT Tests 102 and 103 do not pass, refer to "PR-MAINT (Maintenance Processor)" on page 8-459. 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 8-115. 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)

An ISDN-PRI Signaling Link Port is known as a D-channel. The ISDN-PRI interface uses out-of-band signaling as opposed to robbed-bit, in-band signaling. User information (for example, digital data) is carried on bearer channels (B-channels); DS1 (UDS1) ISDN trunks are B-channels and they carry the user 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 (ISDN-LNK) and the associated DS1 (UDS1) ISDN trunk (ISDN-TRK) use ports on a TN767E DS1 (TN2207 UDS1) Interface circuit pack. The DS1 ISDN trunk, also referred to as B-channels, may use any of the first 23 ports, but the ISDN-PRI Signaling Link Port, also referred to as the D-channel, must be the 24th port. Similarly, the UDS1 ISDN trunk may use any of the ports 1 through 15 or 17 through 31, but the ISDN-PRI Signaling Link Port must be the 16th port.

A problem with the ISDN-PRI Signaling Link Port (D-channel) affects all of the associated DS1 ISDN trunks (B-channels) since no call control information can be conveyed to the far-end without it. Stable conferences may remain operational, but no new conferences can be established.

The ISDN-PRI Signaling Link Port itself depends on two other entities: the TN767E DS1 or TN2207 UDS1 Interface circuit pack it resides on and the processor interface link that provides the link to the processor. If there are any problems with the ISDN-PRI Signaling Link Port, also investigate the TN767E DS1 or TN2207 UDS1 Interface circuit pack and the processor interface link.

Table 8-116. ISDN-LNK (ISDN-PRI Signaling Link Port)

Alarm Level	Initial Craft Command to Run
Minor	test port <i>PCSSpp</i> * l
Warning	test port <i>PCSSpp</i> sh

* Where *pp* is 24 for 24-channel interfaces.

NOTE:

For additional repair information, see also "DS1-BD (DS1 Interface Circuit Pack)" on page 8-189.

In a 24-channel system, the DS1 ISDN trunk (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 (see

"ISDN-SGR (ISDN-PRI Signaling Group)" on page 8-251 for details). Similarly, ports 1 through 15 and 17

through 31 on the UDS1 Interface circuit pack are used as B-channels. The 16th port is used as the D-channel.

ISDN-LNK handles maintenance and recovery for the D-channel port on the DS1 (UDS1) carrying the signaling link. A problem with the ISDN-PRI Signaling Link Port (D-channel) affects all of the associated DS1 (UDS1) ISDN trunks (B-channels) since no call control information can be conveyed to the far-end switch without it. Stable calls may remain operational, but no new calls can be made.

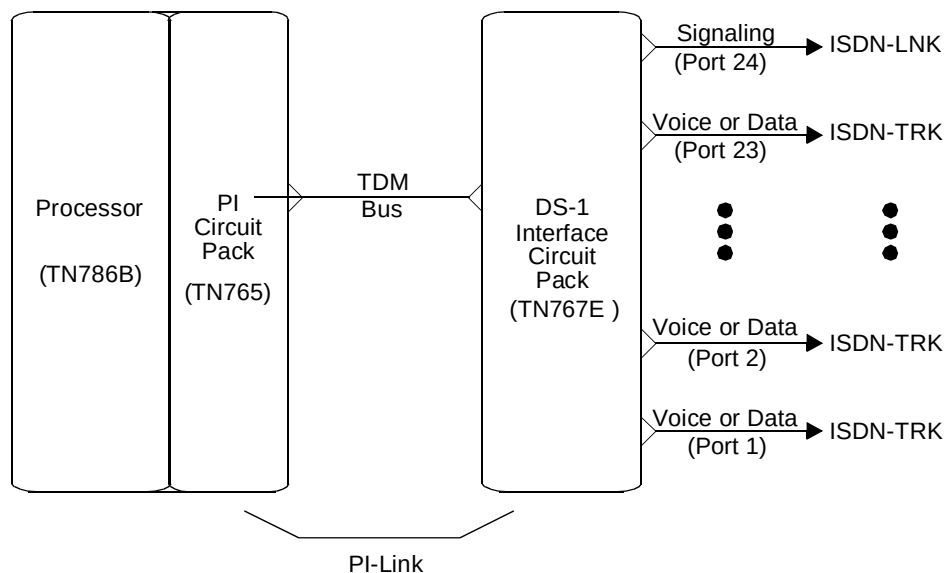


Figure 8-5. ISDN-PRI Signaling Link Port Interactions (24 Channels)

Hardware Error Log Entries

The following table shows the ISDN-PRI Signaling Link Port hardware error log entries.

Table 8-117. ISDN-PRI Signaling Link 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 <i>PCSSxx</i> * sh r 1	Run the short test sequence first. If all tests pass, run the long test sequence.
18	0		Warning	Off	release port <i>PCSSxx</i>	The port has been busied out by craft.
130		None	Warning	On	test port <i>PCSSxx</i> sh	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.
1793						The cabled DS1 (UDS1) circuit pack has been disconnected. Reconnect it.

* Where xx is 24 for 24-channel interfaces.

Craft-Demanded Tests

Always investigate tests in the order presented in the table below when inspecting errors in the system. 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.

Table 8-118. Order of Investigation

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Signaling Link Board Check (#643)	Short	Long	No

Signaling Link Board Check #643

This ISDN-PRI Signaling Link Port D-channel depends on the health of the DS1 (UDS1) Interface circuit pack. This test checks for the state of the DS1 (UDS1) Interface circuit pack transporting the ISDN-PRI Signaling Link Port.

Table 8-119. Test #643 Signaling Link Board Check

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.
8	FAIL	The DS1 (UDS1) circuit pack is not in-service.	1. Check the hardware error log for entries logged against DS1-BD (UDS1-BD). 2. Consult the DS1-BD (DS1 Interface circuit pack) for repair procedures.
	PASS	The DS1 (UDS1) Interface circuit pack transporting the ISDN-PRI Signaling Link Port is in-service.	

ISDN-SGR (ISDN-PRI Signaling Group)

An ISDN-PRI Signaling Group is a collection of DS1 (UDS1) ISDN trunks (B-channels) for which a given ISDN-PRI Signaling Link Port (D-channel) carries signaling information. ISDN-PRI requires the TN767E DS1 (TN2207 UDS1) Interface circuit pack.

NOTE:

See "DS1-BD (DS1 Interface Circuit Pack)" on page 8-189 for a description of this circuit pack.

The first 23 ports on the DS1 Interface circuit pack are used as B-channels. The 24th port may be used as a B-channel or D-channel depending on the type of signaling group used. Similarly, ports 1 through 15 and 17 through 31 on the UDS1 Interface circuit pack are used as B-channels. The 16th port is used as the D-channel.

Table 8-120. ISDN-SGR (ISDN-PRI Signaling Group)

Alarm Level	Initial Craft Command to Run
Major	test sig-group <group>*
Minor	test sig-group <group>
Warning	test sig-group <group>

* Where <group> is a number from 1 to 18 and the test sequence can be either short or long.

There are two types of signaling groups:

- Facility Associated Signaling (FAS)
- Non-Facility Associated Signaling (NFAS)

The figures following this section illustrate each of the configurations. In an FAS signaling group, the 24th port or the 15th port of the DS1 Interface circuit pack is always the D-channel that carries signaling information for other ports (B-channels) on the circuit pack.

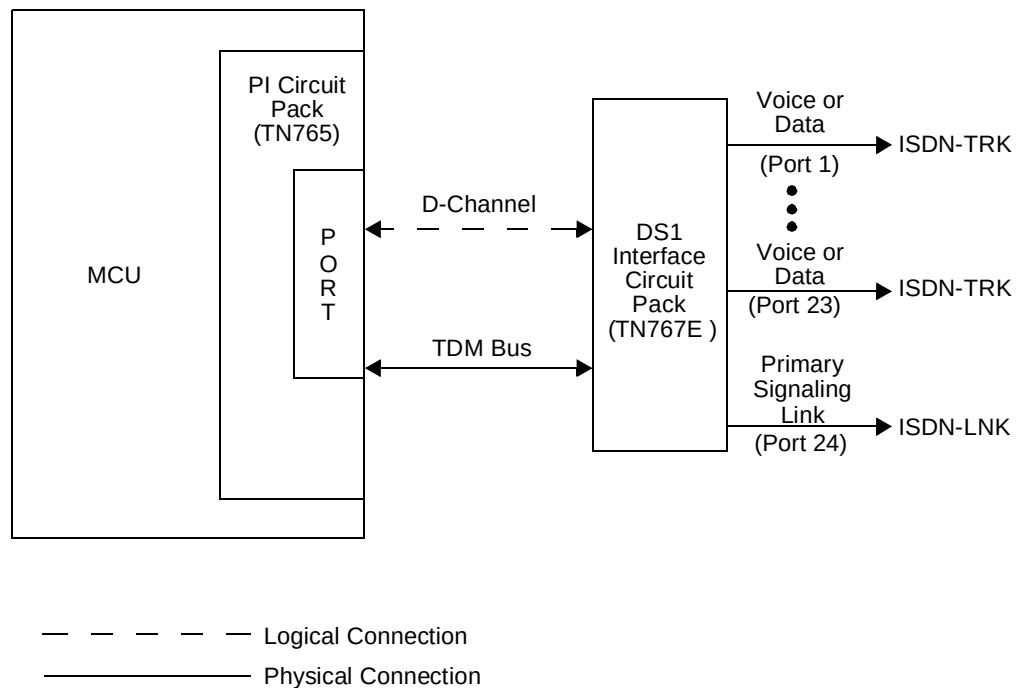


Figure 8-6. FAS ISDN-PRI Signaling Group (24 Channels)

In an NFAS signaling group, the 24th port of a DS1 Interface circuit pack (for 24 channels) is administered as a D-channel. The D-channel carries signaling information for 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 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.



NOTE:

E1 facilities do not support NFAS.

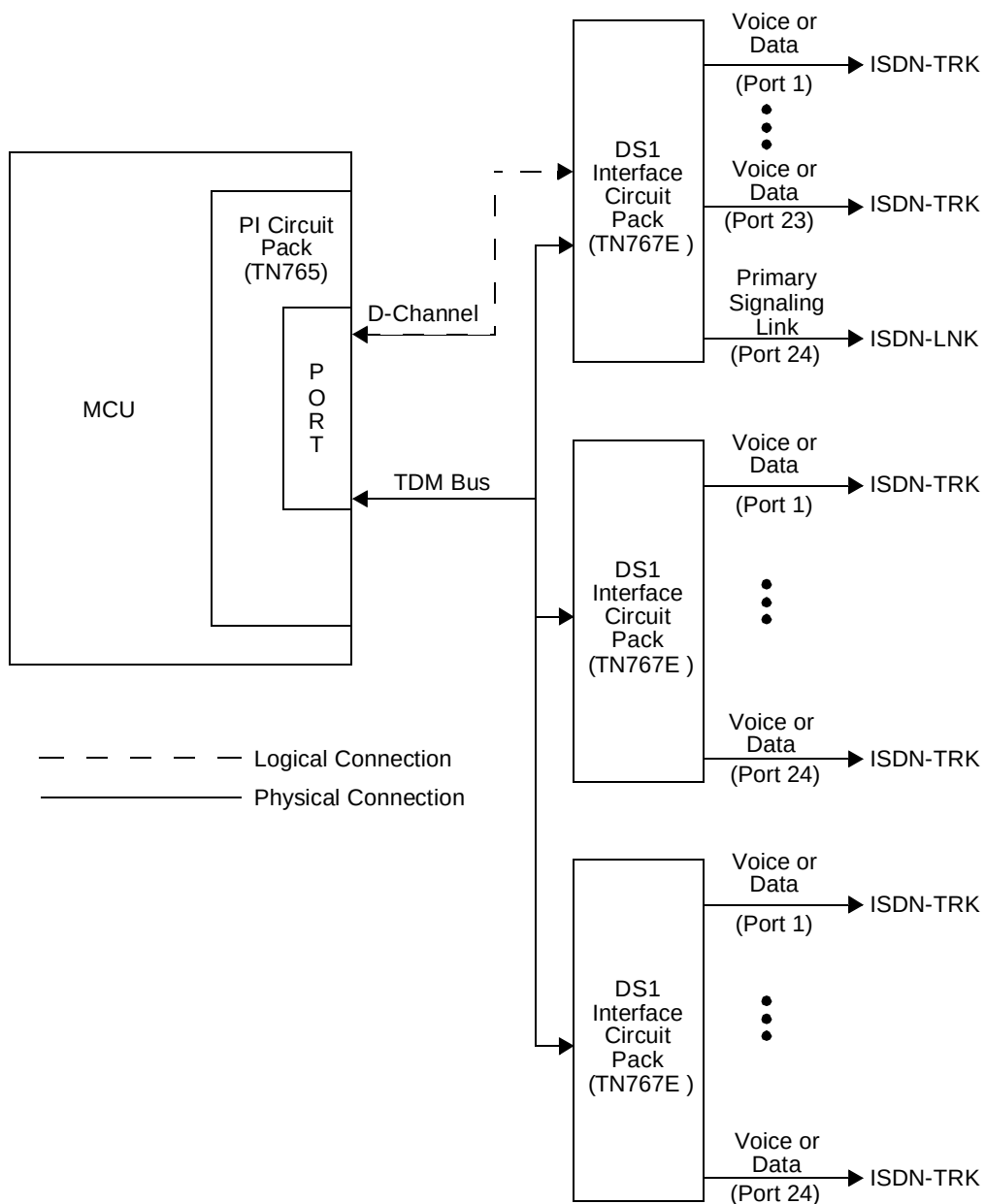
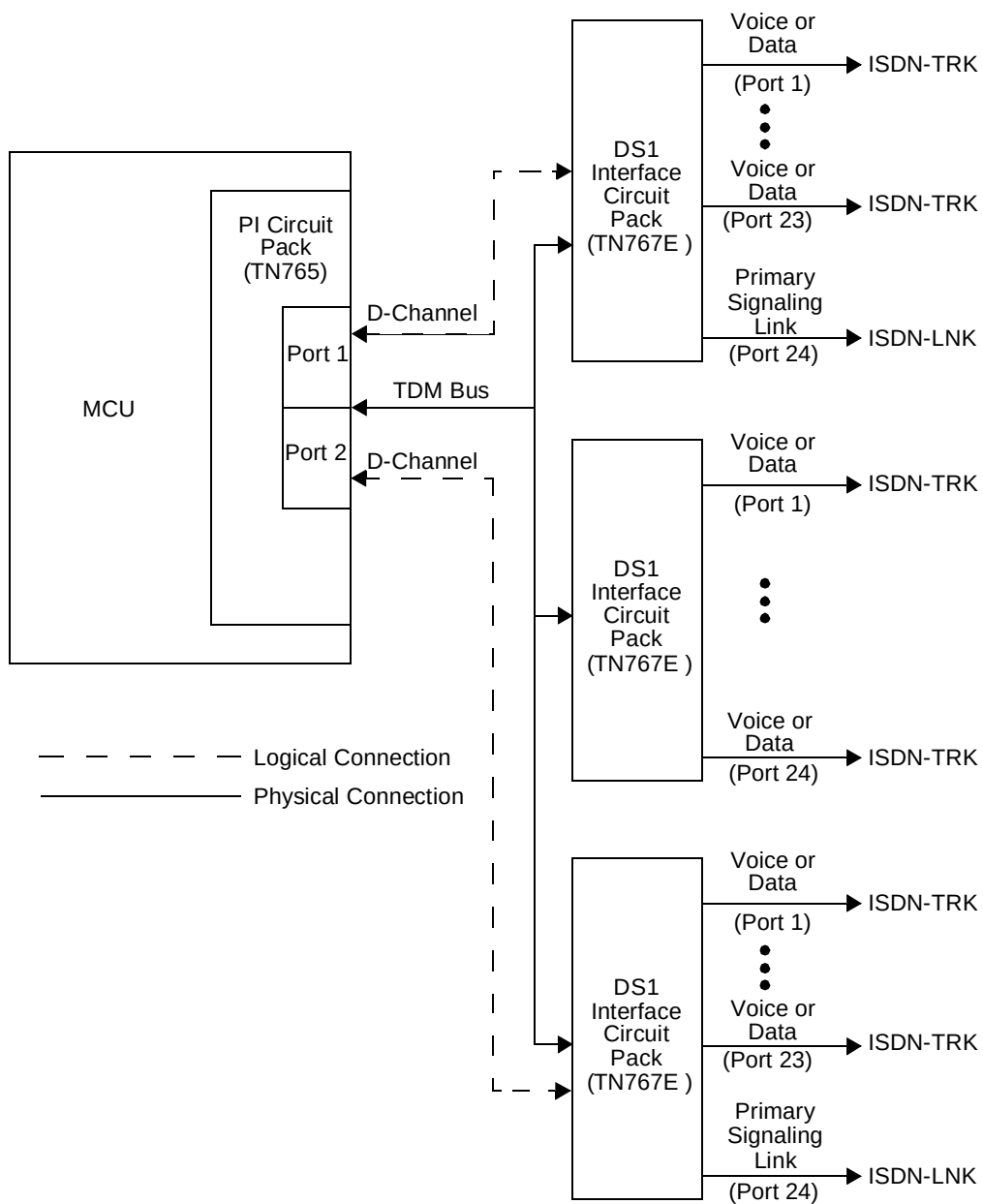


Figure 8-7. NFAS Simplex ISDN-PRI Signaling Group (24 Channels)

In addition to NFAS simplex, another type of NFAS group is 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.

The ISDN-PRI signaling group itself depends on three other entities: the DS1 (UDS1) Interface circuit pack on which the D-channel resides, the ISDN-PRI signaling link port and the processor interface link that provides the link to the processor. If there are any problems with the ISDN-PRI signaling group, also investigate these other entities.

**Figure 8-8. NFAS Duplex ISDN-PRI Signaling Group (24 Channels)**

Hardware Error Log Entries

The following table describes the hardware error log entries and the test to clear values.

Table 8-121. ISDN-PRI Signaling Group Error Log Entries

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
0	0	Any	Any		test sig-group <group>	Run the short test sequence first. If all tests pass, run the long test sequence.
1		None				There is no <i>Test to Clear Value</i> because an internal counter keeps track of errors and is decremented by one every 15 minutes. The MCU sent a message to the far-end, which did not respond in the allotted time. This is due to a link failure or congestion or outage at the far-end.
257		None	Major/Warning	On/Off	test sig-group <group>	The primary signaling link connection has been lost for more than 90 seconds. If a secondary signaling link does not exist or is not in-service, the associated DS1 ISDN trunk B-channels are placed in the ISDN Maintenance/Near-End state. An alarm is raised and those trunks are not usable for outgoing calls, although incoming calls are still accepted. The MCU automatically attempts to recover the link. Note the results of test #636. When the link recovers, the DS1 ISDN trunk B-channels are negotiated back to the in-service state and their alarms are retired.

Table 8-121. ISDN-PRI Signaling Group Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
513		None	Major/ Warning	On/Off	test sig-group <group>	The secondary signaling link connection was lost for more than 90 seconds. If the primary signaling link is not in service, DS1 ISDN trunks (B-channels) are placed in the ISDN Maintenance/Near-End state. An alarm is raised and the trunks are unusable for outgoing calls, although incoming calls are accepted. The MCU automatically tries to recover the link. Note the results of Test #639. When the link recovers, the DS1 ISDN trunk B-channels are negotiated back to the in-service state and their alarms are retired. When this error occurs, the state of the signaling group is changed to out of service (use status sig-group to verify) and a major alarm is raised against the signaling group. If the link is disabled via change com link, a warning is raised for the signaling group instead of a major alarm.

Table 8-121. ISDN-PRI Signaling Group Error Log Entries — *Continued*

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
769		#636	Minor	On	test sig-group <group>	
1025		#639	Minor	On	test sig-group <group>	

Table 8-121. ISDN-PRI Signaling Group Error Log Entries — *Continued*

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
1793		None	Minor	Off	test sig-group <group>	A failure occurred in the primary link. Investigate the Processor Interface Link for the MCU and the far-end.

Table 8-121. ISDN-PRI Signaling Group Error Log Entries — *Continued*

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
2049		None	Minor	Off	test sig-group <group>	A failure occurred in the secondary link. Investigate the Processor Interface Link for the MCU and the far-end.

Table 8-121. ISDN-PRI Signaling Group Error Log Entries — *Continued*

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
2305		#637	Minor	Off	test sig-group <group>	

Table 8-121. ISDN-PRI Signaling Group Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
3585	port #	None				A SERVICE or SERVICE ACKnowledge ISDN message was received for the D-channel on a non-domestic interface (country option is other than 1). These messages are for the NFAS feature (supported by country protocol 1 only). There may be a mismatch in administration between the MCU and the far-end. See the network provider to determine if the D-channel is set up correctly on the far-end.
3840 to 3928	port #					This reports certain error messages received by the ISDN-PRI signaling group for one of its associated DS1 ISDN trunks (B-channels). The <i>Aux Data</i> field shows which DS1 ISDN trunk (the port number) the message was intended. The exact error type logged is greater than 3840. It is 3840 plus X, where X refers to a Cause Value as defined by the ISDN PRI specification. There is no <i>Test to Clear Value</i> since selected cause values are placed into the log when these values are received so the data is not lost, but no direct action or alarming is done based solely on their reception. They provide added data to help track obscure networking and routing problems.

The following table provides descriptions and recommendations for errors 3840 to 3928.

Table 8-122. ISDN-SGR Errors 3840-3928

Error Type	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 <i>Aux Data</i> 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 (<i>IXC</i> field).
3846	The far-end 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 MCU and the far-end have different B-channels administered) or could reflect the occurrence of a normal race condition (such as the MCU requested use of a B-channel which the far-end just reserved for use on another call). 1. From the circuit pack and port number (in the <i>Aux Data</i> field), determine the trunk group against which the error was reported. 2. Issue status <trunk group/trunk> for the trunk specified. 3. Refer to the "DS1 ISDN Trunk Service States" on page 8-273 and "ISDN-PRI Trunk Service States" on page 8-276 sections under ISDN-TRK.
3858	Similar to error type 1; the MCU sent an ISDN message to the far-end which did not respond in the allotted time.	There is no <i>Test to Clear Value</i> because an internal counter keeps track of these errors and is decremented by one every 15 minutes. The MCU sent a message to the far-end which did not respond in the allotted time. This could be due to either a link failure or congestion or outage at the far-end.
3878	The far-end has indicated that the network is not functioning correctly, and that the condition may last a relatively long period of time (for example, immediately retrying the call may not be successful).	1. From the circuit pack and port number (in the <i>Aux Data</i> 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 that is out of service.

Table 8-122. ISDN-SGR Errors 3840-3928 — Continued

Error Type	Description	Recommendation
3890	A request to use a network service (such as SDN) has been denied. Administration somewhere on the network indicates 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 <i>Aux Data</i> field), determine the trunk group against which the error was reported. 2. Display the trunk form. 3. If the trunk group is Call-by-Call (<i>Service Type</i> is cbc), check all routing pattern forms containing this trunk group to see if the <i>Service/Feature</i> fields contain the correct network services purchased for this trunk. 4. If the trunk group is not Call-by-Call, check that the <i>Service Type</i> field contains the single network service purchased for this trunk. 5. 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 the customer is complaining of unexpected intercept tones when accessing ISDN trunks and no other cause can be found, escalate the problem and 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.	1. Eliminate any transitory state mismatch problems with test port PCSSpp for the trunk port shown in the <i>Aux Data</i> field. 2. Test #256 is the important test in the sequence. If this passes, yet the customer continues to complain of unexpected intercept tones when accessing ISDN trunks and no other cause can be found, escalate the problem and provide the next tier with this Error Log information.
3905	Protocol detail; may offer a clue if the customer is having ISDN calls denied with an unexpected intercept tone.	If the customer is complaining about unexpected intercept tones when accessing ISDN trunks and no other cause can be found, escalate the problem and provide the next tier with this Error Log information.

Table 8-122. ISDN-SGR Errors 3840-3928 — *Continued*

Error Type	Description	Recommendation
3906	Protocol detail; may offer a clue if the customer is having ISDN calls denied with an unexpected intercept tone.	If the customer is complaining of unexpected intercept tones when accessing ISDN trunks and no other cause can be found, escalate the problem and 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 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.	This error might be helpful as a clue if the customer complains of receiving unexpected intercept tones after accessing ISDN trunks. 1. Determine the trunk group from the circuit pack and port number (in the <i>Aux Data</i> field). 2. Check the <i>BCC</i> fields of the pertinent routing patterns. 3. Investigate whether or not the calling and called endpoints are compatible.

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 Primary Signaling Link Hardware Check, you may also clear errors generated from other tests in the testing sequence.

Table 8-123. Order of Investigation

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Primary Signaling Link Hardware Check (#636)	Short	Long	No
Secondary Signaling Link Hardware Check (#639)	Short	Long	No
Remote Layer 3 Query Test (#637)	Short	Long	No

Primary Signaling Link Check #636

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

The following figure shows the ISDN-PRI Signaling Link Port interactions.

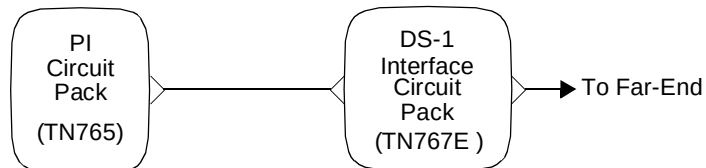
**Figure 8-9. ISDN-PRI Signaling Link Port Interactions**

Table 8-124. Test #636 Primary Signaling Link Hardware Check

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.
4	FAIL	There is a problem with the Processor Interface Link. No DS1 ISDN trunk (B-channel) 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 that holds this ISDN-PRI Signaling Link Port). 2. Consult the procedures for Processor Interface Link.
8	FAIL	There is a problem with the DS1 circuit pack. No DS1 ISDN trunk (B-channel) calls can be made until the problem is resolved.	Consult the procedures for DS1 circuit pack.
	PASS	The basic physical connectivity of the link from the Processor Interface Link (including the TN765 circuit pack), the DS1 circuit pack and on to the far-end is intact and functional.	Try this test repeatedly to ensure the link is up and uncover any transitory problems.

Secondary Signaling Link Hardware Check #639

This ISDN-PRI Signaling Group D-channel depends on the health of the DS1 Interface circuit pack and the processor interface link. This test checks the hardware of the secondary signaling link (if administered) to ensure the basic physical connectivity of the link between the processor interface link (includes the TN765 Processor Interface circuit pack), the DS1 Interface circuit pack, and on to the far-end.

**NOTE:**

The next test in the sequence, test #637, carries this one step further and checks the link starting from the MCU through to the far end.

Table 8-125. Test #639 Secondary Signaling Link Hardware Check

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.
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) calls can be made until the problem is resolved.	1. Display the Communication-Interface Links form using display communication-interface . 2. Determine which link is down (find the one that matches the DS1 Interface circuit pack where the ISDN-PRI Signaling Link Port resides). 3. Refer to "PI-LINK (Processor Interface Link)" on page 8-377.
8	FAIL	There is a problem with the DS1 Interface circuit pack. No DS1 ISDN trunk (B-channel) calls can be made until the problem is resolved.	Refer to "DS1-BD (DS1 Interface Circuit Pack)" on page 8-189.
	PASS	The basic physical connectivity of the link between the Processor Interface Link (including the TN765 circuit pack), the DS1 Interface circuit pack, and on to the far-end is intact and functional.	Try this test repeatedly to ensure the link is up and to uncover any transitory problems.

Remote Layer 3 Query Test #637

This test queries the far-end to determine if the signaling connection is functioning properly at Layer 3.

For country protocol 1 interfaces (including the US), this test selects a DS1 ISDN trunk B-channel in the in-service or maintenance ISDN service state and sends an ISDN Layer 3 SERvice message. This requires a response from the far-end (similar to performing test #256 on a DS1 ISDN trunk). The test is not performed if there are no DS1 ISDN trunks in an appropriate ISDN service state (such as out of service or none are administered). Service state can be displayed with **status trunk <trunk group/trunk member>**.

For interfaces not using country protocol 1, this test selects a DS1 ISDN trunk B-channel and sends an ISDN Layer 3 STATus ENquiry message. The STATus ENquiry contains either a CRV from an active call if there is a trunk in the signaling group with an active call, or an unused CRV if no active trunks are in the signaling group. Either message format requires a response from the far-end. The test is not performed if no DS1 ISDN trunks are in the signaling group.

As with test #256 for a DS1 ISDN trunk, a PASS only indicates a message was composed and sent to the far-end. The ISDN-PRI specification allows up to two 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.

Test #636 checks the communications path starting at the processor interface link and on to the far-end. As shown in the following figure, this test goes one step further by checking the communication path starting from the processor (through the processor interface link and DS1 Interface circuit pack and on to the far-end). A special ISDN message is sent to the far-end, which must respond within a specified amount of time. This test is designed to ensure the communications path between the two points is up and operational, and that the two points can properly exchange ISDN control messages.

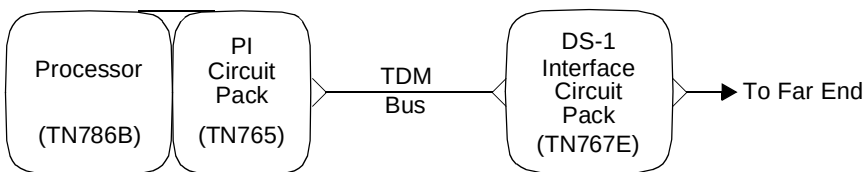


Figure 8-10. Remote Layer 3 Query Test #637

Table 8-126. Test #637 Remote Layer 3 Query

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 is a normal abort. For country protocol 1 interfaces (including the US), either no B-channels are 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 PMRC, indicating that a B-channel maintenance message for that B-channel has been sent and not yet acknowledged).	1. Administer an ISDN trunk (B-channel) in this signaling group or use status trunk <trunk group/trunk> to check the state of the ISDN trunks associated with this signaling group. 2. Refer to the "ISDN-TRK (DS1 ISDN Trunk)" on page 8-272 for further details regarding service state definitions and transitions. For systems not using country protocol 1 interfaces, there are no B-channels administered for this signaling group.
1019	ABORT	There is already a Remote Layer 3 Query in progress. This is a normal abort.	Wait two minutes then follow the procedures when the test passes.
1113	ABORT	The Signaling Link is down. No messages can be sent to the far-end.	1. Examine the results of test #636 and #639 and follow the recommendations provided there. 2. If either of these tests passes, it may be because the signaling link was disabled by craft. Use display comm link to verify this. Tests #636 and #639 pass if the signaling link is disabled. 3. If these tests pass and the signaling link is enabled, 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 8-126. Test #637 Remote Layer 3 Query — Continued

Error Code	Test Result	Description	Recommendation
2500	ABORT	Same as ABORT with no error code.	
2500	FAIL	Same as ABORT with no error code.	
	PASS	A message was composed and sent to the far-end. The ISDN-PRI specification allows up to two minutes for a reply. 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 are logged since the test was run, then the MCU and the far-end can exchange call control messages.	1. If there is still a problem with a particular DS1 ISDN trunk (B-channel), busy out the trunk and run the long test sequence. 2. Note the results of test #258 (ISDN Test Call). 3. If the problem persists, and the above action does not reveal the cause, escalate the problem.

ISDN-TRK (DS1 ISDN Trunk)

A DS1 ISDN trunk is known as a B-channel. It is a 64k bearer channel that can be used to transmit digital traffic, either voice, video, or data. These trunks use a separate channel for signaling; this is known as out-of-band signaling, as opposed to in-band, robbed-bit, where the signaling traffic flows over the same channel as the voice and 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).

On 24-channel interfaces, any of the first 23 ports on the DS1 Interface circuit pack can be a B-channel. The 24h port may be used for as a B-channel or a D-channel, depending on the type of ISDN-PRI signaling group (ISDN-SGR) to which it belongs. Refer to "ISDN-SGR (ISDN-PRI Signaling Group)" on page 8-251 and "DS1-BD (DS1 Interface Circuit Pack)" on page 8-189 for more details.

For interfaces using country protocol 1 on the DS1 Circuit Pack Administration form (including the 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-channels is defined by the International Telecommunications Union-Telecommunications (ITU-T) ISDN-PRI specification.

There are five possible SERVICE STATES for B-channel. The service state is negotiated with the far-end, 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.

The service state of a particular DS1 ISDN trunk B-channel can be displayed by issuing **status trunk <trunk_group/trunk_member>**. If a call is present, the specification defines the permissible call states as well. These are tests in the short and long test sequences for DS1 ISDN trunks designed to audit these states and ensure agreement between both ends of the PRI connection.

Alarming Based on Service States

A DS1 ISDN trunk B-channel alarms with a warning if it is placed in a maintenance/far-end or out-of-service/far-end state. While it is in such a state, the trunk is unusable for outgoing calls. When a warning alarm is raised, use **status trunk** to determine the exact state.

Other alarms can be diagnosed by using the short and/or long test sequences. Note that a DS1 ISDN trunk B-channel can be placed in a far-end service state by both direct action by the far-end or by inaction of the far-end. For example, if it does not respond to a Remote Layer 3 Query test #637, the associated DS1 ISDN trunk B-channels are placed in the maintenance/far-end service state.

A DS1 ISDN trunk is a port on a DS1 Interface circuit pack and so it depends on the health of the DS1 Interface circuit pack for proper operation. As noted earlier, a DS1 ISDN trunk 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 port, in turn, the DS1 ISDN trunk is affected. The ISDN-PRI signaling link port depends on the PI-LINK. Therefore, processor interface link problems affect the ISDN-PRI signaling link port.

This hierarchy of dependencies is important to remember when diagnosing problems.

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 link-no** does not drop stable trunk calls. In this state, the B-channel is not usable for new outgoing calls, but is available for incoming calls and outgoing test calls.
- Pending States: If the near end is expecting a timed response from the far end for a request to change service state of a trunk, then the state of the trunk reflects a pending state:
 - Pending In-Service (PINS) means the near-end has sent a B-channel maintenance message to the far-end, requesting the B-channel service state be transitioned to in-service. The far-end has a certain amount of time to respond to the message. The service state remains PINS until either a response is received or the timer expires.

- Pending-Maintenance (PMTc) is a state supported only by systems using country protocol 1 (including the US). The near-end has sent a B-channel maintenance message to the far-end, requesting the B-channel service state be transitioned to maintenance. The far-end has a certain amount of time to respond to the message. The service state remains PMTC until either a response is received or the timer expires.
- Call Activity States reflect the B-channel call activity. If a call is connected over the B-channel, then the state of the trunk reflects the active call state, for example, in-service/active. If there is no call on the B-channel, then the trunk reflects the idle call state, for example, OOS/FE-idle.

The following figure of the DS1 ISDN trunk service states shows the common progression from one service state to another and the event that caused the change of state.

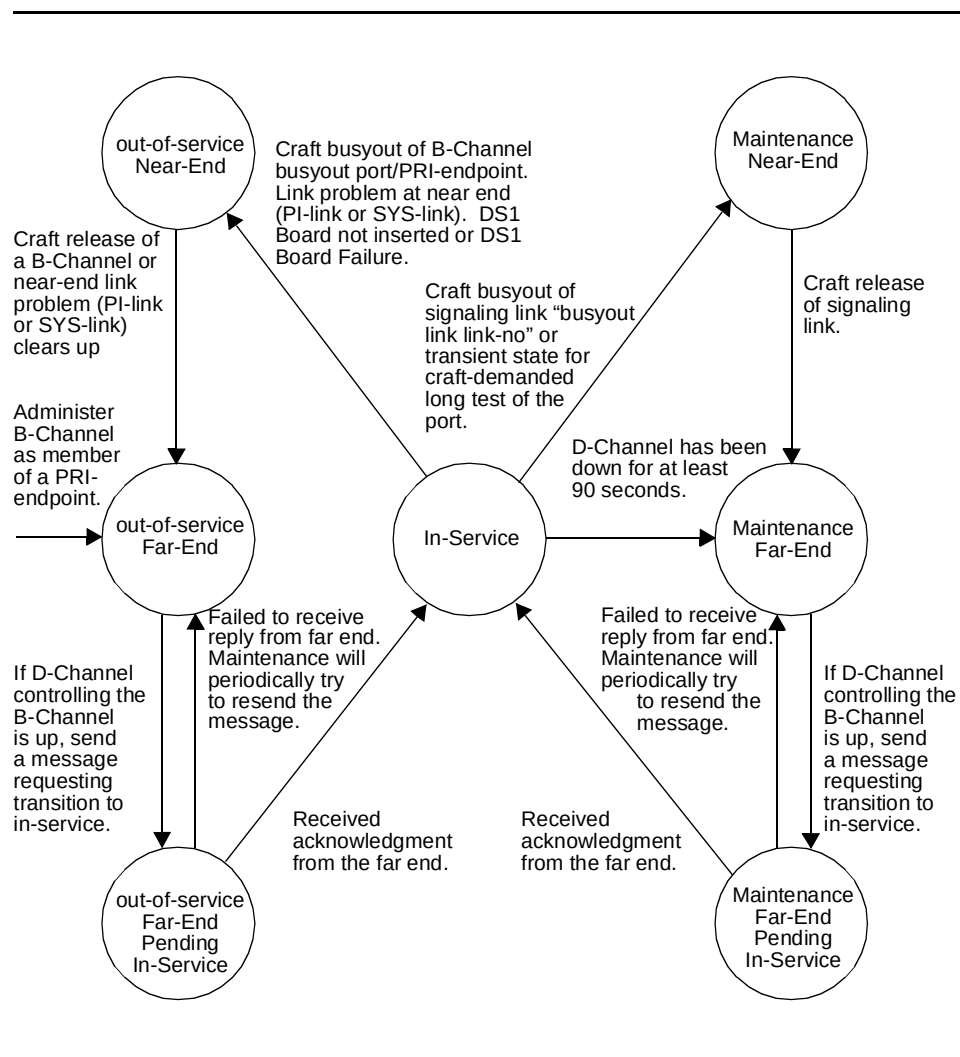


Figure 8-11. Common Progressions in Service States

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 8-127. 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 (DS1 Interface Circuit Pack)" on page 8-189.
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 link-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 8-127. 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 (Processor Interface Link)" on page 8-377. 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/mb> (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 War- ning 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 8-128. 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 8-128. 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 8-128. 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 8-128. 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 8-128. 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 8-128. 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 8-129. Order of Investigation

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 8-130. Test #6 NPE Crosstalk Test

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 (TDM Bus)" on page 8-520 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 (TTR Level)" on page 8-573. 2. Look for TONE-PT errors in the error log. If present, see "TONE-PT (Tone Generator)" on page 8-562. 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.
1117	ABORT	A service state audit message is outstanding.	Wait two minutes and try again.

Table 8-130. Test #6 NPE Crosstalk Test — 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 8-131. Test #7 Conference Circuit Test

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.
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 8-132. Test #36 Audit and Update Test

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.
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 8-133. Test #255 Signaling Link State Check Test

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.
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 "ISDN-TRK (DS1 ISDN Trunk)" on page 8-272). This test performs a Service State Audit with the far-end.

For interfaces using country protocol 1 (including the US), the Service State Audit executes in all trunk service states. A message is sent to the far-end to ensure that both sides agree on the service state. A PASS for this test simply means the message has been successfully sent.

Two minutes are allowed for a reply. If no reply is received within that time frame, the message is resent. If that attempt fails, an error is logged (error code 3073) and the MCU attempts another Service State Audit every 15 minutes. If the trunk was initially INS (in-service), it is then placed in the MTC/FE (maintenance state/far-end problem) state.

No outgoing calls can be placed over this trunk, but incoming calls are accepted. If an incoming call is presented while in this state, a Service State Audit attempt will immediately be tried (that is, the MCU will not wait 15 minutes, but will try to recover immediately).

For interfaces not using country protocol 1, the Service State Audit executes only if the trunk is in the OOS/FE (out of service/far-end problem) state. A message is sent to the far-end to attempt to bring the trunk back into service. A PASS for this test simply means the message was sent successfully. Two minutes are allowed for a reply. If no reply is received, the message is resent. If no response is received in the next two minute window, then the trunk remains in the OOS/FE state. The MCU will attempt another Service State Audit in another hour.

To investigate the service state of the DS1 ISDN trunk, issue **status trunk** **<trunk_group/trunk_member>**.

Table 8-134. Test #256 Service State Audit Test

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.
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 Trunk Service States" on page 8-273 and "ISDN-PRI Trunk Service States" on page 8-276 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 8-135. Test #257 Call State Audit Test

Error Code	Test Result	Description	Recommendation
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 8-136. Test #258 ISDN Test Call

Error Code	Test Result	Description	Recommendation
4	ABORT	There is a problem with the Processor Interface Link.	Refer to "PI-LINK (Processor Interface Link)" on page 8-377.
8	ABORT	There is a problem with the DS1 Interface circuit pack.	Refer to "DS1-BD (DS1 Interface Circuit Pack)" on page 8-189.
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 (DS1 Interface Circuit Pack)" on page 8-189.
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 8-136. Test #258 ISDN Test Call — 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.
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 8-136. Test #258 ISDN Test Call — 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 8-136. Test #258 ISDN Test Call — 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 five times. 2. If the test continues to abort, escalate the problem.

Table 8-136. Test #258 ISDN Test Call — 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.

MEMORY (MEMORY)

The memory contains the MCU's software and firmware. The Processor circuit pack is the most critical component of all system operations.

The MCU contains memory that is integrated with the processor. For testing purposes, the TN786B circuit pack is logically separated into PR-MAINT, PROCR, and MEMORY. This means a memory problem requires that the processor be replaced.

 NOTE:

Additional memory is provided by the CPP1 circuit pack, which is joined to the TN786B circuit pack.

The MCU contains two types of memory: flash ROM and DRAM. Flash ROM is permanent memory that contains the boot image and PI firmware. This type of memory is not erased during circuit pack resets. It can be reprogrammed only with **reset system**.

DRAM is used for software data storage, and it changes constantly. DRAM loses its value during circuit pack resets. Both types of memory are present on the Processor circuit pack. The diagnostics run appropriate tests on both memories.

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.

Table 8-137. MEMORY (MEMORY)

MO Name in Alarm Log	Alarm Level	Initial Craft Command to Run
MEMORY*	Major	test memory sh c

* MEMORY may also be tested using test processor.

The faulty memory circuit pack is identified in the *Alt Name* field on the Alarm Report form and on the Hardware Error Report form. A **1** in the *Alt Name* field refers to the processor circuit pack.

Hardware Error Log Entries

The following table lists the error types and associated data.

Table 8-138. Memory 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 memory l r 1	Run the short test sequence first. If all tests pass, run the long test sequence. Refer to the appropriate test descriptions and follow the recommended procedures.
1 to 256	Any	#85	Major	On	test memory l r 5	
257 to 512	Any	#85	Major	On	test memory l r 1	Test #85 failed. Refer to the FAIL description of this test.
513	0	#87	Major	On	test memory r 3	Test #87 failed. Refer to the FAIL description of this test.
769	Any	#86	Major	On/Off	test memory l r 2	Test #86 failed. Refer to the FAIL description for this test.
1025	Any	#332	Major	On	test memory l r 1	This test is run only via reset system 4 or reset system 5 .
1793 to 2048	0	#85	Major	On	test memory l r 1	Test #85 failed. Refer to the FAIL description of this test.
2049	0	#87	Major	On	test memory r 3	Test #87 failed. Refer to the FAIL description for this test.

Craft-Demanded Tests

Always investigate errors in the order in which they are presented in this table 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 by other tests in the sequence.

Table 8-139. Order of Investigation

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Read All Memory Test #85	Long		No
Memory Error Detection Test #87	Short	Long	No
Text Checksum Test #86	Long		No
Memory Functional Test #332*			Yes
Memory Board Check Test #631	Short	Long	No

* This test is run only via **reset system 4** or **reset system 5**.

Read All Memory Test #85

This nondestructive 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 8-140. Test #85 Read All Memory Test

Error Code	Test Result	Description	Recommendation
1	FAIL	The MCU may or may not continue to operate correctly. If it can still provide service, this indicates the processor circuit pack can still function, but has a problem.	The PROCR (TN786B) should be replaced. If the test continues to fail, escalate the problem. WARNING: If the TN786B 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 TN786B circuit pack), remove the blank <i>before</i> 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) may be damaged.
	PASS	The memory is healthy.	
2	FAIL	You should not get this error.	If you do, escalate the problem.

Text Checksum Test #86

This nondestructive test computes the checksum of the MCU software text module and validates the operation of the flash ROM. A failure of this test indicates corruption of the text. This may or may not be a hardware problem.

Table 8-141. Test #86 Text Checksum Test

Error Code	Test Result	Description	Recommendation
	FAIL	The MCU may or may not continue to operate correctly. It may fail later when some action requires access to the corrupted area of the text.	1. Use upgrade software to reprogram the flash ROM. (The memory card should contain the same vintage software that is currently loaded in the MCU.) 2. If the test continues to fail, escalate the problem.
	PASS	The checksum is correct.	

Memory Error Detection Test #87

This nondestructive 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 8-142. Test #87 Memory Error Detection Test

Error Code	Test Result	Description	Recommendation
1	FAIL	The parity detection circuitry is not working correctly. If the MCU can still provide service, this indicates the processor circuit pack has a problem, but can still function.	1. Replace the Processor circuit pack (TN786B). WARNING: If there is a blank in the expansion memory circuit pack slot (the slot immediately to the right of the TN786B circuit pack), remove the blank <i>before</i> 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 be damaged. 2. If the test continues to fail, escalate the problem.
2	FAIL	You should not receive this error.	If you do, escalate the problem.
	PASS	The parity detection circuitry is working.	

Memory Functional Test #332

This test is destructive. It ensures that every DRAM memory location can be accessed and changed independently. Running this test erases all data in DRAM memory. This test is performed during a **reset system 4** or **reset system 5**. If the test fails, refer to SPE-Down mode for the recommended maintenance strategy.

Memory Board Check Test #631

This test always passes.

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 (Multimedia Interface Port)" on page 8-323}. 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.

Table 8-143. MMI-BD (Multimedia Interface Circuit Pack)

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 Circuit Pack)" on page 8-605 for details.

Hardware Error Log Entries

The following are the hardware error log entries and the associated test to clear value.

Table 8-144. 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.
217	0	None	Warning	On		There are more than four circuit packs in the system. Remove the circuit pack against which the error is logged.
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 8-144. 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	#973	None			This MMI circuit pack reported a loss of MMI synchronization. Refer to test #973 for repair procedures.

Table 8-144. 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	#958	Major	On	test board PCSS I r 3	TSI Loop-Around test #958 failed. Refer to that test for repair procedures.

Table 8-144. MMI-BD Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
2306	Any	#967	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.
2561	Any	#975	Minor	Off	test board PCSS l r 3	Refer to the repair procedure for test #975.
2817	Any	#973	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 TN787D.

Craft-Demanded Tests

Perform these tests in the order shown.

Table 8-145. Order of Investigation

Order of Investigation	First Test Sequence	Second Test Sequence	Reset Board Sequence	Is Test Destructive?
Control Channel Looparound Test #52*	Short	Long		No
MMI Cable Status Test #967	Short	Long		No
MMI Synchronization Status Test #973	Short			No
MMI Synchronization Status Test #972		Long		No
MMI DS1 Looparound Test #975		Long		No
TSI Cross Talk Test #6	Long			No
TSI Looparound Test #958	Long			No
SAKI Sanity Test #53*			Reset	Yes

* Refer to "XXX-BD (Common Port Circuit Pack)" on page 8-605 for details.

MMI to DS1 Cable Status Test #967

This is a nondestructive test.

The TN787D MMI circuit pack supports a cable interface between itself and a corresponding DS1 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 circuit pack provides a signal across the cable to the MMI circuit pack. When 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 to the specified DS1 circuit pack via the DS1 Administration form. The address of the MMI circuit pack is included on this form if the cable interface is to be used. If the MMI circuit pack detects a loss of the signal from the DS1 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 circuit pack again. This test monitors this signal.

Table 8-146. Test #967 MMI to DS1 Cable Status

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 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 circuit pack, but the DS1 circuit pack is not inserted.	Insert the DS1 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.
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 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 TN787D circuit pack. If the test still fails, replace the DS1 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 #972 and #973

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 #972 runs when you enter the "long" option of the test board command. Test #973 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 8-147. Test #972 and #973 MMI Synchronization Status

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 Cable Loop-Around Test #975

This is a nondestructive test.

The TN787D MMI circuit pack supports a cable interface between itself and a corresponding DS1 circuit pack. Using the cable saves TDM time slots in the MCU. Test #975 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 circuit pack is told to provide loop-back at the cable. In cable loop-around mode, the DS1 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 circuit pack. Since the DS1 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 8-148. Test #975 MMI to DS1 Cable Loop-Around Test

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 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 circuit pack, but the DS1 circuit pack is not inserted.	Insert the DS1 circuit pack and repeat the test.
1051	ABORT	Currently, the MMI circuit pack has a call active between itself and the DS1 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 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 circuit pack. 4. If the test still fails, escalate the problem.
	PASS	The cable between the MMI circuit pack and the DS1 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 8-149. Test #6 TSI Crosstalk Test

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 8-149. Test #6 TSI Crosstalk Test — 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 #958

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 8-150. Test #958 TSI Loop-Around Test

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 8-150. Test #958 TSI Loop-Around Test — 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.

Table 8-151. MMI-LEV

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 8-152. 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.

Table 8-153. MMI-PT (Multimedia Interface Port)

Alarm Level	Initial Craft Command to Run
Minor	test port PCSSpp I r#
Warning	test port PCSSpp I r#

Hardware Error Log Entries

The following table shows the error log entries and related information, including the test to clear values.

Table 8-154. 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: <i>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.</i>

Table 8-154. MMI-PT Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
513	Any	#961	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 (Voice Conditioner DSP Port)" on page 8-581 for details.

Table 8-154. 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 8-155. Order of Investigation

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Resource Loop-Around Test #961	Short	Long	No

Resource Loop-Around Test #961

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 8-156. Test #961 Resource Loop-Around Test

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 8-156. Test #961 Resource Loop-Around Test — 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 TN787D 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.

Table 8-157. MMI-SYNC (Multimedia Interface Resource Level)

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 8-158. 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.

M/T-BD (Maintenance/Test Circuit Pack)

Table 8-159. 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)" on page 8-605 Maintenance documentation for circuit pack level errors. See also "M/T-DIG (Maintenance/Test Digital Port)" on page 8-331 and "M/T-PKT (Maintenance/Test Packet Bus Port)" on page 8-348 for related digital port and Packet Bus port information, respectively.

M/T-DIG (Maintenance/Test Digital Port)

Table 8-160. 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.).

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)" on page 8-272 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.

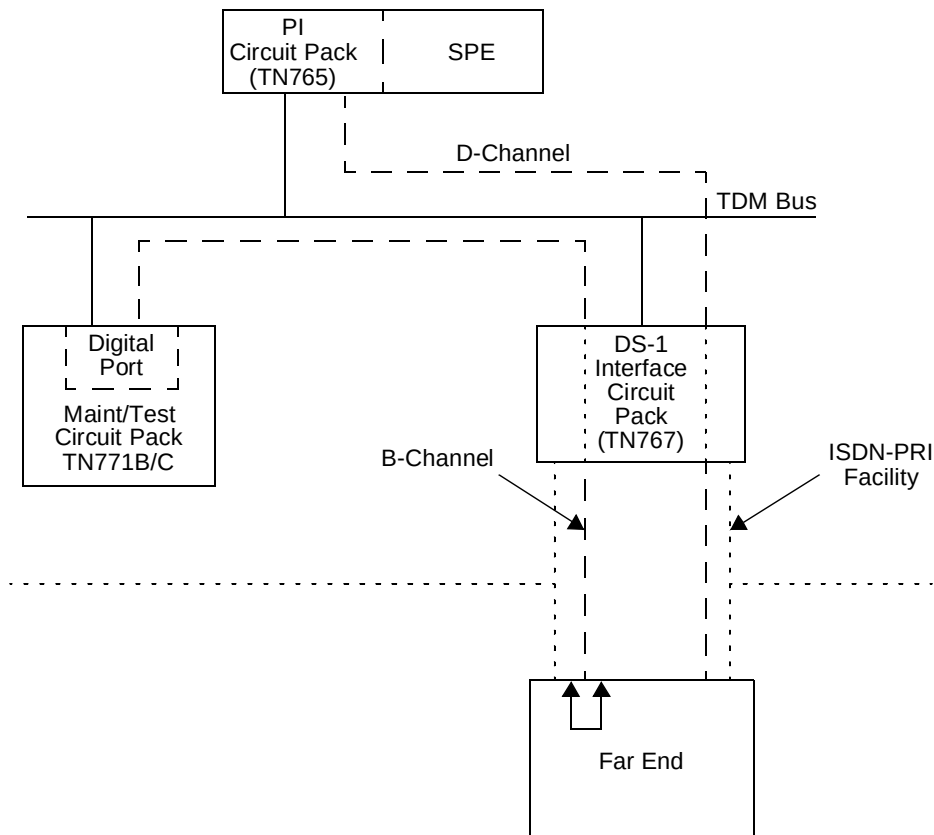


Figure 8-12. ISDN-PRI Outgoing Test Call

Hardware Error Log Entries

Table 8-161. 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 8-161. 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 8-162. Order of Investigation

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 8-163. Test #9 NPE Crosstalk Test

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 (TDM Bus)" on page 8-520 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 8-163. Test #9 NPE Crosstalk Test — 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)" on page 8-573. 2) Look for TONE-PT errors in the Error Log. If present, refer to "TONE-PT (Tone Generator)" on page 8-562. 3) If neither condition exists, retry the test at one-minute intervals a maximum of five times. 4) If the test continues to abort, escalate the problem.
1004	ABORT	The port has been seized by a valid ISDN-PRI test call. Use the list isdn-testcall command to determine which call is using the port (from the M/T Port column). Either wait for the test call to complete (as indicated in the Start Time and Duration fields of the above display), or abort the test call with the clear isdn-testcall tg/mem command, where tg/mem is determined from the B-channel field of the above display.	1) Retry the command at one-minute intervals a maximum of five times. 2) If the test continues to abort and the port is not in use, escalate the problem.
2000	ABORT	Response to the test request was not received within the allowable time period.	

Table 8-163. Test #9 NPE Crosstalk Test — 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 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 8-164. Test #13 Digital Port Loop-Around Test

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 (TDM Bus)" on page 8-520 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 8-164. Test #13 Digital Port Loop-Around Test — 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)" on page 8-573. 2) Look for TONE-PT errors in the Error Log. If present, refer to "TONE-PT (Tone Generator)" on page 8-562. 3) If neither condition exists, retry the test at one-minute intervals a maximum of five times. 4) If the test continues to abort, escalate the problem.
1004	ABORT	The port has been seized by a valid ISDN-PRI test call. Use the list isdn-testcall command to determine which call is using the port (from the M/T Port column). Either wait for the test call to complete (as indicated in the Start Time and Duration fields of the above display), or abort the test call with the clear isdn-testcall tg/mem command, where tg/mem is determined from the B-channel field of the above display.	1) Retry the command at one-minute intervals a maximum of five times. 2) If the test continues to abort and the port is not in use, escalate the problem.
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 8-164. Test #13 Digital Port Loop-Around Test — 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 (#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 8-165. Test #270 Clear Error Counters

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 8-166. Test #565 Digital Port Sanity Test

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 busyout 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 (TDM Bus)" on page 8-520 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 8-166. Test #565 Digital Port Sanity Test — 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 (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.
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 8-166. Test #565 Digital Port Sanity Test — 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 8-167. Test #566 Hook State Inquiry

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)

Table 8-168. 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)" on page 8-411 for further information.

Hardware Error Log Entries

Table 8-169. 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 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	None	Minor	On	test port PCSSpp l 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 (#567)" on page 8-353, 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 8-170. Order of Investigation

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 (#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 8-171. Test #270 Clear Error Counters

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 8-172. Test #567 Packet Bus Port Inquiry Test

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 (Packet Bus)" on page 8-411 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 TN754B 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.

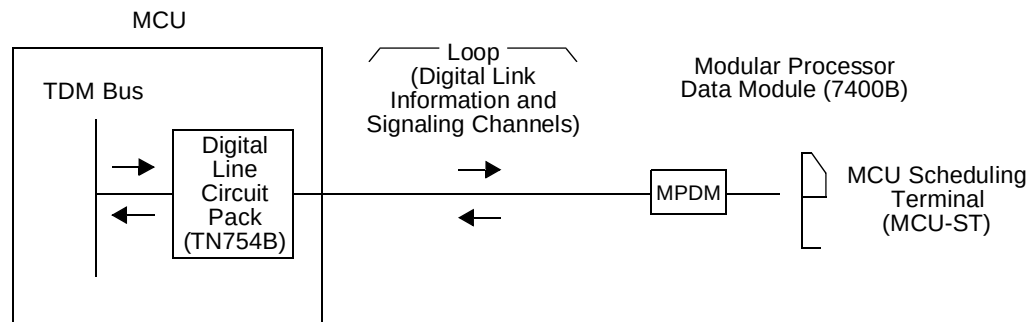


Figure 8-13. Typical Data Module Application

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.

Table 8-173. PDMODULE (Data Module)

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 loopback, 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 8-174. 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 8-174. 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 8-174. 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 8-174. 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 8-174. 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 8-175. Order of Investigation

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 Looparound 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 8-176. Test #9 NPE Crosstalk Test

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 8-176. Test #9 NPE Crosstalk Test — 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 (TTR Level)" on page 8-573. 2. Look for TONE-PT errors in the error log. If present, refer to "TONE-PT (Tone Generator)" on page 8-562. 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 8-176. Test #9 NPE Crosstalk Test — 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 8-177. Test #13 Information and Control Channel Local Loop Test

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 (TTR Level)" on page 8-573. 2. Look for TONE-PT errors in the error log. If present, see "TONE-PT (Tone Generator)" on page 8-562. 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 8-177. Test #13 Information and Control Channel Local Loop Test — 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.
7	FAIL	Conference test failed on the primary information channel. In some cases, the user may not notice disruption in service. In extreme cases, conferencing feature may not work.	1. Use test board PCSS short to check the Tone Generator and the Tone Detector circuit pack. 2. Resolve any problems that are detected. 3. If the circuit packs are functioning, and the test still fails, replace the Digital Line circuit pack.

Table 8-177. Test #13 Information and Control Channel Local Loop Test — Continued

Error Code	Test Result	Description	Recommendation
14	FAIL	The primary information channel is not transmitting properly. User impact may range from noticing nothing to not being able to use this port.	1. Use test board PCSS short to check the Tone Generator circuit pack and the Tone Detector circuit pack. 2. Resolve any problems that are detected. 3. If the circuit packs are functioning, and the test still fails, replace the Digital Line circuit pack.
15	FAIL	The control channel between the processor and digital line circuit pack is not transmitting properly. User may notice nothing or not be able to use the port. Could also be disruptive to other users.	1. Use the test board PCSS short command to check the Tone Generator circuit pack and the Tone Detector circuit pack. 2. Resolve any problems that are detected. 3. If the circuit packs are functioning, and the test still fails, replace the Digital Line circuit pack.
	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 8-178. Test #17 Data Module Audits Test

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 8-178. Test #17 Data Module Audits Test — 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.

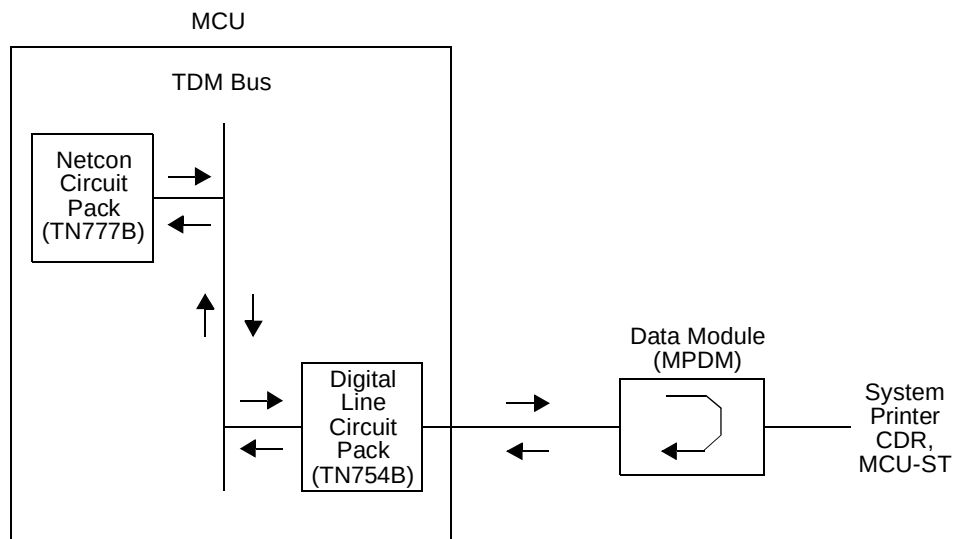


Figure 8-14. Internal Loop-Around Test

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 8-179. Test #175 Data Module Internal Loop-Around Test

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 8-179. Test #175 Data Module Internal Loop-Around Test — 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.
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 loopback 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 8-179. Test #175 Data Module Internal Loop-Around Test — 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.

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.

Table 8-180. PI-BD (Processor Interface 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)" on page 8-605. Test #423 is the only test that is described in this section; the others are described under XXX-BD.

Table 8-181. 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: <i>Reseating the circuit pack may cause a system restart.</i>
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.

Table 8-181. PI-BD Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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	
257	Other					This error indicates transient communication problems with this circuit pack. This error is not service-affecting and no action is required.

Table 8-181. PI-BD Error Log Entries — *Continued*

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

Table 8-181. PI-BD Error Log Entries — Continued

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

Craft-Demanded Tests

The following tests must be performed in the order provided.

Table 8-182. Order of Investigation

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)" on page 8-605 for details on this test.

NPE Audit Test #50

Refer to "XXX-BD (Common Port Circuit Pack)" on page 8-605 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.

Table 8-183. PI-LINK (Processor Interface Link)

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

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 ISDN-TRK.

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 (Processor Interface Port)" on page 8-397 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 8-184. 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.

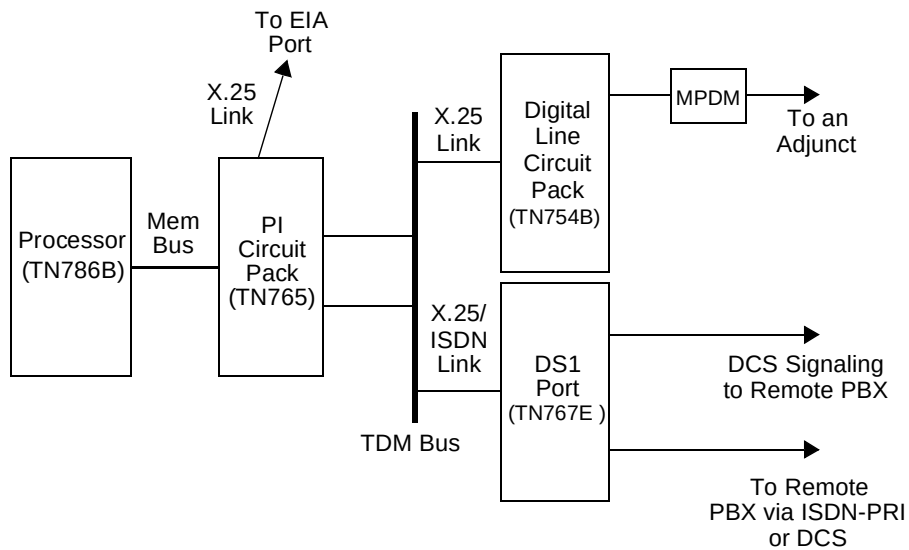


Figure 8-15. Processor Interface Link Communications Interactions

Hardware Error Log Entries

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

Table 8-185. 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 8-185. 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 8-185. 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 8-185. 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 8-185. 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 8-185. 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 8-185. 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 (DS1 ISDN Trunk)" on page 8-272). Major alarms may be downgraded to warning alarms based on the value set under set options .

Table 8-185. 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 (DS1 Interface Circuit Pack)" on page 8-189 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 8-186. Order of Investigation

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 8-187. Test #182 Processor Interface Loop-Around Test

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	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.
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.
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 to 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.

Table 8-187. Test #182 Processor Interface Loop-Around Test — Continued

Error Code	Test Result	Description	Recommendation
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.
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 8-188. Test #183 TDM Loop-Around Test

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 TN767Cv23/D 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.
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.

Table 8-188. Test #183 TDM Loop-Around Test — Continued

Error Code	Test Result	Description	Recommendation
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.
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 TN767Cv23/D 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 are queries

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 8-189. Test #233 Link Quality Test

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.
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 (DS1 Interface Circuit Pack)" on page 8-189. 2. For PI link problems, see "PI-LINK (Processor Interface Link)" on page 8-377.
16387	FAIL	Excessive Level 2 resets and excessive Level 2 I-frame retransmission.	See "PI-LINK (Processor Interface Link)" on page 8-377.
16389	FAIL	Excessive Level 2 resets and excessive LAPD invalid frame errors.	See "PI-LINK (Processor Interface Link)" on page 8-377.
16390	FAIL	Excessive Level 2 I-frame retransmissions and excessive LAPD invalid frame errors.	See "PI-LINK (Processor Interface Link)" on page 8-377.

Table 8-189. Test #233 Link Quality Test — Continued

Error Code	Test Result	Description	Recommendation
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 Interface Circuit Pack)" on page 8-189.

Table 8-190. Test #234 ISDN Hardware Check Test

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 (Processor Interface Link)" on page 8-377 for details.

Table 8-191. PI-PT (Processor Interface Port)

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 8-192. 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 (Processor Interface Link)" on page 8-377.

Craft-Demanded Tests

PI-PT can be tested using **test interface PCS** on the PI circuit pack. Refer to "PI-SCI (System Communication Interface)" on page 8-400 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 8-193. Order of Investigation

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.

Table 8-194. PI-SCI (System Communication Interface)

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 8-195. 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 8-195. 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 8-195. 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 8-196. Order of Investigation

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)" on page 8-605 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 8-197. Test #176 SCI Start Test

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 8-197. Test #176 SCI Start Test — 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 8-197. Test #176 SCI Start Test — 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 8-198. Test #231 SCI Self-Test

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.
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.
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.

Table 8-198. Test #231 SCI Self-Test — Continued

Error Code	Test Result	Description	Recommendation
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 8-199. PKT-BUS (Packet Bus)

Alarm Level	Initial Craft Command to Run*
Major	test pkt P I r 2
Minor/Warning	test pkt P I

* 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" on page 9-21 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 "Packet Bus Fault Isolation Flowchart" on page 9-21 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 "Special Precaution Concerning the TN771" on page 9-20 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 "Packet Bus Maintenance" on page 9-8 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 8-200. 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.

Table 8-200. PKT-BUS Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
1793	Any	None				Packet circuit packs have detected possible Packet Bus failures via in-line error or background test failure. Examine the Error and Alarm logs for more specific PKT-BUS errors.
2305	1-24	#572			test pkt P 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	X		
2		X	
3	X	X	
4			X
5	X		X
6		X	X
7	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 8-201. Order of Investigation

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 8-202. Test #571 Packet Control Bus Loop-Around Test

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 (Packet Control Circuit Pack)" on page 8-424 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 8-202. Test #571 Packet Control Bus Loop-Around Test — 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 (Packet Control Circuit Pack)" on page 8-424 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" on page 9-21 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 8-203. Test #572 Maintenance/Test Circuit Pack Query Test

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/Test Packet Bus Port)" on page 8-348 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/Test Packet Bus Port)" on page 8-348 to correct the problem. 2) Reenter the test command. 3) If the test continues to abort with this code, escalate the problem.

Table 8-203. Test #572 Maintenance/Test Circuit Pack Query Test — 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" on page 9-21 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 8-203. Test #572 Maintenance/Test Circuit Pack Query Test — 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" on page 9-21' 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 8-204. Test #573 Packet Circuit Pack Audit Test

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" on page 9-21 of Chapter 9, "Packet Bus Fault Isolation and Correction", to determine the cause of the error reports.

Table 8-204. Test #573 Packet Circuit Pack Audit Test — Continued

Error Code	Test Result	Description	Recommendation
2	FAIL	More than one Packet circuit pack has reported Packet Bus-related in-line errors within that last minute.	
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 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" on page 9-21 of Chapter 9, "Packet Bus Fault Isolation and Correction", to isolate the problem.	

PKT-CTRL (Packet Control Circuit Pack)

Table 8-205. 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

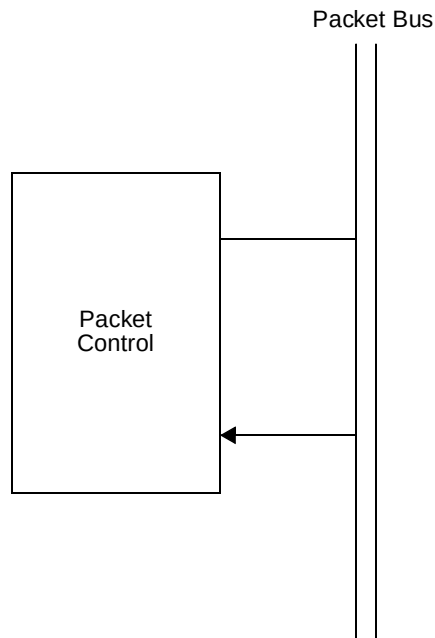


Figure 8-16. Hardware Configuration

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 "Maintenance-Related System Parameters Form" on page 5-3 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 8-206. 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 8-206. 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 8-206. 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 8-206. 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 8-206. 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 8-207. Order of Investigation

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 8-208. Test #583 Packet Control Error Counter Read and Clear Test

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.	

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 8-209. Test #584 Packet Control Parity Circuitry Test

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 8-209. Test #584 Packet Control Parity Circuitry Test — 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.

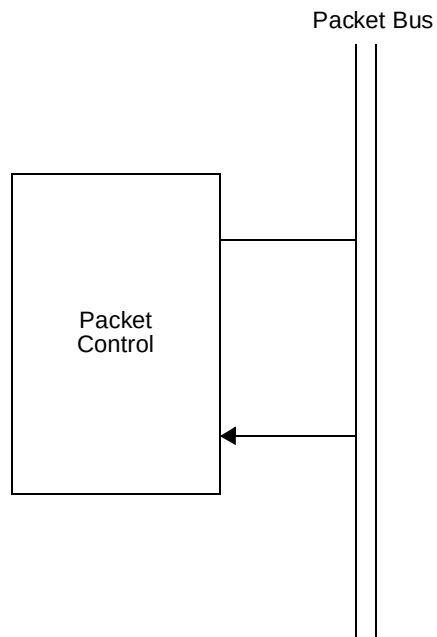


Figure 8-17. Test Configuration

Table 8-210. Test #585 Packet Control Loop Around Test

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 8-211. Test #586 Packet Control Reset Test

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 8-211. Test #586 Packet Control Reset Test — 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" on page 5-3 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.

Table 8-211. Test #586 Packet Control Reset Test — Continued

Error Code	Test Result	Description	Recommendation
2073	FAIL	After being downloaded, the Packet Control circuit pack does not contain valid downloadable firmware in its memory.	1) Retry the command. 2) If the tests fails again with the same error code, retry the command. If the test still fails with this error code, replace the Packet Control circuit pack. If the test continues to fail, escalate the problem.
2500	FAIL	Internal system error.	1) Retry the command at one-minute intervals a maximum of five times. 2) If the test continues to fail, escalate the problem.
	PASS	The reset command passed and the Packet Control circuit pack is operational. If the Packet Control circuit pack was busied-out, it needs to be released (via the release packet-control command) before it can be considered in service.	

POWER (Battery) for DC Systems

The MCU can be powered by either an external AC or DC power source. See DC-POWER for environmental maintenance strategy.

Table 8-212. POWER (Battery) for DC-Powered Systems

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 8-213. Battery and Battery Charger 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 8-214. Order of Investigation

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 (External Alarm)" on page 8-233.

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 8-215. Test #5 Battery and Battery Charger Query Test

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 8-216. Test #78 AC Power Query Test

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 8-217. Test #127 Power Unit Query Test

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" on page 5-13 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 8-217. Test #127 Power Unit Query Test — 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 8-217. Test #127 Power Unit Query Test — 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 8-218. Test #122 Cabinet Temperature Query Test [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 8-218. Test #122 Cabinet Temperature Query Test [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 maintenance objects first, then rerun the test. If the test still fails, escalate the problem.

Table 8-218. Test #122 Cabinet Temperature Query Test [N-V Speed Fans] — *Continued*

Error Code	Test Result	Description	Recommendation
1	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.

Table 8-218. Test #122 Cabinet Temperature Query Test [N-V Speed Fans] — *Continued*

Error Code	Test Result	Description	Recommendation
1	FAIL		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 8-218. Test #122 Cabinet Temperature Query Test [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 8-218. Test #122 Cabinet Temperature Query Test [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 8-219. Test #122 Cabinet Temperature Query Test [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 8-219. Test #122 Cabinet Temperature Query Test [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 8-219. Test #122 Cabinet Temperature Query Test [V Speed Fans] — Continued

Error Code	Test Result	Description	Recommendation
1	FAIL		6. At this point, there should be nothing impeding the air flow, and the fans should be running at 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 8-219. Test #122 Cabinet Temperature Query Test [V Speed Fans] — Continued

Error Code	Test Result	Description	Recommendation
1	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 8-219. Test #122 Cabinet Temperature Query Test [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)

The TN786B Processor circuit pack contains the 80386 Processor (PROCR), the Maintenance Processor (PR-MAINT), and the Memory (MEMORY).

 NOTE:

Additional memory is provided by the CPP1 circuit pack, which is joined to the TN786B circuit pack.

On the TN786B circuit pack, PR-MAINT is responsible for monitoring the sanity of the 80386 processor, maintaining the on-board memory, and controlling the environmental conditions.

Hardware Error Log Entries

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

Table 8-220. Maintenance Processor 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 processor 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	#101	Minor	On	test processor l r 3	Test #101 has failed. Refer to test description for instructions.
257	Any	#106			test processor r 2	Test #106 has failed. Refer to test description for instructions.
513	Any	#103	Minor	On	test processor r 8	Test #103 has failed. Refer to test description for instructions.
769	Any	#104	Minor	On	test processor l r 3	Test #104 has failed. Refer to test description for instructions.
1025	Any	#102	Minor	Off	test processor r 5	Test #102 has failed. Refer to test description for instructions.
1537	Any	#228	Minor	On	test processor r 3	Test #228 has failed. Refer to test description for instructions.
1793	Any	#229	Minor	On	test processor r 3	Test #229 has failed. Refer to test description for instructions.



NOTE:

MTP Reset test #101 logs you off the system so all tests may not be displayed on the screen.

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 MP Reset test, for example, you may also clear errors generated by another test in the sequence.

Table 8-221. Order of Investigation

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Processor Software Initiated Interrupt Test #77*	Short	Long	No
Processor ROM Checksum Test #80*	Short	Long	No
Processor Non-Maskable Interrupt Test #82*	Short	Long	No
Processor Sanity Test #83*	Long		Yes
Read All Memory Test #85†	Long		No
Memory Error Detection Test #87†	Short	Long	No
Text Checksum Test #86†	Long		No
Memory Functional Test #332†	Long		Yes
Memory Board Check Test #631†	Short	Long	No
MP Reset Test #101	Long		Yes
MP Dual Port Ram Test #104	Long		Yes
MP Sanity Handshake Test #106	Short	Long	No
MP Loop-Around Test #228	Short	Long	No
MP Analog Loop-Around Test #103	Short	Long	No
MP Outpulse Relay Test #102	Short	Long	No
MP Aux Loop-Around Test #229	Short	Long	No

* Refer to "PROCR (Processor Circuit Pack)" on page 8-481 for details.

† Refer to "MEMORY (MEMORY)" on page 8-300 for details.

MP Reset Test #101

This test is destructive. It resets the Maintenance Processor circuit pack. The destructive nature of this test causes the following actions:

- Forces MCU-MT to log off
- Terminates CDR port data transmission
- Terminates INADS connection

Table 8-222. Test #101 MP Reset Test

Error Code	Test Result	Description	Recommendation
10102	ABORT	System software resources required to run this test are not available.	1. Repeat the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
10104	ABORT	Internal system error.	1. Repeat the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
10105	FAIL	The MP did not respond to being reset.	1. Repeat the command at one-minute intervals up to five times. 2. If the test continues to fail, replace the Processor circuit pack. WARNING: If the TN786B circuit pack must be replaced, and if there is a blank in the expansion memory circuit pack slot (to the right of the TN786B circuit pack), remove the blank before removing the circuit pack. Otherwise, the circuit pack and/or the two connectors used to connect the expansion memory circuit pack may be damaged.
10106	FAIL	The Maintenance Processor circuit pack was reset, but it responded with a NOT PASS, indicating it did not pass initialization. The MP is not functioning correctly. The MCU should continue to function, but it will not be able to save translation if it needs to be rebooted. Environmental monitoring is lost.	1. Repeat the command at one-minute intervals up to five times. 2. If the test continues to fail, replace the Processor circuit pack. WARNING: If the TN786B Processor circuit pack must be replaced, and if there is a blank in the expansion memory circuit pack slot (to the right of the TN786B Processor circuit pack), remove the blank before removing the circuit pack. Otherwise, the circuit pack and/or the two connectors used to connect the expansion memory circuit pack may be damaged.
	PASS	The Maintenance Processor circuit pack was reset and passed initialization. The other MP tests should be examined to verify that the MP is functioning properly.	Enter test processor and verify that the MP is functioning correctly.

MTP Outpulse Relay Test #102

This nondestructive test validates the correct operation of the remote access CO trunk used by INADS and the AT&T VTC. The MP first goes off-hook, then on-hook using this trunk. If the loop current is detected, the test passes. This test is not allowed if the remote access line is in use.

Table 8-223. Test #102 MP Outpulse Relay Test

Error Code	Test Result	Description	Recommendation
1018	ABORT	The test has been disabled via administration.	1. To enable the test, enter change system-parameters maintenance and set the <i>Test Remote Access Port</i> field to y . 2. Rerun the test.
1131	ABORT	The INADS port is busy because the MCU is reporting alarms or because INADS dialed into the MCU.	Wait 10 minutes then reenter the command.
10201	ABORT	System software resources required to run this test are not available.	1. Repeat the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
10202	ABORT	Internal system error.	1. Repeat the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
10203	ABORT	MP did not respond to the test sequence.	1. Repeat the test at one-minute intervals up to five times. 2. If all MP tests are aborting, execute the test processor long command to reset the MP and examine the results of test #101. 3. Replace the Processor circuit pack. WARNING: If the TN786B Processor circuit pack must be replaced, and if there is a blank in the expansion memory circuit pack slot (to the right of the TN786B Processor circuit pack), remove the blank before removing the circuit pack. Otherwise, the circuit pack and/or the two connectors used to connect the expansion memory circuit pack may be damaged. 4. If only the MP Outpulse Relay test aborts, escalate the problem.

Table 8-223. Test #102 MP Outpulse Relay Test — Continued

Error Code	Test Result	Description	Recommendation
10204	FAIL	MP reported test failure. No loop current detected.	1. Repeat the command at one-minute intervals up to five times. 2. If the test continues to fail, examine the INADS trunk for connectivity and manually check for loop current. 3. If the INADS trunk checks out okay, check the backplane connector wiring. 4. If the backplane wiring checks out okay, replace the Processor circuit pack. WARNING: If the TN786B Processor circuit pack must be replaced, and if there is a blank in the expansion memory circuit pack slot (to the right of the TN786B Processor circuit pack), remove the blank before removing the circuit pack. Otherwise, the circuit pack and/or the two connectors used to connect the expansion memory circuit pack may be damaged.
10205	ABORT	Internal system error.	1. Repeat the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
10206	ABORT	System could not determine if the testing of the INADS port is administered.	1. Enter change system-parameters maintenance to verify the <i>Test Remote Access Port</i> field is set to y. 2. Repeat the command at one-minute intervals up to five times. 3. If the data on the Maintenance-Related System Parameters form is correct, escalate the problem.
10208	ABORT	The remote access port is busy. INADS is probably dialed into the MCU.	If INADS is dialed in, the INADS trunk is working. There is no need to run this test.
	PASS	MP detected loop current on the remote access port.	If the MCU cannot call INADS, or INADS cannot contact the MCU, check the local CO for problems with the INADS trunk and verify that the INADS number is correct.

MP Analog Loop-Around Test #103

This nondestructive test performs an on-board loop-around by using the MP INADS channel. Test data is sent through the on-board 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.



NOTE:

The test does not send any data onto the INADS trunk. However, to pass, the test requires the trunk to be present.

Table 8-224. Test #103 MP Analog Loop-Around Test

Error Code	Test Result	Description	Recommendation
1018	ABORT	The test has been disabled via administration.	1. To enable the test, enter change system-parameters maintenance and set the <i>Test Remote Access Port</i> field to y. 2. Rerun the test.
1031	ABORT	The INADS port is busy because the MCU is reporting alarms to INADS or because INADS dialed into the MCU.	Wait about 10 minutes then reenter the command.
10301	ABORT	System software resources required to run this test are not available.	1. Repeat the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
10302	ABORT	Internal system error.	1. Repeat the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
10303	ABORT	MP did not respond to the test request.	1. Repeat the test at one-minute intervals up to five times. 2. If only the MP Analog Loop-Around test is aborting, escalate the problem. 3. If all MP tests are aborting, enter test processor long to reset the MP and examine the results of test #101.
10305	ABORT	Internal system software error.	1. Repeat the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
10306	ABORT	System could not determine if the testing of the INADS port is administered.	1. Enter change system-parameters maintenance to verify the <i>Test Remote Access Port</i> field is set to y. 2. Repeat the command at one-minute intervals up to five times. 3. If the data on the Maintenance-Related System Parameters form is correct, escalate the problem.
10308	ABORT	The remote access port is busy; INADS probably dialed into the MCU.	Wait until the INADS session is complete, then reenter the command.

Table 8-224. Test #103 MP Analog Loop-Around Test — Continued

Error Code	Test Result	Description	Recommendation
10309	ABORT	System software resources required to run this test are not available.	1. Repeat the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
10310	ABORT	MP did not respond to the test request.	1. Repeat the test at one-minute intervals up to five times. 2. If only the MP Analog Loop-Around test is aborting, escalate the problem. 3. If all MP tests are aborting, execute the test processor long command to reset the MP and examine the results of test #101.
10311	ABORT	Test #102 failed.	Refer to error code 10204 of the MP Output Relay test #102.
10304	FAIL	MP reported a test failure. The MCU is unable to reliably contact INADS with alarm data. However, the MCU continues to provide good service.	1. If test #102 is also failing, check for the presence of the INADS trunk and resolve any INADS trunk problems. 2. If test #102 passes, the fault is on the Processor circuit pack. Replace it. WARNING: If the TN786B Processor circuit pack must be replaced and if there is a blank in the expansion memory circuit pack slot (to the right of the TN786B), remove the blank before removing the circuit pack. Otherwise, the circuit pack and/or the two connectors used to connect the expansion memory circuit pack may be damaged.
	PASS	MP detected correct data through the loop-back connection.	If the MCU cannot call INADS, or if INADS cannot contact the MCU, check the local CO for problems with the INADS trunk and verify that the INADS number is correct.

MP Dual-Port Ram Test #104

This test is destructive. It is coordinated with the test on the MP Dual-Port RAM (DPR). The DPR is a section of memory that is shared by the MP and the 386 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 MCU-MT to log off before the test result is displayed. If the test is run from a terminal other than the MCU-MT, such as remotely from the MCU-ST or the AT&T VTC, 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 8-225. Test #104 MP Dual-Port Ram Test

Error Code	Test Result	Description	Recommendation
1000	ABORT	System software resources required to run this test are not available.	1. Repeat 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. Repeat the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2028	ABORT	System software resources required to run this test are not available.	1. Repeat the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2029	ABORT	Internal system error.	1. Repeat the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
	FAIL	The dual-port RAM is not functioning correctly. Communication between the processor and the MP is lost. The MCU is unable to report environmental alarms or reboot if necessary.	1. Repeat the command at one-minute intervals up to five times. 2. If the test continues to fail, replace the Processor circuit pack. WARNING: If the TN786B Processor circuit pack must be replaced, and if there is a blank in the expansion memory circuit pack slot (to the right of the TN786B), remove the blank before removing the circuit pack. Otherwise, the circuit pack and/or the two connectors used to connect the expansion memory circuit pack may be damaged.
	PASS	Dual-Port RAM is functioning. Communication exists between the 80386 processor circuit pack and the MP.	

MP Sanity Handshake Test #106

This nondestructive test is simply a query from a maintenance process to the MP. The MP must reply for this test to pass.

Table 8-226. Test #106 MP Sanity Handshake Test

Error Code	Test Result	Description	Recommendation
1000	ABORT	System software resources required to run this test are not available.	1. Repeat the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2033	ABORT	Internal system error.	1. Repeat the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
	FAIL	The MP did not respond to the sanity handshake query.	1. Reenter the command with the long option. 2. If the test continues to fail, replace the Processor circuit pack. WARNING: If the TN786B Processor circuit pack must be replaced, and if there is a blank in the expansion memory circuit pack slot (to the right of the TN786B), remove the blank before removing the circuit pack. Otherwise, the circuit pack and/or the two connectors used to connect the expansion memory circuit pack may be damaged.
	PASS	The MP responded to the sanity handshake query.	

MP Loop-Around Test #228

This is a nondestructive test that places the MP into a loop-around mode and verifies the data integrity of the channel. Although the test is nondestructive, it causes a loss of keyboard input from the MCU-MT.

Table 8-227. Test #228 MP Loop-Around Test

Error Code	Test Result	Description	Recommendation
1000	ABORT	System software resources required to run this test are not available.	1. Repeat the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2000	ABORT	The response to the test request was not received within the allowable time period.	1. Repeat the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2033	ABORT	Internal system error.	1. Repeat the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2034	ABORT	Internal system error.	1. Repeat the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
	FAIL	The Loop-Back test failed. The MCU-MT is probably unusable, but remote access can still be used.	1. Repeat the command at one-minute intervals up to five times. 2. If the test continues to fail, replace the Processor circuit pack. WARNING: If the TN786B Processor circuit pack must be replaced, and if there is a blank in the expansion memory circuit pack slot (the slot to the immediate right of the TN786B), remove the blank before removing the circuit pack. Otherwise, the circuit pack and/or the two connectors used to connect the expansion memory circuit pack may be damaged.
	PASS	The Loop-Back Test passed.	This test does not always display PASS. This is because a successful test #228 results in logging off the MCU-MT.

MP Auxiliary Loop-Around Test #229

This nondestructive test places the auxiliary channel of the MP into a loop-around mode and verifies the data integrity of the channel. The auxiliary channel is used as the CDR output port.

Table 8-228. Test #229 MP Auxiliary Loop-Around Test

Error Code	Test Result	Description	Recommendation
1000	ABORT	The system software resources required to run this test are not available.	1. Repeat the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1018	ABORT	The test has been disabled via administration.	
2000	ABORT	Response to the test request was not received within the allowable time period.	1. Repeat the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2033	ABORT	Internal system error.	1. Repeat the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2034	ABORT	Internal system error.	1. Repeat the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
22902	ABORT	The system software resources required to run this test are not available.	1. Repeat the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.

Table 8-228. Test #229 MP Auxiliary Loop-Around Test — Continued

Error Code	Test Result	Description	Recommendation
22903	ABORT	The system software resources required to run this test are not available.	1. Repeat the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
	FAIL	The auxiliary channel failed on the Loop-Back test. The AUX port is probably not sending any auxiliary data to the auxiliary collection device.	1. Repeat the command at one-minute intervals up to five times. 2. If the test continues to fail, replace the Processor circuit pack. WARNING: If the TN786B Processor circuit pack must be replaced and there is a blank in the expansion memory circuit pack slot (to the immediate right of the TN786B), remove the blank before removing the circuit pack. Otherwise, the circuit pack and/or the two connectors used to connect the expansion memory circuit pack may be damaged.
	PASS	The auxiliary channel passed the Loop-Back Test. The auxiliary port is functioning correctly.	If no auxiliary data is being recorded, check the auxiliary collection device and verify it has been set up and connected 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:

- AT&T 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 TN754B 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 TN754B 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)" on page 8-605 for details.
7. If the destination is EIA, then look for PR-MAINT errors in the error log (refer to "PR-MAINT (Maintenance Processor)" on page 8-459).

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)" on page 8-129; 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 8-229. 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 8-229. 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-maintenance to see the start time of daily maintenance. If the error occurs and is resolved during daily maintenance, it can be ignored.

Table 8-229. 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 8-230. Order of Investigation

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 8-231. Test #213 Link Tear Down Test

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 8-232. Test #215 Link Retry Test

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 8-233. 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 (Processor Circuit Pack)

This section applies to the TN786B Processor circuit packs (PROCR). The TN786B has a 80386 processor that uses on-board flash ROM and DRAM memory. It contains the 80386 processor (PROCR), the Maintenance Processor (PR-MAINT), and memory (MEMORY).

⇒ NOTE:

Additional memory is provided by the CPP1 circuit pack, which is joined to the TN786B circuit pack.

The 80386 Processor circuit pack portion is responsible for the execution of the software package. This includes all of the call processing, maintenance, and administration functions. The 80386 Processor circuit pack is the most critical component to the correct operation of the MCU.

Table 8-234. PROCR (Processor Circuit Pack)

Alarm Level	Initial Craft Command to Run
Major	test processor sh r/c

The PR-MAINT is responsible for monitoring the sanity of the 80386 Processor circuit pack as well as the environmental conditions. The PR-MAINT provides the serial interfaces for the MCU-MT and the CDR ports, and also provides the communications interface to INADS for alarm reporting and remote maintenance capability.

Hardware Error Log Entries

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

Table 8-235. 80386 Processor 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 processor 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	0	#77	Major	On	test processor r 3	Software-Initiated Interrupt test #77 failed. Refer to the FAIL condition for further action.
769	0	#80	Major	On	test processor r 5	Processor Non-Maskable Interrupt test #82 failed. Refer to the FAIL condition for further action.
1025	0	#82	Major	On	test processor r 2	Processor Non-Maskable Interrupt test #82 failed. Refer to the FAIL condition for further action.
1281	0	#83	Major	On	test processor l r 2	Processor Sanity Timer test #83 failed. Refer to the FAIL condition for further action.

Craft-Demanded Tests

Always investigate tests in the order presented in the table below when you are inspecting errors in the MCU. By clearing error codes associated with the Processor Non-Maskable Interrupt test, for example, you may also clear errors generated from other tests in the testing sequence.

Table 8-236. Order of Investigation

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Processor Non-Maskable Interrupt Test #82	Short	Long	No
Processor ROM Checksum Test #80	Short	Long	No
Processor Software Initiated Interrupt Test #77	Short	Long	No
Processor Sanity Timer Test #83	Long		Yes
Read All Memory Test #85*	Long		No
Memory Error Detection Test #87*	Short	Long	No
Text Checksum Test #86*	Long		No
Memory Functional Test #332*	Long		Yes
Memory Board Check Test #631*	Short	Long	No
MP Outpulse Relay Test #102†	Short	Long	No
MP Analog Loop-Around Test #103†	Short	Long	No
MP Sanity Handshake Test #106†	Short	Long	No
MP SAT Loop-Around Test #228†	Short	Long	No
MP Aux Loop-Around Test #229†	Short	Long	No
MP Reset Test #101†	Long		Yes
MP Dual-Port RAM Test #104†	Long		Yes

* Refer to MEMORY for a description of these tests.

† Refer to PR-MAINT (Maintenance Processor) for a description of these tests.

Processor Software-Initiated Interrupt Test #77

This nondestructive test verifies if the 80386 processor can exercise the three types of software-initiated interrupts:

- Divide by zero
- Single step
- One byte interrupt instruction

Table 8-237. Test #77 Processor Software-Initiated Interrupt Test

Error Code	Test Result	Description	Recommendation
	FAIL	The processor did not detect the software interrupt condition. As a result, the processor executed the incorrect interrupt vector. The MCU may or may not continue to operate properly.	1. Repeat the command at one-minute intervals up to five times. 2. If the test continues to fail, the Processor circuit pack should be replaced. WARNING: If the TN786B Processor circuit pack must be replaced, and there is a blank in the expansion memory circuit pack slot (immediately to the right of the TN786B), remove the blank before removing the circuit pack. Otherwise, the circuit pack and/or the two connectors connecting the expansion memory circuit pack may be damaged.
	PASS	The processor detected the software interrupt condition, and it executed the correct interrupt vector. The MCU continues to operate correctly.	

Processor ROM Checksum Test #80

This nondestructive test computes the checksum of the processor's bootstrap ROM, and compares it to a predetermined value stored within the ROM. A failure of this test indicates ROM corruption.

Table 8-238. Test #80 Processor ROM Checksum Test

Error Code	Test Result	Description	Recommendation
	FAIL	The computed checksum did not match the ROM checksum. The MCU may or may not continue to operate correctly. The system may fail later when some action requires access to the corrupted area of the bootstrap ROM.	Replace the Processor circuit pack. WARNING: If the TN786B Processor circuit pack must be replaced, and if there is a blank in the expansion memory slot (immediately to the right of the TN786B), remove the blank before removing the circuit pack. Otherwise, the circuit pack and/or the two connectors used to connect the expansion memory circuit pack might be damaged.
	PASS	The computed checksum matched the ROM checksum. The system continues to operate normally.	

Processor Non-Maskable Interrupt Test #82

This nondestructive test is used to verify the 80386 processor can detect and respond to non-maskable interrupts. For example, the processor intentionally causes 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 80386 CPU chip.

Table 8-239. Test #82 Processor Non-Maskable Interrupt Test

Error Code	Test Result	Description	Recommendation
	FAIL	The interrupt was not detected or acted upon.	1. Repeat the command at one-minute intervals up to five times. 2. If the test continues to fail, the Processor circuit pack should be replaced. WARNING: If the TN786B Processor circuit pack must be replaced, and if there is a blank in the expansion memory circuit pack slot (immediately to the right of the TN786B), remove the blank before removing the circuit pack. Otherwise, the circuit pack and/or the two connectors used to connect the expansion memory circuit pack may be damaged. 3. If replacement of the processor circuit pack still results in test failure, the following circuit packs should be replaced, one at a time: TN765 processor interface, TN777B Network Control. 4. If the test still fails after you replace all the circuit packs in Step 3, the problem is in the control carrier. Replace the carrier.
	PASS	The interrupt was correctly detected. The 386 CPU chip is functioning correctly.	

Processor Sanity Timer Test #83

This test is destructive. This test causes service to be disrupted for about one second on the TN786B Processor circuit pack. During this time, the MCU does not respond to any user action.

This test checks to see if the 386 processor watchdog sanity timer is functioning correctly. The processor intentionally allows the sanity timer to time out. If the processor detects itself being reset, the test passes, and the processor continues

to execute normally. If the processor does not detect a reset, the test has failed. If this test continues to fail, the processor circuit pack should be replaced. The sanity timer is not critical to the MCU operation, but is needed for processor recovery if the processor stops functioning.

Table 8-240. Test #83 Processor Sanity Timer Test

Error Code	Test Result	Description	Recommendation
1000	ABORT	System software resources required to run this test are not available.	1. Repeat the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
	FAIL	The sanity timer did not time out as expected. The MCU continues to function normally. If the processor gets into an infinite loop, the reset cannot be detected and the MCU does not reboot to clear the problem.	1. Repeat the command at one-minute intervals up to five times. 2. If the test continues to fail, the processor circuit pack should be replaced. WARNING: If the TN786B circuit pack must be replaced, and if there is a blank in the expansion memory circuit pack slot (immediately to the right of the TN786B), remove the blank before removing the circuit pack. Otherwise, the circuit pack and/or the two connectors used to connect the expansion memory circuit pack may be damaged.
	PASS	The sanity timer went off as expected. The system continues to function normally. If the processor gets into an infinite loop, the reset is detected, and the MCU reboots itself to clear 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 8-241. 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.

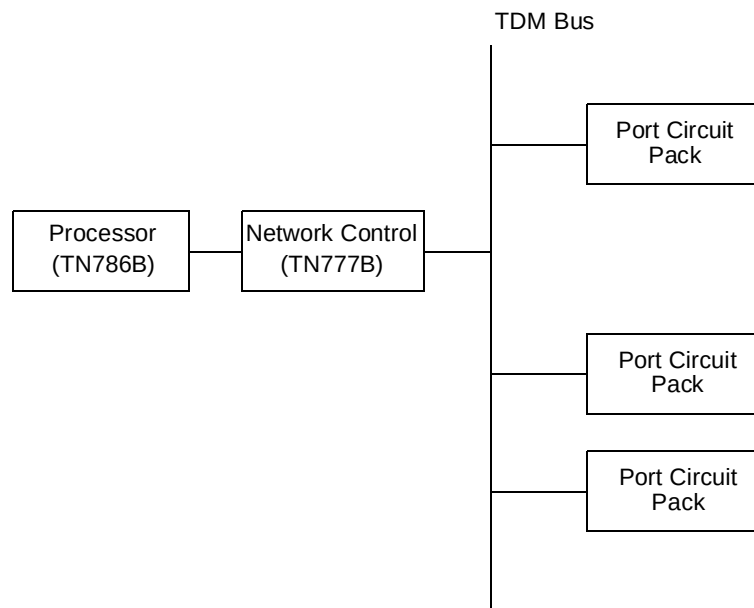


Figure 8-18. Switch Control Connectivity

Hardware Error Log Entries

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

Table 8-242. 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 8-242. 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 I 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 I r 2	

Table 8-242. 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 8-243. Order of Investigation

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

Loopback 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 8-244. Test #92 Control Channel Interface Test

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 8-244. Test #92 Control Channel Interface Test — 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 8-245. Test #93 Switch Control Reset Test

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 8-246. Test #94 Control Channel Transmission Test

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 8-246. Test #94 Control Channel Transmission Test — 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 8-247. Test #95 Time of Day Clock Test

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.	

Switch Control EPN Maintenance Board Interface Test #324

Loop-back messages are sent to Switch Control via the interface used for EPN maintenance circuit pack messages. The messages are returned to the SPE for verification via the same interface.

Table 8-248. Test #324 Switch Control EPN Maintenance Board Interface Test

Error Code	Test Result	Description	Recommendation
1005	ABORT	The system does not contain an EPN so this test is not executed.	

Switch Control Destructive EPN Maintenance Board Interface Test #325

This test writes test patterns into the EPN Maintenance circuit pack interface and verifies that it can read back these test patterns successfully. Messages to or from the EPN Maintenance circuit pack can be lost when this test is run.

Table 8-249. Test #325 Switch Control Destructive EPN Maintenance Board Interface Test

Error Code	Test Result	Description	Recommendation
1005	ABORT	The MCU does not contain an EPN so this test is not executed.	

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 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 Tone-Clock circuit packs are as follows:

- Yellow LED is on 2.7 seconds and off 0.3 seconds: Indicates an external timing source is being used as a synchronization reference and the circuit pack is in Active mode.
- Yellow LED is on 0.3 seconds and off 2.7 seconds: Indicates the local oscillator on the Tone-Clock circuit pack is being used as the synchronization reference and the circuit pack is in Active mode.
- Yellow LED stays on: Indicates the circuit pack has been reset but no translation has been downloaded. This also indicates the circuit pack is providing clocks and is in Active mode. To determine the mode of the circuit pack, use **status system**. Green and yellow flashing indicate that maintenance is running on the active circuit pack.

Hardware Error Log Entries

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

Table 8-250. 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 synchronization	Run the short test sequence first. If all tests pass, run the long test sequence. Refer to the appropriate test procedures.
1	Any	None	Warning/Minor*	Off	None	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 8-250. 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 (TDM Bus Clock)" on page 8-532. 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 8-250. 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 8-250. 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 (TDM Bus Clock)" on page 8-532. 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 8-250. 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 (TDM Bus Clock)" on page 8-532 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 8-251. Order of Investigation

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 8-252. Test #417 Test Synchronization Test

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-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.

Table 8-253. SYS-PRNT (System Printer)

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 TN754B 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 TN754B 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 (Maintenance Processor)" on page 8-459.) 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 8-254. 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 8-254. 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 I	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" on page 8-512 for details. Minor alarms may be downgraded to warning based on the setting of set options.

Table 8-254. 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" on page 8-512 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 8-255. Order of Investigation

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 8-256. Test #213 Link Tear Down Test

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.
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.
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 8-257. Test #215 Link Retry Test

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" on page 8-512 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" on page 8-512 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 8-258. 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.
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.

TDMODULE (Trunk Data Module)

The TDMODULE (Trunk Data Module) is covered under PDMODULE (Processor Data Module).

Table 8-259. TDMODULE (Trunk 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).

Table 8-260. TDM-BUS (TDM Bus)

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 8-261. 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 cause the circuit pack that was in the reset state to begin functioning on the current control channel bus. If this method is not feasible, try one of the following procedures.

■ **Procedure 3 (Nondestructive)**

Enter **test tdm** to execute the Idle Time Slot test #294 when the control channel is on the same TDM Bus as it was when the circuit pack entered the reset state. If using this method is not feasible, try the remaining procedure.

■ **Procedure 4 (Destructive)**

Reset the port network that contains the circuit pack in the reset state. When the network is reset, two restart messages, one on the control channel of each TDM Bus, are sent to each circuit pack on the network. Executing **reset system L** (where **L** is **2, 3, 4**, or **5**) resets all networks in the system.

Hardware Error Log Entries

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

Table 8-262. 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 (Switch Control)" on page 8-489). 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 8-262. 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					
3874 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.

Craft-Demanded Tests

Always investigate tests in the order presented in the table below. By clearing the error codes associated with the Control Channel test, for example, you may also clear errors generated by the other tests.

Table 8-263. Order of Investigation

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
Control Channel Test on the Control Channel Bus #296	Short	Long	No
Digit Detection Test on the Non-Control Channel Bus #297	Short	Long	No
Idle Time Slot Test on TDM Bus A #296	Short	Long	No

Idle Time Slot Test #296

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 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 idle. After all the time slots are 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; no more than 300 are taken out of service on both buses at one time.

Table 8-264. Test #296 Idle Time Slot Test

Error Code	Test Result	Description	Recommendation
None	ABORT	Could not allocate the necessary system resources to run this test. Maintenance could be running on the Tone Detector circuit pack and using the CPTRs, for example.	1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1005	ABORT	Since this test is only valid on the control channel bus, it aborts when run on the non-control channel bus. This is a valid response.	Use status system to verify which bus is the control channel bus.
1115	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 220	FAIL	The error code specifies the number of bad time slots detected. The cause of this failure is most likely a bad port circuit pack and not the TDM Bus itself.	1. Retry the command. 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 packs repair procedures. 4. Retest the TDM Bus. If the error persists, see "TDM Bus Fault Detection and Isolation" on page 8-521.
	PASS	All idle time slots are that are supposed to be idle are indeed idle. There is no noise on any of them.	

Control Channel Test #294

The Control Channel test checks the integrity of the control channel bus. It ensures that communication through the TDM Bus is operational.

Table 8-265. Test #294 Control Channel Test

Error Code	Test Result	Description	Recommendation
Any <i>except</i> 1005	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.
1005	ABORT	Since this test is valid only on the control channel bus, it aborts when run on the non-control channel bus. This is a valid response.	Use status system to verify which bus is the control channel bus.
None	FAIL	Communication through the control channel is not working. The problem is not necessarily the TDM Bus itself.	1. Display the hardware error and alarm log for the Tone-Clock circuit pack (see "TONE-BD (Tone Clock Circuit Pack)" on page 8-555). 2. Display the hardware error and alarm log for the Network Control circuit pack (see "DATA-BD (Network Control Circuit Pack)" on page 8-129). 3. Resolve the errors and then execute test tdm again. 4. If the test still fails, see "TDM Bus Fault Detection and Isolation" on page 8-521.
	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 places a tone on the non-control channel bus and the Tone Detector circuit pack listens to it. The test passes if the tone is successfully transmitted on the non-control channel bus.

Table 8-266. Test #297 Digit Detection Test

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.
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.
1005	ABORT	Since this test is only valid on the non-control channel bus, it aborts when run on the control channel bus. This is a valid response.	Use status system 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 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	This failure indicates that communication on the non-control channel is not reliable.	1. Retry the command. 2. If the problem persists, test both the Tone-Clock circuit pack (see "TONE-BD (Tone Clock Circuit Pack)" on page 8-555) and the Tone Detector circuit pack (see "TONE-PT (Tone Generator)" on page 8-562, "GPTD-PT (General-Purpose Tone Detector Port)" on page 8-237, and "DTMR-PT (Dual-Tone Multifrequency Receiver Port)" on page 8-224). 3. Retry the command. 4. If the problem persists, see "TDM Bus Fault Detection and Isolation" on page 8-521
	PASS	The non-control channel bus is operational.	

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). 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 8-267. 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.
126		None	Minor	On		This error indicates that the port network specified in the <i>Port</i> field of the error booted up without a Tone-Clock circuit pack.
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.
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 (Synchronization)" on page 8-501 to check for synchronization errors. 3. If the problem persists, escalate it.

Table 8-267. TDM Bus Clock Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
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.
1281	Any	None				If the <i>Aux Data</i> value is 18368, this error indicates the Tone-Clock circuit pack detected a loss of timing signal from the system synchronization reference (see "SYNC (Synchronization)" on page 8-501). Otherwise, this error indicates switching of the system synchronization reference has occurred (see "SYNC (Synchronization)" on page 8-501).
1537	Any	#150			test tone-clock sh	This error indicates switching of the system synchronization reference occurred (see "SYNC (Synchronization)" on page 8-501).
1793	18240	None				This error indicates switching of the system synchronization reference occurred (see "SYNC (Synchronization)" on page 8-501).

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 8-268. Order of Investigation

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

* See the following MOs for descriptions of these tests: Test #52 and #53, see "XXX-BD (Common Port Circuit Pack)" on page 8-605; Test #46, see "TONE-BD (Tone Clock Circuit Pack)" on page 8-555; and Tests #40, #41, and #90, see "TONE-PT (Tone Generator)" on page 8-562.

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 8-269. Test #148 TDM Bus Clock Circuit Status Inquiry Test

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 (Synchronization)" on page 8-501 to change the system synchronization reference.
2	FAIL	This error indicates the Tone-Clock circuit pack has inaccurately detected loss of signal on the external synchronization timing source.	Replace the Tone-Clock circuit pack. This error may produce errors in data communications.
4	FAIL	The local oscillator on the Tone-Clock circuit pack has failed.	Replace the Tone-Clock circuit pack. This error may produce errors in data communications.
8	FAIL	The local oscillator on the Tone-Clock circuit pack has failed.	Replace the Tone-Clock circuit pack. This error may produce errors in data communications.
16	FAIL	The circuitry on the Tone-Clock circuit pack used to detect synchronization timing errors has failed.	Replace the Tone-Clock circuit pack. This error may produce errors in data communications.

Table 8-269. Test #148 TDM Bus Clock Circuit Status Inquiry Test — Continued

Error Code	Test Result	Description	Recommendation
32	FAIL	The circuitry on the Tone-Clock circuit pack used to detect synchronization timing errors has failed.	Replace the Tone-Clock circuit pack. This error may produce errors in data communications.
64	FAIL	This message is only sent when an external synchronization reference is providing a timing signal for the Tone-Clock circuit pack. This error indicates the Tone-Clock circuit pack has detected a loss of timing signal from the external synchronization reference.	No corrective action is needed. SYNC maintenance corrects this error.
	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 8-270. Test #149 TDM Bus Clock Slip Inquiry Test

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.

Table 8-270. Test #149 TDM Bus Clock Slip Inquiry Test — 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.
1 to 255	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 (Synchronization)" on page 8-501 to change the system synchronization reference. 2. Check for errors against DS1 Interface circuit pack (see "DS1-BD (DS1 Interface Circuit Pack)" on page 8-189). 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.

TDM Bus Clock PPM Inquiry Test #150

This test evaluates the quality of the synchronization source for the Tone-Clock circuit pack.

Table 8-271. Test #150 TDM Bus Clock PPM Inquiry Test

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 8-271. Test #150 TDM Bus Clock PPM Inquiry Test — 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.
1 to 254	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 (Synchronization)" on page 8-501 to change the system synchronization reference. 2. If there are errors against the DS1 Interface circuit pack, see "DS1-BD (DS1 Interface Circuit Pack)" on page 8-189. 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 action updates the tone-clock internal circuit pack parameters. This process always passes.

Table 8-272. Test #151 TDM Bus Clock Parameter Update Test

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.

Table 8-273. TIE-DS1 (DS1 Tie Trunk)

Alarm Level	Initial Craft Command to Run
Major*	test trunk <grp/mbr> I
Minor	test trunk <grp/mbr> I
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 8-274. 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 8-274. 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 8-274. 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.

Table 8-274. DS1 Tie Trunk Maintenance Error Log — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
1793					test board PCSS long	The DS1 Interface circuit pack is out of service. See "DS1-BD (DS1 Interface Circuit Pack)" on page 8-189.
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.
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 8-275. Order of Investigation

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 8-276. Test #6 NPE Crosstalk Test

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 (TDM Bus)" on page 8-520).	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 (TTR Level)" on page 8-573). 2. Look for TONE-PT error in the error log (see "TONE-PT (Tone Generator)" on page 8-562). 3. If neither condition exists, retry the test at one-minute intervals up to five times. 4. If the test continues to abort, escalate the problem.
1004	ABORT	The port has been seized by a user for a valid call.	1. Use status trunk to determine when the port is available for testing. 2. Retry the command at one-minute intervals up to five times. 3. If the test continues to abort, and the port is not in use, escalate the problem.
1020	ABORT	The test did not run because of a previously existing error on the specific port or a more general circuit pack error.	Examine the error log for existing errors against this port or the circuit pack and attempt to diagnose the already existing error.

Table 8-276. Test #6 NPE Crosstalk Test — 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.
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 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 8-277. Test #7 Conference Circuit Test

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.
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.
	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 by examining trunk or external wiring.

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 8-278. Test #36 Audit and Update Test

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	Response to the test request was not received within the allowable time period.	1. Retry the command at one-minute intervals up to five times. 2. If the test continues to fail, escalate the problem.
2100	ABORT	Could not allocate the necessary system resources to run this test.	1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
	FAIL	Internal system error.	1. Retry the command at one-minute intervals up to five times. 2. If the test continues to fail, escalate the problem.
	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 8-279. Test #136 DS1 Tie Trunk Seizure Test

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 (DS1 Interface Circuit Pack)" on page 8-189). 2. Retry the command. 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.

Table 8-279. Test #136 DS1 Tie Trunk Seizure Test — Continued

Error Code	Test Result	Description	Recommendation
	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 (DS1 Interface Circuit Pack)" on page 8-189). 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 (DS1 Interface Circuit Pack)" on page 8-189).
	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.

Table 8-280. TONE-BD (Tone-Clock Circuit Pack)

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).

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).

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 8-281. 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 (Switch Control)" on page 8-489).
23	0	None	Warning	Off		The circuit pack has been administered but not installed. The alarm is cleared when it is installed.
125		None	Minor	On		The wrong circuit pack is installed in the slot where this circuit pack is administered. Either remove the wrong circuit pack or use change circuit-pack to readminister the slot to match the circuit pack inserted.
126		None	Minor	On		The port network specified in the <i>PORT</i> field of the error booted up without a Tone-Clock circuit pack.

Table 8-281. Tone-Clock Circuit Pack 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 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 8-281. 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 the Tone-Clock Circuit Pack" on page 8-532
2561		None	Major	On		A Tone-Clock circuit pack with a different circuit pack code than required has been inserted. See "Replacing the Tone-Clock Circuit Pack" on page 8-532 for the appropriate circuit pack code and replace it accordingly.

Table 8-281. 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.

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 8-282. Order of Investigation

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

* See "XXX-BD (Common Port Circuit Pack)" on page 8-605 for a description of this test.

† See "TONE-PT (Tone Generator)" on page 8-562 for a description of this test.

‡ See "TDM-CLK (TDM Bus Clock)" on page 8-532 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 8-283. Test #46 Clock Health Inquiry Test

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).

Table 8-284. TONE-PT (Tone Generator)

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 8-285. 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.
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.
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 8-285. 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.

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 8-286. Order of Investigation

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

* See "XXX-BD (Common Port Circuit Pack)" on page 8-605 for a description of this test.

† See "TONE-BD (Tone Clock Circuit Pack)" on page 8-555 for a description of this test.

‡ See "TDM-CLK (TDM Bus Clock)" on page 8-532 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 8-287. Test #40 Tone Generator Transmission Test

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.

Table 8-287. Test #40 Tone Generator Transmission Test — Continued

Error Code	Test Result	Description	Recommendation
1043	ABORT	DTMF generation was unable to run on the standby tone generator because the tone detector it was using was a TN748C vintage 5 or greater.	
2000	ABORT	Response to the test request was not received within the allowable time period.	1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2100	ABORT	System resources required for the test are not available.	1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
1	FAIL	DTMF generation failed for the active tone generator.	Check that all Tone Detector circuit packs have the same companding mode as that administered for the system. If this is not the problem, replace the Tone-Clock circuit pack.
101	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.
102	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 2225-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 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.

Table 8-287. Test #40 Tone Generator Transmission Test — Continued

Error Code	Test Result	Description	Recommendation
112	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.
113	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.
114	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 digital milliwatt 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.
116	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).
121	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 8-288. Test #41 Tone Generator Update/Audit Test

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.
	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 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 8-289. Test #90 Tone Generator Crosstalk Test

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.

Table 8-289. Test #90 Tone Generator Crosstalk Test

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 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 (Tone Detector Circuit Pack)" on page 8-166, "DTMR-PT (Dual-Tone Multifrequency Receiver Port)" on page 8-224, and "GPTD-PT (General-Purpose Tone Detector Port)" on page 8-237 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 TN420C 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.

Table 8-290. TTR-LEV (TTR Level)

Alarm Level	Initial Craft Command to Run
Warning	See "Repairing TTR-LEV" on page 8-574.

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 (TN748B) 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 8-291. 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.

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.

Table 8-292. UDS1-BD (UDS1 Interface Circuit Pack)

Alarm Level	Initial Craft Command to Run
Minor	test board <i>PCSS l</i>
Warning	test board <i>PCSS sh</i>

VC-BD (Voice Conditioner Circuit Pack)

The Voice Conditioner circuit pack (TN788B) 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 (TN787D) 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.

Table 8-293. VC-BD (Voice Conditioner Circuit Pack)

Alarm Level	Initial Craft Command to Run
Major	test board <i>PCSS l r#</i>
Minor	test board <i>PCSS l r#</i>
Warning*	test board <i>PCSS s r#</i>

* Refer to "XXX-BD (Common Port Circuit Pack)" on page 8-605 for details.

Hardware Error Log Entries

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

Table 8-294. 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.
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 8-294. 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 8-294. 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 8-295. Order of Investigation

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 Pack)" on page 8-605 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.

Table 8-296. VC-DSPPT (Voice Conditioner Circuit Pack DSP Port)

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 8-297. 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	#953	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	#954	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	#956	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	0	#955	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 8-298. Order of Investigation

Order of Investigation	First Test Sequence	Second Test Sequence	Reset Port Sequence	Is Test Destructive?
NPE Crosstalk Test #953	Long			Yes
TDM Loop-Back Test #954	Short	Long		Yes
DSP Loop-Back Test #955	Short	Long		Yes
VC Port Reset DSP Test #956			Reset	Yes

VC DSP Port NPE Crosstalk Test #953

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 8-299. Test #953 VC DSP Port NPE Crosstalk Test

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 #954

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 8-300. Test #954 VC DSP Port Local TDM Loop-Back Test

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 (TDM Bus)" on page 8-520 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.
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.

Table 8-300. Test #954 VC DSP Port Local TDM Loop-Back Test — Continued

Error Code	Test Result	Description	Recommendation
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 #955

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 8-301. Test #955 VC DSP Port DSP Loop-Back Test

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 (TDM Bus)" on page 8-520 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 8-301. Test #955 VC DSP Port DSP Loop-Back Test — 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 #956

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 8-302. Test #956 VC Port Reset DSP Test

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.

Table 8-303. VC-LEV (Voice Conditioner DSP Port Level)

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 8-304. 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 (Voice Conditioner DSP Port)" on page 8-581 and "VC-BD (Voice Conditioner Circuit Pack)" on page 8-577 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.

Table 8-305. VC-SUMPT (Voice Conditioner Summer Ports)

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 8-306. 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	#950	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 8-307. Order of Investigation

Order of Investigation	First Test Sequence	Second Test Sequence	Is Test Destructive?
NPE Crosstalk Test #6	Long		Yes
TDM Loop-Back Test #950	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 8-308. Test #6 NPE Crosstalk Test

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 #950

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 8-309. Test #950 VC Summer Port Local TDM Loop-Back Test

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 (TDM Bus)" on page 8-520 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 8-309. Test #950 VC Summer Port Local TDM Loop-Back Test — 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.	

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.

Table 8-310. VC-SUMPT (Voice Conditioner Summer Ports)

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 (UDS1 Interface Circuit Pack)" on page 8-577.

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 AT&T fractional T-1 service. An example of this is the AT&T Static Integrated Network Access, where a trunk group to AT&T 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 AT&T fractional T-1 service, and it does not terminate on local endpoint equipment but is connected to a far-end CPE (for example, a PBX) via the dedicated fractional T-1. All Wideband Access Endpoint functionality and operation is identical on both line-side and network facilities. However, because maintenance capabilities are limited to the Wideband Access Endpoint interface, and because faults can occur end-to-end, troubleshooting procedures based on an end-to-end view of the network is required.

Wideband Access Endpoint Port maintenance provides a strategy for maintaining a Wideband Access Endpoint Port via a port on the Universal DS1 interface circuit pack hardware. The maintenance strategy involves logging Wideband Access Endpoint Port hardware errors, running tests for port initialization, periodic and scheduled maintenance, craft-demanded tests, and alarm escalation and resolution. Two different port service states are specified in the Wideband Access Endpoint Port maintenance. These states include *out-of-service*, where the port is in a deactivated state and cannot be used for calls, and *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 8-311. 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 8-311. 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 (UDS1 Interface Circuit Pack)" on page 8-577 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 8-312. Order of Investigation

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 8-313. Test #6 NPE Crosstalk Test

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 (TDM Bus)" on page 8-520 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. 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 (TTR Level)" on page 8-573. 2. Look for TONE-PT errors in the error log. If present, see "TONE-PT (Tone Generator)" on page 8-562. 3. If neither condition exists, retry the test at one-minute intervals up to five times. 4. If the test continues to abort, escalate the problem.
1004	ABORT	The port has been seized by a user for a valid call. Use the status access-endpoint <extension> command to determine when the port is available for testing. The port is available when it is in the in-service or idle state.	1. Retry the command at one-minute intervals a maximum of five times. 2. If the test continues to abort, and the port is not in use, escalate the problem.

Table 8-313. Test #6 NPE Crosstalk Test — Continued

Error Code	Test Result	Description	Recommendation
1020	ABORT	The test did not run due either to a previously existing error on the specific port or to a more general circuit pack error.	Examine the error log for existing errors against this port or the circuit pack and attempt to diagnose the already existing error.
2000	ABORT	Response to the test request was not received within the allowable time period.	1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
2100	ABORT	System resources for this test were not available.	1. Retry the command at one-minute intervals up to five times. 2. If the test continues to abort, escalate the problem.
	FAIL	The NPE of the tested port was found to be transmitting in error. This causes noisy and unreliable connections.	Replace the circuit pack.
	PASS	The port is correctly using its allocated time slots.	User-reported troubles on this port should be investigated by using other port tests and by examining the terminal adapter or external wiring.

Conference Circuit Test (#7)

One or more Network Processing Elements (NPEs) reside on each circuit pack with a TDM Bus interface. (The UDS1 circuit pack has one SCOTCH-NPE chip instead of several NPE chips). The NPE controls port connectivity and gain, and it provides conferencing functions on a per-port basis. The Conference Circuit Test verifies that the NPE channel for the port being tested can correctly perform the conferencing function. The NPE is instructed to listen to several different tones and to conference the tones together. The resulting signal is then measured by a Tone Detector port. If the level of the tone is within a certain range, the test passes.

Table 8-314. Test #7 Conference Circuit Test

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 8-315. Test #36 Audit and Update Test

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 TN754B 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 8-316. Trunk Port Circuit Packs

Code	Description	MO Name
TN767E	DS1 Interface	DS1-BD
TN2207	UDS1 Interface	UDS1-BD

Table 8-317. Station Port Circuit Packs

Code	Description	MO Name
TN754B	Digital Line	DIG-BD

Table 8-318. Service Port Circuit Packs

Code	Description	MO Name
TN420C	Tone Detector	DETR-BD
TN768	Tone-Clock	TONE-BD
TN786B	Processor Interface	PI-BD
TN777B	Network Control	DATA-BD
TN787D	Multimedia Interface	MMI-BD
TN788B	Voice Conditioner	VC-BD

Hardware Error Log Entries

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

Table 8-319. 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 8-319. 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.

Table 8-319. Common Port Circuit Pack Error Log Entries — Continued

Error Type	Aux Data	Assoc. Test #	Alarm Level	On/Off Board	Test to Clear Value	Description
1025	4363	#50			test board PCSS I r 20	This error is not service-affecting and no action is required.
1538	Any	None	Warning / Minor	On		The hyperactive circuit pack is out of service and may exhibit one or more of the following symptoms: - Common Circuit Pack level tests, such as test #51, are aborting with error code 2000. - The tests run on the ports of this circuit pack are returning with a NO BOARD. - A busyout/release of the circuit pack has no affect on test results. - A list configuration command shows the circuit pack and ports are properly installed. If the XXX-BD is not a TN754 DIG-BD and if this error recurs within 15 minutes, replace the circuit pack. If the XXX-BD is a TN754 DIG-BD, check the alarm level. A warning indicates users are probably causing the hyperactivity; a minor alarm suggests the circuit pack is hyperactive.
3840	Any	None				This is not service-affecting. No action required.

Craft-Demanded Tests

Always investigate the following tests in the order presented.

Table 8-320. Order of Investigation

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 8-321. Test #50 NPE Audit Test

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 8-322. Test #52 Control Channel Loop-Around Test

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 with up to five tries. 2. If the problem continues, and if the circuit pack is one of the port circuit packs, replace it. 3. Otherwise, if the circuit pack is one of the processor complex circuit packs, see Chapter 7, "LED Interpretation" for instructions for replacing it. 4. Retry the command up to five tries. 5. If the test continues to fail, escalate the problem.
	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.

SAKI Sanity Test #53

This test is destructive. It resets the circuit pack.

Table 8-323. Test #53 SAKI Sanity

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 (Synchronization)" on page 8-501 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.

Table 8-324. 12V-PWR (12-Volt Power Supply)

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 8-325. 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 8-326. Order of Investigation

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)" on page 8-91 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 8-327. Test #701 12-Volt Power Supply Test

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.	

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 on page 9-5 shows the various circuit packs that communicate on the Packet Bus. Logical and physical connections are illustrated. Connectivity with three port networks is similar.

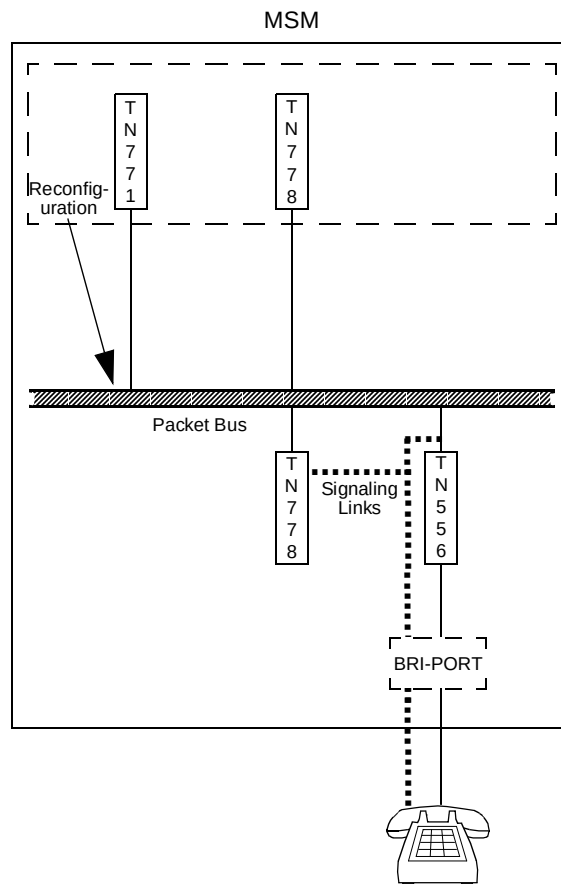


Figure 9-1. ISDN-BRI/Packet Bus Connectivity

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 on page 9-13.
3. 258B Six-Port Male Amphenol Adapter (COMCODE 103 923 025). This adapter is illustrated in Figure 9-3 on page 9-13.
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)

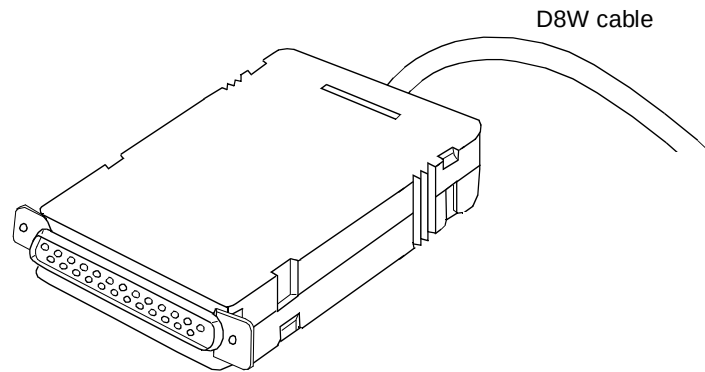


Figure 9-2. 355A EIA-232 Adapter

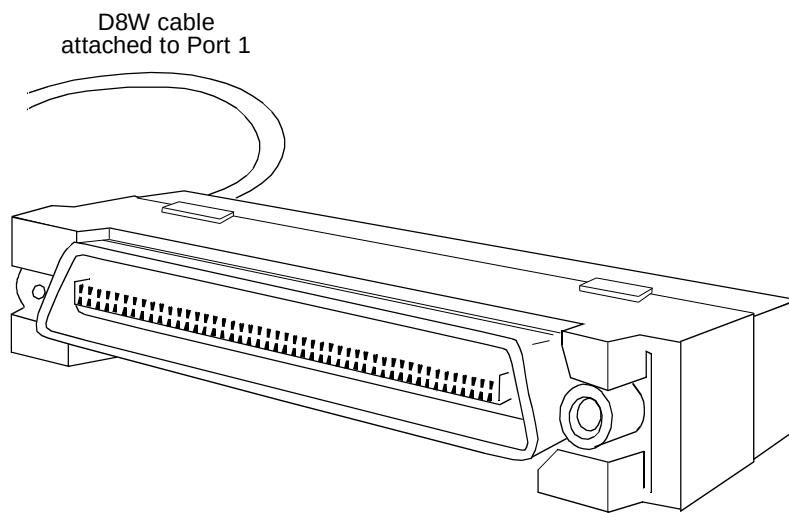


Figure 9-3. 258B Six-Port Male Amphenol Adapter

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:

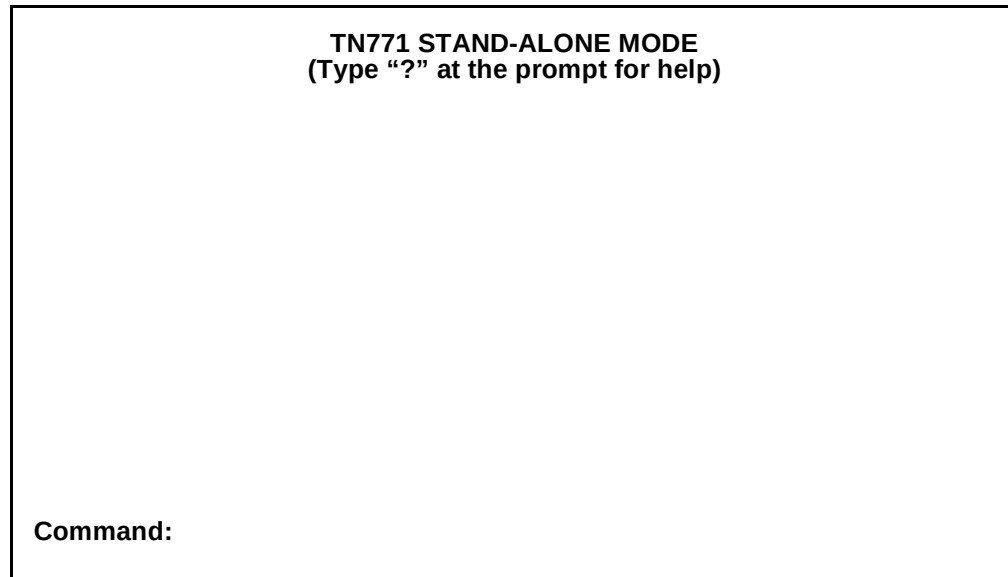


Figure 9-4. Normal Stand-Alone Mode Display



CAUTION:

If the display in Figure 9-4 on page 9-15 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 on page 9-16 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.

L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	H	H	S	S	S	L
P	0	1	2	3	4	5	6	7	8	P	0	1	2	3	4	5	6	7	8	S	F	B	F
S	S																						
Command:																							

Figure 9-5. Example Stand-Alone Mode Display

The information within a stand-alone mode display is used in the Packet Bus Fault Correction procedures that follow. The TN771 circuit pack display indicates the specific leads on the backplane to examine for bent or damaged pins. Figure 9-6 on page 9-18 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.

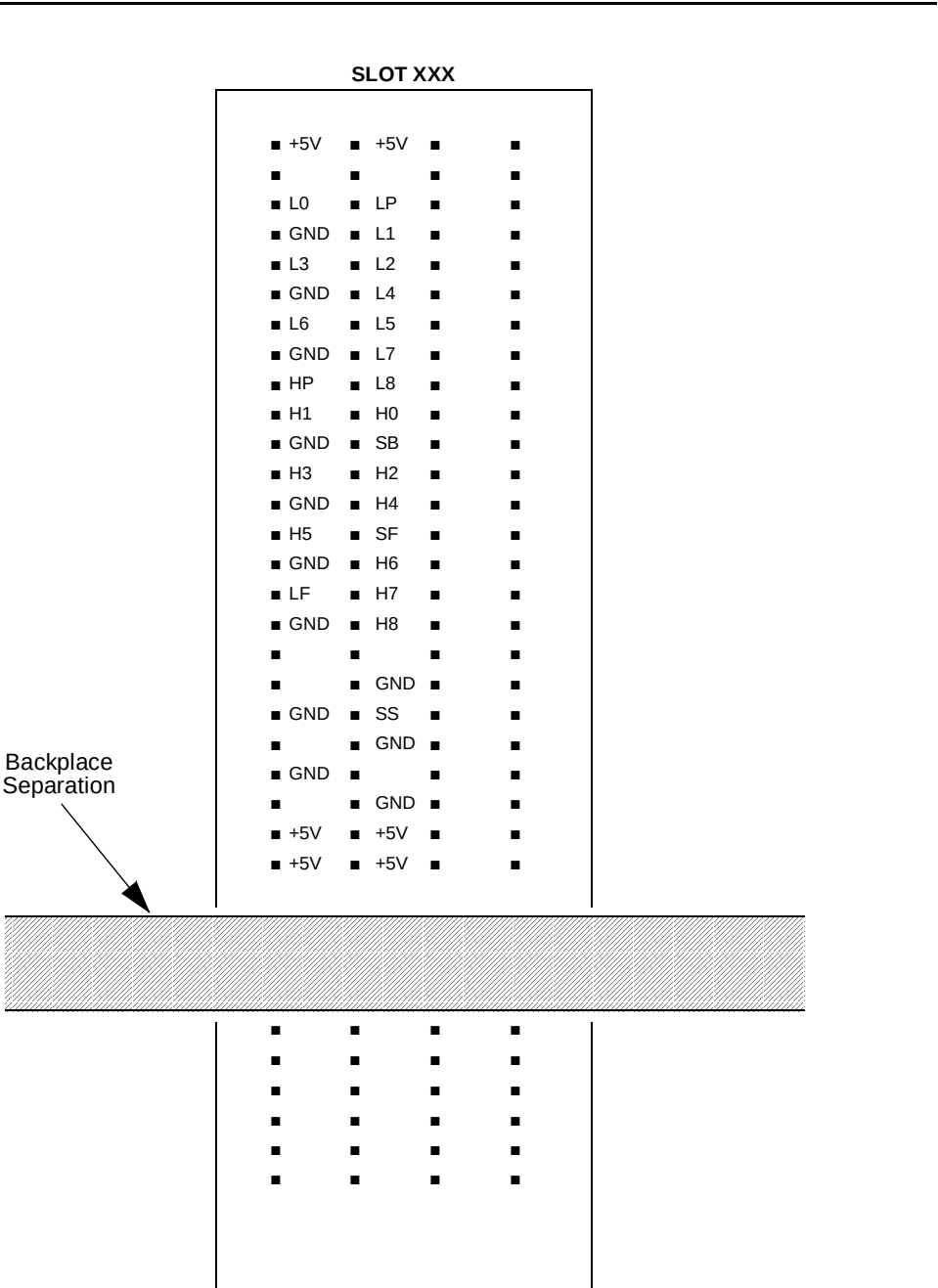


Figure 9-6. Packet Bus Leads on the Backplane—Front View

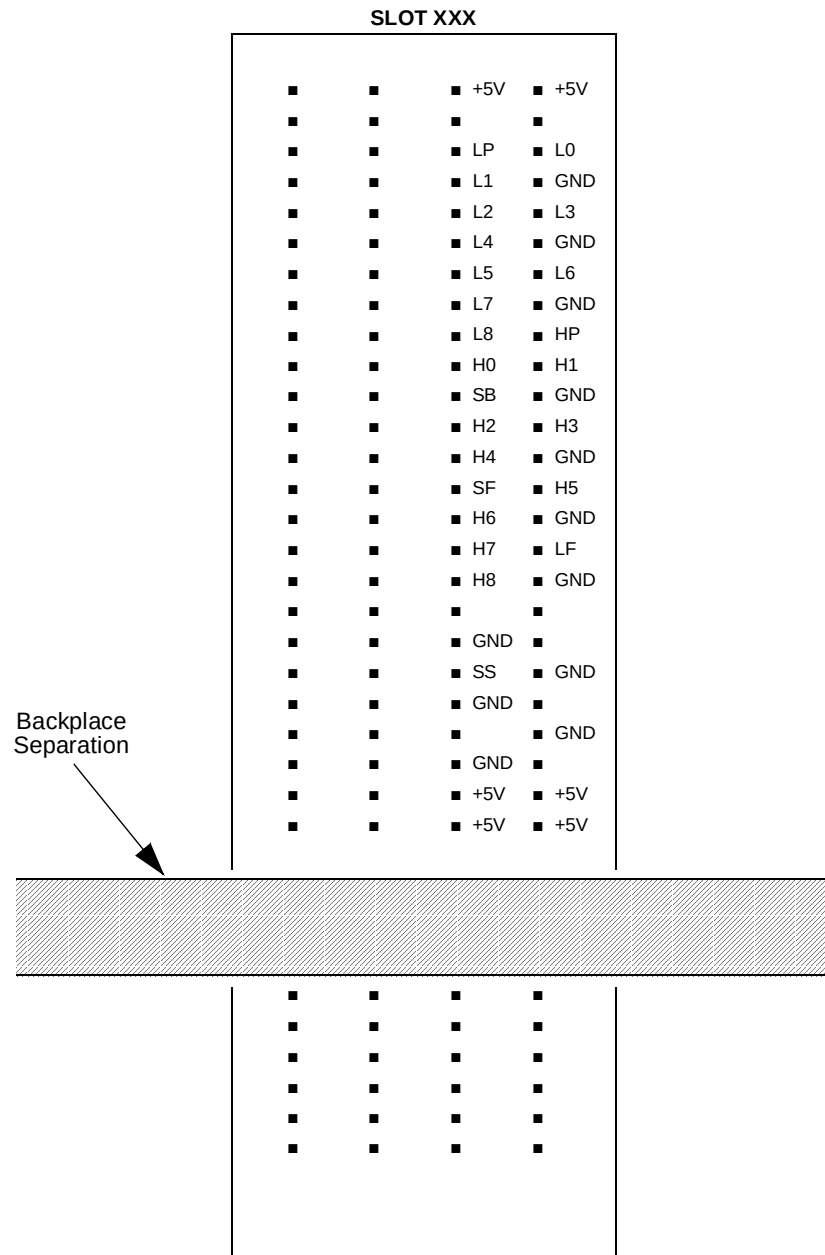


Figure 9-7. Packet Bus Leads on the Backplane—Back View

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, "MCU 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 rectangles and diamonds in the flowchart.

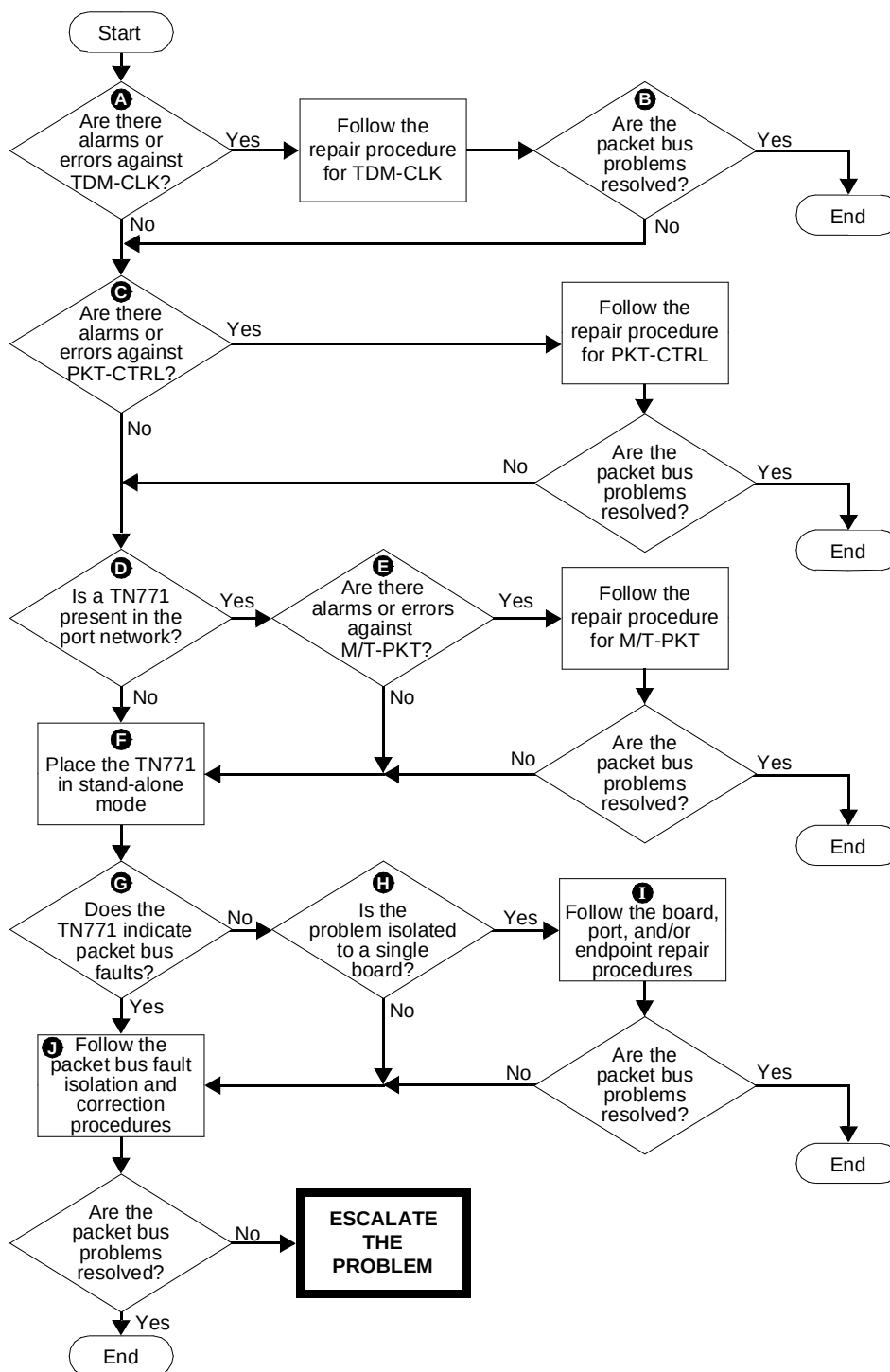


Figure 9-8. Processing of Packet Bus Problems

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 box or diamond in the flowchart.

- a. Problems with the system clock (TDM-CLK) can cause service disruptions on the Packet Bus as well as on the TDM Bus. Therefore, if there are alarms active against TDM-CLK, these alarms should be resolved before any other Packet Bus fault isolation is attempted.

NOTE:

All TDM-CLK problems should be resolved before the process is continued, even if the problems refer only to the TDM Bus. (This is an exception to the previous note.) This is recommended because a Packet Bus problem cannot cause a TDM-CLK problem, while a TDM-CLK problem can cause a Packet Bus problem.

- b. The question "Are the Packet Bus problems resolved?" appears several times on the flowchart. This is a general question that can involve several checks. The basic question is "Are the problems that caused you to use this flowchart resolved?" Some of the more specific questions might be:
 - Are all Packet Bus alarms resolved?
 - Are all Packet circuit pack (port, endpoint) alarms resolved?
 - Are all ISDN-BRI stations/data modules in service?
 - Does the Maintenance/Test Packet Bus port (in normal or stand-alone mode) still indicate a Packet Bus fault?
- c. The Packet Control is checked before the Packet Bus Fault Correction procedures are implemented.
- d. If a TN771 is not present, one must be installed to accommodate the stand-alone mode, which is discussed earlier in this chapter.
- e. If a TN771 is present, it can fail in such a fashion that it eventually disrupts the Packet Bus or misinterprets a Packet Bus problem.

- f. If work is being done on-site, follow the procedures described earlier in this chapter for placing the TN771 into stand-alone mode. If work is not being done on-site, go to the next step.
- g. The answer is "Yes" if the TN771 in stand-alone mode indicates any faulty leads. The answer is also "Yes" if Test #572 in the PKT-BUS test sequence fails, and/or if the **status system** display indicates that faulty leads are present (and the TN771 in the port network is known to be functioning correctly).
- h. If the nonfunctional endpoints are isolated to a single circuit pack, the circuit pack is probably the cause of the problem.
- i. The procedures that must be executed are determined by which maintenance objects on the circuit packs are alarmed. Start with the procedures for the circuit pack errors/alarms, then continue with those for the port. Finally, execute the procedures for the endpoint.
- j. Follow the procedures outlined later in this chapter. If the Packet Bus problem cannot be resolved by executing these procedures, escalate the problem.

Packet Bus Fault Correction

Using and Interpreting Results from the Status System Command

The **status system P** command can be issued to retrieve information about the Packet Bus. This command provides the service state, alarm status, and, if the Maintenance/Test Packet Bus port is activated, the number of faulty and open leads. This information can be used to determine the urgency of the repair. In general, a service state of "out" indicates extreme urgency, while a service state of "reconfig" indicates moderate urgency.



CAUTION:

Ultimately, the urgency of a repair is determined by the customer's requirements. A customer who uses ISDN-BRI for station sets probably considers a Packet Bus failure critical. However, a customer with only a small percentage of ISDN-BRI service may consider even an uncorrectable Packet Bus fault to be of minor importance and may prefer to delay performing repairs, due to their destructive nature.



NOTE:

If maintenance is actively running on the Packet Bus at the time the **status system** command is issued, the data reported for the Packet Bus may be inconsistent. The reason is that this data is updated by the maintenance tests that are running. If the data seems inconsistent, enter the command again.

If test results or the results of the **status system** command indicate that there are 24 faults on the Packet Bus, the problem is probably caused by faulty cables between carriers, or by defective bus terminators. However, before proceeding, make sure that the report is not being falsely given by the Maintenance/Test Packet Bus port. Accordingly, look for an M/T-PKT error in the error log. Then test the Maintenance/Test Packet Bus port by entering the **test port PCSSpp** command. Refer to the "Special Precaution Concerning the TN771" section earlier in this chapter if any problems are suspected.

If the carrier into which a TN771 Maintenance/Test circuit pack is installed does not have a -5 volt power supply, the Maintenance/Test Packet Bus port reports 24 open leads on the Packet Bus (via the **status system** command, and via Test #572 of the PKT-BUS test sequence). No failure of the TN771 is indicated in this case because the TN771 is not defective. Ensure that a -5 volt power supply is available.

Troubleshooting Procedures

As we discussed earlier in this chapter, Packet Bus faults are usually caused by a defective circuit pack connected to the backplane, by bent pins on the backplane, or by defective cables/terminators that make up the Packet Bus. The first two faults cause shorts, while the third fault causes either shorts or opens.

There are four procedures for correcting Packet Bus faults. The number of procedures that are to be used to correct faults depends on a number of factors relevant to system performance and to the content of the procedures themselves. For example, if the Maintenance/Test Packet Bus port is activated, and if there is an indication of open leads on the Packet Bus (either via the **status system** command or via Test #572 failure), **go directly to Procedure 4**. The reason for this is that Procedures 1 through 3 try to locate faulty circuit packs or bent pins behind circuit packs. Since these types of failures can never cause open faults, Procedures 1 through 3 need not be implemented in this case. However, if there are both shorts and opens, execute Procedure 4, then return to Procedure 1 if there are still shorts after the open lead problems are resolved.

CAUTION:

Since Packet Bus fault isolation procedures involve removing circuit packs and possibly disconnecting entire carriers, these procedure have a profound effect on service. Therefore, if possible, implement these procedures after hours or during hours of minimum system use.

NOTE:

Each of these procedures contains one or more steps that require a determination as to whether the Packet Bus problem has been resolved. Accordingly, several condition checks must be performed. We can present each such check in the form of a question, as follows:

- Did the Maintenance/Test circuit pack stand-alone mode initially indicate the existence of faulty leads, and are these leads no longer indicated?
- Have all alarms against the Packet Bus and Packet circuit packs been resolved?



NOTE:

If all alarms are resolved, issue the **clear pkt** command. This command attempts to put the switch back into the service state by resolving any BRI problems that exist.

- Are all ISDN-BRI stations and data modules in service?



NOTE:

If one of these conditions is not yet met, the others need not be checked.

The following sections discuss the four procedures for correcting Packet Bus faults.

Procedure 1

Procedure 1 determines if any circuit packs that use the Packet Bus have faults. For each circuit pack type (see Table 9-1 on page 9-27), 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 on page 9-27. 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 on page 9-30). 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 Bus. In addition, the Maintenance/Test circuit pack (in stand-alone mode) must be connected to the “shortened” bus.

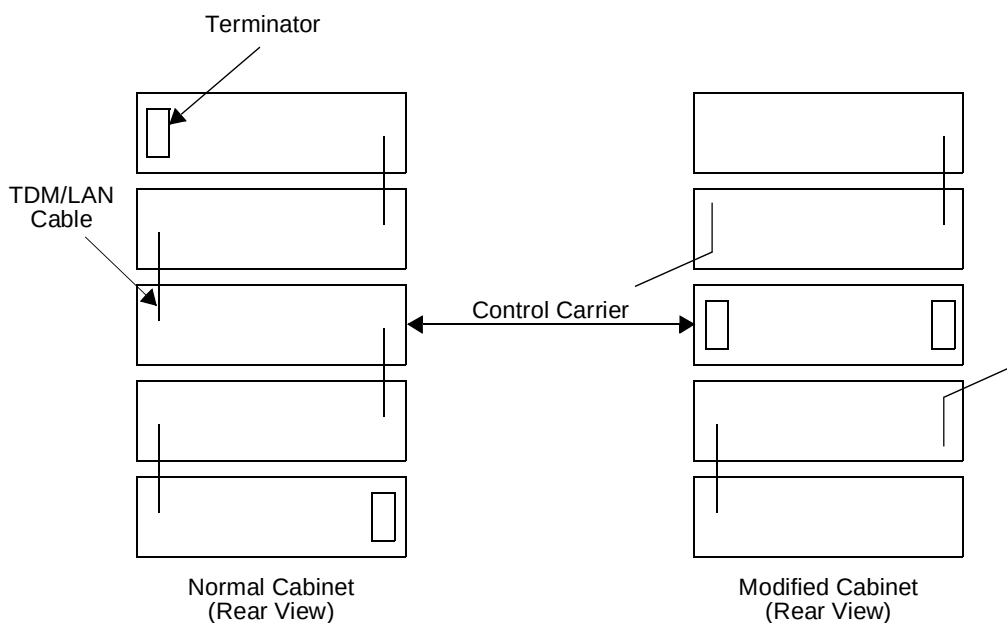


Figure 9-9. Carrier Rewiring Example



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.

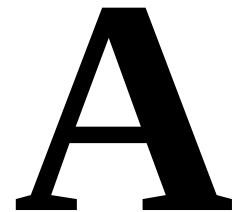
Part 2:

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.)
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.

MCU Commands



Commands

The following section describes the available actions for each object and possible qualifiers.

AAR Analysis

Table A-1. AAR Analysis

change	aar analysis	0-9 x or X (dialed string) part (1-8)
display	aar analysis	0-9 x or X (dialed string) part (1-8) print schedule
list	aar analysis	start dialed string count (1-2000) rp (1-40 or r1-r32) part (1-8) print schedule

AAR Digit Conversion

Table A-2. AAR Digit Conversion

change	aar digit-conversion	0-9 x or X
display	aar digit-conversion	0-9 x or X print schedule
list	aar digit-conversion	start (matching pattern) count (1-300) print schedule

AAR Routing

Table A-3. AAR Routing

list	route-chosen	dialed number partition (1-8) print schedule

ACA Button Location

Table A-4. ACA Button Locations

display	buttons-location-aca	

ACA Measurements

Table A-5. ACA Measurements

list	measurements aca	print schedule

ACA Parameters

Table A-6. ACA Parameters

list	aca-parameters	print schedule

Administered Connection

Table A-7. Administered Connection

add	administered-connection	1-128 next
change	administered-connection	1-128 next
display	administered-connection	1-128 next print schedule
duplicate	administered-connection	number to duplicate
list	administered-connection	1-24 count (1-24) print schedule
release	administered-connection	1-24
remove	administered-connection	1-24 next

Alarms

Table A-8. Alarms

display	alarms	

Alphanumeric Dialing Table

Table A-9. Alphanumeric Dialing Table

change	alphanumeric-dial-table	
display	alphanumeric-dial-table	print

ARS Analysis Table

Table A-10. ARS Analysis Table

change	ars analysis	0-9 x or X (dialed string) part (1-8) min (1-23)
display	ars analysis	0-9 x or X (dialed string) part (1-8) min (1-23) print schedule
list	ars analysis	start (matching pattern) count (1-2000) rp (1-40, r1-r32) part (1-8)) print schedule

ARS Digit Conversion

Table A-11. ARS Digit Conversion

change	ars digit-conversion	0-9 x or X
display	ars digit-conversion	0-9 x or X print schedule
list	ars digit-conversion	start (matching pattern) count (1-300) print schedule

ARS Measurements

Table A-12. ARS Measurements

change	ars-meas-selection	
display	ars-meas-selection	print schedule

ARS Routing

Table A-13. ARS Routing

list	route-chosen	dialed number partition (1-8) print schedule

ARS Toll Table

Table A-14. ARS Toll Table

change	ars toll	n:xyy (1-32:office code)
display	ars toll	n:xyy (1-32:office code) print schedule

Board

Table A-15. Board

busyout	board	xxxxxx
release	board	xxxxxx
reset	board	xxxxxx
test	board	xxxxxx

Board Configuration

Table A-16. Board Configuration

list	configuration board	1Axx (xx=slot) print schedule

Call Detail Recording (CDR)

Table A-17. Call Detail Recording

busyout	CDR-link	
status	CDR-link	print

Carrier Configuration

Table A-18. Carrier Configuration

list	configuration carrier	1A

CBC Trunk Group Measurements

Table A-19. CBC Trunk Group Measurements

list	measurements cbc-trunk-group	last hour print schedule

Circuit Packs

Table A-20. Circuit Packs

change	circuit-packs	1 print schedule
display	circuit-packs	1 print schedule

Class of Restriction

Table A-21. Class of Restriction

change	cor	0-63
display	cor	0-63 print schedule

Class of Service

Table A-22. Class of Service

change	cos	
display	cos	print schedule

Communication Interface

Table A-23. Communication Interface

change	communication-interface	links processor channels
display	communication-interface	links processor channels print schedule
status	interface link processor channel	1Ax (x=1-2) A1/A2/B1/B2 1-8 [print] 1-64 (processor channel)

Communications Link Measurements

Table A-24. Communications Link Measurements

list	measurements communications-link	print schedule

Conference

Table A-25. Conference

add	conference	1-200 (Conference ID) next
display	conference	1-200 (Conference ID)
list	conference	1-200 (Conference ID)
monitor	conference	1-200 (Conference ID)
remove	conference	1-200 (Conference ID)
status	conference	1-200 (Conference ID) all print schedule

Configuration All

Table A-26. Configuration All

list	configuration all	print schedule

Control Configuration

Table A-27. Control Configuration

list	configuration control	print schedule
list	configuration board	print schedule
list	configuration carrier	print schedule
list	configuration port-network	print schedule
list	configuration software version	print schedule
list	configuration stations	print schedule
list	configuration trunks	print schedule

Data Modules

Table A-28. Data Modules

add	data-module	xxxx next
busyout	data-module	xxxx
change	data-module	xxxx
display	data-module	xxxx print schedule
duplicate	data-module	extension to duplicate
list	data-module groups-of-extension	xxxx (starting extension) count (1-24) print schedule xxxx print schedule
remove	data-module	xxxx
status	data-module	xxxx print

Dial Plan Record

Table A-29. Dial Plan Record

change	dialplan	
display	dialplan	print schedule

Digit Absorption

Table A-30. Digit Absorption

change	digit-absorption	0-4
display	digit-absorption	0-4 print schedule

DS1 Circuit Pack

Table A-31. DS1 Circuit Packs

add	ds1	1Axx (xx=slot number) print schedule
change	ds1	1Axx (xx=slot number) print schedule
display	ds1	1Axx (xx=slot number) print schedule
list	measurements ds1	location print schedule
list	measurements ds1 log	location print schedule
remove	ds1	1Axx (xx=slot number)

Endpoints

Table A-32. Endpoints

status	conference endpoint	1-200 (Conference ID) 1-48 (Endpoint ID)

Errors

Table A-33. Errors

display	errors	

Feature Access Codes

Table A-34. Feature Access Codes

change	feature-access-codes	
display	feature-access-codes	print schedule

History

Table A-35. History

list	history	print schedule

Hunt Groups

Table A-36. Hunt Group

add	hunt-group	1-12 next
change	hunt-group	1-12
display	hunt-group	1-12 print schedule
list	hunt-group	print schedule
remove	hunt-group	1-12

Hunt Group Measurements

Table A-37. Hunt Group Measurements

list	measurements hunt-group	options print schedule

Hunt Group Performance

Table A-38. Hunt Group Performance

list	performance hunt-group	options print schedule

Hunt Group Traffic

Table A-39. Hunt Group Traffic

monitor	traffic hunt-groups	option

ISDN-BRI Facilities

Table A-40. ISDN-BRI Facilities

status	bri-port	xxxxxx

ISDN-PRI Network Facilities

Table A-41. Network Facilities

change	isdn network-facilities	
display	isdn network-facilities	print schedule

Maintenance Object (MO)

Table A-42. Maintenance Object (MO)

release	MO	all
status	MO	

Meet-Me Number Administration

Table A-43. Meet-Me Number Administration

add	mcu-extension	xxxxx next
change	mcu-extension	xxxxx
display	mcu-extension	xxxxx print schedule
list	mcu-extension	xxxxx count (1-200) print schedule
remove	mcu-extension	xxxxx

Memory Card

Table A-44. Memory Card

status	card-mem	

Occupancy Busiest-Interval Measurements

Table A-45. Occupancy Busiest-Interval Measurements

list	measurements occupancy busiest-interval	print schedule

Occupancy Last-Hour Measurements

Table A-46. Occupancy Last-Hour Measurements

list	measurements occupancy last-hour	print schedule

Occupancy Measurements

Table A-47. Occupancy Measurements

clear	measurements occupancy	

Occupancy Summary Measurements

Table A-48. Occupancy Summary Measurements

list	measurements occupancy busiest-interval	

Packet Bus

Table A-49. Packet Bus

?		
clear	pkt	xx
ds		
dsa		
status	packet-control	xx
test	PACCON	xx
test	pkt	xx

Performance Summary

Table A-50. Performance Summary

list	performance summary	options print schedule

Port Network Configuration

Table A-51. Port Network Configuration

list	configuration port-network	1

Ports

Table A-52. Ports

busyout	port	xx
display	port	assigned port print schedule
recycle	port	xx
status	bri-port	xx print
test	port	xx

Report Scheduler

Table A-53. Report Scheduler

change	report scheduler	1-50 (job ID number)
list	report scheduler	print schedule
remove	report scheduler	1-50 (job ID number)

Security Violations

Table A-54. Security Violations Measurements

clear	measurements security-violations	
display	svn-button location	print
list	measurements security-violations	print schedule
monitor	security-violations	print

Signaling Group

Table A-55. Signaling Group

add	signaling-group	1-8 next
change	signaling-group	1-8
display	signaling-group	1-8 print schedule
get	signaling-group	1-8
list	signaling-group	1-8 count print schedule
remove	signaling-group	1-8

Software Versions Configuration

Table A-56. Software Versions Configuration

list	configuration software-versions	memory-resident print schedule

Stations

Table A-57. Stations

add	station	xxxxx next
busyout	station	xxxxx
change	station	xxxxx
display	station	xxxxx 1-8 print schedule
duplicate	station	xxxx (start extension, board location or x, count)
list	configuration stations	print schedule
list	extension-type	xxxxx count (1-500) print schedule
list	station	xxxxx count (1-8) 1Axyyy (xx=slot, yy=circuit)
release	station	xxxxx
remove	station	xxxxx
status	station	xxxxx print
test	station	extension

Synchronization Plan

Table A-58. Synchronization Plan

change	synchronization	
display	synchronization	print schedule
get	synchronization	
status	synchronization	print

System Parameters

Table A-59. System Parameters

change	system-parameters features	
display	system-parameters features	print schedule

System

Table A-60. System

status	system	
status	health	

System View

Table A-61. System View

monitor	system view	1 2

TDM Usage Measurements

Table A-62. TDM Usage Measurements

list	measurements tdm-usage	options print schedule

Time

Table A-63. Time

display	time	print
get	time	
set	time	

Toll Analysis

Table A-64. Toll Analysis

change	toll	0-9 x or X min (1-23)
display	toll	0-9 x or X min (1-23) print schedule
list	toll all	start (dialed string) count (1-1000) print schedule
list	toll toll-list	start (dialed string) count (1-1000) print schedule
list	toll restricted-call	start (dialed string) count (1-1000) print schedule
list	toll unrestricted-call	start (dialed string) count (1-1000) print schedule enter (1-10)

Tone Receiver Measurements

Table A-65. Tone Receiver Measurements

list	measurements tone-receiver	options print schedule

Trunks

Table A-66. Trunks

busyout	trunk	1-16/1-99 (group/member)
list	configuration trunks	print schedule
status	trunk	1-16/1-99 (group/member)

Trunk Group Measurements

Table A-67. Trunk Group Measurements

list	measurements trunk-group	option print schedule

Trunk Group Performance

Table A-68. Trunk Group Performance

list	performance trunk-group	option print schedule

Trunk Group Traffic

Table A-69. Trunk Group Traffic

monitor	traffic trunk-groups	option

Trunk Lightly Used Measurements

Table A-70. Trunk Lightly Used Measurements

list	measurements lightly-used-trunk	option print schedule

Trunk Outage Measurements

Table A-71. Trunk Outage Measurements

list	measurements outage-trunk	option print schedule

Video Processors

Table A-72. Video Processors

change	video-processors	print schedule
display	video-processors	print schedule

Wideband

Table A-73. Wideband

busyout	access-endpoint	xxxxx
release	access-endpoint	xxxxx
status	access-endpoint	xxxxx
test	access-endpoint	xxxxx

Glossary

A

active

A reserved conference status when the conference is scheduled to begin but no conferees have joined. A dedicated conference status is active at all times.

Advanced mode

A feature of the MCU that offers presentation and broadcast with auto-scan conference modes.

Application Compliant flag

A per-user flag in the Conference Record that indicates which endpoints use non-compliant applications.

AT&T Conference Reservation 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.

AT&T MultiPoint Control Unit

Equipment that provides high-quality multimedia conferencing with video endpoints that communicate via the ITU-T Px64 standards.

AT&T Video Technical Center

A video technical support group that is available to help with questions about the AT&T MCU.

Audio Add-On

Feature that allows the MCU to support up to six non-Px64 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 mode

A feature of the MCU that offers voice-activated conference mode.

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 128k, 192k, 256k, 320k, 384k, 768k, 1472k, 1536k, and 1920k, or BONDing bandwidths of 112/128k, 168/192k, 224/256k, 280/320k, and 336/384k.

Bandwidth on Demand

Feature that allows the AT&T MCU to establish conferences at bandwidths greater than 128k without the use of ISDN-PRI and Wideband H0 channels.

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.

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.

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, or 336/384k.

broadcaster

A video endpoint is considered the broadcaster when it sends the same video, audio and data signal to two or more locations.

Broadcast/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.

Browse

A Universal Conference Control subfeature that allows the broadcaster to scan endpoints in the conference without specifying an endpoint number for each scanned endpoint. With this feature, only the broadcaster sees a change in video caused by the scan.

Business Card

A feature that allows the MCU to collect business card-type information from conference participants and to then send this information to other endpoints upon request. "Business card" information might include (but is not limited to) the following: name, title, company, address, email address, telephone number, and fax number.

C

cascading

Connecting two or more AT&T MCUs via a Px64 communications link. This feature allows endpoints connected on different MCUs to participate in the same conference.

Chair control mode

A conference mode where one site controls which endpoints are added and/or dropped during a conference.

CIF

Common Intermediate Format (also known as FCIF or Full CIF). An industry-standard means for encoding video signals for high-quality pictures. QCIF MPI specifies a picture interval numbers.

class

A Conference Record has one of three classes: reserved, dedicated, or file.

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).

convener

The person who schedules a conference and is responsible for distributing the Meet-Me numbers.

CRS

See AT&T Conference Reservation System.

D

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-sigaled 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 Px64 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.

Disconnect Notification

This feature allows an endpoint or an MCU to send notification that it intends to disconnect from the conference. This notification is sent before the conference is actually torn down.

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

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.

Endpoint Notification of Time Left

A feature that enables the WorldWorx PCS Meeting Reservation and Control System (MRCS) to instruct the MCU to play a conference termination warning tone. The tone played is the same tone that the MCU plays for the "10-minute warning" for "reserved" conferences.

entry tone

A tone that alerts conferees already on a conference that another conferee has joined in the conference.

exit tone

A tone that alerts conferees on a conference that a conferee has left the conference.

F

far-end

When troubleshooting problems on the MCU, the video endpoint is often referred to as being on the far-end of the connection.

FCIF

See CIF.

file

A conference class that saves a copy of a Conference Record for future use.

G

G.711 Audio

See PCM.

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.

H

H0

A one-channel 384k bandwidth call.

H.320

The multipoint conferencing standard adopted by the ITU-T (also known as Px64). 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-series

See H.320.

handshake

An expression relating to the establishment of communications between the MCU and a video endpoint.

I

Inactive

A conference status when a conference is reserved but has not begun and when a conference has a class of file.

In-use

A conference status when a reserved conference has begun and at least one conferee has joined the conference.

ITU-T

An international group known as International Telecommunications Union-Telecommunications established in 1993 to develop standards to allow video endpoints to communicate with each other.

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.

login

A keyword assigned to a user to access the MCU.

login password

A codeword 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 Px64 ports. Multiple Px64 ports in a conference can implement this feature simultaneously.

M

Management Terminal

A 715 BCT used primarily for administration and maintenance functions.

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.

MCS/MLP

A multipoint data conferencing feature based on the H.221 MLP feature that enables data collaboration capabilities within a conference.

MCU

See AT&T MultiPoint Control 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-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.

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.

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.

notification tones

The entry, exit, and warning tones available with some of the MCU models.

P

paper-based scheduling system

A method of recording and tracking conference reservations to prevent overbooking of the MCU.

Per-conference password

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.

PC-based scheduling

A scheduling method that uses the AT&T Conference Reservation System to accept reservations and qualify video endpoints to participate in a multipoint video conference.

PCM (G.711)

Pulse Code Modulation. A means of encoding audio by assigning less bandwidth to video.

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.

Port and Extension Usage Chart

A chart that is used to record the number of MCU ports and MCU-extensions reserved for a particular day.

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 whom is speaking. Any conferee can be a speaker. The video endpoint that is the presenter views endpoints determined by voice-activated switching.

protocol

A set of international industry-standard rules governing the exchange of data between two entities.

Px64

Also known as H-series. The standards adopted by the ITU-T committee that allow video endpoints that comply with the standards to communicate with each other.

Q

QCIF

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 AT&T MCU to interwork endpoints operating with 2B-channels that are on both 56k and 64k networks.

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.

reserved

A conference class that indicates a conference will begin and end within the next 24 hours.

reservations agent

The person responsible for accepting multipoint conference reservations, making reservations on the MCU-ST or CRS and resolving minor problems.

Rollcall

A Universal Conference Control subfeature that allows the broadcaster to scan endpoints in the conference without specifying an endpoint number for each scanned endpoint. With this feature, 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.

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.

site profile

A list of video endpoints that may participate in multipoint video conferences and their location, time zone, bandwidth, and network type.

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.

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

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.

tones

See Notification Tones.

U

Universal Conference Control

Customer option that enables an endpoint to manage a 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 is a regular touch-tone 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.

User Identification Number

A unique number that is assigned to each user who registers for service. The UIN contains 14 digits, and it is queried and validated by the MCU concurrently with the password.

V

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.

VTC

See AT&T Video Technical Center.

Voice-activated

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.

W

warning tone

A tone that sounds when only 10 minutes remain in a conference.

WorldWorx Data Compliance

A feature that allows the MCU to block automatically endpoints from affecting a data conference. This feature requires the endpoints to announce in the ns-cap that they are compliant to the WorldWorx MCS/MLP specification. For a conference that has the data mode set to "WorldWorx-PCS," the MCU allows only endpoints that have announced the capability to join the data portion of the conference. For endpoints that do not announce this capability, the MCU opens an MCS/MLP channel to these endpoints, but it neither sends data to nor receives data from them.

WorldWorx Service Indicator

A feature that allows endpoints to receive a special look and feel. This capability is provided by the endpoint, and it is driven by the MCU. The MCU drives this capability by sending a BAS ns-cap to the endpoint indicating that the service is provided by the WorldWorx PCS (that is, the WorldWorx model is selected).

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