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**Meridian 1**

**Succession 1000M**

Succession 3.0 Software

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# Large System Maintenance

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## Revision history

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### October 2003

Standard 1.00. This document is a new NTP for Succession 3.0. It was created to support a restructuring of the Documentation Library, which resulted in the merging of multiple legacy NTPs. This new document consolidates information previously contained in the following legacy documents, now retired:

- General Maintenance (553-3001-500)
- Fault Clearing (553-3001-510)
- Hardware Replacement (553-3001-520)



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## About this document

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This document is a global document. Contact your system supplier or your Nortel Networks representative to verify that the hardware and software described are supported in your area.

### Subject

This document describes maintenance for Meridian 1 and Succession 1000M systems.

#### **Note on legacy products and releases**

This NTP contains information about systems, components, and features that are compatible with Succession 3.0 Software. For more information on legacy products and releases, click the **Technical Documentation** link under **Support** on the Nortel Networks home page:

<http://www.nortelnetworks.com/>

### Applicable systems

This document applies to the following systems:

- Meridian 1 Option 51C
- Meridian 1 Option 61
- Meridian 1 Option 61C
- Meridian 1 Option 61C CP PII
- Meridian 1 Option 81
- Meridian 1 Option 81C

- Meridian 1 Option 81C CP PII
- Succession 1000M Half Group
- Succession 1000M Single Group
- Succession 1000M Multi Group

Note that memory upgrades may be required to run Succession 3.0 Software on CP3 or CP4 systems (Options 51C, 61, 61C, 81, 81C).

### System migration

When particular Meridian 1 systems are upgraded to run Succession 3.0 Software and configured to include a Succession Signaling Server, they become Succession 1000M systems. Table 1 lists each Meridian 1 Large System that supports an upgrade path to a Succession 1000M Large System.

**Table 1**  
**Meridian 1 systems to Succession 1000M systems**

This Meridian 1 system...	Maps to this Succession 1000M system
Meridian 1 Option 51C	Succession 1000M Half Group
Meridian 1 Option 61	Succession 1000M Single Group
Meridian 1 Option 61C	Succession 1000M Single Group
Meridian 1 Option 61C CP PII	Succession 1000M Single Group
Meridian 1 Option 81	Succession 1000M Multi Group
Meridian 1 Option 81C	Succession 1000M Multi Group
Meridian 1 Option 81C CP PII	Succession 1000M Multi Group

For more information, see *Large System: Upgrade Procedures* (553-3021-258).

## Intended audience

This document is intended for individuals responsible for maintaining Large Systems.

## Conventions

### Terminology

In this document, the following systems are referred to generically as “system”:

- Meridian 1
- Succession 1000M

The following systems are referred to generically as “Large System”:

- Meridian 1 Option 51C
- Meridian 1 Option 61
- Meridian 1 Option 61C
- Meridian 1 Option 61C CP PII
- Meridian 1 Option 81
- Meridian 1 Option 81C
- Meridian 1 Option 81C CP PII
- Succession 1000M Half Group
- Succession 1000M Single Group
- Succession 1000M Multi Group

## Related information

This section lists information sources that relate to this document.

### NTPs

The following NTPs are referenced in this document:

- *Library Navigator* (553-3001-000)
- *Equipment Identification* (553-3001-154)
- *Circuit Card: Description and Installation* (553-3001-211)
- *System Management* (553-3001-300)
- *Features and Services* (553-3001-306)
- *Software Input/Output: Administration* (553-3001-311)
- *Telephones and Consoles* (553-3001-367)
- *ISDN Primary Rate Interface: Description* (553-3001-369)
- *Software Input/Output: System Messages* (553-3001-411)
- *Software Input/Output: Maintenance* (553-3001-511)
- *ISDN Primary Rate Interface: Maintenance* (553-3001-517)
- *Large System: System Overview* (553-3021-010)
- *Large System: Planning and Engineering* (553-3021-120)
- *Large System: Installation and Configuration* (553-3021-210)
- *Large System: Maintenance* (553-3021-500)

### Online

To access Nortel Networks documentation online, click the **Technical Documentation** link under **Support** on the Nortel Networks home page:

<http://www.nortelnetworks.com/>

## **CD-ROM**

To obtain Nortel Networks documentation on CD-ROM, contact your Nortel Networks customer representative.





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# Communicating with the system

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## Contents

This section contains information on the following topics:

<a href="#">Overview</a> .....	17
<a href="#">System terminal</a> .....	17
<a href="#">Maintenance telephone</a> .....	24

## Overview

You can exchange information through system terminals and maintenance telephones. When you replace equipment, you often send commands to the system software in order to disable faulty equipment and to enable and test newly installed equipment.

The Multi User Login feature allows more than one device to interact with the system. Refer to *System Management* (553-3001-300) for details on using this feature.

## System terminal

You can send maintenance commands and receive system messages (status and error messages) by accessing the Central Processing Unit (CPU) through an RS-232 device, such as a video display terminal (VDT) or teletypewriter (TTY).

For most systems, only the code is displayed or printed when the CPU sends system messages. For the interpretation of the code and any required action,

refer to *Software Input/Output: System Messages* (553-3001-411). Systems provide the code, a plain text explanation, and required actions.

Enhanced I/O buffering (independent throughout) is provided. With this capability, devices with higher baud rates run faster than devices that are limited to slower speeds.

## Access through the system terminal

When you access the system through a system terminal, a login procedure is required (see Procedure 1 on [page 18](#)). All system passwords are initially set as 0000, but you can change passwords in the Configuration Record (LD 17).

**Note:** If a sysload occurs before you save a new password in a data dump, the last active password remains valid.

Each system has two levels of passwords: level 1 is for general use, level 2 is for administrative use. Either password is accepted in the login procedure.

### Procedure 1

#### Access through the system terminal

- 1 Press the return key.
  - a) If the response is a period (.), you are ready to log into the system.
  - b) If the response is  
**OVL111 nn TTY x** or **OVL111 nn SL1**  
someone else is logged into the system. When they have logged off, press return and go to step 2 on [page 19](#).
  - c) If the response is  
**OVL111 nn IDLE** or **OVL111 nn BKGD**  
you are ready to log into the system. Go to step 2 on [page 19](#).
  - d) If the response is  
**OVL000 >**  
you are already logged into the system. Go to step 5 on [page 19](#).

**Note:** Responses vary with different Background Terminal packages.

- 2 Log into the system by entering  
**LOGI**  
then press the return key.
- 3 The normal response is  
**PASS?**  
If there is any other response, see *Software Input/Output: Administration* (553-3001-311).
- 4 Enter either the level 1 or level 2 password and press the return key.  
If the password is correct, the system responds with the prompt **>**.
- 5 Load a program by entering  
**LD xx** “xx” represents the number of the program
- 6 Perform tasks.
- 7 End the program by entering  
**END** or **\*\*\*\***
- 8 Always end the login session with  
**LOGO**  
Background routines are then loaded automatically.

## Local and remote access

A terminal or a modem must remain permanently connected to an SDI port in a network slot to provide a constant I/O interface to the system. Although only one device can communicate with the system at a time, many devices can be installed at local and remote locations.

When a system terminal is installed locally, it is connected directly to a serial data interface (SDI) card, located within a module. When a system terminal

is installed at a remote location, modems (or data sets) and a telephone line are required between the terminal and the SDI card.

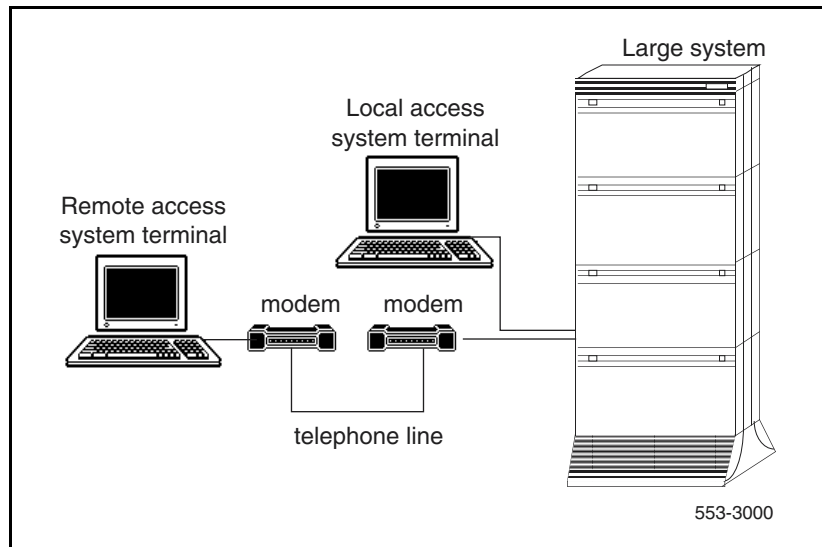
**CAUTION**

If a Hayes command-set compatible (smart) modem is used at the system end, you *must* select the dumb mode of operation, Command Recognition OFF and Command Echo OFF, before connecting the modem to the SDI port. Refer to the modem instructions to set the mode of operation.

If a printer is connected to an SDI port (locally or remotely), you must disable XON/XOFF flow control so that no characters or signals are sent to the port, to avoid a “ping-pong” effect.

Figure 1 shows typical system terminal configurations. See “Procedure 1 on [page 18](#)” for the access procedure.

**Figure 1**  
**Local and remote access to a system terminal**



See “Large system terminal and modem guidelines” on [page 21](#) for further information.

## Large system terminal and modem guidelines

Each Call Processor Card provides a data terminal equipment (DTE) port at J21 and a data communication equipment (DCE) port at J25 on the Core and Core/Network Module I/O panel. The designations DTE and DCE refer to the function of the port, not the type of device that connects to the port. Therefore, a modem (which is DCE) connects to the DTE port at J21, and a terminal (which is DTE) connects to the DCE port at J25.

The input/output ports on the CP card (CPSI ports) are used for access to the Core or Core/Network Module, which houses the card. The CPSI ports are active only when the Core associated with the CP card is active. Therefore, the CPSI ports should not be used as the only I/O connection for the system.

**Note:** For correct operation, terminals used with large systems must be set to 9600 baud, 7 data, space parity, one stop bit, full duplex, XON.

Figure 2 shows the recommended configuration for remote maintenance monitoring the system. In this configuration, a switch box is normally set to the SDI port to remotely monitor general system operation. The CPSI ports can be accessed for debugging and patch downloading (through your Nortel Networks representative).

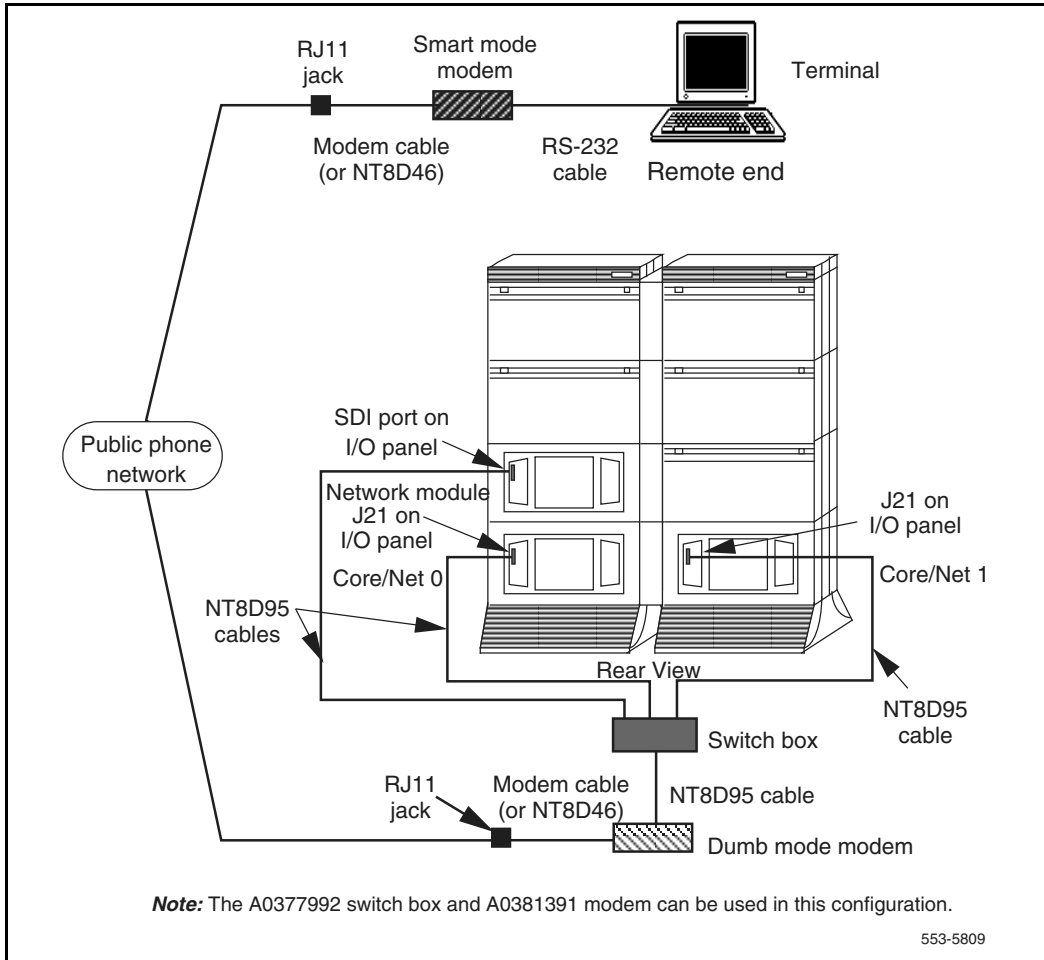
See “Large system terminal and modem connections” in *Large System: Installation and Configuration* (553-3021-210) for detailed information on configuring and connecting terminals and modems with large systems.

**Note:** The A0377992 Black Box ABCDE-Switch, A0381391 UDS FastTalk modem, and cables required for the configuration are available through Nortel Networks.

Modems must meet the following required specifications to be compatible with the system. Modems that meet the following recommended specifications must also meet the required specifications.

- *Required:* true, not buffered, 9600 baud support (required for remote Nortel Networks technical support)

**Figure 2**  
**Modem to a switch box and SDI and CPSI ports**



- *Required:* CCITT V.32 or V.32bis compliance
- *Recommended:* the ability to adjust to lower and higher speeds, depending on line quality, while maintaining 9600 baud at local DTE
- *Recommended:* V.42 error correction
- *Recommended:* V.42bis data compression

The following models have been tested and verified as compatible with the system:

- Hayes V-series ULTRA Smartmodem 9600
- Motorola 28.8 Data/Fax modem
- UDS FastTalk V.32/42b (available through Nortel Networks)
- US Robotics Courier HST Dual Standard V.32bis

A dispatch or call back modem, normally connected to the SDI port, can be used if it meets the requirements listed above. If you want to use a modem of this type that does not meet the requirements, the modem can only be used in addition to a modem that does meet specifications.

## Message format

Through the system terminal, you can enter commands that tell the system to perform specific tasks; the system performs the tasks and sends messages back to the system terminal, indicating status or errors. System messages, along with indicators such as maintenance display codes and light emitting diode (LED) indicators, identify faults in the system.

System messages are codes with a mnemonic and number, such as PWR0014. The mnemonic identifies an overlay program or a type of message. The number identifies the specific message. Table 2 gives an example of the format for a system message.

**Table 2**  
**System message format**

<b>System message: PWR0014</b>	<b>Interpretation</b>
PWR	This message (generated by the system monitor) indicates power and temperature status or failures.
0014	This message means the system monitor failed a self-test.

System messages generated from the Core Common Equipment Diagnostic (LD 135) and the Core Input/Output Diagnostic (LD 137) include the interpretation and any action required. For example, if a CPU test from LD 135 fails, the message displayed is “CCED200 CPU test failed Check the CP card.”

See *Software Input/Output: Administration* (553-3001-311) for a description of all maintenance commands, and *Software Input/Output: System Messages* (553-3001-411) for the interpretation of all system messages.

## Maintenance telephone

A telephone functions as a maintenance telephone when you define the class of service as maintenance set allowed (MTA) in the Multi-line Telephone Administration program (LD 11). A maintenance telephone allows you to send commands to the system through the following maintenance overlays: LD 30, LD 32, LD 33, LD 34, LD 35, LD 36, LD 37, LD 38, LD 41, LD 42, LD 43, LD 45, LD 46, LD 60, LD 61, and LD 62.

**Note:** The Core Common Equipment Diagnostic (LD 135) and Core I/O Diagnostic (LD 137) are among the overlays that cannot be accessed through a maintenance telephone.

You can test tones and outpulsing through the maintenance telephone. Specific commands for tone testing are given in the Tone and Digit Switch and Digitone Receiver Diagnostic (LD 34).

To enter commands on a maintenance telephone, you press the keys that correspond to the letters and numbers of the command (for example, to enter *LD 42 return*, key in *53#42##*). Table 3 shows the translation from a terminal keyboard to a telephone dial pad.



See “Access through the maintenance telephone” on [page 26](#) for the access procedure.

**Table 3**  
**Translation from keyboard to dial pad**

Keyboard				Dial pad
			1	1
A	B	C	2	2
D	E	F	3	3
G	H	I	4	4
J	K	L	5	5
M	N	O	6	6
P	R	S	7	7
T	U	V	8	8
W	X	Y	9	9
			0	0
			Space or #	#
			Return	##
			*	*
<b>Note:</b> There is no equivalent for Q or Z on a dial pad.				

## **Procedure 2**

### **Access through the maintenance telephone**

- 1**    Press the prime DN key.
- 2**    Place the set in maintenance mode by entering  
         **xxxx91**        "xxxx" is the customer Special Prefix (SPRE)  
                                 number. It is defined in the Customer Data Block and  
                                 can be printed using LD 21. The SPRE number is  
                                 typically "1" (which means you would enter 191).
- 3**    Check for busy tone by entering "return"  
         **##**
  - a)**    If there is no busy tone, go to step 5 on [page 19](#).
  - b)**    If there is a busy tone, a program is active. To end an active  
         program and access the system enter
- \*\*\*\***
- 4**    Load a program by entering  
         **53#xx##**        "xx" represents the number of the program
- 5**    Perform tasks.
- 6**    Enter \*\*\*\* to exit the program and return the telephone to call processing  
         mode. Background routines are then loaded automatically.

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# How to clear faults

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## Contents

This section contains information on the following topics:

<a href="#">Fault clearing process . . . . .</a>	<a href="#">27</a>
<a href="#">Using this document . . . . .</a>	<a href="#">28</a>
<a href="#">Fault indicators . . . . .</a>	<a href="#">29</a>

## Fault clearing process

Faults clearing can be necessary through installation, maintenance and normal operation processes. When a fault must be cleared in the system, follow these steps:

- Observe and record all fault indicators. All cleared faults should be manually logged in a maintenance journal (file) for accountability and future reference purposes
- System messages, visual fault indicators, maintenance display codes, and user reports identify many problems. If the indicators are not current or seem incomplete, you may need to print the History File for previous messages, you may need to initialize the system for information on the current status, or you may need to do both.

- Look up all maintenance display codes and system messages in the *Software Input/Output: System Messages* (553-3001-411). The interpretation of the message or code may identify faulty equipment and tell you what action to take to clear the problem. If you cannot clear the fault through information in either of these guides, follow the process in this document to isolate and clear the fault (see “Using this document” on [page 28](#)).
- Try to test and enable disabled equipment.
- You may be able to hardware re-enable circuit cards by unseating them, then reinstalling them. You may be able to software re-enable cards by disabling them, then re-enabling them. When the cause of a fault is not clearly evident, a software test may help you identify the problem.
- Replace equipment as necessary.

When you identify faulty equipment, follow procedures in this document. When you think the fault is corrected, follow the instructions in “Final maintenance procedure” on [page 147](#) to completely restore normal operation.

## Using this document

To use the information in this document, follow the steps below:

- 1 Classify the fault by the indicators present (see “Fault indicators” on [page 29](#)). When multiple faults are indicated, clear them in the following order:
  - Power faults, [page 37](#)
  - Common equipment faults, [page 59](#)
  - Network equipment faults, [page 71](#)
  - Peripheral equipment faults, [page 97](#)
  - Trunk faults, [page 111](#)
  - Attendant console faults, [page 119](#)
  - Telephone faults, [page 129](#)

**Note:** Always clear possible power faults then common equipment faults before any other type of fault.

- 2 Go to the chapter for clearing the type of fault identified. There is a chapter for each type of fault listed above (for example, “Clearing power faults” on [page 37](#)). As closely as possible, match the problem to a symptom listed at the beginning of the chapter.
- 3 Go through the procedure for clearing each possible cause of the problem until the fault is cleared.
- 4 When the fault is corrected, follow the instructions in “Final maintenance procedure” on [page 147](#) to completely restore normal operation.

## Fault indicators

When there is a fault in the system, you may be notified by any combination of the following indicators:

- system messages
- visual fault indicators
- maintenance display codes
- user reports

Each type of indicator is described below.

### System messages

System messages are codes with a mnemonic and number, such as PWR0014. The mnemonic identifies a software program or a type of message. The number identifies the specific message. Use system messages with other indicators, such as maintenance display codes and visual indicators, to identify and clear faults.

Table 4 on page 30 lists the most common fault indicating messages and the type of fault they indicate. For a complete list and interpretation of system messages, see the *Software Input/Output: System Messages* (553-3001-411).

**Table 4**  
**System message fault indicators and related fault types**

System messages	Type of fault
BSD090 PWR messages	Power
BSD080, 085, 086, 103 CED messages CIOD, CMON, and CNI messages INI001, 002, 004, 005 IOD006, 007, 060, 061, 291–297 NWS030, 102, 103, 142 SYS messages	Common equipment
BSD081, 101, 110, 111, 121, 130, 201–203, 205–209, 600, 602 CNF messages DTA, DTC, DTI messages ERR020, 120, 4060 INI003, 007–012 NWS101, 141, 201–204, 301, 401 OVD021, 022, 023, 031 TDS messages XMI messages	Network equipment

<b>System messages</b>	<b>Type of fault</b>
BSD301, 401, 402 ERR4062 NWS301, 401, 501 OVD001–010, 024 XMI messages	Peripheral equipment
ERR090, 220, 270 OVD003, 008, 009, 010 TRK messages	Trunk
BSD501	Attendant console
BSD501 ERR500 MWL500 NWS501 OVD001–002, 004, 005 XMI messages	Telephone

## Visual fault indicators

There are visual indicators on the system that can help you identify faults. These indicators include:

- a major or minor alarm display on the attendant console: indicates a possible power, common equipment, or network equipment fault
- circuit card light emitting diodes (LEDs): indicate that a card or a unit on a card is disabled
- column LED: indicates a fault in the column

Table 5 lists visual indicators you may see and the types of faults they indicate.

**Table 5**  
**Visual system fault indicators**

Indicator	Type of fault
Major alarm on attendant consoles Red LED lit on column top cap Green LED off on module power supply Circuit breaker tripped (down) Remote alarm	Power
Major alarm on attendant consoles Red LED lit on CE card (other than the CPU interface card on the non-active CPU)	Common equipment
Minor alarm on an attendant console Red LEDs lit or flashing on associated cards	Network equipment
Red LED lit on associated card	Peripheral equipment
Red LED lit on trunk card	Trunk
Red LED lit on associated cards	Attendant console
Red LED lit on associated cards	Telephone

## Maintenance display codes

Maintenance displays are located on the faceplate of some circuit cards. A maintenance display shows an alphanumeric code that can indicate the status of the system and aid in fault identification. Interpretations of the maintenance display codes are listed under “HEX” in the *Software Input/Output: System Messages* (553-3001-411).

Each new code shown on a maintenance display overwrites the one before it. However, all codes received on common equipment displays are recorded.



You can review them by printing the History File. The most recent 16 codes displayed on an NT8D01 Controller Card stay in memory. You can review them and reset the counter through the Network and Signaling Diagnostic (LD 30). You should examine previous codes, system messages, and visual indicators with the current maintenance display code to properly analyze faults.

Table 6 lists the cards with maintenance displays and the type of fault they might indicate.

**Table 6**  
**Maintenance display locations and related fault types**

<b>Maintenance display</b>	<b>Type of fault</b>
NT6D66 24MB Call Processor Card (CP) NT9D19 68040/48MB Call Processor NT5D10 68060/48MB Call Processor NT6D63 Input/Output Processor Card (IOP) NT5D61 Input/Output Drive Unit with CD-ROM	Common equipment
NT8D01 Controller Card NT1P62 Fiber Controller Card NT7R52 Remote Carrier Interface Card	Peripheral equipment

## User reports

Many faults reported by users, such as a damaged telephones or data sets, are obvious and can be fixed by replacing the damaged equipment.

Some faults are less obvious and may be caused by other equipment, such as a defective peripheral equipment line or trunk card. To classify the fault in these cases, check for system messages and visual fault indications. You may also need to have the user reproduce the problem so you can determine the sequence of events that led to the fault.

Table 7 lists problems users typically report.

**Table 7**  
**User reported problems and related fault types**

User report	Type of fault
Major alarm reported by attendant No ring on 500/2500 telephones	Power
Major alarm reported by attendant	Common equipment
Minor alarm reported by attendant Cannot transfer or conference Cannot dial out on 500/2500 telephones	Network equipment
Trouble with calls on attendant console Trouble with calls on 500/2500 telephones Trouble with calls on SL-1, M1000, or digital telephones	Peripheral equipment
Trouble with a specific trunk Continuous ringing Trouble with calls on console and/or telephones	Trunk

**Table 7**  
**User reported problems and related fault types**

<b>User report</b>	<b>Type of fault</b>
Trouble with calls Trouble with equipment (such as handset, headset, or display)	Attendant console
Trouble with calls Trouble with equipment (such as handset or add-on module)	Telephone



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# Clearing power faults

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## Contents

This section contains information on the following topics:

Power faults . . . . .	37
Fault clearing procedures . . . . .	40

## Power faults

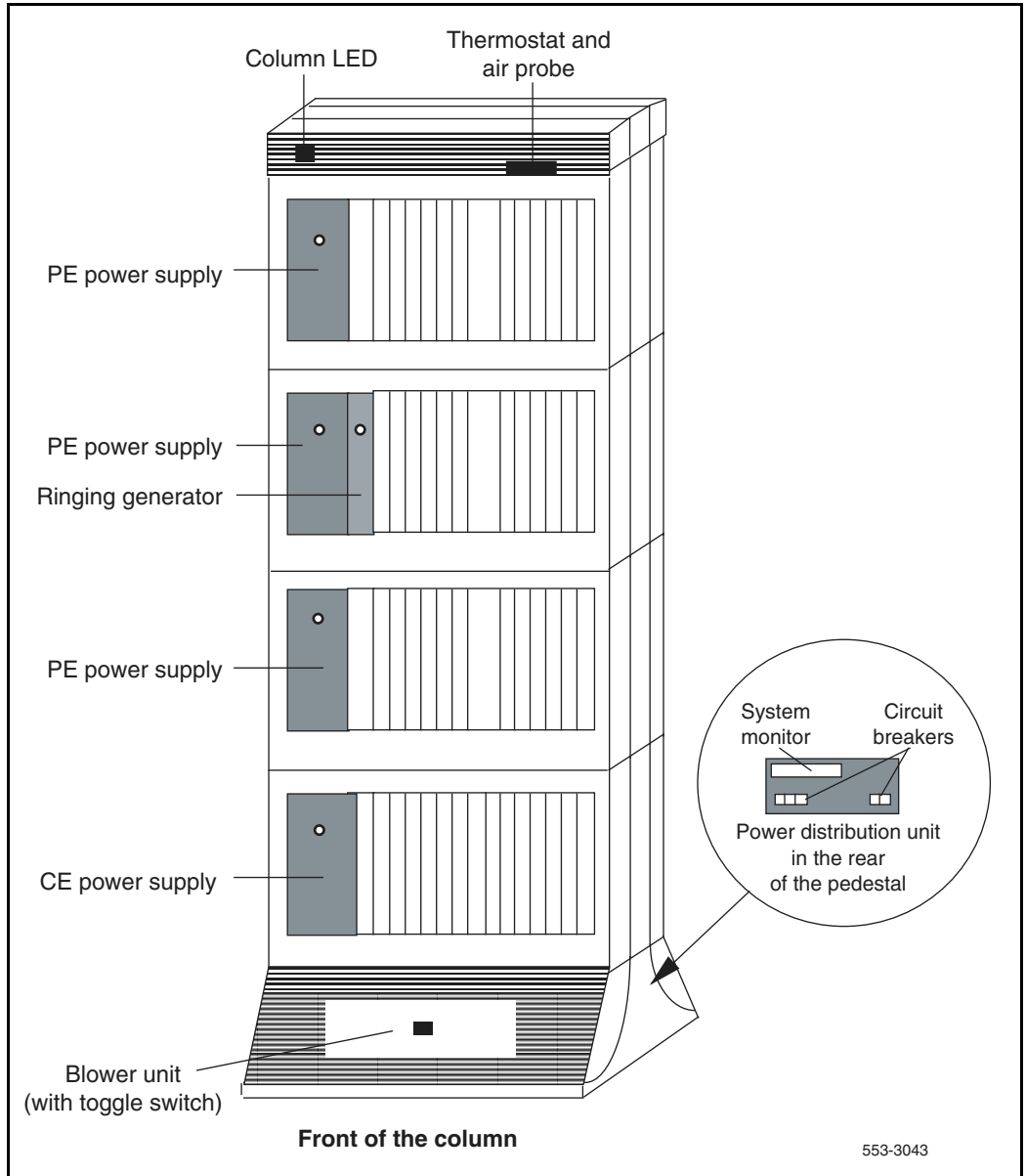
Various electrical voltages are required. These electrical voltages are developed and delivered by the power equipment system. Cooling and monitoring devices are interconnected with the power system. Figure 3 show power, cooling, and monitoring equipment that may be located in a column, including:

- air probe: increases the impeller speed as the temperature goes up
- blower unit: provides cooling for the column
- module power distribution unit (MPDU): houses circuit breakers for some module power supplies
- In DC-powered systems, there is a switch on each power supply, so MPDUs are not required.
- power distribution unit (PDU): distributes power from the external source to module power supplies and houses the column circuit breaker(s)
- module power supply: converts voltage from the PDU to the voltages needed in each type of module

- ringing generator: provides current to ring 500/2500 telephones and to light the message waiting light on the 2500 telephones
- system monitor: monitors power and temperature conditions
- thermostat: monitors column temperature

Power faults can disable ringing for 500/2500 telephones, message waiting lights on 2500 telephones, all the cards in a module, all the modules in a column, or the entire system.

**Figure 3**  
**Internal DC power equipment**



## Fault clearing procedures

System messages with the mnemonic PWR (power) contain four fields of information about power equipment. These fields identify the type of equipment indicated (such as the blower unit) and the source of the message (system monitor, module, or module power supply) in PWR messages. Table 8 defines the fields. Figure 4 shows the power equipment identified in PWR messages.

**Table 8**  
**PWR message fields**

PWRxxxx (HW) (SM) (UEM) (U)	
HW	Hardware type, one of the following: <div><div>CRBK</div><div>Circuit breaker</div><div>DCSP</div><div>DC power supply</div><div>FANU</div><div>Blower unit</div><div>PFTC</div><div>Power fail transfer</div><div>PWSP</div><div>Module power supply, including ringing generator</div><div>THSW</div><div>Thermal switch</div><div>UPSA</div><div>Uninterruptible power supply (UPS) alarm</div><div>XSMC</div><div>System monitor card</div></div>
SM	System monitor (0-63) generating the message (0 is the master system monitor)
UEM	Module (0-3) reporting the condition
U	Number of the power supply (1-2) in the module



**Figure 4**  
**Power equipment destinations**

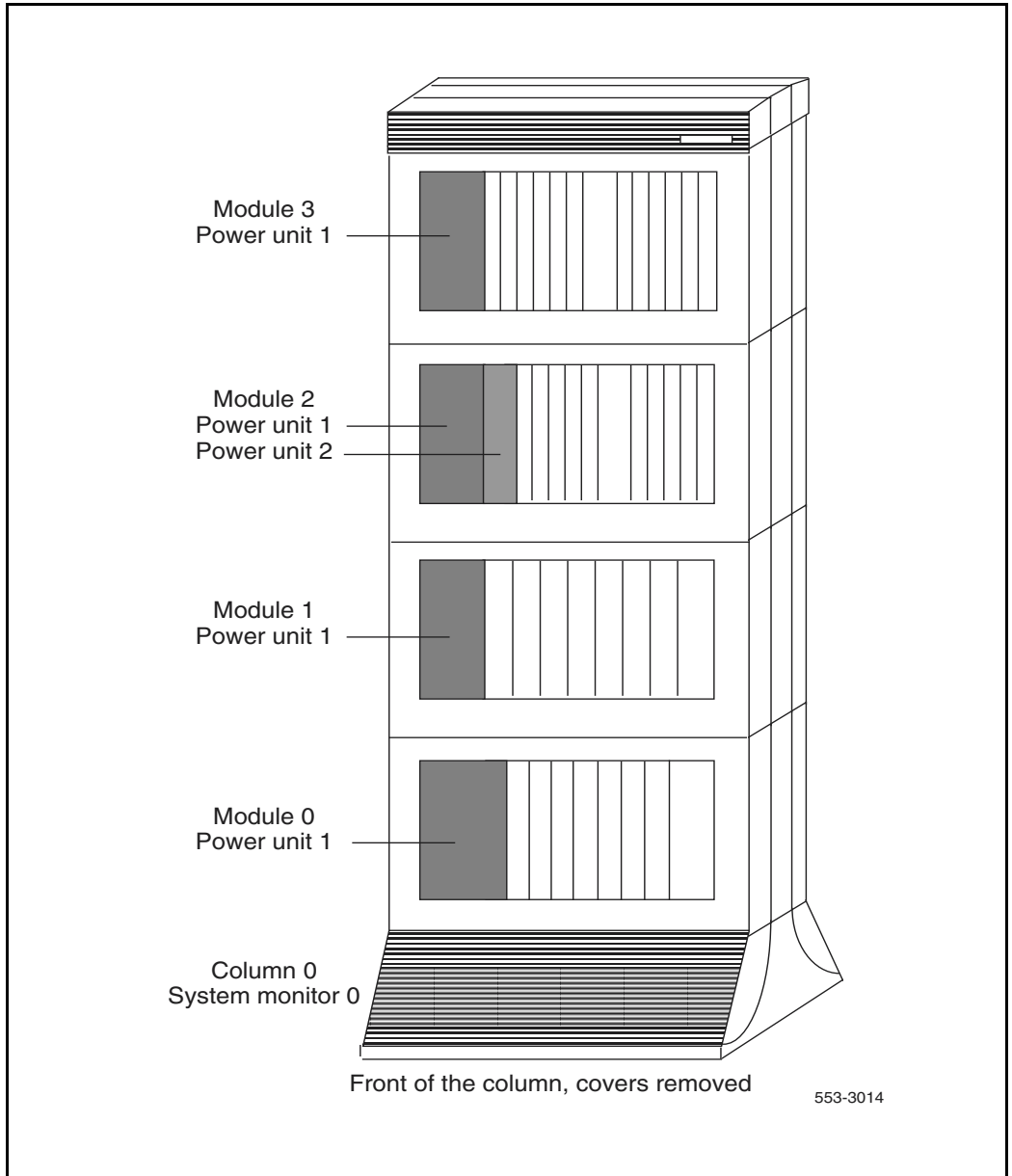


Table 9 lists common power fault indications.

**Table 9**  
**Power fault indicators**

Indicator	Possible indications
System messages	BSD090 (Program has detected a power fault indication. Check PWR messages.)  PWR messages
Visual indicators	Major alarm on attendant consoles  Red LED lit on column top cap  Green LED off on module power supply  LED lit on PFTU  Circuit breaker tripped (down)  Remote alarm
User reports	Major alarm reported by attendant  No ring on 500/2500 telephones

**WARNING**

Modules covers are *not* hinged; do *not* let go of the cover. Lift the cover away from the module and set it out of your work area.

**Symptom:**

**Circuit breakers and all column LEDs off (DC power)**

All the LEDs in a column are off and all circuit breakers on the PDU are tripped. You may receive message PWR0004, which indicates that the circuit breakers for the column have tripped. See “PWR” in the *Software Input/Output: System Messages* (553-3001-411) and use this procedure to clear the problem.

**Note:** High room temperature can shut down the system. If all columns in a multi-column system are shut down, check for this external condition. You may need to replace one of the following:

- Air filter: P0699798
- Air probe harness: NT8D46AM
- System monitor cables
- Thermostat harness: NT8D46AC

Possible cause	Action
Low batteries	If a TRIP signal to the system has shut down power: <ul style="list-style-type: none"><li>— Check the cable from the external power system.</li><li>— Check the batteries and service them as necessary.</li></ul>
Short circuit or damage	Look for signs of damage (such as smoke, burnt contacts, or melted insulation) that may be caused by a short circuit or misplaced equipment.  If you do not find a problem of this type, go to the next possible cause.

Possible cause	Action
Thermal overload	<p>Make sure nothing is blocking ventilation throughout the system. Allow the system to cool for a few minutes, then reset the breakers.</p>
	<p>If the breakers trip immediately, check the thermostat harness:</p> <ul style="list-style-type: none"> <li>— Make sure the harness is securely connected to the module below it.</li> <li>— Use an ohmmeter to check the connector pins for the harness; if there is an open circuit between pins 3 and 4 or between pins 5 and 6, replace the harness.</li> </ul> <p>If the breakers do not trip immediately, check the air filter:</p> <ul style="list-style-type: none"> <li>— If the filter is dirty and undamaged, clean the filter as described in <i>“Routine maintenance”</i> on <a href="#">page 191</a>.</li> <li>— If the filter is damaged in any way, replace the filter as described in <i>“Replacing equipment”</i> on <a href="#">page 193</a>.</li> </ul> <p>If there is no problem with the air filter or if the breakers trip when reset, check the air probe harness:</p> <ul style="list-style-type: none"> <li>— Make sure the harness is securely connected to the module below</li> </ul>
Defective connection to system monitor	<p>Make sure cables to connectors J5 and J6 are securely connected to the system monitor in the column.</p> <p>Check the system monitor connections to each module.</p> <p>If the breakers trip with all cables connected, replace the cables one at a time until the breakers stay on.</p>

**Symptom:****Circuit breakers on but all column LEDs off (DC power)**

All the LEDs in a column are off but the circuit breakers on the PDU are not tripped. Use this procedure to clear the problem. You may need to replace one of the following:

- External rectifier
- PDU

Possible cause	Action
DC wires not connected	If the DC wires are disconnected, connect them.  If the wires are already connected or if the column LEDs do not light when they are connected, go to the next possible cause.
<b>WARNING</b> The following test is performed on a live power connection.	
No power at DC source	Make sure the rectifier is on and connected.  Make sure the rectifier is receiving power.  If there is no problem with the rectifier, go to the next possible cause.
Defective power cable	With a meter, test the field wiring connections in the PDU for DC power.  If there is no power, replace the cable.  If there is power at the connections, go to the next possible cause.
Defective PDU	Replace the PDU.

**Symptom:****Green LED off on module power supply (DC power)**

The green LED is off on one of the following power supplies:

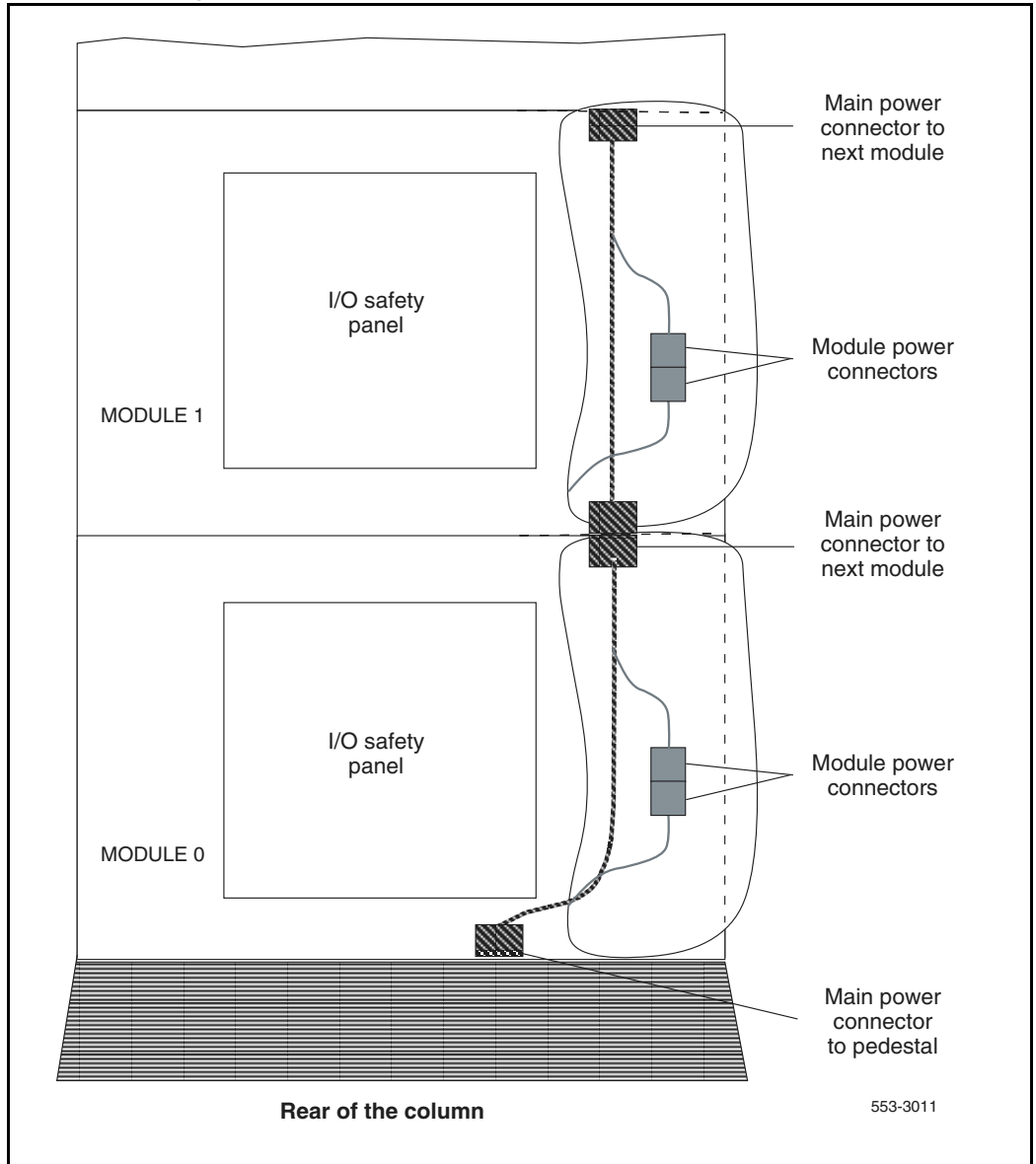
- PE power supply: NT6D40
- CE power supply: NT6D41

- Ringing generator: NT6D42
- CE/PE power supply: NT6D43

You may receive a system message indicating the status of the power supply. See “PWR” in the *Software Input/Output: System Messages* (553-3001-411) and use this procedure to clear the problem.

Possible cause	Action
Disconnected power cable	<p>Check the power cable connection to the power supply.</p> <p>If the cable is connected, check power cable connections to each module below the affected one (see Figure 5).</p> <p>If all power cables are connected, go to the next possible cause.</p>
Defective power supply	<p>Set the switch on the power supply to OFF (down), wait at least 60 seconds, then set the switch back to ON (up).</p> <p>If the LED on the power supply is still off, replace the power supply.</p>

**Figure 5**  
**DC power cabling in rear of column**



## Symptom:

### Defective blower unit indicated (DC power)

The blower unit circuit breaker (breaker number 5 on the PDU) is tripped and trips when reset. You may receive a system message indicating that there is a failure in the blower. See “PWR” in the *Software Input/Output: System Messages* (553-3001-411) and use this procedure to clear the problem. You may need to replace one of the following:

- Pedestal Blower Unit DC: NT8D52DD
- PDU

Possible cause	Action
Blower unit switch turned off	Set the switch on the front of the blower unit to ON (right). Reset the circuit breaker.  If the switch was already on or if the circuit breaker trips again, go to the next possible cause.
Defective blower unit	Replace the blower unit and set the circuit breaker to on.  If the breaker trips, go to the next possible cause.
Defective PDU	Replace the PDU.

## Symptom:

### Main circuit breaker and all column LEDs off (AC power)

All the LEDs in a column are off and the main circuit breaker on the PDU is tripped. You may receive message PWR0004, which indicates that the main circuit breaker for the column has tripped. See “PWR” in the *Software Input/Output: System Messages* (553-3001-411) and use this procedure to clear the problem.



High room temperature or a power surge can shut down the system. If all columns in a multi-column system are shut down, check for these external conditions. You may need to replace one of the following:

- Cooling Unit Filter Assembly: P0699798
- Air probe harness: NT8D46AM
- System monitor cables
- Thermostat harness: NT8D46AC

Possible cause	Action
Short circuit or damage	<p>Look for signs of damage (such as smoke, burnt contacts, or melted insulation) that may be caused by a short circuit or misplaced equipment.</p> <p>If you do not find a problem of this type, go to the next possible cause.</p>
Thermal overload	<p>Make sure nothing is blocking ventilation throughout the system. Allow the system to cool for a few minutes then reset the breaker.</p> <p>If the breaker trips immediately, check the thermostat harness:</p> <ul style="list-style-type: none"> <li>— Make sure the harness is securely connected to the module below it.</li> <li>— Use an ohmmeter to check the connector pins for the harness; if there is an open circuit between pins 3 and 4 or between pins 5 and 6, replace the harness.</li> </ul> <p>If the breakers do not trip immediately, check the air filter:</p> <ul style="list-style-type: none"> <li>— If the filter is dirty and undamaged, clean the filter as described on <a href="#">page 191</a>.</li> <li>— If the filter is damaged in any way, replace the filter as described on <a href="#">page 193</a>.</li> </ul>

Possible cause	Action
	<p>If there is no problem with the air filter or if the breaker trips when reset, check the air probe harness:</p> <ul style="list-style-type: none"> <li>— Make sure the harness is securely connected to the module below it.</li> <li>— Use an ohm meter to check the connector pins for the harness; if there is an open circuit between pins 1 and 2, replace the harness.</li> </ul> <p>If there is no problem with this equipment, go to the next possible cause.</p>
Defective connection to system monitor	<p>Make sure cables to connectors J5 and J6 are securely connected to the system monitor in the column.</p> <p>Check the system monitor connections to each module.</p> <p>If the breaker trips with the cables connected, replace the cables one at a time until the breaker stays on.</p>

**Symptom:****Main circuit breaker on but all column LEDs off (AC power)**

All the LEDs in the column are off but the main circuit breaker on the PDU is not tripped. Use this procedure to clear the problem. You may need to replace one of the following:

- PDU: NT8D53AB
- Main power cord
- UPS

Possible cause	Action
Power cord not connected	<p>If the power cord for the column is unplugged, plug it in.</p> <p>If the power cord is already plugged in or if the column LEDs do not light when it is plugged in, go to the next possible cause.</p>
<p style="text-align: center;"><b>WARNING</b></p> <p style="text-align: center;"><b>The following tests are performed on a live power connection.</b></p>	
No power at outlet	<p>With a meter or test lamp, test for AC power at the outlet.</p> <p>If there is no power at the outlet when AC power is supplied through a UPS unit, repair or replace the UPS following the manufacturer's instructions.</p> <p>If there is no power at the outlet when AC power is supplied through commercial service (not through a UPS), take the necessary steps to have the commercial power restored.</p> <p>If there is power at the outlet, go to the next possible cause.</p>
Defective power cord	<p>With a meter or test lamp, test the field wiring connections in the PDU for AC power.</p> <p>If there is no power, replace the power cord.</p> <p>If there is power at the connections, go to the next possible cause.</p>
Defective PDU	Replace the PDU.

## Symptom:

### **Breaker off on MPDU (AC power)**

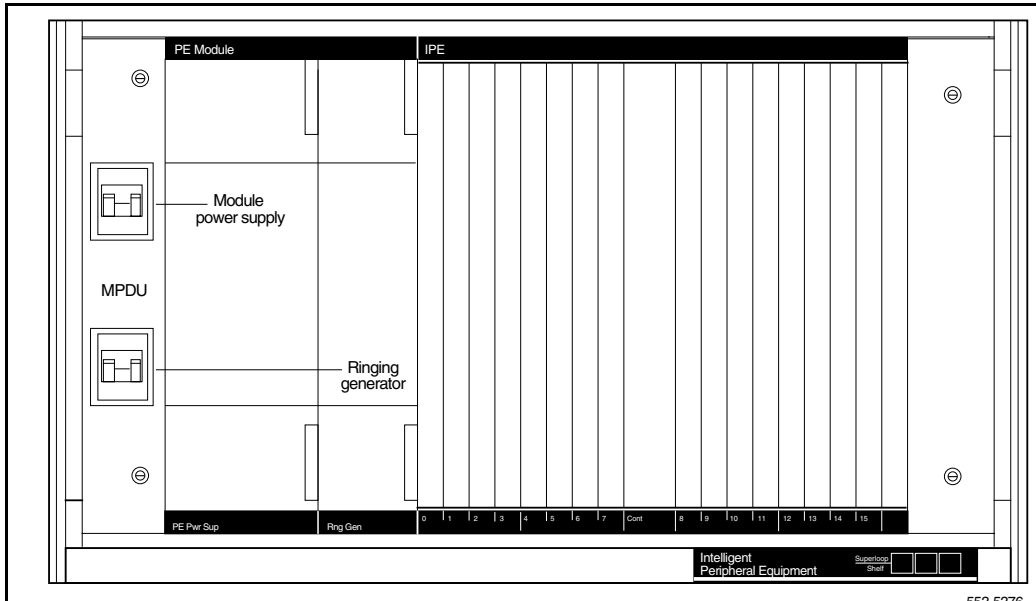
A circuit breaker on a MPDU is tripped and trips when reset. The green LED will be off on the associated power supply:

- NT8D56AA single breaker MPDU: for NT8D29 CE Power Supply
- NT8D57AA dual breaker MPDU: for NT8D06 PE Power Supply and NT8D21 Ringing Generator

You may receive a system message indicating the status of the breaker. See “PWR” in the *Software Input/Output: System Messages* (553-3001-411) and use this procedure to clear the problem.

Possible cause	Action
Short circuit or damage	<p>Look for signs of damage (such as smoke, burnt contacts, or melted insulation) that may be caused by a short circuit or misplaced equipment.</p> <p>If you do not find a problem of this type, go to the next possible cause.</p>
Defective module power supply (single breaker)	<p>Unseat the associated power supply and reset the breaker.</p> <p>If the breaker does not trip, replace the power supply.</p> <p>If the breaker trips, replace the MPDU.</p>
Defective module power supply (dual breaker)	<p>If one circuit breaker is tripped on a dual MPDU:</p> <p>Unseat the associated power supply (see Figure 6) then reset the breaker.</p> <p>If the breaker does not trip, replace the power supply.</p> <p>If the breaker trips, replace the MPDU.</p>
	<p>If both circuit breakers are tripped:</p> <p>Unseat both power supplies, then reset the breakers.</p> <p>If either breaker or both breakers trip, replace the MPDU.</p> <p>If the breakers do not trip, set them to OFF (down):</p> <p>Reinsert one power supply then reset the associated breaker.</p> <p>If the breaker trips, replace that power supply.</p> <p>If the breaker does not trip, set the breaker to OFF and unseat that power supply.</p> <p>Reinsert the other power supply, then reset the associated breaker.</p> <p>If the breaker trips, replace that power supply.</p>

**Figure 6**  
**Dual circuit breaker and associated module power supplies**



**Symptom:**

### Green LED off on module power supply (AC power)

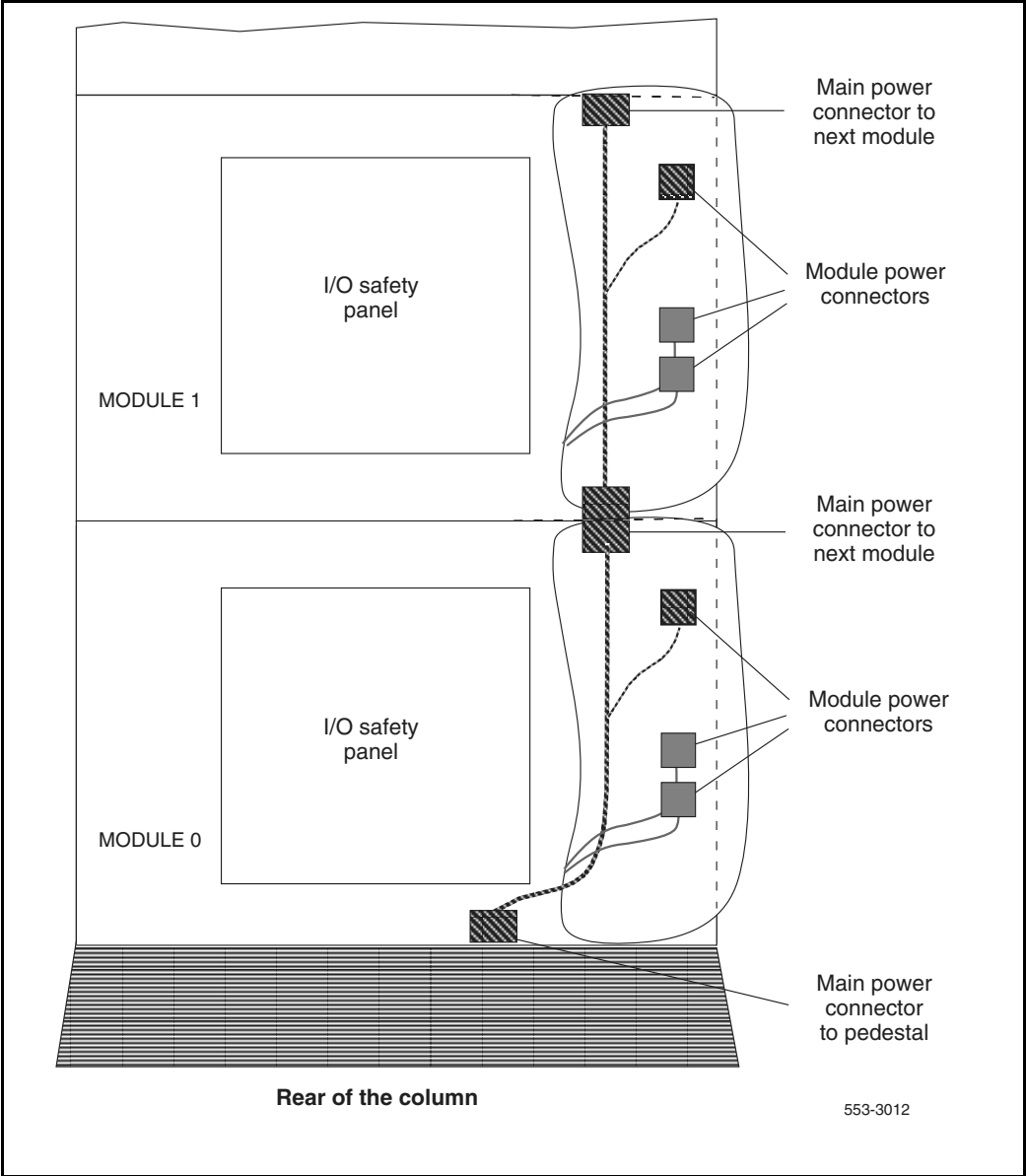
The circuit breaker on the associated MPDU is not tripped, but the green LED is off on one of the following power supplies:

- PE power supply: NT8D06
- CE/PE power supply: NT7D14
- Ringing generator: NT8D21
- CE power supply: NT8D29

You may receive a system message indicating the status of the power supply. See “PWR” in the *Software Input/Output: System Messages* (553-3001-411) and use this procedure to clear the problem.

Possible cause	Action
Disconnected power cable	<p>Check the power cable connection between the power supply and the back of the MPDU.</p> <p>If the cable is connected, check power cable connections to each module below the affected one (see Figure 7).</p> <p>If all power cables are connected, go to the next possible cause.</p>
Defective power supply	<p>Set the circuit breaker on the associated MPDU off, then back on (see Figure 6 if there are dual circuit breakers).</p> <p>If the LED on the power supply is still off, replace the power supply.</p> <p>If you replace the power supply, the LED on the replacement should light and stay lit. If it does not, go to the next possible cause.</p>
Defective MPDU	Replace the MPDU.

**Figure 7**  
**AC power cabling in rear of column**





**Symptom:****Defective blower unit indicated (AC power)**

The blower unit circuit breaker (located on the front of the unit) is tripped and trips when reset. You may receive a system message indicating that there is a failure in the blower. See “PWR” in the *Software Input/Output: System Messages* (553-3001-411) and use this procedure to clear the problem. You may need to replace one of the following:

- Blower unit: NT8D52AB
- PDU: NT8D53

Possible cause	Action
Defective blower unit	Replace the blower unit and set the circuit breaker to ON (up). If the breaker trips, go to the next possible cause.
Defective PDU	Replace the PDU.



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# Clearing common equipment faults

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## Contents

This section contains information on the following topics:

<a href="#">Common equipment faults</a> .....	59
<a href="#">Fault clearing procedures</a> .....	60

## Common equipment faults

Common equipment (CE) functions perform system control and switching. Common equipment can include:

- Bus Terminating Unit (BTU): provides logical termination to CPU and network buses
- Central Processing Unit (CPU): performs system call processing functions
- Call Processor (CP): performs system arithmetic and logic functions
- Data cartridge: allows access to software packages purchased
- Mass Storage Interface card (floppy disk interface card, mass storage interface card, or enhanced mass storage interface card): interface between the CPU and the mass storage unit
- Mass Storage Unit (floppy disk unit, multi drive unit, small system multi drive unit, or core multi disk unit): provides a backup for programs and data stored in system memory
- Read Only Memory (ROM) card: provides memory for the CPU on the NT6D66 Call Processor

- Serial Data Interface (SDI) card: provides ports between the CPU and external devices
- Core to Network Interface (CNI) card: links the CE bus with the three-port extender (3PE) card(s) in the network slots
- Three-Port Extender (3PE) card: extends CPU signals to the network, and between Core Network Interface (CNI) and the network.

Common equipment faults can disable the CPU or the mass storage unit and stop call processing. In addition, other types of equipment (such as network equipment) may not operate properly while there is a CE fault in the system.

Look up all system messages and maintenance display codes in the *Software Input/Output: System Messages* (553-3001-411) and follow the instructions given. If the fault does not clear, use the following procedures. Take any action indicated by the maintenance display codes. Continually observe and look up system messages as you perform the procedure.

## Fault clearing procedures

The following table lists common equipment fault indications. Refer to “How to clear faults” on [page 27](#) for complete fault clearing process.

Indicator	Possible indications
System messages	BSD080, 085, 086, 103 CED messages INI001, 002, 004, 005 IOD006, 007, 060, 061, 291–297 NWS030, 102, 103, 142 SYS messages
Visual indicators	Major alarm on attendant consoles Red LED lit on column top cap Red LED lit on CE card of active CPU

Maintenance displays	QPC580 CPU Interface NT8D19 Memory/Peripheral Signaling QPC584 Mass Storage Interface NT9D34 Enhanced Mass Storage Interface QPC742 Floppy Disk Interface NTND01 ICM card NTND10 CMA card NT6D66, NT9D19, NT5D10 Call Processor NT6D63 IOP card NT5D61 IODU/C card
User reports	Major alarm reported by attendant

**WARNING**

Module covers are *not* hinged; do *not* let go of the cover. Lift the cover away from the module and set it out of your work area.

**Symptom:****Fault indicated on a common equipment card**

The red LED is lit or the display is indicating a fault on a common equipment card. The dual Core system will still be operating but may be limited to one CP. Make sure the normal/maintenance switch on both Call Processor cards is set to Norm.

For information on switch settings for the applicable Core cards, see *Circuit Card: Description and Installation* (553-3001-211). You may need to replace one of the following:

- CP card
- CP to CP cable: NTND11

- IODU/C card: NT5D61
- IOP card: NT6D63
- CNI card: NT6D65
- 3PE card: QPC441
- CBT card: NT6D6003

**cPCI Core/Network Card Cage AC/DC: NT4N46AA**

Possible cause	Action
Defective serial I/O ports	<p>Check each SDI port by entering:</p> <p><b>LD 37</b> <b>STAT TTY</b></p> <p>If software is disabled, try to enable it (software disable, hardware disable, then try to reenable).</p> <p>If the card will not enable, replace it.</p> <p>If the CPU is still faulty, go to the next possible cause.</p>
Defective IOP card	<p>Check the IOP card:</p> <p>Reinstall the IOP card, test it, and enable it:</p> <p><b>LD 137</b> <b>DIS IOP</b> <b>TEST IOP</b> <b>ENL IOP</b> <b>****</b></p> <p>If the CPU is still faulty, go to the next possible cause.</p>

Possible cause	Action
Defective CE card (lit LED)	<p>Unseat the CP and CNI cards, then reinstall them. Make sure all cables are securely connected. If all cards do not recover, continue with this procedure.</p> <p>If the display on the CP card shows a fault:</p> <p><b>LD 135</b> <b>TEST CPU</b></p> <p>If there is a problem with the test, CCED system messages will be generated.</p> <p>If the LED is lit on some other CE card, check the CNI card, enter:</p> <p><b>LD 135</b> <b>TEST CNI c s</b></p> <p>where <b>c</b> represents the CPU 0 or 1 and <b>s</b> represents the card slot.</p> <p>If the CPU is still faulty, replace the CE cables one at a time.</p> <p>If CNI is faulty, disable the card before you out it.</p> <p>If the CPU remains faulty, go to the next possible cause.</p>
Defective backplane	<p>Replace the card cage assembly in the module.</p> <p>To be able to replace the card cage, you must first switch the system to use the alternate CPU and then disable and remove all the cards in the card cage you wish to replace.</p>
Defective serial I/O ports	<p>Check each SDI port by entering:</p> <p><b>LD 37</b> <b>STAT TTY</b></p> <p>If software is disabled, try to enable it (software disable, hardware disable, then try to reenale).</p> <p>If the card will not enable, replace it.</p> <p>If the CPU is still faulty, go to the next possible cause.</p>



Possible cause	Action
Defective IOP card	<p>Check the IOP card:</p> <p>Reinstall the IOP card, test it, and enable it:</p> <p><b>LD 137</b>  <b>DIS IOP</b>  <b>TEST IOP</b>  <b>ENL IOP</b>  *****</p> <p>If the CPU is still faulty, go to the next possible cause.</p>
Defective CE card (lit LED)	<p>Unseat the CP and CNI cards, then reinstall them. Make sure all cables are securely connected. If all cards do not recover, continue with this procedure.</p> <p>If the display on the CP card shows a fault:</p> <p><b>LD 135</b>  <b>TEST CPU</b></p> <p>If there is a problem with the test, CCED system messages will be generated.</p> <p>If the LED is lit on some other CE card, check the CNI card, enter:</p> <p><b>LD 135</b>  <b>TEST CNI c s</b></p> <p>where <b>c</b> represents the CPU 0 or 1 and <b>s</b> represents the card slot.</p> <p>If the CPU is still faulty, replace the CE cables one at a time.</p> <p>If CNI is faulty, disable the card before you out it.</p> <p>If the CPU remains faulty, go to the next possible cause.</p>

## Symptom:

### Floppy disk unit not operating

**Note:** There may be a lit LED on the Floppy Disk Unit (FDU). There may be a maintenance display code on the Floppy Disk Interface (FDI) card indicating a problem with the FDU. For information on switch settings, see *Circuit Card: Description and Installation* (553-3001-211). You may need to replace one of the following:

- Cable between FDU and FDI card
- Security Data cartridge: QMM42
- FDI card: QPC742
- FDU: NT8D68 or NTND15

Possible cause	Action
Defective FDI card or data cartridge	<p>Unseat the FDU and FDI card, then reinstall them. Make sure the cable between the FDU and FDI is securely connected. (In a dual CPU system, check both FDI cards.) If the FDU does not recover, continue with this procedure.</p> <p>Check the FDI:</p> <p>Make sure the data cartridge is securely attached.</p> <p>Check switch settings; if necessary, correct the switch settings.</p> <p>Try to enable the FDI (try to software disable, hardware disable, then reenable).</p> <p>If you cannot load a program or the FDI is still disabled, replace it.</p> <p>If necessary, replace the data cartridge.</p> <p>If the FDU is still not operating, go to the next possible cause.</p>
Defective FDU or cable	<p>Replace the FDU. If it is still disabled, replace the cable between the FDU and FDI.</p>

**Symptom:****IODU/C not operating**

There may or may not be a lit LED on the front of the IODU/C. For more information on IODU/C, see the *Large System: Upgrade Procedures* (553-3021-258). For information on switch settings, see *Circuit Card: Description and Installation* (553-3001-211). You may need to replace one of the following:

- IODU/C: NT5D61
- cPCI Core/Network Card Cage AC/DC: NT4N46AA

Possible cause	Action
Defective IODU/C (lit LED)	<p>Unseat the IODU/C, then reinstall it. If the IODU/C does not recover, continue with this procedure.</p> <p>Try to restore the hard drive from disks:</p> <ul style="list-style-type: none"> <li>— Stat, enable, and test the CMDU part of the IODU/C card:</li> </ul> <pre>LD 137 STAT CMDU x TEST CMDU x DIS CMDU X SYNC ENL CMDU X</pre> <p>If the problem continues, a CIOD system message appears and the LED lights on the faceplate.</p>
	<p>If you cannot load the program, replace the IODU/C:</p> <ul style="list-style-type: none"> <li>— If you can load the program, test the port for the system terminal you were using.</li> <li>— If the port is okay, test the cable to the system terminal.</li> <li>— If the cable is okay, check the system terminal.</li> </ul> <p>If the CMDU part of the IODU/C is still faulty, go to the next possible cause.</p>

Possible cause	Action
Defective IOP part of the IODU/C card	<p>Check the IOP part of the IODU/C card:</p> <ul style="list-style-type: none"> <li>— Reinstall the IODU/C card; test and enable the IOP part of the IODU/C card.</li> </ul> <p><b>LD 137</b>  <b>DIS IOP</b>  <b>TEST IOP</b>  <b>ENL IOP</b></p> <p>If the IODU/C is still faulty, go to the next possible cause.</p>
Defective backplane connection to IODU/C (LED not lit)	<p>Try to test the IODU/C by entering:</p> <p><b>LD 137</b>  <b>TEST CMDU x</b>    “x” represents the IODU/C card number 0 or 1</p> <p>If the CMDU part of the IODU/C card is still faulty, replace the IODU/C card.</p> <p>If the CMDU part of the IODU/C enables after it is moved, replace the card cage assembly in the module you took it from.</p>
CD-ROM drive not operating	<p>For redundant systems, remove the disk from the CD-ROM drive, place it in the CD-ROM drive of the other Core, and test operation.</p> <p>If the CD-ROM drive is operational you may need to replace the IODU/C card with the faulty CD-ROM drive.</p>

Possible cause	Action
CD disk is damaged	<p>If you have another CD-ROM disk, insert that CD-ROM disk into a known operational IODU/C card, and load the Software Installation Tool from the correct Install Program diskette.</p> <p>In the Software Installation Tool, go to the Tools Menu and select option &lt;j&gt; - "To check the customer-specific part of the CD-ROM." If this test is successful, the message "Checking directory /cdx/xxxx_DMR.Nxx ended successfully" is displayed.x</p> <p>If the test is successful, it is unlikely the CD-ROM disk is damaged.</p> <p>However, if the test indicates a failure to read all files on the CD-ROM disk, then the CD-ROM disk is damaged and should be replaced.</p>
Mismatch between the Security Device and keycode.	<p>Positively identify the NT SDID (8 digits engraved on the face of the Security Device beneath the Nortel Networks logo) with the NT SDID contained on the keycode floppy disk label, and verify the NT SDIDs match.</p>
IODU/C Software Installation Tool does not load	<p>Verify that the correct Install Program diskette is being used for the CP card in your system.</p>



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# Clearing network equipment faults

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## Contents

This section contains information on the following topics:

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<a href="#">Fault clearing procedures</a> .....	72

## Network equipment faults

Network equipment provides speech path switching and transmits and receives signaling messages from the CPU. Network equipment can include:

- conference/tone and digit switch (CONF/TDS) card: provides conference capability, all tones for the system, and multi frequency sender (MFS) functionality
- intergroup switch (IGS) card: provides speech path switching between network groups for Meridian 1 Option 81C CP PII
- network card: provides digital switching for the system
- The NT8D04 Superloop Network Card provides the equivalent of four network loops. The NT1P61 Fiber Superloop Network card and the NT7R51 Local Carrier Interface card provide the equivalent of two network loops.
- peripheral signaling (PS) card: provides the signaling interface to the CPU and clocking

- The NTND02 Misc/SDI/Peripheral Signaling Card combines the functionality of peripheral signaling and SDI cards, as well as miscellaneous CPU functions.
- serial data interface (SDI) card: provides the interface from the CPU to an input/output (I/O) device

Network equipment faults can cause system initializations and disable conference capability or all terminal connections (such as trunks and telephones) on a loop. Defective network equipment can make functional peripheral equipment seem faulty.

## Fault clearing procedures

Manual continuity tests can be used to isolate superloop network card and IPE faults. For a description of manual continuity tests, see “Software maintenance tools” on [page 151](#). See “LD 45” in the *Software Input/Output: Maintenance* (553-3001-511) for details on performing the tests.

Look up all system messages and maintenance display codes in the *Software Input/Output: System Messages* (553-3001-411) and follow the instructions given. Continually observe and look up system messages as you perform this procedure.

Replace equipment as described on [page 193](#).

Table 10 lists common network equipment fault indications. Refer to “How to clear faults” on [page 27](#) for complete fault clearing process.

### **WARNING**

Module covers are *not* hinged; do *not* let go of the cover. Lift the cover away from the module and set it out of your work area.



**Table 10**  
**Network equipment fault indicators**

Indicator	Possible indications
System messages	BSD081, 101, 110, 111, 121, 130, 201–203, 205–209, 600, 602 CNF messages DTA, DTC, DTI messages ERR020, 120, 4060 INI003, 007–012 NWS101, 141, 201–204, 301, 401 OVD021, 022, 023, 031 TDS messages XMI messages
Visual indicators	Minor alarm on an attendant console Red LEDs lit or flashing on cards
User reports	Minor alarm reported by attendant Users cannot transfer or conference Users cannot dial out on 500/2500 telephones No dial tone at all sets; no display on digital sets

### **Symptom:**

#### **Disabled loop indicated by OVD message (NT1P61 Fiber Superloop Network Card)**

An overload (OVD) system message indicates that a loop on an NT1P61 Fiber Superloop Network Card is disabled. All terminal connections on the loop are disabled. A red LED on the card may be lit or flashing. You may need to replace one of the following:

- Fiber Peripheral Controller card: NT1P62

- Fiber Superloop network card: NT1P61
- IPE card
- Cable between superloop network card and controller card

Possible cause	Action
Defective superloop network card	<p>Hardware disable, then reenable, the superloop network card to initiate a self-test or executing the <b>XNTT loop</b> command. If the test fails, check the card status.</p> <p>Check the status of the Fiber Superloop Network card:</p> <p><b>LD 30</b>  <b>STAT loop</b>      “loop” represents the loop number.</p> <p>Check the display and take steps to resolve the problem indicated in the status report.</p>
	<p>If you receive an OVD message, replace the superloop network card.</p> <p>If the card is disabled, enable it by executing the <b>ENLL loop</b> command. If the response is UNEQ, install the card correctly and observe self-test.</p>
Defective controller card	<p>Perform the Fiber Peripheral Controller card self-test:</p> <p><b>DSXP x</b>              “x” represents the controller number.</p> <p>If the test passed, enable the card by executing:</p> <p><b>ENXP x</b>              “x” represents the controller number.</p> <p>If the test failed, check the maintenance display codes on the controller card and wait for an OVD message. In the OVD message is received, replace the card.</p> <p>If there is no OVD message, go to the next possible cause.</p>
Defective IPE card	<p>Reinsert the IPE cards one at a time. Wait for an OVD message after each card is inserted.</p> <p>If the red LED lights when a card is inserted, software disable the card, then try to reenable it. If it will not enable, replace the card.</p> <p>If you receive an OVD message when one of the IPE cards is inserted, replace that card.</p> <p>If there is no OVD message as you insert the cards, go to the next possible cause.</p>

Possible cause	Action
Defective Fiber-optic span	<p>To check the Fiber-optic span, perform loopback test across the span.</p> <p>Load <b>LD 45</b> and execute the <b>XCON 6</b> test with Fiber Superloop Network card as the generator and detector with span looped at the Fiber Peripheral Controller card at the Fiber Remote IPE.</p> <p>Check the test results and proceed accordingly.</p>
Defective terminal equipment	<p>Check terminal equipment (such as attendant consoles and telephones) on the disabled loop.</p> <p>If you find defective terminal equipment, see the appropriate chapter (such as “Clearing attendant console faults” on <a href="#">page 119</a>) to fix the fault.</p>

## Symptom:

### Disabled loop indicated by OVD message (NT7R51 Local Carrier Interface Card)

An overload (OVD) system message indicates that a loop on an NT7R51 Local Carrier Interface Card is disabled. All terminal connections on the loop are disabled. A red LED on the card may be lit or flashing. You may need to replace one of the following:

- Remote Carrier Interface card: NT7R52
- Local Carrier Interface card: NT7R51
- IPE card
- Cable between superloop network card and controller card

Possible cause	Action
Defective Local Carrier Interface card	<p>Hardware disable, then reenable, the superloop network card to initiate a self-test. If the test fails, replace the card. If the test passes, follow the procedure below.</p> <p>Check the status of the Local Carrier Interface card:</p> <p><b>LD 32</b> <b>STAT sl</b>        “sl” represents the loop number.</p> <p>Check the display and take steps to resolve the problem indicated in the status report.</p>
	<p>If you receive an OVD message, replace the superloop network card.</p> <p>If the card is disabled, enable it by executing the <b>ENLL sl</b> command. If the response is UNEQ, install the card correctly and observe self-test.</p>
Defective Remote Carrier Interface card	<p>Unseat all cards on the IPE shelf except the Remote Carrier Interface card. Unseat and seat the Remote Carrier Interface card to start self-test. Observe self-test:</p> <p>If the test passed, enable the card by executing:</p> <p><b>ENXP x</b>        “x” represents the controller number.</p> <p>If the test failed, check the maintenance display codes on the card faceplate and wait for an OVD message. In the OVD message is received, replace the card.</p> <p>If there is no OVD message, go to the next possible cause.</p>

Possible cause	Action
Defective IPE card	<p>Reinsert the IPE cards one at a time. Wait for an OVD message after each card is inserted.</p> <p>If the red LED lights when a card is inserted, software disable the card, then try to reenable it. If it will not enable, replace the card.</p> <p>If you receive an OVD message when one of the IPE cards is inserted, replace that card.</p> <p>If there is no OVD message as you insert the cards, go to the next possible cause.</p>
Defective cable	<p>To check the carrier span, perform loopback test across the span.</p> <p>Load <b>LD 45</b> and execute the <b>XCON 6</b> test with Local Carrier Interface card as the generator and detector with span looped at the Remote Carrier Interface card at the Carrier Remote IPE.</p> <p>Check the test results and proceed accordingly.</p> <p>If there is no OVD message, go to the next possible cause.</p>
Defective terminal equipment	<p>Check terminal equipment (such as attendant consoles and telephones) on the disabled loop.</p> <p>If you find defective terminal equipment, see the appropriate chapter (such as “Clearing attendant console faults” on <a href="#">page 119</a>) to fix the fault.</p>
Defective Local Carrier Interface card	<p>Hardware disable, then reenable, the superloop network card to initiate a self-test. If the test fails, replace the card. If the test passes, follow the procedure below.</p> <p>Check the status of the Local Carrier Interface card:</p> <p><b>LD 32</b>  <b>STAT sl</b>            “sl” represents the loop number.</p> <p>Check the display and take steps to resolve the problem indicated in the status report.</p>
	<p>If you receive an OVD message, replace the superloop network card.</p> <p>If the card is disabled, enable it by executing the <b>ENLL sl</b> command. If the response is UNEQ, install the card correctly and observe self-test.</p>

Possible cause	Action
Defective Remote Carrier Interface card	<p>Unseat all cards on the IPE shelf except the Remote Carrier Interface card. Unseat and seat the Remote Carrier Interface card to start self-test. Observe self-test:</p> <p>If the test passed, enable the card by executing:</p> <p><b>ENXP x</b>        “x” represents the controller number.</p> <p>If the test failed, check the maintenance display codes on the card faceplate and wait for an OVD message. In the OVD message is received, replace the card.</p> <p>If there is no OVD message, go to the next possible cause.</p>
Defective IPE card	<p>Reinsert the IPE cards one at a time. Wait for an OVD message after each card is inserted.</p> <p>If the red LED lights when a card is inserted, software disable the card, then try to reenable it. If it will not enable, replace the card.</p> <p>If you receive an OVD message when one of the IPE cards is inserted, replace that card.</p> <p>If there is no OVD message as you insert the cards, go to the next possible cause.</p>
Defective cable	<p>To check the carrier span, perform loopback test across the span.</p> <p>Load <b>LD 45</b> and execute the <b>XCON 6</b> test with Local Carrier Interface card as the generator and detector with span looped at the Remote Carrier Interface card at the Carrier Remote IPE.</p> <p>Check the test results and proceed accordingly.</p> <p>If there is no OVD message, go to the next possible cause.</p>
Defective terminal equipment	<p>Check terminal equipment (such as attendant consoles and telephones) on the disabled loop.</p> <p>If you find defective terminal equipment, see the appropriate chapter (such as “Clearing attendant console faults” on <a href="#">page 119</a>) to fix the fault.</p>

Symptom:

Disabled loop indicated by OVD message  
(NT8D04 Superloop Network Card)

An overload (OVD) system message indicates that a loop on an NT8D04 Superloop Network Card is disabled. All terminal connections on the loop are disabled. A red LED on the card may be lit or flashing. You may need to replace one of the following:

- Controller card: NT8D01
- Superloop network card: NT8D04
- IPE card
- Cable between superloop network card and controller card

Possible cause	Action
Defective superloop network card	<p>Hardware disable, then reenable, the superloop network card to initiate a self-test. If the test fails, replace the card. If the test passes, follow the procedure below.</p> <p>Disconnect the loop cable(s) to the superloop network card. Enable and test each loop on the card by entering:</p> <p><b>LD 32</b> <b>ENLL loop</b>    “loop” represents the loop number.</p> <p>Wait for an OVD message.</p> <p>If you receive an OVD message, replace the superloop network card.</p> <p>If there is no OVD message, go to the next possible cause.</p>



Possible cause	Action
Defective controller card	<p>Unseat all cards on the IPE shelf except the controller card. Reconnect the loop cable to the controller card and enable the card by entering:</p> <p><b>ENXP x</b>      “x” represents the controller number.</p> <p><b>Note:</b> If more than one shelf is involved, follow this and subsequent procedures one at a time for each controller card.</p> <p>Check the maintenance display codes on the controller card and wait for an OVD message.</p> <p>If you receive an OVD message, unseat and reinstall the controller card to initiate a self-test. If the test fails, replace the card and reinsert cards on the IPE shelf.</p> <p>If there is no OVD message, go to the next possible cause.</p>
Defective IPE card	<p>Reinsert the IPE cards one at a time. Wait for an OVD message after each card is inserted.</p> <p>If the red LED lights when a card is inserted, software disable the card, then try to reenable it. If it will not enable, replace the card.</p> <p>If you receive an OVD message when one of the IPE cards is inserted, replace that card.</p> <p>If there is no OVD message as you insert the cards, go to the next possible cause.</p>
Defective cable	<p>Disconnect the loop cable at the controller card. (If there is more than one loop cables, disconnect them one at a time and follow the procedure below for each cable.)</p> <p>Reconnect the cable(s) to the superloop network card and wait for an OVD message.</p> <p>If you receive an OVD message, replace the cable.</p> <p>If there is no OVD message, go to the next possible cause.</p>
Defective terminal equipment	<p>Check terminal equipment (such as attendant consoles and telephones) on the disabled loop.</p> <p>If you find defective terminal equipment, see the appropriate chapter (such as “Clearing attendant console faults” on <a href="#">page 119</a>) to fix the fault.</p>

## **Symptom:**

### **Loop disabled without OVD message (NT8D04 Superloop Network Card)**

There is probably a system message indicating the loop or loops on this card are defective or disabled, but there is no overload (OVD) message indicating the card is disabled. The LED on the faceplate may be lit or flashing. You may need to replace one of the following:

- Controller card: NT8D01
- Superloop network card: NT8D04
- IPE card
- Cable between superloop network card and controller card

Possible cause	Action
Defective superloop network card	<p>Hardware disable, then reenable, the superloop network card to initiate a self-test. If the test fails, replace the card. If the test passes, follow the procedure below.</p> <p>Disconnect the loop cable(s) to the superloop network card. Try to enable each loop on the card by entering:</p> <p><b>LD 30</b> <b>ENLL loop</b> "loop" represents the loop number.</p> <p>Test each loop by entering:</p> <p><b>LOOP loop</b></p> <p>If you receive an OVD message at this point, replace the superloop network card.</p> <p>If there is no OVD message and the loops will not enable, go to the next possible cause.</p>
Defective controller card	<p>Unseat all cards on the IPE shelf except the controller card. Reconnect the loop cable to the controller card and enable the controller card by entering:</p> <p><b>LD 32</b> <b>ENXP x</b> "x" represents the controller number.</p> <p><b>Note:</b> If more than one shelf is involved, follow this and subsequent procedures one at a time for each controller card.</p> <p>Check the maintenance display codes on the controller card.</p> <p>If you receive an OVD message at this point, unseat and reinstall the controller card to initiate a self-test. If the test fails, replace the card. Reinsert cards on the IPE shelf.</p> <p>If there is no OVD message and the loops will not enable, go to the next possible cause.</p>

Possible cause	Action
Defective IPE card	<p>Reinsert the IPE cards one at a time.</p> <p>If the red LED lights when a card is inserted, software disable the card, then try to reenale it. If it will not enable, replace the card.</p> <p>If you receive an OVD message when one of the IPE cards is inserted, replace that card.</p> <p>If no LEDs light and there is no OVD message as you reinsert the cards, go to the next possible cause.</p>
Defective cable	<p>Disconnect the loop cable at the controller card. (If there is more than one cable, disconnect them one at a time and follow the procedure below for each cable.)</p> <p>Reconnect the cable(s) to the superloop network card.</p> <p>If you receive an OVD message at this point replace the cable.</p> <p>If there is no OVD message and the loops will not enable, go to the next possible cause.</p>
Defective terminal equipment	<p>Check terminal equipment (such as attendant consoles and telephones) on the disabled loop.</p> <p>If you find defective terminal equipment, see the appropriate chapter (such as “Clearing attendant console faults” on <a href="#">page 119</a>) to fix the fault.</p>

## Symptom:

### Disabled loop indicated by OVD message (QPC414 Network Card)

An overload (OVD) system message indicates that a loop on a QPC414 Network Card is disabled. All terminal connections on the loop are disabled. A red LED on the card may be lit. For information on switch settings, see *Circuit Card: Description and Installation* (553-3001-211). You may need to replace one of the following:

- Dual loop peripheral buffer (DLB) card: QPC659
- Network card: QPC414

- IPE card
- Cable between network card and DLB card

Possible cause	Action
Defective network card	<p>Disconnect the loop cable(s) to the network card. Enable and test each loop on the network card by entering:</p> <p><b>LD 30</b> <b>ENLL loop</b> “loop” represents the loop number.</p> <p>Test each loop by entering:</p> <p><b>LOOP loop</b></p> <p>Wait for an OVD message.</p> <p>If you receive an OVD message, replace the network card.</p> <p>If there is no OVD message, go to the next possible cause.</p>
Defective DLB card	<p>Unseat all cards on the IPE shelf except the DLB card (if there are two shelves on the loop, disconnect the cable to connector LPY):</p> <ul style="list-style-type: none"><li>— Reconnect the loop cable to the DLB card.</li><li>— If you receive an OVD message, replace the DLB card and reinsert cards on the IPE shelf.</li></ul> <p>If there is no OVD message:</p> <ul style="list-style-type: none"><li>— Check switch settings on the DLB card; if necessary, correct the switch settings.</li><li>— If there are two shelves on the loop, go to the next possible cause.</li><li>— If there is one shelf on the loop, go to “Disabled peripheral equipment card” on <a href="#">page 106</a></li></ul>

Possible cause	Action
Defective DLB card on second shelf (if two shelves are on the loop)	<p>Unseat all cards on the second shelf except the DLB card. Reconnect the inter-shelf cable to the DLB card and wait for an OVD message.</p> <p>If there is an OVD message, replace the DLB card and reinsert cards on the IPE shelf.</p> <p>If there is no OVD message, go to the next possible cause.</p>
Defective NT5K10 DLB card	<p>In Dual Loop Mode</p> <ul style="list-style-type: none"> <li>— Unseat 4 IPE cards pertaining to the defective loop or</li> </ul> <p>In Single Loop Mode</p> <ul style="list-style-type: none"> <li>— Unseat 8 IPE cards pertaining to the defective loop.</li> </ul> <p>Wait for the OVD message.</p> <p>If there is no OVD message, go to the defective IPE card.</p> <p>If you receive an OVD message, remove the backplane access plate at the back of the EEPE shelf and replace the Dual Loop Peripheral Buffer Card.</p> <p>Reinsert the IPE cards on the shelf.</p> <p>Replace the backplane access plate.</p>
Defective IPE card	<p>Reinsert the IPE cards one at a time. (If there are two shelves on the loop, follow this and subsequent procedures one at a time for each shelf.) Wait for an OVD message after each card is inserted.</p> <p>If the LED lights when a card is inserted, software disable the card, then try to reenale it. If it will not enable, replace the card.</p> <p>If you receive an OVD message when one of the IPE cards is inserted, replace that card.</p> <p>If there is no OVD message as you reinsert the cards, go to the next possible cause.</p>

Possible cause	Action
Defective cable between network and DLB cards	<p>For the EEPE shelf only: remove the backplane access plate at the back of the module.</p> <p>Disconnect the loop cable at the DLB card.</p> <p>Reconnect the cable(s) to the network card and wait for an OVD message.</p> <p>If you receive an OVD message, replace the cable.</p> <p>If there is no OVD message, go to the next possible cause.</p> <p>For the EEPE shelf only: replace the backplane access plate.</p>
Defective cable between shelves (if two shelves are on the loop)	<p>Disconnect the inter-shelf cable to connector LPX on the second shelf DLB card.</p> <p>Reconnect the cable to connector LPY on the first shelf DLB card and wait for an OVD message.</p> <p>If you receive an OVD message, replace the inter-shelf cable. Reinsert cards on the IPE shelf.</p> <p>If there is no OVD message, go to the next possible cause.</p>
Defective terminal equipment	<p>Check terminal equipment (such as attendant consoles and telephones) on the disabled loop.</p> <p>If you find defective terminal equipment, see the appropriate chapter (such as “Clearing attendant console faults” on <a href="#">page 119</a>) to fix the fault.</p>

## Symptom:

### Loop disabled without OVD message (QPC414 Network Card)

There is probably a system message indicating that the loop or loops on this card are defective or disabled, but there is no overload (OVD) message indicating the card is disabled. The LED on the faceplate may be lit. For information on switch settings, see *Circuit Card: Description and Installation* (553-3001-211). You may need to replace one of the following:

- Dual loop peripheral buffer (DLB) card: QPC659

- Network card: QPC414
- IPE card
- Cable between network card and DLB card

Possible cause	Action
Defective network card	<p>Test the loops on the card by entering:</p> <p><b>LD 30</b></p> <p><b>LOOP loop</b>    “loop” represents the loop number.</p> <p>Try to enable the loops by entering:</p> <p><b>ENLL loop</b></p> <p>Wait for an OVD message.</p> <p>If you receive an OVD message at this point, replace the network card.</p> <p>If there is no OVD message and the loops will not enable, go to the next possible cause.</p>
Defective DLB card	<p>Unseat all cards on the IPE shelf except the DLB card (if there are two shelves on the loop, disconnect the cable to connector LPY):</p> <ul style="list-style-type: none"> <li>— Reconnect the loop cable to the DLB card.</li> <li>— If you receive an OVD message at this point, replace the peripheral buffer card and reinsert cards on the IPE shelf.</li> </ul> <p>If there is no OVD message and the loops will not enable:</p> <ul style="list-style-type: none"> <li>— Check switch settings on the DLB card; if necessary, correct the switch settings.</li> <li>— If there are two shelves on the loop, go to the next possible cause.</li> <li>— If there is one shelf on the loop, go to “Disabled peripheral equipment card” on <a href="#">page 106</a>.</li> </ul>



Possible cause	Action
Defective QPC659 DLB card on second shelf (if two shelves are on the loop)	<p>Unseat all cards on the second shelf except the DLB card. Reconnect the inter-shelf cable to the DLB card.</p> <p>If you receive an OVD message at this point, replace the DLB card and reinsert cards on the IPE shelf.</p> <p>If there is no OVD message and the loops will not enable, go to the next possible cause.</p>
Defective NT5K10 Peripheral Buffer Card	<p>In Dual Loop Mode</p> <ul style="list-style-type: none"> <li>— Unseat 4 IPE cards pertaining to the defective loop or</li> </ul> <p>In Single Loop Mode</p> <ul style="list-style-type: none"> <li>— Unseat 8 IPE cards pertaining to the defective loop.</li> </ul> <p>Wait for the OVD message.</p> <p>If there is no OVD message, go to the defective IPE card.</p> <p>If you receive an OVD message, remove the backplane access plate at the back of the EEPE shelf and replace the Dual Loop Peripheral Buffer Card.</p> <p>Reinsert the IPE cards on the shelf.</p> <p>Replace the backplane access plate.</p>
Defective IPE card	<p>Reinsert the IPE cards one at a time. (If there are two shelves on the loop, follow this and subsequent procedures one at a time for each shelf.)</p> <p>If the LED lights when a card is inserted, software disable the card, then try to reenabling it. If it will not enable, replace the card.</p> <p>If you receive an OVD message when one of the IPE cards is inserted, replace that card.</p> <p>If no LEDs light and there is no OVD message as you reinsert the cards, go to the next possible cause.</p>

Possible cause	Action
Defective cable between network and DLB cards	<p>For EEPE shelf only: remove the backplane access plate at the rear of the module.</p> <p>Disconnect the loop cable at the DLB card.</p> <p>Reconnect the cable(s) to the network card.</p> <p>If you receive an OVD message at this point, replace the cable.</p> <p>If there is no OVD message and the loops will not enable, go to the next possible cause.</p> <p>For EEPE shelf only: remove the backplane access plate at the rear of the module.</p>
Defective cable between shelves (if two shelves on the loop)	<p>Disconnect the inter-shelf cable to connector LPX on the second shelf DLB card.</p> <p>Reconnect the cable to connector LPY on the first shelf DLB card.</p> <p>If you receive an OVD message at this point, replace the inter-shelf cable. Reinsert cards on the IPE shelf.</p> <p>If there is no OVD message and the loops will not enable, go to the next possible cause.</p>
Defective terminal equipment	<p>Check terminal equipment (such as attendant consoles and telephones) on the disabled loop.</p> <p>If you find defective terminal equipment, see the appropriate chapter (such as “Clearing attendant console faults” on <a href="#">page 119</a>) to fix the fault.</p>

## Symptom:

### Disabled peripheral signaling card indicated by OVD message

There is an overload (OVD) system message indicating that a peripheral signaling card is disabled. The LED on the faceplate may be lit. You may need to replace one of the following:

- Superloop network card or network card: NT8D04, QPC414
- PS card: QPC43R

- Clock controller: QPC471
- D-channel handler interface card: QPC757

Possible cause	Action
Defective PS card	<p>Unseat all network cards associated with the PS card.</p> <p>Enable the PS card by entering:</p> <p><b>LD 32</b>  <b>ENPS x</b>        “x” represents the PS card number.</p> <p>Wait for an OVD message.</p> <p>If you receive an OVD message, replace the PS card.</p> <p>If there is no OVD message, go to the next possible cause.</p>
Defective network card	<p>Reinsert network cards one at a time.</p> <p>Wait for an OVD message after each card is inserted.</p> <p>If you receive an OVD message when one of the cards is inserted, replace that card.</p> <p>Reenable the PS card by entering:</p> <p><b>LD 32</b>  <b>ENPS x</b></p> <p>If you do not receive an OVD message, go to the next possible cause.</p>

## Symptom:

### Peripheral signaling card disabled without OVD message

The peripheral signaling card is disabled on one shelf. The LED on its faceplate may be lit. There is no overload (OVD) message indicating a fault with this card. You may need to replace one of the following:

- Superloop network card or network card: NT8D04, QPC414
- PS card: QPC43R
- Clock controller: QPC471
- D-channel handler interface card: QPC757

Possible cause	Action
Defective PS card	<p>Unseat all network cards associated with the PS card.</p> <p>Try to enable the PS card by entering:</p> <p><b>LD 32</b>  <b>ENPS x</b>        “x” represents the PS card number.</p> <p>If you receive an OVD message at this point or you cannot enable the PS card, replace it.</p> <p>If the PS card is still disabled, go to the next possible cause.</p>
Defective network card	<p>Reinsert network cards one at a time.</p> <p>If you receive an OVD message when one of the cards is inserted or if the card is disabled, replace that card.</p> <p>Reenable the PS card by entering:</p> <p><b>LD 32</b>  <b>ENPS x</b></p> <p>If the PS card is still disabled, go to the next possible cause.</p>

## Symptom:

### Problems with transferring, placing conference calls, or Music-on-Hold

Several users cannot transfer or place conference calls, or calls do not receive Music-on-Hold. A card that provides conference capability may be disabled. You may need to replace one of the following:

- Conference/TDS card: NT8D17
- PS card: QPC43R
- 3PE card: QPC441
- Telephone keys

Possible cause	Action
Defective conference/TDS card	<p>If there are no messages indicating a fault on any conference loop, test each conference loop in the system by entering:</p> <p><b>LD 38</b>  <b>CNFC loop</b> “loop” represents the conference loop number.</p> <p><b>Note:</b> See the <i>Software Input/Output: Maintenance</i> (553-3001-511) for other tests.</p> <p>If the conference loop is disabled, try to enable it by entering:</p> <p><b>LD 38</b>  <b>ENLX loop</b> “loop” represents the Conference loop, which is the odd loop of the Conference/TDS loop pair.</p> <p><b>Note:</b> You must enable the card with the command ENLX. Enabling the loops with the command ENLL does not enable the hardware.</p> <p>If a fault is indicated on a conference loop, replace the conference/TDS card identified.</p> <p>If no faults are detected on any conference loop, go to the next possible cause.</p>
Defective card on Network shelf	<p>One at a time, replace the following cards until the fault clears:</p> <ul style="list-style-type: none"> <li>— 3PE card</li> <li>— PS card</li> </ul> <p>If there is still a Conference problem, go to the next possible cause.</p>
Defective telephone keys	<p>Check the keys on any telephone with this problem. See the following Nortel Networks Publications:</p> <ul style="list-style-type: none"> <li>— <i>Software Input/Output: Maintenance</i> (553-3001-511)—LD 31 tests</li> <li>— <i>Telephones and Consoles</i> (553-3001-367)</li> </ul>
Excessive traffic in the system	<p>Additional conference/TDS cards may be required to handle the traffic in the system. See <i>Traffic Measurement: Formats and Output</i> (553-3001-450).</p>

## **Symptom:**

### **Problems placing calls on 2500 telephones and some trunks**

Several users of 2500 telephones report trouble placing calls. Other users may report trouble dialing on certain trunks. A digitone receiver or a card that provides tone and digit switch capability may be disabled. You may need to replace one of the following:

- Tone Detector Card: QPC422
- Conference/TDS card: NT8D17
- DTR card: NT8D16
- Network/DTR card: NT8D18

Possible cause	Action
Defective digitone receiver	<p>Check for disabled digitone receiver TNs by entering:</p> <p><b>LD 34</b> <b>STAT</b></p> <p>If any are disabled, try to enable them by entering:</p> <p><b>ENLR l s c u</b> “l s c u” represents loop, shelf, card, and unit numbers.</p> <p>Test the digitone receiver by entering:</p> <p><b>DTR l s c u</b></p> <p>If the digitone receiver fails the test, replace it.</p> <p>If the digitone receiver passes the test, go to the next possible cause.</p>
Defective conference/TDS card	<p>Test Tone and Digit Switch loops by entering:</p> <p><b>LD 34</b> <b>TDS loop</b> “loop” represents the loop number.</p> <p>If the conference loop is disabled, try to enable it by entering:</p> <p><b>ENLX loop</b> “loop” represents the TDS/MFS loop, which is the even loop of the Conference/TDS loop pair).</p> <p><b>Note:</b> You must enable the card with the command ENLX. Enabling the loops with the command ENLL does not enable the hardware.</p> <p>If a fault is indicated on a conference loop, replace the conference/TDS card identified.</p> <p>If no faults are detected on any conference loop, go to the next possible cause.</p>
Excessive traffic in the system	<p>Additional digitone receivers or conference/TDS cards may be required to handle the traffic in the system. See <i>Traffic Measurement: Formats and Output</i> (553-3001-450).</p>





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# Clearing peripheral equipment faults

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## Contents

This section contains information on the following topics:

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Fault clearing procedures . . . . .	98

## Peripheral equipment faults

Peripheral equipment (PE) provides the interface between network equipment switching and terminal equipment (such as trunks, telephones, data sets, and attendant consoles). Peripheral equipment faults can disable network and terminal equipment.

**Note:** For fault clearing purposes, the general term “peripheral equipment” includes intelligent peripheral equipment (IPE). When there are differences, PE and IPE are specified.

### CAUTION

NT6D71 fuse replacement F1 through F16.

For continued protection against risk of fire, replace the fuse only with a fuse of the same type and rating (125 V, 1.0 A).

## Fault clearing procedures

The following table lists common peripheral equipment fault indications (many other system messages may be generated). Refer to “How to clear faults” on [page 27](#) for complete fault clearing process.

### Symptom:

#### **Red LED lit on Fiber Peripheral Controller card**

The red LED is lit on the controller card. Red LEDs on Peripheral Equipment (PE) cards on the same shelf may be lit. You may need to replace one of the following:

- Fiber Peripheral Controller card: NT1P62
- IPE card
- IPE card cage: NT8D3703

Possible cause	Action
Defective Fiber peripheral controller card	<p>Perform the Fiber controller card self-test by executing the <b>DSXP x</b> command for LD 32 to disable the card.</p> <p>Execute the <b>XPCT x</b> command to initiate self-test.</p> <ul style="list-style-type: none"> <li>— The maintenance display on the card shows the code for each test running (see “HEX” in the <i>Software Input/Output: Maintenance</i> (553-3001-511)). If the tests complete successfully, the display continuously flashes.</li> <li>— If the card continually fails a test, the code for that test is steadily displayed.</li> </ul> <p>If the test fails, replace the card.</p> <p>If the test passes but the card is still disabled, enable the card:</p> <p><b>ENXP x</b>            “x” represents the controller number.</p> <p>If the test fails, go to the next possible cause.</p>
Defective PE card	<p>Unseat all the cards in the shelf associated with the controller card:</p> <ul style="list-style-type: none"> <li>— If the red LED on the controller card turns off, the fault is in one of the unseated cards.</li> <li>— Reinsert the cards one at a time.</li> <li>— When the controller card LED turns on again, replace the last card you inserted.</li> </ul> <p>If the red LED on the controller card does not turn off when the PE cards are unseated, reinstall the cards and go to the next possible cause.</p>
Defective cable	<p>Test all cables to the controller card.</p> <p>If you find a defective cable, replace it.</p> <p>If there is no problem with the cables, go to the next possible cause.</p>
Defective backplane	<p>Replace the card cage assembly in the module.</p>

## **Symptom:**

### **Red LED lit on Remote Carrier Interface card**

The red LED is lit on only one controller card. Red LEDs on Peripheral Equipment (PE) cards on the same shelf may be lit. You may need to replace one of the following:

- Remote Carrier Interface card: NT7R52
- IPE card
- IPE card cage: NT8D3703

Possible cause	Action
Defective Remote Carrier Interface card	<p>Perform the remote carrier interface card self-test by removing and reinstalling the card.</p> <p>Observe the self-test:</p> <ul style="list-style-type: none"> <li>— The maintenance display on the card shows the code for each test running (see “HEX” in the <i>Software Input/Output: Maintenance</i> (553-3001-511)). If the tests complete successfully, the display continuously flashes.</li> <li>— If the card continually fails a test, the code for that test is steadily displayed.</li> </ul> <p>If the test fails, replace the card.</p> <p>If the test passes but the card is still disabled, enable the card:</p> <p><b>ENLL sl</b> “sl” represents the card number.</p> <p>If the test fails, go to the next possible cause.</p>
Defective PE card	<p>Unseat all the cards in the shelf associated with the controller card:</p> <ul style="list-style-type: none"> <li>— If the red LED on the controller card turns off, the fault is in one of the unseated cards.</li> <li>— Reinsert the cards one at a time.</li> <li>— When the controller card LED turns on again, replace the last card you inserted.</li> </ul> <p>If the red LED on the controller card does not turn off when the PE cards are unseated, reinstall the cards and go to the next possible cause.</p>
Defective cable	<p>Test all cables to the controller card.</p> <p>If you find a defective cable, replace it.</p> <p>If there is no problem with the cables, go to the next possible cause.</p>
Defective backplane	<p>Replace the card cage assembly in the module.</p>

## **Symptom:**

### **Red LED lit on Peripheral Controller card**

The red LED is lit on only one controller card. Red LEDs on Peripheral Equipment (PE) cards on the same shelf may be lit. You may need to replace one of the following:

- Controller card: NT8D01BC, NT8D01AC, NT8D01AD
- IPE card
- IPE card cage: NT8D3703

Possible cause	Action
Defective controller card	<p>Remove, then, reinstall the controller card to initiate a self-test:</p> <ul style="list-style-type: none"> <li>— The maintenance display on the card shows the code for each test running (see “HEX” in the <i>Software Input/Output: Maintenance</i> (553-3001-511))</li> <li>— If the tests complete successfully, the display continuously flashes.</li> <li>— If the card continually fails a test, the code for that test is steadily displayed.</li> </ul> <p>If the test fails, replace the card.</p> <p>If the test passes but the card is still disabled, test the loop by entering:</p> <p><b>LD 30</b>  <b>LOOP loop</b> “loop” represents the loop number.</p> <p>If the test fails, go to the next possible cause.</p>
Defective PE card	<p>Unseat all the cards in the shelf associated with the controller card:</p> <ul style="list-style-type: none"> <li>— If the red LED on the controller card turns off, the fault is in one of the unseated cards.</li> <li>— Reinsert the cards one at a time.</li> <li>— When the controller card LED turns on again, replace the last card you inserted.</li> </ul> <p>If the red LED on the controller card does not turn off when the PE cards are unseated, reinstall the cards and go to the next possible cause.</p>
Defective cable	<p>Test all cables to the controller card.</p> <p>If you find a defective cable, replace it.</p> <p>If there is no problem with the cables, go to the next possible cause.</p>
Defective backplane	<p>Replace the card cage assembly in the module.</p>

## Symptom:

### Red LED lit on dual loop peripheral buffer card

The red LED is lit on only one dual loop peripheral buffer card. Red LEDs on PE cards on the same shelf may be lit. For information on switch settings, see *Circuit Card: Description and Installation* (553-3001-211). You may need to replace one of the following:

- Dual loop peripheral buffer (DLB) card: QPC659 or NT5K10
- Existing Peripheral Equipment Power Supply (EPEPS): NT5K12
- Cable between the Network Superloop card and the Enhanced Dual Loop Peripheral Buffer Card
- PE card
- PE card cage NT8D1303 or NT5K1106



Possible cause	Action
Defective QPC659M DLB card	<p>Test the shelf by entering:</p> <p><b>LD 30</b></p> <p><b>LOOP I s</b> “I s” represents loop and shelf numbers.</p> <p><b>Note:</b> If two loops are assigned to the shelf, be sure to test both.</p> <p>If a defective DLB card is indicated, check the switch settings on the card.</p> <p>If the switch settings are correct, replace the card.</p> <p>If the test fails but the DLB card does not seem to be faulty, go to the next possible cause.</p>
Defective QPC659 DLB card	<p>In Dual Loop Mode</p> <ul style="list-style-type: none"> <li>— Unseat 4 PE cards pertaining to the defective loop or</li> </ul> <p>In Single Loop Mode</p> <ul style="list-style-type: none"> <li>— Unseat 8 PE cards pertaining to the defective loop.</li> </ul> <p>Wait for the OVD message.</p> <p>If there is no OVD message, go to the defective PE card.</p> <p>If you receive an OVD message, remove the backplane access plate at the rear of the EEPE shelf and replace the Dual Loop Peripheral Buffer Card.</p> <p>Reinsert the PE cards on the shelf.</p> <p>Replace the backplane access plate.</p>

Possible cause	Action
Defective PE card	<p>For the EEPE shelf only: remove the backplane access plate at the rear of the module.</p> <p>Unseat all the cards in the shelf associated with the DLB card:</p> <ul style="list-style-type: none"><li>— If the red LED on the DLB card turns off, the fault is in one of the unseated cards.</li><li>— Reinsert the cards one at a time.</li><li>— When the DLB LED turns on again, replace the last card you inserted.</li></ul> <p>If the red LED on the DLB does not turn off when the PE cards are unseated, reinstall the cards and go to the next possible cause.</p> <p>For the EEPE shelf only: replace the backplane access plate at the rear of the module.</p>
Defective cable	<p>Test all cables to the DLB card.</p> <p>If you find a defective cable, replace it.</p> <p>If there is no problem with the cables, go to the next possible cause.</p>
Defective backplane	Replace the card cage assembly in the module.

## Symptom:

### Disabled peripheral equipment card

One PE or IPE card is disabled, the red LED on a PE card is lit, or two or more units on a card are disabled. There is a system message indicating that the card or units on the card are disabled. Only one card on the shelf is affected. You may need to replace one of the following:

- Controller card: NT8D01BC, NT8D01AC, NT8D01AD
- Dual loop peripheral buffer (DLB) card: QPC659
- Superloop network card and network card: NT8D04, QPC414
- PE or IPE card

- PE or IPE card cage: NT8D1303, NT8D3703

Possible cause	Action
Defective PE card	<p>Replace the affected card.</p> <p>Enable the card by entering:</p> <p><b>LD 32</b>  <b>ENLC I s c</b>    “I s c” represents loop, shelf, and card numbers.</p> <p>Test the card by entering:</p> <p><b>LD 30</b>  <b>SHLF I s</b></p>
Defective controller card or DLB card	<p>Replace the controller card or DLB card.</p> <p>Enable the PE card by entering:</p> <p><b>LD 32</b>  <b>ENLC I s c</b></p> <p>Test the card by entering:</p> <p><b>LD 30</b>  <b>SHLF I s</b></p>
Defective network card	<p>Replace the network card.</p> <p>Test the loop by entering:</p> <p><b>LOOP loop</b>    “loop” represents the loop number.</p>
Defective backplane	<p>Replace the card cage assembly in the module.</p>

## Symptom:

### More than one peripheral equipment card disabled

More than one PE or IPE card, or two or more units on different cards, are disabled on the same shelf. There is a system message indicating that the

cards or units on the cards are disabled. You may need to replace one of the following:

- Cable between network card and PE/IPE shelf
- Controller card: NT8D01BC, NT8D01AC, NT8D01AD
- Dual loop peripheral buffer (DLB) card: QPC659
- Superloop network card and network card: NT8D04, QPC414
- PE or IPE card
- PE or IPE card cage: NT8D1303, NT8D3703

Possible cause	Action
Defective controller card or DLB card	<p>Replace the controller card or DLB card.</p> <p>Enable the PE card by entering:</p> <p><b>LD 32</b>  <b>ENLC I s c</b>     “I s c” represents loop, shelf, and card numbers.</p> <p>Test the card by entering:</p> <p><b>LD 30</b>  <b>SHLF I s</b></p>
Defective cable from network card	<p>Disable the loop for the affected shelf by entering:</p> <p><b>DISL loop</b>     “loop” represents the loop number.</p> <p>Replace the cable from the network card to the PE shelf.</p> <p>Test the loop by entering:</p> <p><b>LOOP loop</b></p>
Defective network card	<p>Replace the network card.</p> <p>Test the loop by entering:</p> <p><b>LOOP loop</b></p>

Possible cause	Action
Defective PE card	Replace the affected card. Enable the card by entering: <b>LD 32</b> <b>ENLC I s c</b> Test the card by entering: <b>LD 30</b> <b>SHLF I s</b>
Defective backplane	Replace the card cage assembly in the module.



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# Clearing trunk faults

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## Contents

This section contains information on the following topics:

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## Trunk faults

Trunk cards provide the interface between the peripheral equipment buffer and various trunk facilities. This chapter specifically considers two types of trunk cards:

- E&M trunk card: provides four analog trunks, each of which can be individually configured to operate as:
  - E&M signaling trunk
  - Two-wire tie trunk
  - Two-wire tie trunk Type V (BPO)
  - DC-5 trunk
  - 2280 Hz tie trunk
  - Four-wire tie trunk
  - Four-wire tie trunk type V (BPO)
  - Four-wire tie trunk type C2 Earth-off Idle
  - Paging trunk

- Universal trunk card: provides eight trunks, each of which can be individually configured to operate as:
  - Central Office (CO) trunk
  - Direct Inward Dialing (DID) trunk
  - Two-way tie, Dial Repeating (2DR)
  - Two-way tie, Outgoing Automatic Incoming Dial (OAID) trunk
  - Outgoing Automatic Number Identification (OANI) trunk
  - Recorded Announcement (RAN) trunk
  - Music trunk
  - Paging trunk
- Direct Inward Dial Trunk: Provides eight trunks. The signaling supported depends on the country of operation, and can include:
  - Direct Inward Dialing (DID) trunk
  - Two-way Dial Repeating (2DR)
  - Outgoing Automatic Number Identification
  - Music On Hold Equipment
- Central Office Trunk: Provides eight trunks. The signaling supported depends on the country of operation, and can include:
  - Ground Start
  - Loop Start
  - A-type signaling
  - Loop Start Disconnect Clearing
  - Loop Start Guarded Clearing

Trunk faults can cause problems (such as noise) on outside calls and can keep calls from coming in or going out.



## Fault clearing procedures

Table 11 on page 113 lists common trunk fault indications. Refer to “How to clear faults” on [page 27](#) for complete fault clearing process.

**Table 11**  
**Trunk fault indicators**

Indicator	Possible indications
System messages	ERR090, 220, 270 OVD003, 008, 009, 010 TRK messages
Visual indicators	Red LED lit on trunk card
User reports	Users have trouble with a specific trunk Callers report continuous ringing Trouble with calls on console and/or telephones

### **WARNING**

Module covers are *not* hinged; do *not* let go of the cover. Lift the cover away from the module and set it out of your work area.

### **Symptom:**

#### **Trunk cannot make or receive calls (OVD message received)**

You cannot make or receive calls over a trunk and an overload (OVD) system message is received. The message indicates that only the TN for this trunk has been disabled. You may need to replace one of the following:

- E&M trunk card: NT8D15
- Universal trunk card: NT8D14
- Central office trunk card: QPC218, QPC219, QPC450, QPC470

- Any other trunk card
- Conference/TDS card: NT8D17
- DTR card: NT8D16
- Tone Detector card: QPC422
- Network/DTR card: NT8D18
- Trunk equipment (such as music source or paging equipment)
- PE or IPE card cage: NT8D1303, NT8D3703

Possible cause	Action
Defective trunk card	<p>If the indicated card is an E&amp;M or universal trunk card, unseat, then reinstall, the card to initiate a self-test. If the test fails, replace the card. If the test passes, follow the procedure below.</p> <p>Disconnect the wiring between the card and the cross-connect terminal.</p>
	<p>Enable the TN by entering:</p> <p><b>LD 32</b>  <b>ENLU I s c u</b> "I s c u" represents loop, shelf, card, and unit numbers.</p> <p>Wait for an OVD message. If you receive an OVD message, replace the card.</p> <p>If you do not receive an OVD message, reconnect the wiring and go to the next possible cause.</p>
Defective wiring	<p>At the main cross-connect terminal, disconnect the wiring to the CO or other trunk equipment (such as a music source or paging equipment).</p> <p>Enable the TN and wait for an OVD message. If you receive an OVD message, repair or replace the wiring to the PE shelf.</p> <p>If there is no OVD message, repair or replace the wiring from the cross-connect terminal to the telephone.</p> <p>If the trunk card still will not enable or there is still a trunk problem, reconnect the wiring and go to the next possible cause.</p>
Defective trunk equipment	<p>Make sure the CO equipment or other trunk equipment is not defective.</p> <p>If there is no problem with this equipment, go to the next possible cause.</p>

Possible cause	Action
Defective DTR, TDS, or MFS	<p>Use the attendant console to seize trunks and audibly test for dial tone and outpulsing, or use a maintenance telephone and enter:</p> <p><b>LD 36</b> <b>TRK I s c u</b></p> <p><b>Note:</b> See the <i>Software Input/Output: Maintenance</i> (553-3001-511) for information on using this test.</p> <p>If you do not hear outpulsing, the digitone receiver, tone and digit switch, or multi frequency sender may not be sending or receiving digits and the fault will affect more than one trunk. See the procedures for clearing faults on this equipment.</p> <p>If there is no problem with this equipment, go to the next possible cause.</p>
Defective PE shelf	<p>Unseat the affected trunk card and enable the TN.</p> <p>If you do not receive an OVD message, test superloop TNs by entering:</p> <p><b>LD 30</b> <b>UNTT I s c u</b></p> <p>Test TNs on other loops by entering:</p> <p><b>LD 45</b> <b>TEST</b></p> <p>If you receive an OVD message, replace the card cage assembly in the module.</p>

## Symptom:

### Trunk cannot make or receive calls (no OVD message)

You cannot make or receive calls over a trunk, but there is no overload (OVD) or other system message showing that the TN for this trunk is defective or has been disabled. You may need to replace one of the following:

- E&M trunk card: NT8D15
- Universal trunk card: NT8D14

- Central office trunk card: QPC218, QPC219, QPC450, QPC470
- Any other trunk card
- Conference/TDS card: NT8D17
- DTR card: NT8D16
- Tone Detector card: QPC422
- Network/DTR card: NT8D18
- Trunk equipment (such as music source or paging equipment)

Possible cause	Action
Defective trunk equipment	Make sure the CO equipment or other trunk equipment is not defective. If there is no problem with this equipment, go to the next possible cause.
Disabled or defective TN	Test TNs on superloops by entering: <b>LD 30</b> <b>UNTT l s c u</b> "l s c u" represents loop, shelf, card, and unit numbers. Test TNs on other loops by entering: <b>LD 45</b> <b>TEST</b> If the test fails, replace the indicated item and test again.
Defective trunk card	If the card is an E&M or universal trunk card, unseat, then reinstall the card to initiate a self-test. If the test fails, replace the card. If the test passes, go to the next possible cause.

Possible cause	Action
Defective wiring	<p>At the main cross-connect terminal, disconnect the wiring to the CO or other trunk equipment.</p> <p>Enable the TN and wait for an OVD message. If you receive an OVD message, repair or replace the wiring to the PE shelf.</p> <p>If there is no OVD message, repair or replace the wiring from the cross-connect terminal to the telephone.</p> <p>If the trunk card still will not enable or there is still a trunk problem, reconnect the wiring and go to the next possible cause.</p>
Defective DTR, TDS, or MFS	<p>Use the attendant console to seize trunks and audibly test for dial tone and outpulsing, or use a maintenance telephone and enter:</p> <p><b>LD 36</b> <b>TRK I s c u</b></p> <p><b>Note:</b> See the <i>Software Input/Output: Maintenance</i> (553-3001-511) for information on using this test.</p>
	<p>If you do not hear outpulsing, the digitone receiver, tone and digit switch, or multi frequency sender may not be sending or receiving digits and the fault will affect more than one trunk. See the procedures for clearing faults on this equipment.</p> <p>If there is no problem with this equipment, go to the next possible cause.</p>
Excessive traffic in the system	<p>Additional trunk cards may be required to handle the traffic in the system. See <i>Traffic Measurement: Formats and Output</i> (553-3001-450).</p>



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# Clearing attendant console faults

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## Contents

This section contains information on the following topics:

<a href="#">Attendant console faults .....</a>	<a href="#">119</a>
<a href="#">Fault clearing procedures .....</a>	<a href="#">120</a>

## Attendant console faults

Attendant consoles are the operator's interface to the system and its features. Components that can cause an attendant console fault are:

- the console itself or add-on units
- the console power supply
- the building wiring
- the cross-connect from the console to the line circuit
- the unit on the peripheral line card
- the peripheral line card
- the ringing generator
- the peripheral controller card
- the peripheral module power
- the peripheral module backplane

Attendant console faults typically affect only a single attendant. However, if more than one attendant console is affected, look for the following connections, among others:

- they are on the same line card
- they are on the same module
- they are on the same loop
- they are served by the same peripheral controller
- there is a problem with ringing or tones

Use the following software programs to isolate attendant console faults:

- LD 30 to test network loops
- LD 31 to test sets and consoles
- LD 32 to test peripheral controllers
- LD 45 to perform
  - signaling tests
  - manual continuity tests

## Fault clearing procedures

Table lists common attendant console fault indications. Refer to “How to clear faults” on [page 27](#) for complete fault clearing process.

**Table 12**  
**Telephone fault indicators**

Indicator	Possible indications
System messages	BSD501—The console (identified by loop, shelf, card, and unit) failed the signaling test. If the unit number is preceded by a minus sign, the console was disabled. There is a console fault or a fault on the peripheral equipment card indicated.



**Table 12**  
**Telephone fault indicators**

Indicator	Possible indications
Visual indicators	Red LED lit on associated cards
User reports	Trouble with calls Trouble with equipment (such as handset, headset, or display)

**WARNING**

Module covers are *not* hinged; do *not* let go of the cover. Lift the cover away from the module and set it out of your work area.

**Symptom:****Console cannot make or receive calls (OVD message received)**

The attendant console cannot make or receive calls. There is an OVD message indicating that a TN for the attendant console has been disabled. See *Telephones and Consoles* (553-3001-367) for information on connecting attendant consoles. See *Large System: Installation and Configuration* (553-3021-210) for information on system cabling. To replace other

equipment, see *Large System: Maintenance* (553-3021-500). You may need to replace one of the following:

- Attendant console
- PE or IPE card associated with the console
- CE/PE, PE, or IPE card cage: NT8D1103, NT8D1303, NT8D3703

Possible cause	Action
Defective PE card	<p>Software disable the TN indicated by the OVD message by entering:</p> <p><b>LD 32</b></p> <p><b>DISU I s c u</b>    "I s c u" represents loop, shelf, card, and unit numbers.</p> <p>Disconnect the wiring between the PE card and the cross-connect terminal.</p> <p>Reenable the TN by entering:</p> <p><b>ENLU I s c u</b></p> <p>and wait for an OVD message.</p>
	<p>If you receive a message indicating a problem with the card or unit, replace the card.</p> <p>If you do not receive a message indicating a problem with the card or unit, reconnect the wiring and go to the next possible cause.</p>
Defective console	<p>Disable the TN. Disconnect the wiring from the console to the jack.</p> <p>Reenable the TN and wait for an OVD message.</p> <p>If you do not receive an OVD message, replace the console.</p> <p>If you receive an OVD message, reconnect the wiring and go to the next possible cause.</p>

Possible cause	Action
Defective wiring	<p>Disable the TN. Disconnect the wiring between the console and the cross-connect terminal.</p> <p>Reenable the TN and wait for an OVD message.</p> <p>If you do not receive an OVD message, replace or repair the wiring between the console and the cross-connect terminal.</p> <p>If you receive an OVD message, replace or repair the wiring between the PE shelf and the cross-connect terminal.</p> <p>If there is still a console problem, reconnect all wiring and go to the next possible cause.</p>
Defective backplane	<p>Disable the TN. Unseat the affected PE card.</p> <p>Reenable the TN and wait for an OVD message.</p> <p>If you receive an OVD message, replace the card cage assembly in the module.</p>

**Symptom:****Console cannot make or receive calls (no OVD message)**

The attendant console cannot make or receive calls. There is no OVD message. There may be other system messages indicating that the TN for this console is defective or has been disabled. See *Telephones and Consoles* (553-3001-367) for information on connecting attendant consoles. See *Large System: Installation and Configuration* (553-3021-210) for information on system cabling.

Possible cause	Action
No power to console	<p>Check the power supply and wiring to see that the console is powered up.</p> <p>If there is a power supply problem, correct it.</p> <p>If there is no power problem, go to the next possible cause.</p>
Defective console	<p>Test the console by entering:</p> <p><b>LD 31</b></p> <p><b>Note:</b> See the <i>Software Input/Output: System Messages</i> (553-3001-411) for information on testing consoles with LD 31.</p> <p>If the console fails the test, replace it.</p> <p>If the console passes the test, go to the next possible cause.</p>
Console connected to wrong TNs	<p>Check the cross-connect terminal to make sure the console is connected to the correct TNs.</p> <p>If the console is not connected correctly, fix the wiring.</p> <p>If the console is connected correctly, go to the next possible cause.</p>

Possible cause	Action
Disabled TN	<p>Software disable, then reenable, each TN by entering:</p> <p><b>LD 32</b> <b>DISU I s c u</b> <b>ENLU I s c u</b> “I s c u” represents loop, shelf, card, and unit numbers.</p> <p>Test TNs on superloops by entering:</p> <p><b>LD 30</b> <b>UNTT I s c u</b></p> <p>Test TNs on other loops by entering:</p> <p><b>LD 45</b> <b>TEST</b></p> <p>If there is still a console problem, go to the next possible cause.</p>
Defective wiring	<p>Make sure wiring is properly connected and wires are not interchanged, crossed, or grounded:</p> <ul style="list-style-type: none"><li>— Check the wiring between the console and the cross-connect terminal.</li><li>— Check the wiring between the PE/IPE shelf and the cross-connect terminal.</li></ul> <p>If there is a wiring problem, correct it.</p>

**Symptom:****Indicator or digit display not functioning properly**

The attendant console operates, but some LCD indicators or digit displays are not functioning properly. See *Telephones and Consoles* (553-3001-367) for information on connecting attendant consoles.

Possible cause	Action
Disconnected or defective power supply	Make sure the required power supplies to the attendant console are connected and are not defective.  If there is still a console problem, go to the next possible cause.
Disabled TN	Software disable, then reenable, each TN by entering:  <b>LD 32</b> <b>DISU I s c u</b> <b>ENLU I s c u</b> "I s c u" represents loop, shelf, card, and unit numbers.  Test TNs on superloops by entering:  <b>LD 30</b> <b>UNTT I s c u</b>
	Test TNs on other loops by entering:  <b>LD 45</b> <b>TEST</b>  If there is still a console problem, go to the next possible cause.
Feature not assigned	Make sure the feature or the indicator is assigned in software (see the <i>Software Input/Output: Administration</i> (553-3001-311)).  If there is still a console problem, go to the next possible cause.
Defective console	Test the console by entering:  <b>LD 31</b>  (See the <i>Software Input/Output: System Messages</i> (553-3001-411) for information on testing consoles with LD 31.)  If the console fails the test, replace it.

**Symptom:****Operator cannot hear or be heard properly**

The attendant console operates, but the user cannot hear or be heard properly. See *Telephones and Consoles* (553-3001-367) for information on connecting attendant consoles. See *Large System: Installation and Configuration* (553-3021-210) for information on system cabling.

Possible cause	Action
Defective headset or handset	<p>Make sure the handset or headset is plugged into the correct jack on the console.</p> <p>Try another handset or headset.</p> <p>If the test equipment works, replace the faulty handset or headset.</p> <p>If there is still a console problem, go to the next possible cause.</p>
Defective console	<p>Test the console by entering:</p> <p><b>LD 31</b></p> <p>(Follow the procedures in the <i>Software Input/Output: Maintenance</i> (553-3001-511) to test consoles with LD 31.)</p> <p>If the console fails the test, replace it.</p> <p>If the console passes the test, go to the next possible cause.</p>

Possible cause	Action
Defective PE/IPE card	<p>Software disable each TN by entering:</p> <p><b>LD 32</b></p> <p><b>DISU I s c u</b>    “I s c u” represents loop, shelf, card, and unit numbers.</p> <p>Disconnect the wiring between the PE card and the cross-connect terminal.</p> <p>Reenable and test each TN by entering:</p> <p><b>ENLU I s c u</b></p> <p>Wait for an OVD message. If you receive a message indicating a problem with the card or unit, replace the card.</p> <p>If you do not receive a message indicating a problem with the card or unit, reconnect the wiring and go to the next possible cause.</p>
Defective wiring to console	<p>Make sure wiring is properly connected and wires are not interchanged, crossed, or grounded:</p> <ul style="list-style-type: none"> <li>— Check the wiring between the console and the cross-connect terminal.</li> <li>— Check the wiring between the PE shelf and the cross-connect terminal.</li> </ul> <p>If there is a wiring problem, correct it.</p>



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# Clearing telephone faults

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## Contents

This section contains information on the following topics:

<a href="#">Telephone faults .....</a>	<a href="#">129</a>
<a href="#">Fault clearing procedures .....</a>	<a href="#">130</a>

## Telephone faults

Telephones and terminals are the user's interface to the system and its features. Components that can cause a telephone fault are:

- the telephone itself or add-on units
- the telephone power supply
- the building wiring
- the cross-connect from the telephone to the line circuit
- the unit on the peripheral line card
- the peripheral line card
- the ringing generator
- the peripheral controller card
- the peripheral module power
- the peripheral module backplane

Telephones and terminal faults typically affect only a single user. However, if more than one telephone is affected, look for the following connections, among others:

- they are on the same line card
- they are on the same module
- they are on the same loop
- they are served by the same peripheral controller
- there is a problem with ringing or tones

Use the following software programs and tests to isolate telephone faults:

- LD 30 to test network loops
- LD 31 to test sets and consoles
- LD 32 to test peripheral controllers
- LD 45 to perform signaling tests
- Meridian Modular Telephone (M2006, M2008, M2016S, and M2616) self-test

## Fault clearing procedures

Table 13 lists common telephone fault indications. Refer to “How to clear faults” on [page 27](#) for complete fault clearing process.

**Table 13**  
**Telephone fault indicators (Part 1 of 2)**

Indicator	Possible indications
System messages	BSD501 ERR500 MWL500 NWS501 OVD001–002, 004, 005 XMI messages

**Table 13**  
**Telephone fault indicators (Part 2 of 2)**

Visual indicators	Red LED lit on associated cards
User reports	Trouble with calls  Trouble with equipment (such as handset or add-on module)

**WARNING**

Module covers are *not* hinged; do *not* let go of the cover. Lift the cover away from the module and set it out of your work area.

**Symptom:****Telephone cannot make or receive calls (OVD message received)**

The telephone cannot make or receive calls. There is an OVD message indicating that the TN for only this telephone has been disabled. See *Telephones and Consoles* (553-3001-367) for information on connecting telephones. See *Large System: Installation and Configuration* (553-3021-210) for information on system cabling. You may need to replace one of the following:

- PE or IPE card
- Telephone
- Wiring between the cross-connect terminal and the telephone
- Wiring between the PE/IPE shelf and the telephone
- CE/PE, PE, or IPE card cage: NT8D1103, NT8D1303, NT8D3703

Possible cause	Action
Defective PE card	<p>Software disable the TN indicated by the OVD message by entering:</p> <p><b>LD 32</b>  <b>DISU I s c u</b>    "I s c u" represents loop, shelf, card, and unit numbers.</p> <p>Disconnect the wiring between the PE card and the cross-connect terminal.</p>
	<p>Reenable the TN by entering:</p> <p><b>ENLU I s c u</b></p> <p>and wait for an OVD message.</p>
	<p>If you receive a message indicating a problem with the card or unit, replace the card.</p> <p>If you do not receive a message indicating a problem with the card or unit, reconnect the wiring and go to the next possible cause.</p>
Defective telephone	<p><b>Note:</b> If the telephone is a Meridian Modular Telephone, enter:</p> <p><b>LD 32</b>  <b>IDU I s c u</b></p> <p>If there is no response, replace the telephone.  If there is an appropriate response, continue this procedure.</p> <p>Disable the telephone TN. Disconnect the wiring from the telephone to the jack.</p> <p>Reenable the TN and wait for an OVD message.</p> <p>If you do not receive an OVD message, replace the telephone.</p> <p>If you receive an OVD message, reconnect the wiring and go to the next possible cause.</p>

Possible cause	Action
Defective wiring	<p>Disable the TN. Disconnect the wiring between the telephone and the cross-connect terminal.</p> <p>Reenable the TN and wait for an OVD message.</p> <p>If you do not receive an OVD message, replace or repair the wiring between the telephone and the cross-connect terminal.</p> <p>If there is still a problem with the telephone, reconnect all wiring and go to the next possible cause.</p>
Defective backplane	<p>Disable the TN. Unseat the affected PE card.</p> <p>Reenable the TN and wait for an OVD message.</p> <p>If you receive an OVD message, replace the card cage assembly in the module.</p>

**Symptom:****Telephone cannot make or receive calls (no OVD message)**

The telephone cannot make or receive calls. There is no OVD message or other system message indicating the TN for this telephone is defective or disabled. There may or may not be dial tone when the handset is off-hook. See *Telephones and Consoles* (553-3001-367) for information on connecting telephones. See *Large System: Installation and Configuration* (553-3021-210) for information on system cabling. To replace other equipment, see “Replacing equipment” on [page 193](#).

Possible cause	Action
No power to digital telephone	<p>Check the power supply (if one is required) and make sure it is not defective.</p> <p>If there is a power supply problem, correct it.</p> <p>If there is no problem with the power supply, go to the next possible cause.</p>
Telephone connected to wrong TNs	<p>Check the cross-connect terminal to make sure the telephone is connected to the correct TN.</p> <p>If the telephone is not connected correctly, fix the wiring.</p> <p>If the telephone is connected correctly, go to the next possible cause.</p>
Disabled TN	<p>Software disable, then reenable, the telephone TN by entering:</p> <p><b>LD 32</b>  <b>DISU I s c u</b>  <b>ENLU I s c u</b> "I s c u" represents loop, shelf, card, and unit numbers.</p> <p>Test TNs on superloops by entering:</p> <p><b>LD 30</b>  <b>UNTT I s c u</b></p> <p>Test TNs on other loops by entering:</p> <p><b>LD 45</b>  <b>TEST</b></p> <p>If there is still a problem with the telephone, go to the next possible cause.</p>

Possible cause	Action
Defective telephone	<p>Disconnect the telephone from the jack. Plug in another telephone of the same type.</p> <p>If the replacement telephone works, replace the telephone you removed.</p> <p>If the replacement telephone does not work, reconnect the original telephone and go to the next possible cause.</p> <p><b>Note:</b> If the telephone is a Meridian Modular Telephone, enter:</p> <p><b>LD 32</b> <b>IDU I s c u</b></p> <p>If there is no response, replace the telephone.</p> <p>If there is an appropriate response, see “Add-on modules” in <i>Telephones and Consoles</i> (553-3001-367) for self-test instructions.</p>
Defective wiring	<p>Make sure wiring is properly connected and wires are not interchanged, crossed, or grounded:</p> <ul style="list-style-type: none"> <li>— Check the wiring between the telephone and the cross-connect terminal.</li> <li>— Check the wiring between the PE shelf and the cross-connect terminal.</li> </ul> <p>If there is a wiring problem, correct it.</p>

## Symptom:

### One end cannot hear or be heard

The person at the far end can hear you but you cannot hear them or the person at the far end cannot hear you but you can hear them. See *Telephones and Consoles* (553-3001-367) for information on connecting telephones. See *Large System: Installation and Configuration* (553-3021-210) for information on system cabling. To replace other equipment, see “Replacing equipment” on [page 193](#). You may need to replace one of the following:

- PE or IPE card

- Telephone handset
- Telephone
- Wiring to the telephone

Possible cause	Action
Fault on other equipment	<p>Check with the user to determine if the fault is present only on:</p> <ul style="list-style-type: none"> <li>— Certain types of calls (such as on a paging trunk or a Tie trunk).</li> <li>— Calls to a specific location.</li> <li>— Calls to a specific telephone or other piece of equipment (such as a modem or Fax machine).</li> </ul> <p>If the fault occurs only with certain calls, take the appropriate action.</p> <p>If the fault occurs on all calls, go to the next possible cause.</p>
Defective handset	<p>Check the receiver or transmitter in the handset. If one is defective, replace the handset or, if necessary, the telephone.</p>
Defective telephone	<p>Disconnect the telephone from the jack. Plug in another telephone of the same type.</p> <p>If the replacement telephone works, replace the telephone you removed.</p> <p>If the replacement telephone does not work, reconnect the original telephone and go to the next possible cause.</p> <p><b>Note:</b> If the telephone is a Meridian Modular Telephone, enter:</p> <p><b>LD 32</b> <b>IDU I s c u</b></p> <p>If there is no response, replace the telephone.</p> <p>If there is an appropriate response, see “Add-on modules” in <i>Telephones and Consoles</i> (553-3001-367) for self-test instructions.</p>



Possible cause	Action
Defective PE card	<p>Software disable the telephone TN by entering:</p> <p><b>LD 32</b></p> <p><b>DISU l s c u</b> “l s c u” represents loop, shelf, card, and unit numbers.</p> <p>Disconnect the wiring between the PE card and the cross-connect terminal.</p> <p>Reenable and test the TN by entering:</p> <p><b>ENLU l s c u</b></p> <p>Wait for an OVD message. If you receive a message indicating a problem with the card or unit, replace the card.</p> <p>If you do not receive a message indicating a problem with the card or unit, reconnect the wiring and go to the next possible cause.</p>
Defective wiring to telephone	<p>Make sure wiring is properly connected and wires are not interchanged, crossed, or grounded:</p> <ul style="list-style-type: none"> <li>— Check the wiring between the telephone and the cross-connect terminal.</li> <li>— Check the wiring between the PE shelf and the cross-connect terminal.</li> </ul> <p>If there is a wiring problem, correct it.</p>

## Symptom:

### Noise or low volume on all calls

There is noise on the line on all calls or the volume is lower than usual on all calls. See *Telephones and Consoles* (553-3001-367) for information on connecting telephones. See *Large System: Installation and Configuration* (553-3021-210) for information on system cabling. To replace other equipment, see “Replacing equipment” on [page 193](#). You may need to replace one of the following:

- PE or IPE card

- Telephone
- Wiring to the telephone

Possible cause	Action
Defective wiring	<p>Make sure wiring is properly connected and wires are not interchanged, crossed, or grounded:</p> <ul style="list-style-type: none"> <li>— Check the wiring between the telephone and the cross-connect terminal.</li> <li>— Check the wiring between the PE shelf and the cross-connect terminal.</li> </ul> <p>If there is a wiring problem, correct it.</p> <p>If there is no problem with the wiring, go to the next possible cause.</p>
Defective telephone	<p>Disconnect the telephone from the jack. Plug in another telephone of the same type.</p> <p>If the replacement telephone works, replace the telephone you removed.</p> <p>If the replacement telephone does not work, reconnect the original telephone and go to the next possible cause.</p> <p><b>Note:</b> If the telephone is a Meridian Modular Telephone, enter:</p> <p><b>LD 32</b> <b>IDU I s c u</b></p> <p>If there is no response, replace the telephone.</p> <p>If there is an appropriate response, see “Add-on modules” in <i>Telephones and Consoles</i> (553-3001-367) for self-test instructions.</p>

Possible cause	Action
Defective PE card	<p>Software disable the telephone TN by entering:</p> <p><b>LD 32</b></p> <p><b>DISU l s c u</b> "l s c u" represents loop, shelf, card, and unit numbers.</p> <p>Disconnect the wiring between the PE card and the cross-connect terminal.</p> <p>Reenable and test the TN by entering:</p> <p><b>ENLU l s c u</b></p> <p>Wait for an OVD message. If you receive a message indicating a problem with the card or unit, replace the card.</p>

## Symptom:

### Defective indicator, digit display, or component

The telephone can place and receive calls, but one or more LED or LCD indicators, digit displays, or components (such as a handsfree unit) are not working. See *Telephones and Consoles* (553-3001-367) for information on connecting telephones. To replace other equipment, see "Replacing equipment" on [page 193](#). You may need to replace one of the following:

- Power supply to telephone
- PE or IPE card
- Telephone

Possible cause	Action
Telephone has incorrect software parameters	<p>Disconnect, then reconnect, power to the telephone to force a reset and parameter download.</p> <p>If the fault is not cleared, go to the next possible cause.</p>
No power to digital telephone	<p>Check the power supply (if one is required) and make sure it is not defective.</p> <p>If there is a power supply problem, correct it.</p> <p>If there is no problem with the power supply, go to the next possible cause.</p>
Defective telephone	<p>Disconnect the telephone from the jack. Plug in another telephone of the same type.</p> <p>If the replacement telephone works, replace the telephone you removed.</p> <p>If the replacement telephone does not work, reconnect the original telephone and go to the next possible cause.</p> <p><b>Note:</b> If the telephone is a Meridian Modular Telephone, enter:</p> <p><b>LD 32</b> <b>IDU I s c u</b></p> <p>If there is no response, replace the telephone.</p> <p>If there is an appropriate response, see "Add-on modules" in <i>Telephones and Consoles</i> (553-3001-367) for self-test instructions.</p>
Feature not assigned	<p>Make sure the feature or the indicator is assigned in software (see the <i>Software Input/Output: Administration</i> (553-3001-311)).</p>

**Symptom:****Defective feature**

The telephone can make and receive calls, but one or more of its features (such as call transfer or ring again) is not working. See *Telephones and Consoles* (553-3001-367) for information on connecting telephones.

Possible cause	Action
Feature not assigned	<p>Make sure the feature or the indicator is assigned in software (see the <i>Software Input/Output: Administration</i> (553-3001-311)).</p> <p>If there is still a console problem, go to the next possible cause.</p>
Defective telephone	<p>Disconnect the telephone from the jack. Plug in another telephone of the same type.</p> <p>If the replacement telephone works, replace the telephone you removed.</p> <p>If the replacement telephone does not work, reconnect the original telephone and go to the next possible cause.</p> <p><b>Note:</b> If the telephone is a Meridian Modular Telephone, enter:</p> <p><b>LD 32</b> <b>IDU I s c u</b></p> <p>If there is no response, replace the telephone.</p> <p>If there is an appropriate response, see “Add-on modules” in <i>Telephones and Consoles</i> (553-3001-367) for self-test instructions.</p>

**Symptom:****Defective add-on module**

The telephone can make and receive calls, but an add-on module connected to it is not working. See *Telephones and Consoles* (553-3001-367) for information on connecting telephones. You may need to replace one of the following:

- Add-on module

- Data option card
- Power supply for add-on module

Possible cause	Action
Defective power supply for add-on module	If the add-on module requires a separate power supply, make sure it is properly connected and in working order.  If there is still a problem with the telephone, go to the next possible cause.
Defective add-on module	Replace the add-on module.
Defective data option card	If the fault is with a data add-on module, replace the data option card.

## Symptom:

### Cannot dial from 2500 telephone

A user cannot dial from a 2500 telephone. The condition may exist on more than one telephone and may be intermittent. The telephone may occasionally experience a “no dial tone” condition. Calls from other types of sets are not affected. See *Telephones and Consoles* (553-3001-367) for information on connecting telephones. See *Large System: Installation and Configuration* (553-3021-210) for information on system cabling. To replace other equipment, see “Replacing equipment” on [page 193](#). You may need to replace one of the following:

- DTR card: NT8D16
- Tone Detector card: QPC422
- Network/DTR card: NT8D18
- Telephone
- Wiring to the telephone

Possible cause	Action
Defective telephone	<p>If only one telephone is affected, replace it.</p> <p>If there is still a problem with the telephone, go to the next possible cause.</p>
Defective wiring	<p>If only one telephone is affected, make sure wiring is properly connected and wires are not interchanged, crossed, or grounded:</p> <ul style="list-style-type: none"> <li>— Check the wiring between the telephone and the cross-connect terminal.</li> <li>— Check the wiring between the PE shelf and the cross-connect terminal.</li> </ul> <p>If there is a wiring problem, correct it.</p> <p>If there is still a problem with the telephone, go to the next possible cause.</p>
Defective digitone receiver	<p>If the condition is intermittent or more than one telephone is affected, test the digitone receivers in the system by entering:</p> <p><b>LD 34</b>  <b>DTR I s c u</b> “I s c u” represents loop, shelf, card, and unit numbers of the DTR.</p> <p>Replace any units that fail the test.</p> <p>If there is still a problem with the telephone, go to the next possible cause.</p>
Excessive Digitone traffic	<p>Additional digitone receivers may be required to handle the traffic in the system. See <i>Traffic Measurement: Formats and Output</i> (553-3001-450).</p>

## Symptom:

### No ring on 500 and 2500 telephones

Both 500 and 2500 telephones do not ring. One or several sets in the same module are experiencing the problem. See *Telephones and Consoles* (553-3001-367) for information on connecting telephones. See *Large System: Installation and Configuration* (553-3021-210) for information on system cabling. To replace other equipment, see “Replacing equipment” on [page 193](#). You may need to replace one of the following:

- Ringing generator: NT6D42, NT8D21

- PE or IPE card
- Telephone
- Wiring to the telephone
- CE/PE, PE, or IPE card cage: NT8D1103, NT8D1303, NT8D3703

Possible cause	Action
Defective telephone	<p>If only one telephone is affected, replace it.</p> <p>If there is still a problem with the telephone, go to the next possible cause.</p>
Defective wiring	<p>If only one telephone is affected, make sure wiring is properly connected and wires are not interchanged, crossed, or grounded:</p> <ul style="list-style-type: none"> <li>— Check the wiring between the telephone and the cross-connect terminal.</li> <li>— Check the wiring between the PE shelf and the cross-connect terminal.</li> </ul> <p>If there is a wiring problem, correct it.</p> <p>If there is still a problem with the telephone, go to the next possible cause.</p>
Defective PE card	<p>Software disable the telephone TN by entering:</p> <p><b>LD 32</b></p> <p><b>DISU l s c u</b>    “l s c u” represents loop, shelf, card, and unit numbers.</p> <p>Disconnect wiring between the PE card and the cross-connect terminal.</p> <p>Reenable and test the TN by entering:</p> <p><b>ENLU l s c u</b></p> <p>Wait for an OVD message. If you receive a message indicating a problem with the card or unit, replace the card.</p> <p>If you do not receive a message indicating a problem with the card or unit, reconnect the wiring and go to the next possible cause.</p>



Possible cause	Action
Defective controller card	<p>If several sets on different cards in the same loop are affected, replace the controller card.</p> <p>If there is still a problem with the telephone, reinstall the original controller card and go to the next possible cause.</p>
Defective ringing generator	<p>If several sets on different cards in the same module are affected, replace the ringing generator for the shelf (even if the green LED on the unit is lit).</p> <p>If there is still a problem with the telephone, reinstall the original ringing generator and go to the next possible cause.</p>
Defective backplane	<p>If the green LED is lit on the ringing generator and the fault persists, replace the card cage assembly in the module.</p>



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# Final maintenance procedure

---

## Introduction

Perform the final maintenance Procedure 3 to verify that the system is operating properly and that there are no remaining faults.

### **Procedure 3** **Final maintenance procedure**

- 1** Make sure all cards that may have been removed are reinserted in their assigned location and enabled.
- 2** Make sure all wiring and connectors that may have been disconnected are reconnected.
- 3** Make sure all loops and shelves that should be enabled are enabled.

**Note:** Digital telephones on a network loop that was disabled may not be restored when the loop is enabled. Each telephone should be individually disabled and reenabled through LD 32. Service may also be restored by disconnecting and reconnecting the telephone line cord.

- 4** Make sure all circuit breakers are set to ON and any fuses (in power panels or auxiliary equipment) are inserted.

- 5    Clear fault indicators by entering:

**LD 35 or LD 135**

To clear the maintenance display in a single CPU system, enter:

**CDSP**

To clear the maintenance display in a dual CPU system, clear the display on one CPU by entering:

**CDSP**

Test the CPU by entering:

**TCPU** (LD 35), or

**TEST CPU** (LD 135)

If the response is "OK," switch CPUs by entering:

**SCPU**

Clear the display on the other CPU by entering:

**CDSP**

To clear a major alarm indication and restore Power Fail Transfer Units (PFTUs) to normal operation, enter:

**CMAJ**

To clear a minor alarm indication from all attendant consoles, enter:

**CMIN ALL**

- 6    Set the midnight routine to run after you log out of the system with:

**MIDN**

End the session in LD 35 or LD 135 and log out of the system:

\*\*\*\*

**LOGO** (The midnight routine will now run.)

- 7    Check system messages produced when the midnight routine runs. Clear any faults indicated.

- 8** If there was a sysload (reload) while you were clearing a fault, reset the correct time and date by entering:

**LD 2**

**STAD** (day) (month) (year) (hour) (minute) (second)

Check the time and date you entered:

**TTAD**

End the session in LD 2 and log out of the system:

\*\*\*\*

**LOGO**

- 9** Replace any covers you removed from modules.
- 10** Tag defective equipment with a description of the fault and return it to a repair center.



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# Software maintenance tools

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## Contents

This section contains information on the following topics:

Diagnostic programs . . . . .	151
System features . . . . .	156
History file feature . . . . .	157
Interactive diagnostics. . . . .	158

## Diagnostic programs

Diagnostic software programs monitor system operations, detect faults, and clear faults. Some programs run continuously; some are scheduled.

Diagnostic programs are *resident* or *non-resident*. Resident programs, such as the Error Monitor and Resident Trunk Diagnostic, are always present in system memory. Non-resident programs, such as the Input/Output Diagnostic and Common Equipment Diagnostic, are used as Midnight and Background Routines or for interactive diagnostics. Non-resident programs are loaded from the system disk and are run as scheduled or upon request.

Non-resident programs are called overlay programs or loads. They are identified by a title and a number preceded by the mnemonic for load (for example, Trunk Diagnostic—LD 36).

See *Software Input/Output: Administration* (553-3001-311) for detailed information on all diagnostic programs.

## Error Monitor

The Error Monitor is a resident program that continuously tracks call processing. The Error Monitor generates system messages if it detects invalid or incorrectly formatted call-processing information.

System messages generated by the Error Monitor are preceded by the mnemonic ERR, which usually indicates hardware faults, or the mnemonic BUG, which usually indicates software problems. With prompt ERRM in the Configuration Record (LD 17), you can instruct the system to print or not print ERR or BUG messages.

Refer to *Software Input/Output: System Messages* (553-3001-411) for help in interpreting system messages, including ERR and BUG.

## Initialize Program

The Initialize Program momentarily interrupts call processing as it clears common equipment faults. It then rebuilds call-dependent data and generates system messages, with the mnemonic INI, that indicate the status of the system. This process is called an *initialization*.

Through an initialization, you can download firmware from the CPU to superloop network cards and controller cards. Call processing is interrupted for an additional amount of time during this process.

You can activate an initialization by pressing the manual initialize (Man Int) button on the following:

- NT6D66, NT9D19, NT5D10, or NT5D03 Call Processor Card

An initialization always occurs automatically after the System Loader program runs. An initialization often occurs when a software or firmware fault is detected and when a common equipment hardware fault is detected.

## Midnight and Background Routines

In the Configuration Record (LD 17), you can select the overlay programs that will run in the *Midnight Routine* and *Background Routine*. These routines automatically perform maintenance checks. Programs included in the



Midnight Routine are defined with the prompt DROL (derived from “daily routine overlay”). Programs included in the Background Routine are defined with the prompt BKGD.

The Midnight Routine runs once every 24 hours. This routine is preset to run at midnight when a system is shipped, but you may assign a different time in the Configuration Record. When it is time for the Midnight Routine to start, the system cancels any other program.

The Background Routine runs when no other program is loaded in the overlay area. The programs included in the Background Routine run in sequence repeatedly until the Midnight Routine runs or there is another request to use the overlay area (for example, if you log on to check the status of a circuit card).

You may include the programs listed in Table 14 in Midnight and Background Routines. Your maintenance requirements and the configuration of your system determine the programs you include in Midnight and Background Routines.

**Note:** Software Audit (LD 44) should always be used in the Background Routine.

**Table 14**  
**Programs used in Midnight and Background Routines (Part 1 of 2)**

Program number	Program function
LD 30	Network and Signaling Diagnostic
LD 32 (Midnight only)	Network and Peripheral Equipment Replacement
LD 33	1.5 Mbyte Remote Peripheral Equipment Diagnostic
LD 34	Tone and Digit Switch and Digitone Receiver
LD 36	Trunk Diagnostic 1
LD 38	Conference Circuit Diagnostic
<b>Note 1:</b> LD 43 will automatically be activated during midnight routines if changes have been made within the past 24 hours.	

**Table 14**  
**Programs used in Midnight and Background Routines (Part 2 of 2)**

Program number	Program function
LD 40	Call Detail Recording Diagnostic
LD 41	Trunk Diagnostic 2
LD 43 (Midnight only)	Data Dump (see Note 2)
LD 44	Software Audit
LD 45	Background Signal and Switching Diagnostic
LD 46	Multi frequency Sender Diagnostic for ANI
LD 60 (Midnight only)	Digital Trunk Interface Diagnostic
LD 61 (Midnight only)	Message Waiting Lamps Reset
<b>Note 1:</b> LD 43 will automatically be activated during midnight routines if changes have been made within the past 24 hours.	

## Overlay Loader

This resident program locates, loads, and checks all overlay programs. It automatically activates the Midnight and Background Routines. You can load programs manually by entering commands through the system terminal or maintenance telephone. Once the program is loaded, you see the program mnemonic (such as TRK for Trunk Diagnostic) on the system terminal.

You can also use the Overlay Loader to enable, disable, and display the status of the disk drive unit.

## Overload Monitor

The system continuously monitors the volume of system messages. If it detects too many error messages from a line or trunk card, the system activates the Overload Monitor program. The Overload Monitor disables the faulty card and generates system messages with the mnemonic OVD.

Refer to *Software Input/Output: System Messages* (553-3001-411) for help in interpreting system messages.

## Resident Trunk Diagnostic

This program automatically monitors all trunk calls and records apparent faults on each trunk. If the number of faults on a trunk exceeds the threshold for that trunk, the program generates a system message identifying the trunk and the type of fault.

A failure on a trunk may keep the trunk from detecting incoming calls. The threshold mechanism cannot detect such a failure, so this program also records how many days it has been since each trunk received an incoming call. If you suspect some incoming calls are not being processed, you can use the command LMAX in Trunk Diagnostic 1 (LD 36) to identify the trunk with the maximum idle days.

## System Loader

The System Loader program loads all call-processing programs and data and starts memory-checking diagnostics. After all required programs and data have been loaded and all checks performed, the System Loader is erased from system memory, the Initialize Program runs, and normal call processing begins. This process is called a *sysload* or *system reload*.

The System Loader operates automatically on system power up or if a common equipment or power fault destroys information in the system memory. For maintenance purposes, you generally activate this program only if call processing has stopped.

You can start a sysload manually by pressing the reload (Rld) button on the following:

- NT6D66, NT9D19, NT5D10, or NT5D03 Call Processor Card (simultaneously press both buttons)

#### **CAUTION**

During a sysload *active* calls are not disconnected and the system goes into an emergency line transfer state. Activate the System Loader only if you are specifically instructed to do so in Nortel Networks Publications.

To minimize sysload time, you can enable the Short Memory Test capability in LD 17 (prompt SMEM). If you enable the test, only one pass of memory testing is performed on a normal reload. If any subsequent system failure causes an automatic reload, the full six-pass Memory Test is performed on all system memory.

## **System features**

When the system receives a system reload signal, the sysload occurs in two to five minutes, depending on the size of the customer database. During the sysload, the system performs a core shelf test, which includes self-tests on the CP and the IOP part of the IOP/CMDU. The results of the self-tests are displayed on the liquid crystal display (LCD) on the CP card, the hex display on the IODU/C card, and the system terminal. On the other core cards, the LED blinks three times after a successful test.

The system typically performs an initialization in under 90 seconds. You can manually initialize only the active core side.

The overlays reside in dynamic random access memory (DRAM) after they are loaded from the hard disk during an initial software load (software is shipped on redundant hard disks). Since they are always in resident memory, the overlays can be loaded quickly.

The system can diagnose faults in field replaceable units for all core hardware, including cables. In case of a failure, a message in a natural

language (such as English) appears on the system terminal and on the liquid crystal display (LCD) on the CP card.

If there is a hardware fault, the system attempts a recovery. In the case of a redundant hardware failure, under certain conditions the system will attempt a graceful switchover to the core side without the failure.

Remote operation capabilities include remote access to both Core Modules or Core/Network Modules; the ability to sysload, initialize, or put the system in a split mode; and the ability to upload and download the customer database. You can access the core complex in each Core Module or Core/Network Module through the I/O ports on the CP cards.

## History file feature

If you have a printer connected to the system, each system message is printed as it is received. If you do not have a printer connected, you can use the History File to store a limited number of system messages in protected memory. The contents of the file may then be printed on demand using Print Routine 3 (LD 22).

The messages stored are specified on a system basis and can be one or more of the following types:

- customer service changes (CSC)
- maintenance messages (MTC)
- service changes (SCH)
- software errors (BUG)
- initialization and sysload messages (INI and SYS)

For information on selecting the messages to be stored, see *Features and Services* (553-3001-306). For help with interpreting system messages, refer to *Software Input/Output: System Messages* (553-3001-411).

The contents of the History File are erased during a sysload or if you change the History File's length. However, because the History File is located in protected data store, the contents survive an initialization.

The length of the History File is set in the configuration record (LD 17) at the size prompt under the ADAN gate opener. The maximum length of the file depends on the amount of protected data store available, which in turn depends on the number of system features that require protected data store.

If the History File is full, the first messages stored are replaced by incoming messages. If this happens, the system gives a “file overflow” message at the start of a printout so you know some information has been replaced by newer messages.

## Interactive diagnostics

You can load overlay programs, including programs called *maintenance routines*, into memory through the system terminal or maintenance telephone. This function is performed by the Overload Loader program.

**Note:** The programs used in Midnight and Background Routines are also used manually as interactive diagnostic programs (see Table 14).

Maintenance routines are used interactively with a command/response format. In this format, you enter a command that tells the system to perform a specific task. The system performs the task and sends system messages indicating the status or errors back to you.

With interactive diagnostics you can do the following:

- disable, test, and enable specific equipment
- verify that a reported fault still needs to be cleared
- verify that a repair procedure has cleared a fault

All maintenance programs and commands are described in detail in *Software Input/Output: Administration* (553-3001-311). For help with interpreting system messages, refer to *Software Input/Output: System Messages* (553-3001-411).

## The Enhanced Maintenance feature

System software sometimes requires modifications, called *patches*, provided by Nortel Networks Technical Assistance Centers. The command ISS in Print

Routine 3 (LD 22) prints the software generic and issue. A plus sign (+) by the issue number means a patch is in service.

The Enhanced Maintenance feature does the following:

- allows patches to automatically survive a sysload
- permits patches on non-resident programs
- records all patches in the system
- allows data disks to be shipped with pre-loaded patches

A maximum of fifty dummy globals are allowed for patches, instead of the normal five. Usage of these globals is tracked, and a warning message is given if an attempt is made to use them for another patch. If there is a problem with a patch, the CPU sends system messages with the mnemonic EHM to the system terminal or the History File.

## **Manual continuity tests**

You can perform manual continuity tests on superloop network cards, intelligent peripheral equipment, and Basic Rate Interface (BRI) equipment. A continuity test generates a signaling pattern at one point, monitors its progress, and checks for its detection at an end point. For example, when a superloop network card sends a signal to a controller card, the continuity test verifies the following:

- the superloop network card sent the signal
- the loop carried the signal to the controller card
- the controller card received the signal

In a point-to-point continuity test, a superloop network card or a controller card can generate or detect the test pattern. In loopback tests, one card, a superloop network card, a controller card, or a multi-purpose ISDN signaling processor (MISP) card, is both the generator and the detector. Only idle timeslots are tested in any of the continuity tests.

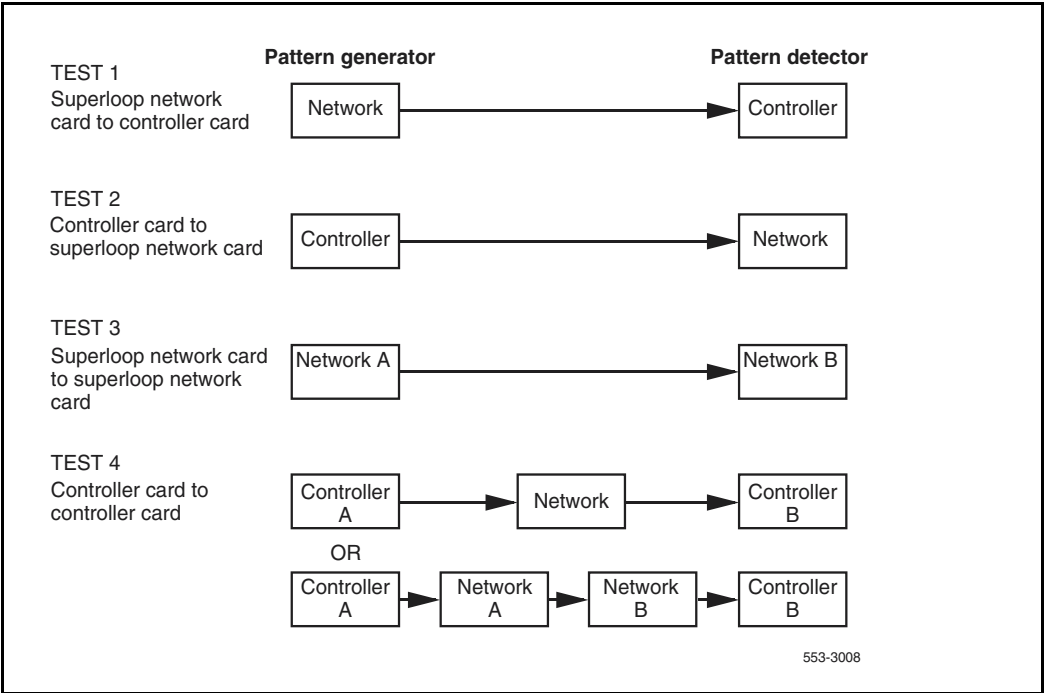
There are two types of loopback tests for BRI equipment. In one type of test, the pattern generated by the MISP card loops back through the digital subscriber loop (DSL) interface. In the other type of test, the pattern

generated by the MISP card loops back through an S/T-interface line card (SILC) or a U-interface line card (UILC), depending on which is specified. Both types of test are accessed as Test 9, but responses to the series of prompts for Test 9 determine the loopback point.

Fifteen continuity tests can run simultaneously. When a test is completed, it stops, the status is reported, and the other tests continue running. You can check the status of any test at any time. When all the tests end, the number of tests run and any failed tests are reported to the CPU. You can display the results at any time during the procedure.

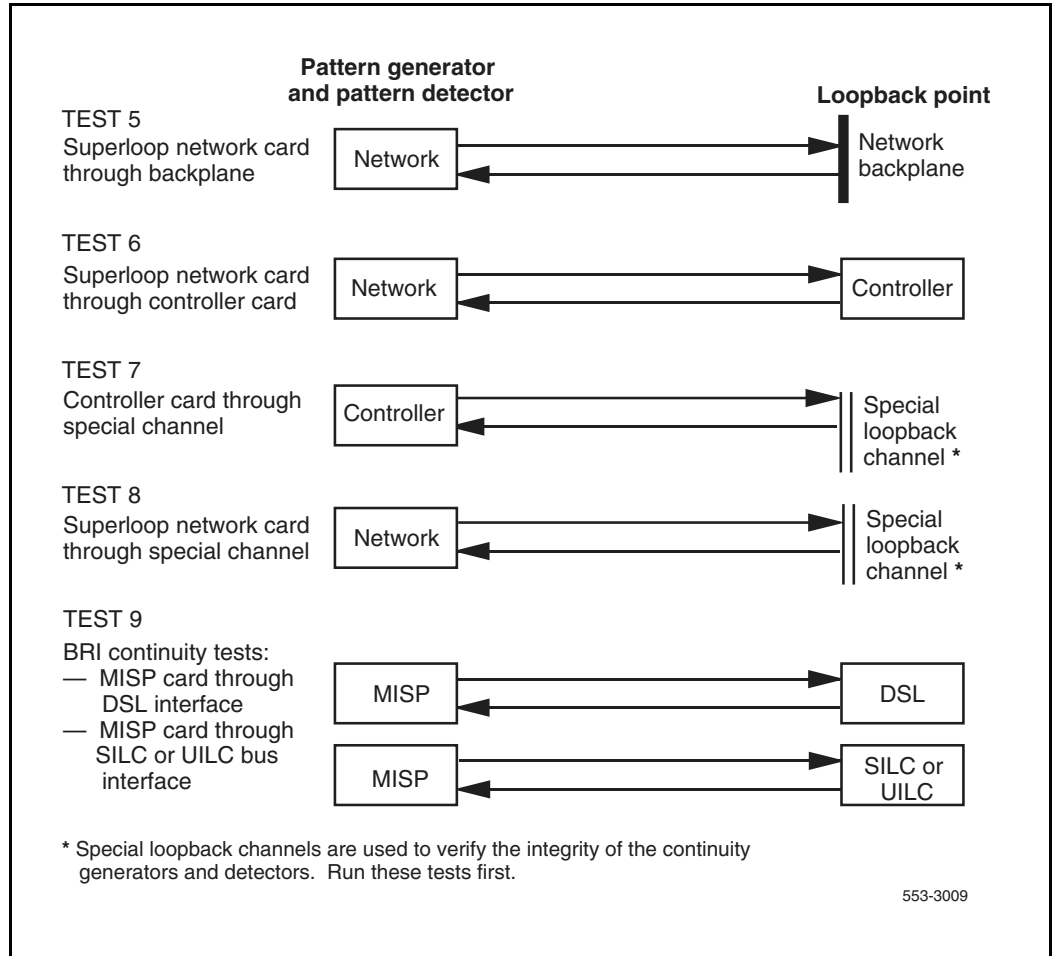
There are nine continuity test configurations. You can run each test by entering a set of prompts outlined in the Background Signaling and Switching Diagnostic (LD 45). Figure 8 on page 160 shows point-to-point configurations. Figure 9 on page 161 shows loopback configurations.

**Figure 8**  
**Manual continuity tests: point-to-point configurations**





**Figure 9**  
**Manual continuity tests: loopback configurations**





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# Hardware replacement guidelines

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## Contents

This section contains information on the following topics:

Precautions .....	163
System cable guidelines .....	167

## Precautions

To avoid personal injury and equipment damage, review the following guidelines before handling equipment.

### Power equipment

There are no user-repairable components in the power system. If a power supply fails, the complete unit must be replaced. Do *not* disassemble a power supply under any circumstances.



#### **DANGER OF ELECTRIC SHOCK**

To avoid the danger of electric shock, be very careful when you work with power equipment and connections. Warning notices on the equipment are displayed and must be heeded.

## **Circuit cards**

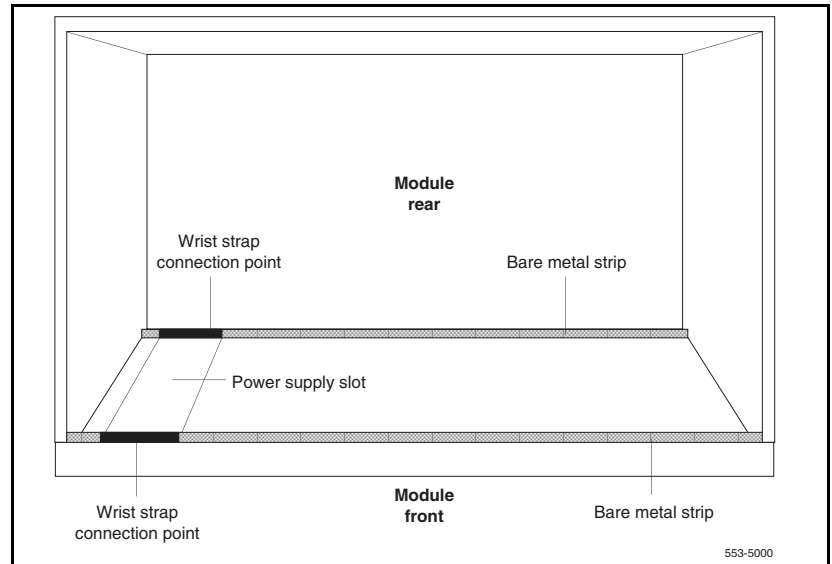
Handle cards as follows:

- Unpack or handle cards away from electric motors, transformers, or similar machinery.
- Handle cards by the edges only. Do not touch the contacts or components.
- Set cards on a protective antistatic bag. If an antistatic bag is not available, hand-hold the card, or set it in a card cage unseated from the connectors.
- Store cards in protective packing. Do not stack cards on top of each other unless they are packaged.

To avoid card damage from static discharge, wear a properly connected antistatic wrist strap when you work on equipment. If a wrist strap is not available, regularly touch one of the bare metal strips in a module to discharge

static. Figure 10 shows the recommended connection points for the wrist strap and the bare metal strips you should touch.

**Figure 10**  
**Static discharge points**



During replacement procedures:

- Turn off the circuit breaker or switch for a module power supply before the power supply is removed or inserted.
- In AC-powered systems, capacitors in the power supply must discharge. Wait five full minutes between turning off the circuit breaker and removing the power supply from the module.
- Software disable cards, if applicable, before they are removed or inserted.
- Hardware disable cards, whenever there is an enable/disable switch, before they are removed or inserted.
- Return defective or heavily contaminated cards to a repair center. Do not try to repair or clean them.

## Data disks

Follow the precautions below to avoid damaging disks:

- Handle only the hard surface; never touch the recording surface.
- Keep disks away from strong magnetic fields.
- Avoid exposing disks to extreme heat, rapid changes in temperature, or high humidity.
- Store disks in a suitable container.

To install a disk, make sure the arrow on the label is pointing up and the rounded corner is on the bottom on the right-hand side.



### **CAUTION**

#### **Damage to Equipment**

The disk drive can be damaged if an upside-down disk is forced into the slot. If there is significant resistance when you try to insert a disk, remove the disk and check the position.

## System cable guidelines

To disconnect a cable from the Core/Network Module backplane, use the P0741489 Extraction Tool provided in the rear of the module (behind the I/O safety panel).



### CAUTION

#### Damage to Equipment

You must use the P0741489 Extraction Tool to disconnect cables from the backplane shrouds in the NT5D21 Core/Network Module. Follow the procedure below to avoid bending or breaking pins when removing cable connectors from the backplane shrouds. Do not insert the extraction tool unless the cable connector is locked into the shroud. Do not force the extraction tool deeper than the detent on the cable connector.

- 1 Grasp the cable connector by the strain relief tab.
- 2 Center the longer flat edge on the angled end of the tool between the cable connector and the wall of the shroud on the right side of the cable connector.

**Note:** If the straight end of the tool is notched, use that end if the connector can be accessed straight-on. If you must angle the tool at all, use the angled end.

- 3 *Gently* insert the extraction tool and gradually apply pressure while gently rocking the cable connector up and down.
- 4 Stop applying pressure as soon as the detent of the cable connector comes loose from the shroud.
- 5 Slowly remove the extraction tool and the cable connector.

Before you connect cables to the backplane, visually inspect the backplane shroud connectors to make sure there are no bent pins. To connect cables:

- 1 Orient the cable connector so the strain relief paddle is to the right.
- 2 Partially insert the cable connector so its guides mate to the corresponding backplane connector.
- 3 Apply a small amount of pressure to push the cable connector straight into the backplane connector. You will feel a detent click when the connector seats.



**CAUTION**

**Damage to Equipment**

Pins may be bent or broken if you try to insert the cable connector at an angle. Do not push the connector in any further after you hear the detent click.



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# Hardware maintenance tools

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## Contents

This section contains information on the following topics:

<a href="#">Overview</a> .....	169
<a href="#">Circuit card features</a> .....	170
<a href="#">CPU controls</a> .....	177
<a href="#">System alarms</a> .....	181
<a href="#">System monitor indicators</a> .....	183

## Overview

There are fault indicators and hardware features that help you perform maintenance tasks (particularly identifying and clearing faults). These maintenance tools include the following:

- circuit card features that include card level tests and status indicators
- CPU controls that allow you to control common equipment functions
- system alarms that categorize the severity of a system failure
- system monitor indicators that identify power and temperature faults

## Circuit card features

### Card test

A card test checks to see that a card is working correctly. Many cards perform a self-test on power-up. You can also force card-level tests through software commands.

When intelligent peripheral cards or network card share installed, the red LED on the faceplate remains lit for two to five seconds while a self-test runs. (The time required for the self-test depends on the type of card.) If the test is successful, the LED flashes three times and remains lit until the card's software is configured and enabled, and then the LED goes out. If the LED does not follow the pattern described or operates in any other manner (such as continually flashing or remaining weakly lit), the card should be replaced.

When Core common control cards are installed, a self-test runs. If the self-test is successful, the LED flashes three times, then goes out

## Enable/disable switch

Some cards have a switch on the faceplate that enables or disables the hardware for that card.

When you remove a card, whenever possible disable the software; then, disable the hardware by setting the switch to Dis.

Hardware disable a card (set the switch to Dis) before you install it. After the card is locked into position, set the switch to Enb; then enable the card in software. Software disable and enable cards as described in the *Software Input/Output: Administration* (553-3001-311).

Figure 11 on page 172 shows the typical location of an Enable/Disable (ENB/DIS) switch.

## LED

Many cards have one or more light emitting diodes (LEDs) on the faceplate. The LED gives a visual indication of the status of the card or of a unit on a card.

When a *green* LED is steadily lit, it indicates the card is operating normally. When a green LED is off, it indicates the card is disabled or faulty.

When a *red* LED is steadily lit, it indicates the card, or a unit on it, is disabled or faulty or unequipped. When a red LED is off and power is available to the card, it indicates the card is operating normally.

**Note 1:** The shape of the LED (some are round and some are rectangular) does not indicate a different function.

**Note 2:** The red LEDs on the NT6D65 Core to Network Interface (CNI) Cards are lit when the associated Core is inactive. This is normal operation.

**Figure 11**  
**Sample enable/disable switch**

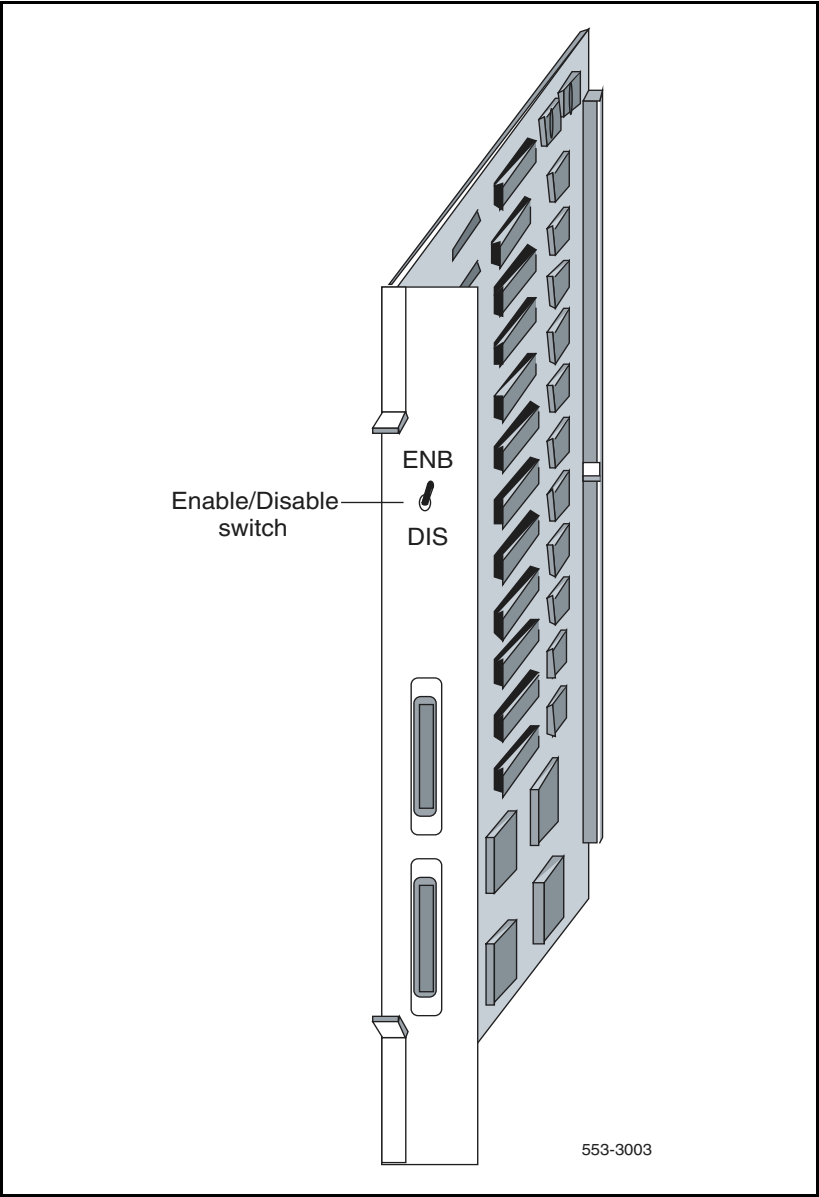


Table 15 gives two examples of LED indications.

**Table 15**  
**Sample LED indications**

Type of card	LED color	Status
Common equipment power supply	green	LED lit = operation normal
Digital line card	red	LED lit = disabled or not equipped

Figure 12 on page 174 shows the location of the LED on the faceplate of an Intelligent Peripheral line card.

## Maintenance display code

Maintenance displays are located on the faceplate of some circuit cards. A hexadecimal code is displayed. Interpretations of the maintenance display codes are listed under “HEX” in the *Software Input/Output: System Messages* (553-3001-411). You should examine previous codes, system messages, and visual indicators with any current maintenance display codes to properly analyze faults.

The maintenance display on the Call Processor Card (NT6D66, NT9D19, NT5D10 or NT5D03) shows two lines of information with up to 16 characters per line. The hexadecimal code and its definition are shown on the display.

Each new code shown on a maintenance display overwrites the one before it. However, note the following:

- All codes received on common equipment displays are recorded. You can review them by printing the History File.
- The most recent 16 codes displayed on a controller card stay in memory. You can review them and reset the counter through the Network and Signaling Diagnostic (LD 30).
- The most recent 64 displays on a CP card stay in memory. You can review the displays on the active CP card through the Core Common Equipment Diagnostic (LD 135).

**Figure 12**  
**Sample LED indicator**

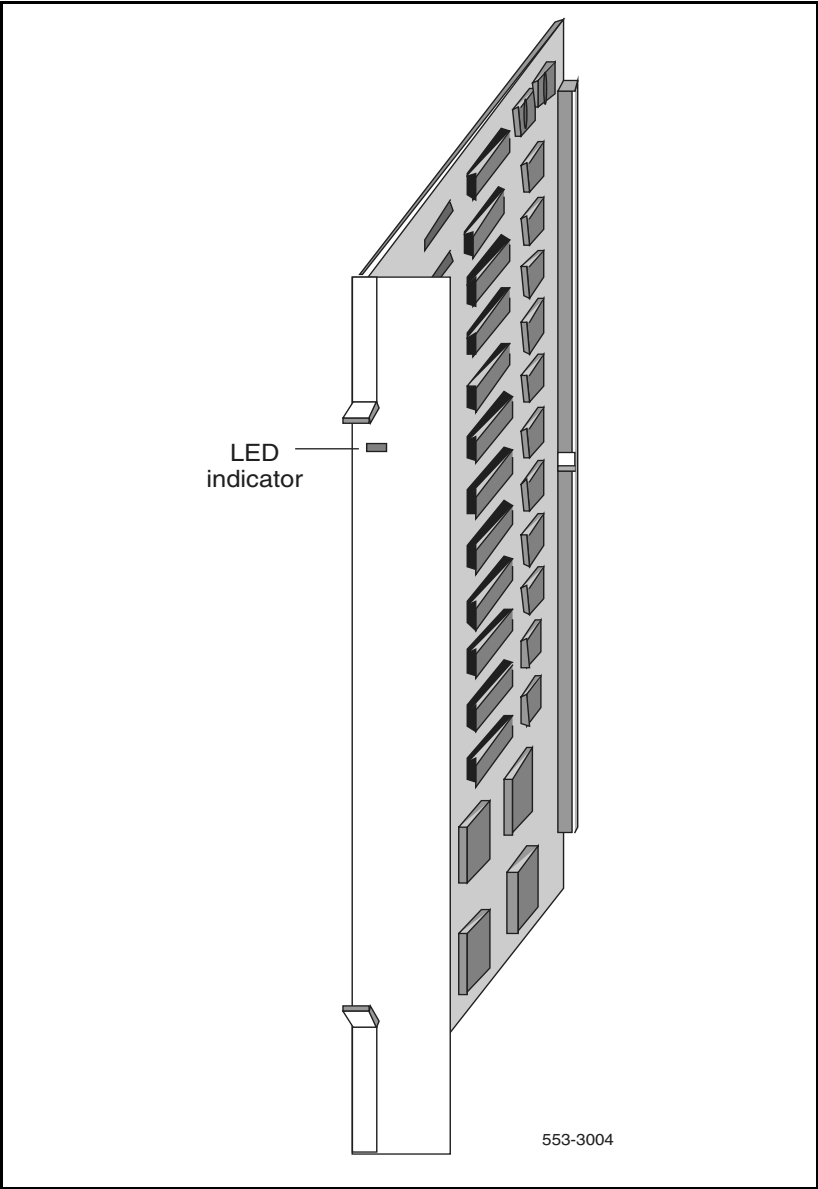
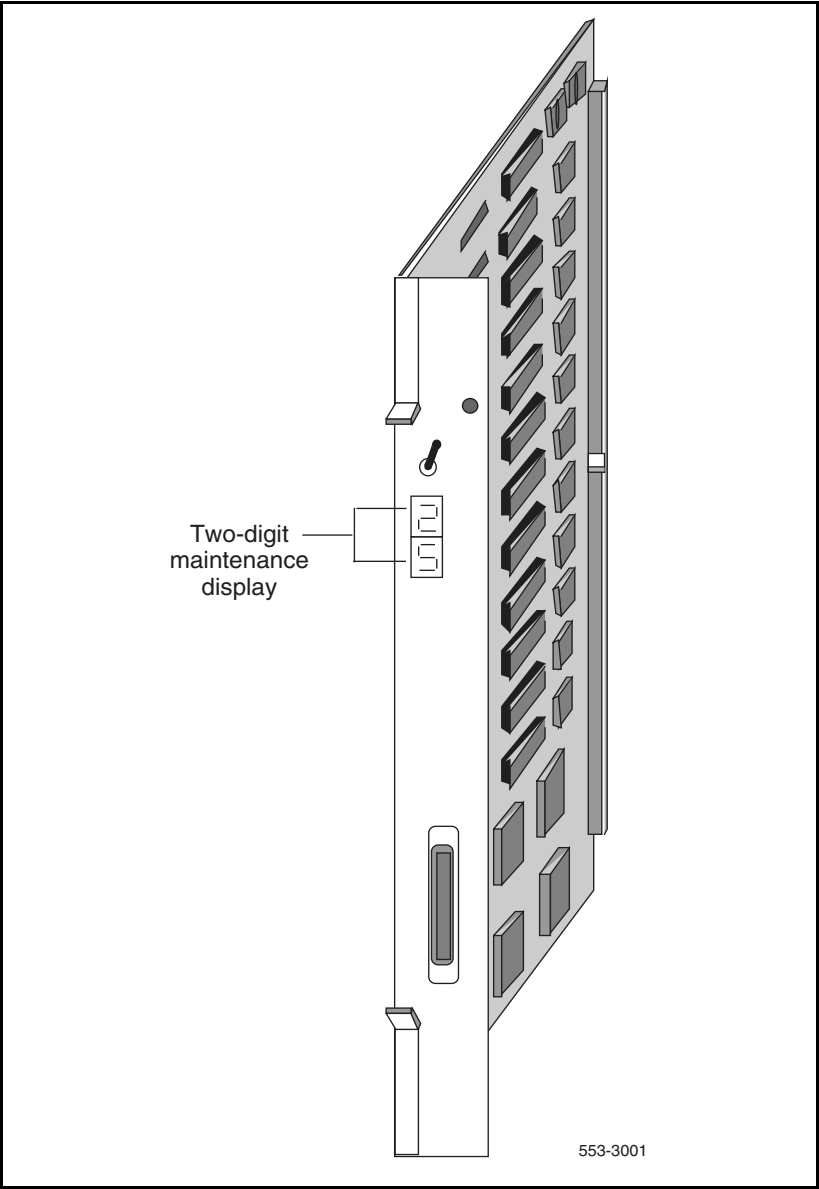


Table 16 lists the cards with maintenance displays and the type of information the codes indicate on each card. Figure 13 on page 176 shows the location of the maintenance display on the faceplate of a floppy disk interface card.

**Table 16**  
**Circuit cards with maintenance displays**

<b>Circuit card</b>	<b>Display indication (for all related cards)</b>
NT6D66, NT9D19, NT5D10, NT5D03 Call Processor Card  NT5D61 IODU/C Card	
NT8D01 Controller Card NT1P62 Fiber Controller	During normal operation, display shows self-test codes and port number on which Controller Clock is tracking
NT7R52 Remote Carrier Interface Card	During normal operation, display shows self-test codes and port number on which Controller Clock is tracking

**Figure 13**  
**Sample maintenance display**





## CPU controls

Switches and buttons on common equipment cards allow you to control CPU activity and clear common equipment faults.

### Initialize button

Pressing the manual initialize (Man Int) button associated with the active CPU starts the Initialize Program. The Initialize Program clears common equipment faults and then rebuilds call-dependent data and generates system messages indicating the status of the system. This process is called an *initialization*. Call processing is briefly interrupted during an initialization.

Manual initialize buttons are located on the following cards:

- The initialize button is on the NT6D66, NT9D19, NT5D10, or NT5D03 Call Processor Card.

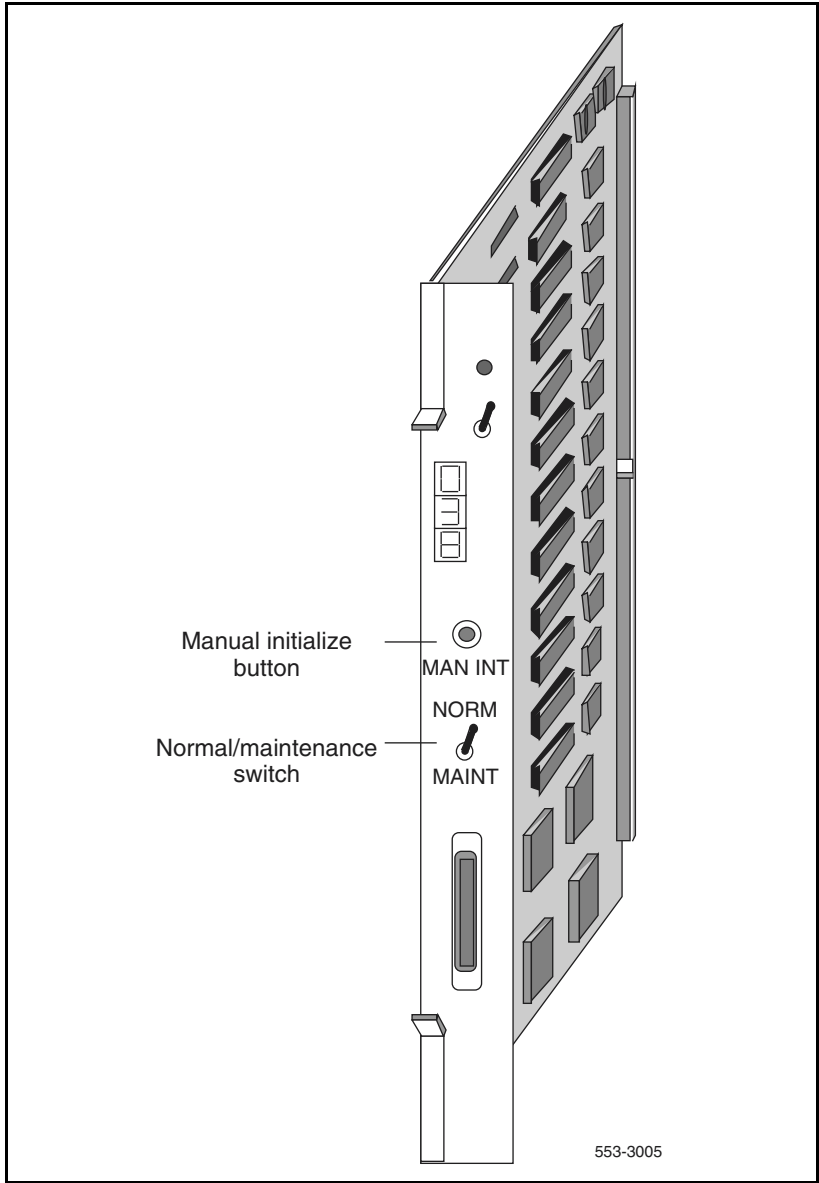
### Normal/maintenance switch

There is a normal/maintenance (Norm/Maint) switch on the Call Processor Card. Figure shows the location of the switch on the Call Processor Card. In dual CPU systems you use this switch as follows to keep the dual CPUs from switching, or trying to switch, when you are testing or replacing common equipment hardware on the inactive CPU:

- On the CPU you are not testing or replacing, set the switch to Maint. This CPU will be *active*.
- On the CPU you are testing or replacing, set the switch to Norm. This CPU will remain *inactive* as long as the other CPU is set to Maint.

For regular operation in dual CPU systems, set both normal/maintenance switches to Norm.

Norm/Maint switch on the Call Processor Card



## Reload button

Reload (Rld or Man Rst) buttons allow you to manually activate the System Loader program. The System Loader initiates call processing and starts memory-checking diagnostics. This process is called a *sysload* or *system reload*. The reload button (Man Rst) is on the Call Processor Card.

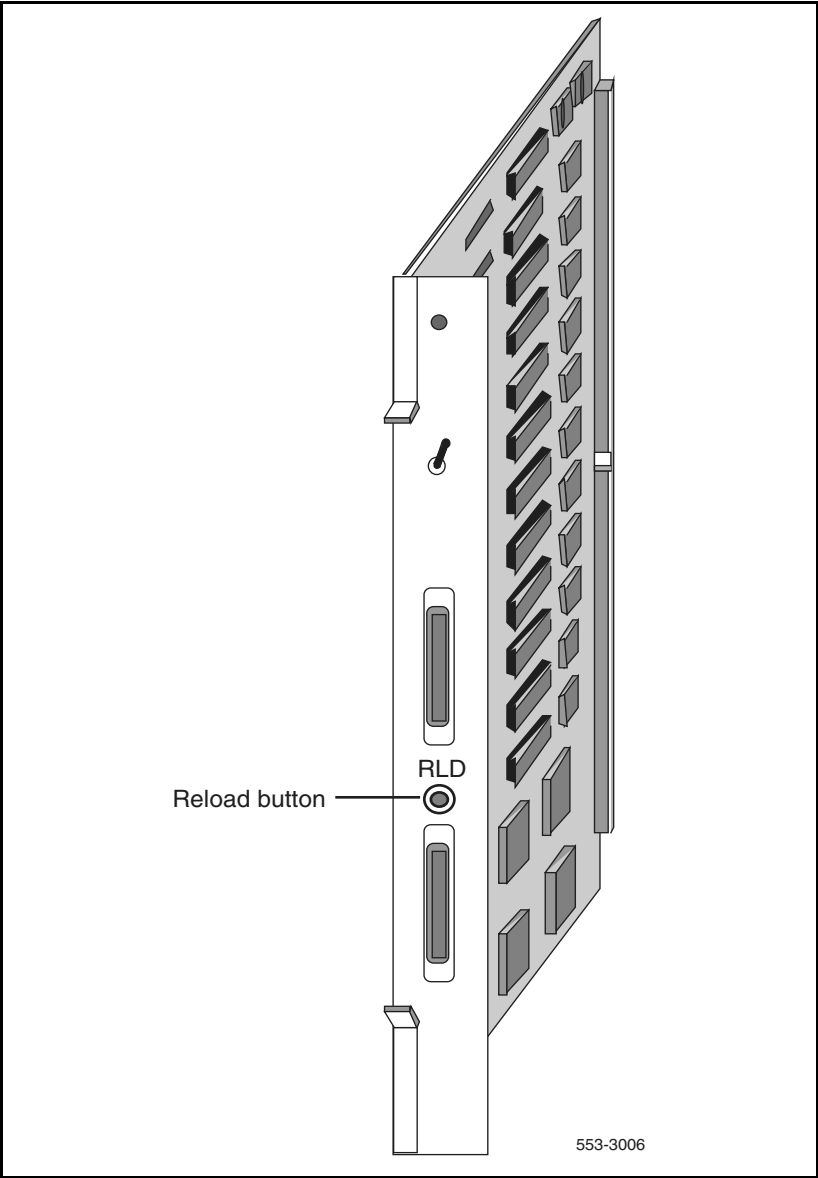
To start a sysload, press both reload buttons simultaneously.

Figure 14 shows the location of the reload button on a QPC581 CMA Card.

### **CAUTION**

During a sysload active calls are disconnected and the system goes into an emergency line transfer state. Use the reload button only if you are specifically instructed to do so in Nortel Networks Publications.

**Figure 14**  
**Reload button on the changeover and memory arbitrator card**



## System alarms

System alarms are based on various fault monitors and indicators. The category of the alarm—major, minor, or remote—indicates the severity of the system failure:

- A major alarm requires immediate action by the technician.
- A minor alarm requires attention, but not necessarily immediate attention, by the technician.
- A remote alarm may require attention by the technician.

### Major alarms

A major alarm indicates a fault that seriously interferes with call processing. The following faults cause a major alarm:

- CPU or control bus failure
- disk system failure when attempting to load the system
- system power failure (without reserve power)
- temperature fault (excessive heat)

When there is a major alarm, the red LED at the top of the affected column lights. A major alarm also activates a display on all attendant consoles.

When a system is equipped with a power failure transfer unit, a major alarm causes designated 500/2500 telephones to connect directly to Central Office trunks; this is called a line transfer.

## Minor alarms

A minor alarm indicates the system hardware or software has detected a fault requiring attention. The following faults cause a minor alarm: Automatic identification of outward dial (AIOD) trunk failure

- conference failure
- digitone receiver failure
- memory failure
- more than one fault on different line and trunk cards in one shelf (indicated on affected customer's console only)
- network failure (indicated on affected customer's console only)
- peripheral signaling failure
- serial data interface failure
- tone and digit switch failure

A minor alarm displays an alarm on attendant consoles in customer groups affected by the fault. (A minor alarm indication on the console is an optional feature, enabled and disabled on a customer basis through data administration procedures.)

## Remote alarms

A remote alarm is an optional extension of a major alarm to another location, such as a monitoring or test center, or to an indicator, such as a light or bell. When a major alarm occurs, the system provides relay contact closure across two remote alarm lines, REMALMA and REMALMB. These lines are extended to the main distribution frame (MDF) through the system monitor to MDF cable for customer use. The relay contacts are rated at 30 V dc and 2 amps. The REMALMB line is the return or ground for the REMALMA line. Nortel Networks does not extend remote alarm lines beyond the MDF.

## System monitor indicators

The system monitor checks the column temperature, cooling system status, and system voltage status and controls line transfer states accordingly.

### NT8D22 System Monitor

The system is equipped with the NT8D22 System Monitor, which is installed in the rear of the pedestal in each column. Table 17 lists faults monitored by this system monitor.

**Note:** In multiple-column systems, there is one master system monitor, located in the column with CPU 0, and multiple slave system monitors. A switch setting on each system monitor defines the master or the address of each slave.

**Table 17**  
**Faults monitored by the NT8D22 System Monitor**

Power faults	Source
CPU condition	CPU failure
	Sysload (system reload)
Main power loss	System input power, AC or DC
Power supply failure	Common equipment power supply
	Common/peripheral equipment power supply
	Peripheral equipment power supply
	Ringling generator
Temperature alarm	Blower unit
	Column temperature sensors

The master system monitor checks the CPU column and periodically polls the slaves to check their status. When polled, the slaves report their status to the master. If a slave does not respond when it is polled, the master reports the address as a faulty slave.

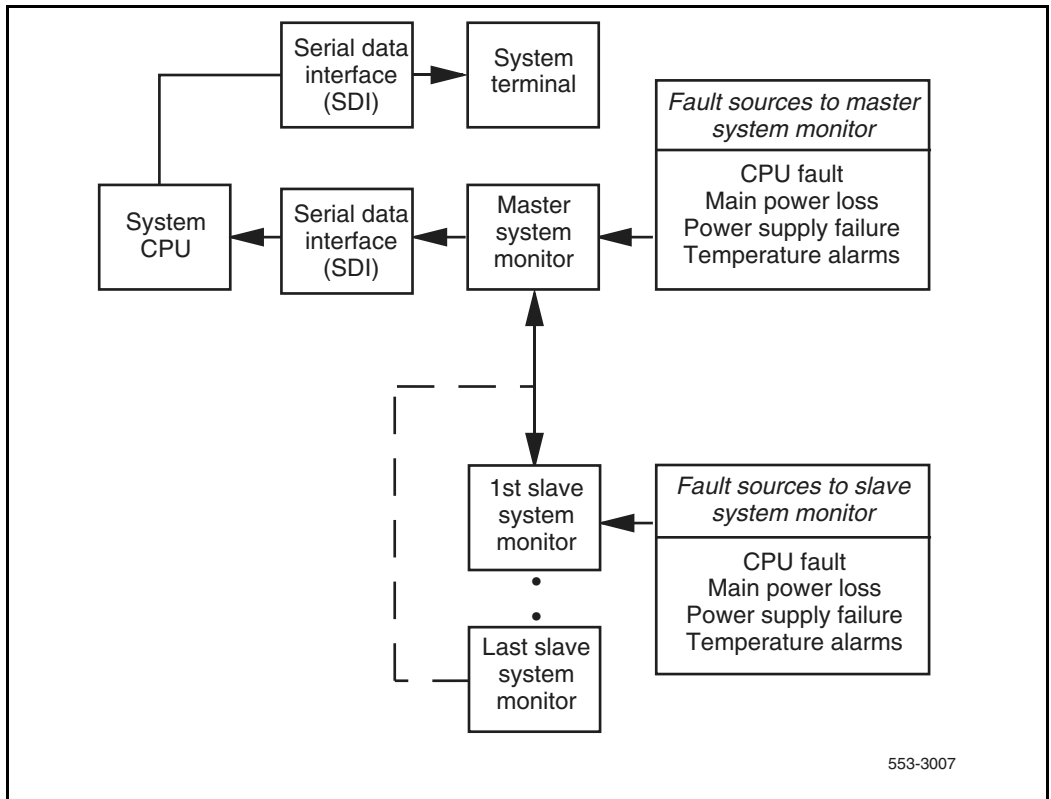
If a slave is removed, the master cannot communicate with higher addresses. Therefore, the master considers the removed slave and all slaves with a higher address as disabled. For example, if slave 2 is disabled, the master also reports slaves 3, 4, and up as disabled.

The system monitor reports power equipment status and faults to the CPU. (Only the master system monitor communicates with the CPU.) System messages generated by the system monitor are identified by the mnemonic PWR. Figure 15 shows the flow of messages from NT8D22 System Monitors to the system terminal.

If there is a fault, the system monitor lights the LED on the affected column.



**Figure 15**  
**NT8D22 System Monitor message flow**



## Line transfer

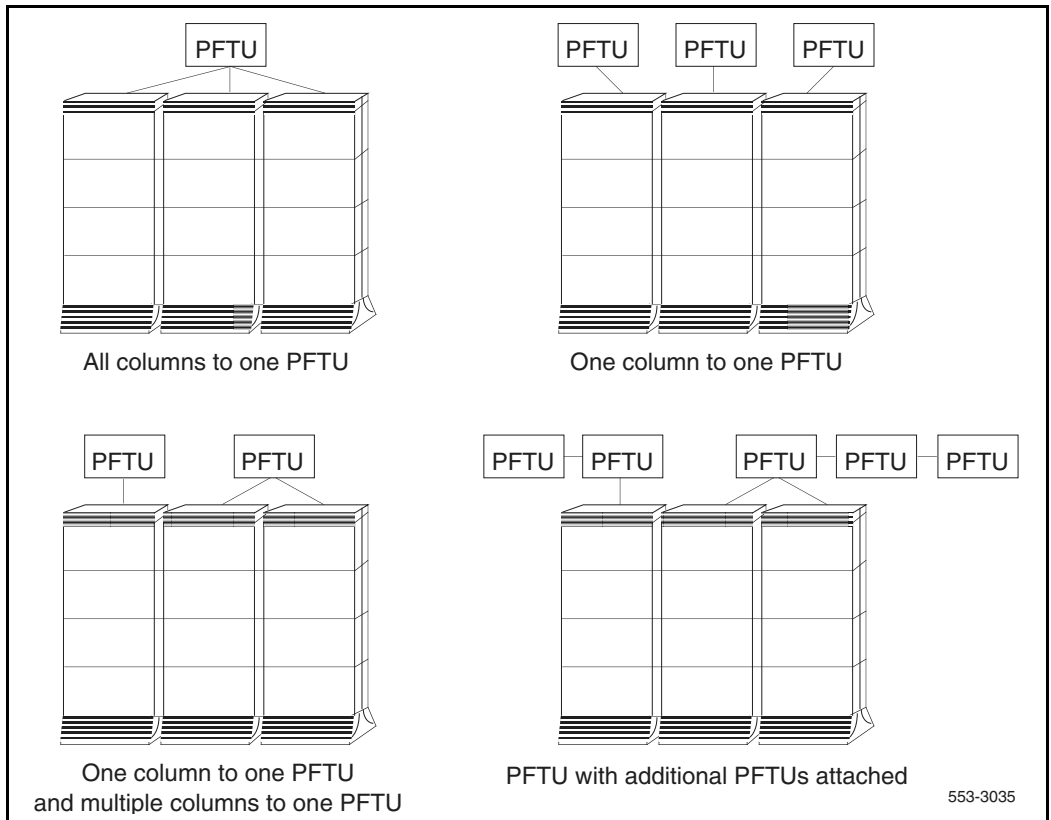
As an option, you can connect one or more power failure transfer units (PFTUs) to the system. Each PFTU connects up to eight designated analog (500/2500 type) telephones to Central Office trunks. If call processing stops, those analog (500/2500 type) telephones are transferred through the PFTU to the Central Office so that you still have outside connections. A line transfer occurs during the following situations:

- during a sysload (system reload)
- if there is a major power failure in a DC-powered system (as detected by the TRIP signal)
- if call processing stops because of a CPU failure
- if there is a loss of power to the column
- if there is a loss of power to the PFTU
- if the temperature in a column is too high
- if a line transfer button on the attendant console is pressed (this applies on a customer basis)
- if a line transfer switch on the PFTU is turned on

**Note:** If position 4 on switch 1 (SW1) is set to OFF on a system monitor, that system monitor's column will not activate a line transfer if the temperature is too high.

Figure 16 on page 187 shows four ways multiple-column systems and PFTUs can be configured. You can configure in the following ways:

- connect all the columns in a system to a single PFTU
- connect each column to an individual PFTU
- combine connecting individual columns to individual PFTUs and multiple columns to a single PFTU
- attach additional PFTUs to a PFTU that is connected to one or multiple columns

**Figure 16**  
**PFTU configurations**

## Main power loss

The system monitor receives status and control signals from the external power system. The system monitor then generates system messages that indicate the status of main and reserve power supplies.

You can connect a reserve (back-up) power supply to the system: either an uninterruptible power supply (UPS) for AC-powered systems or reserve batteries for DC-powered systems. If the main source of external power is lost, power to the system is maintained by the UPS or reserve batteries.

If the main power supply is lost, the system monitor generates a major alarm. The NT8D22 System Monitor also generates system messages to indicate the system is running on reserve power.

## Module power supply failure

There are four types of module power supplies:

- common equipment (CE) power supply
- common/peripheral equipment (CE/PE) power supply
- peripheral equipment (PE) power supply
- ringing generator

The NT8D22 System Monitor handles complete or partial failures in a module power supply as follows:

- If the output voltage is higher than the threshold for +5 volts, the affected power supply shuts down, the column LED lights, and a system message is sent.
- If the output voltage is higher than the threshold for other than +5 volts, power for only that voltage shuts down in the affected power supply, the column LED lights, and a system message is sent.
- If the output voltage is lower than the threshold for any voltage, power for only that voltage shuts down in the affected power supply, the column LED lights, and a system message is sent.
- If the input voltage is lower than the threshold, the affected power supply shuts down and then recovers when the input level recovers.

To help you pinpoint a power supply problem, the master NT8D22 System Monitor identifies the following:

- the column with the fault (system monitor 0–63)
- the module (0–3) in that column
- the power supply unit (1–2) in the module

Figure 17 shows the power equipment designations in a column.

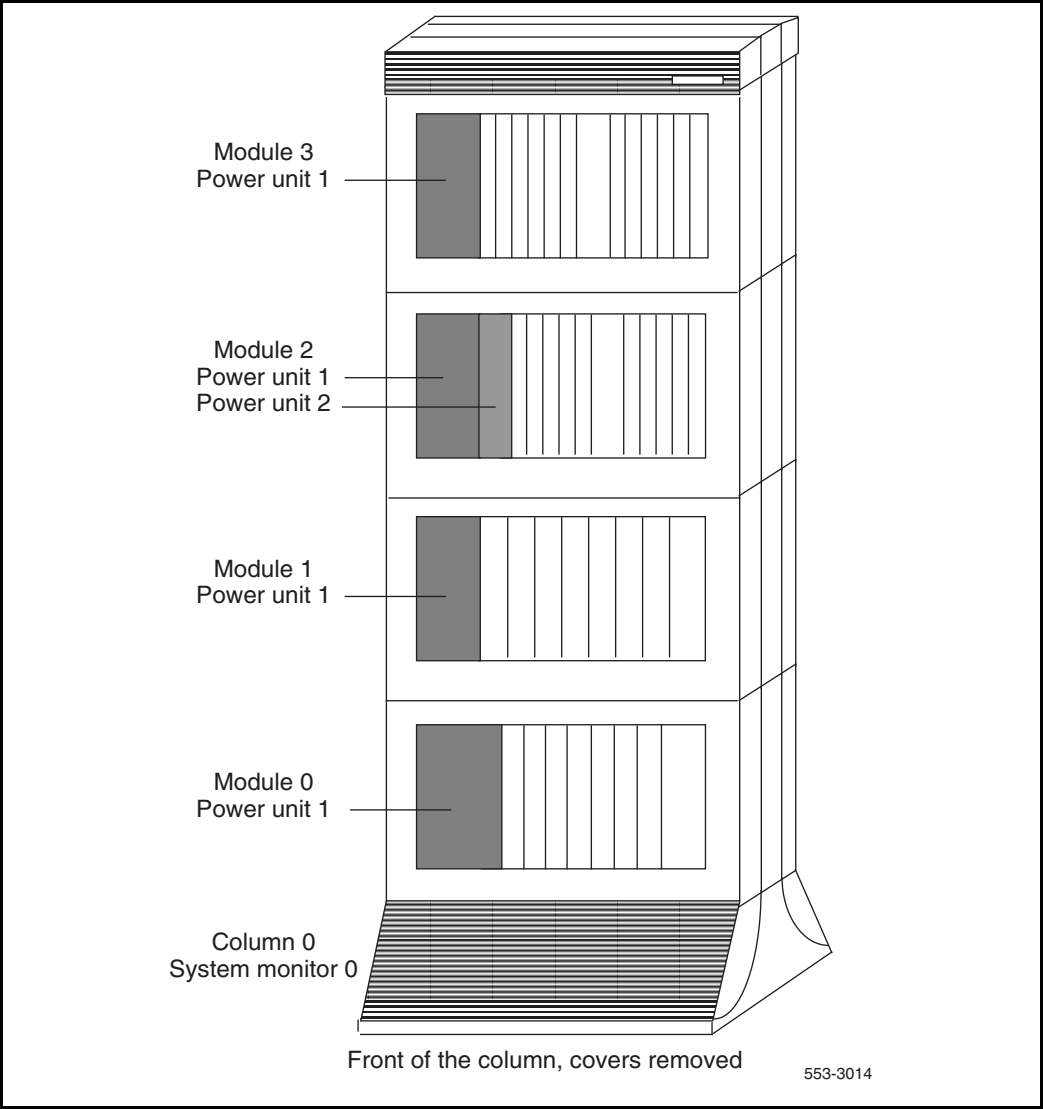
## Temperature alarms

Each column is cooled by a blower unit (NT8D52AB with AC power or NT8D52DD with DC power) in the pedestal. All of these systems are equipped with the NT8D22 System Monitor, which performs the following functions:

- If there is a partial or complete failure in a blower unit, the system monitor lights the column LED and generates a system message.
- If the thermostats in a column report a temperature exceeding 70 degrees C (158 degrees F), the system monitor lights the column LED, generates a system message, then, providing this condition exists for 30 seconds, shuts down power to the column in 30 seconds.

The NT8D22 System Monitor generates a system message if the air leaving the column exceeds 55 degrees C (131 degrees F). This thermal alarm may indicate a loss of air-conditioning in the room, loss of ventilation in the column, a problem with the blower unit, or a blocked air filter.

**Figure 17**  
**Power equipment designations from the master NT8D22 System Monitor**



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# Routine maintenance

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## Contents

This section contains information on the following topics:

<a href="#">Pedestal air filter</a> . . . . .	191
<a href="#">DC-power battery systems</a> . . . . .	192

You must service batteries and air filters regularly. Follow the guidelines in this chapter to maintain batteries and air filters.

## Pedestal air filter

There is an air filter in the pedestal of each column. Service the air filters once a month. For instructions on replacing the air filter, see “Replacing equipment” on [page 193](#).

If an air filter is damaged in any way, discard it and install a new one. If a dirty air filter is not damaged, you can clean it with warm water and mild detergent. (Do not use compressed air because it may damage the filter.) When the filter is completely dry, you can reinsert it in the pedestal or store it as a spare.

Replace the battery pack every three years, even if no battery failures have occurred. For instructions on replacing the battery pack assembly, see “Replacing equipment” on [page 193](#).

## DC-power battery systems

External batteries, often used with DC-powered systems, generally require regular visual inspections. They may also require charger or rectifier tests and pilot cell tests. Perform all inspections and tests according to the supplier's instructions.

To comply with safety requirements, consult the following articles before working with any battery systems:

- Read the “Material Safety Data Sheet” that must be posted to meet Occupational Safety and Health Administration (OSHA) requirements. This article outlines appropriate reserve battery handling procedures.
- Refer to National Electric Code 645-10. This article outlines requirements that call for the installation of AC- and DC-power kill switches to battery systems in certain environments.



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# Replacing equipment

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## Content list

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## Removing module covers and pedestal grills

### Module covers

To remove the front and rear covers from a module:

- 1 With a flat-blade screwdriver, turn the lock clockwise on the two locking latches (see Figure 18).
- 2 Simultaneously push the latches toward the center of the cover and pull the cover toward you while lifting it away from the module.



#### **DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

### Pedestal grills

To remove the front and rear grills on the pedestal:

- 1 Loosen the two captive screws that secure the grill.
- 2 Pull the grill forward and lift it out of the base of the pedestal (see Figure 18).

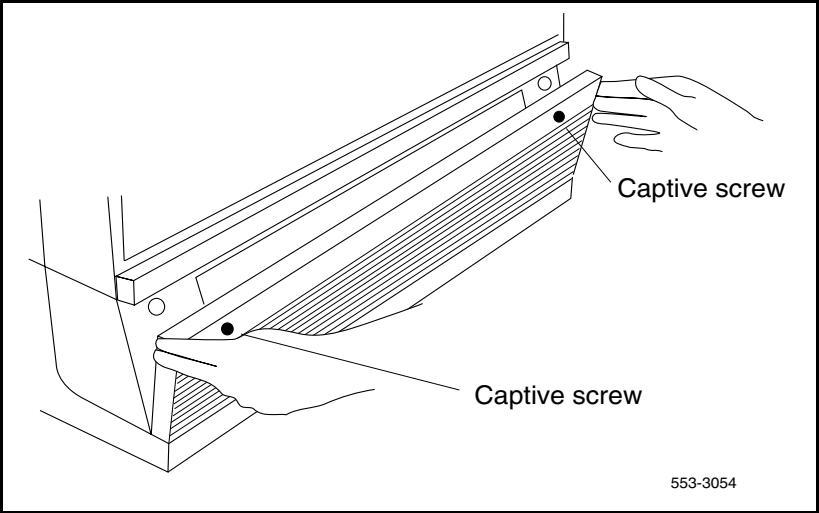
## Removing UK air exhaust/intake grills

Use the following procedures to remove or replace the exhaust and intake grills on United Kingdom (UK) equipment.

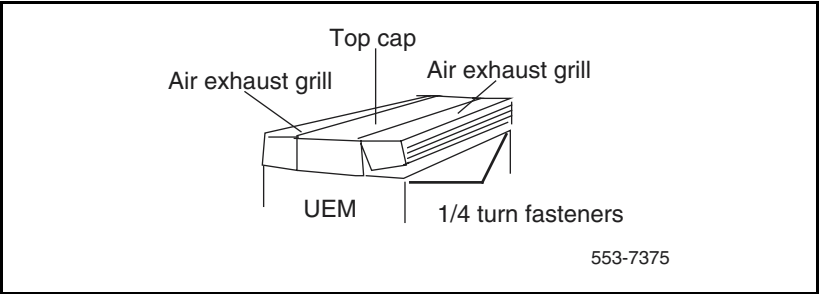
### Air exhaust grill

The front and rear air exhaust grills are secured by Southco fasteners located underneath the front edge of the grill. Use a #1 Phillips head screwdriver and turn the fasteners 1/4-turn to release or secure the grill (see Figure 18).

**Figure 18**  
**Removing the pedestal grill**



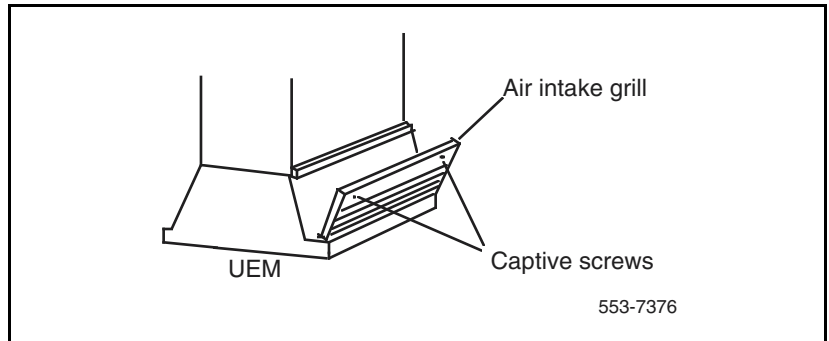
**Figure 19**  
**Removing air exhaust grill**



### Air intake grill

The front and rear air intake grills are secured by captive panel screws located in the face of the grill (see Figure 18). Use a slotted screwdriver to release or secure the grill.

**Figure 20**  
**Removing air intake grill**



## NT1P61 Fiber Superloop Network Card

Use this procedure to replace an NT1P61 Fiber Superloop Network card.

- See *Software Input/Output: Administration* (553-3001-311) for a description of all maintenance commands, and *Software Input/Output: System Messages* (553-3001-411) for interpreting system messages.



### **DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

### Removing and replacing a Fiber Superloop Network card

- 1 Disable the Fiber Superloop Network card by logging in to the system terminal, loading the Network and Peripheral Equipment Diagnostic Program LD 32, and executing **DIS loop**, where **loop** is the actual loop number of the Fiber Superloop Network card.
- 2 Set the ENB/DIS switch to DIS.

- 3    Disconnect all the Fiber-optic patchcords and the SDI/System Monitor cable from the card faceplate.
- 4    Unlatch the card's locking devices by squeezing the tabs and pulling the upper locking device away from the card and pressing the lower locking device downward.
- 5    Pull the card out of the network module and place it into an antistatic bag away from the work area.
- 6    Check the replacement card and make sure that the Electro-optical packlets are already installed. If not installed, install the new packlets or remove the packlets from the faulty Fiber Superloop Network card and install them on the replacement card if you are sure that the packlets are not faulty.
- 7    Set the replacement card ENB/DIS switch to DIS.
- 8    Hold the replacement card by the card locking devices and insert it partially into the card guides in the module.
- 9    Pull the upper locking device away from the faceplate on the card and press the lower locking device downward and insert the card firmly into the backplane connector. Press the upper locking device firmly against the faceplate and press the lower locking device upwards to latch the card inside the module.
- 10   Set the ENB/DIS switch on the Fiber Superloop Network card to ENB. The Fiber Superloop Network card automatically starts the self-test.
- 11   Observe the red LED on the front panel during self-test. If it flashes three times and stays on, it has passed the test; go on to step 13. If it does not flash three times and then stays on, it has failed the test. Pull the card partially out of the module and reinsert it firmly into the module. If the problem persists, troubleshoot or replace the Fiber Superloop Network card.
- 12   Connect the SDI/System Monitor cable and the Fiber-optic patchcords to the faceplate connectors of the replacement Fiber Superloop Network card.
- 13   Enable the Fiber Superloop Network card by logging in to the system terminal, loading the Network and Peripheral Equipment Diagnostic Program LD 32, and executing **ENLL loop**, where **loop** is the actual loop number of the Fiber Superloop Network card.
- 14   Tag the defective card(s) with a description of the problem and prepare them for shipment to your equipment supplier's repair depot.

## NT1P62 Fiber Peripheral Controller Card

Use this procedure to replace a Fiber Peripheral Controller card.

- *Software Input/Output: Administration* (553-3001-311) for a description of all maintenance commands, and *Software Input/Output: System Messages* (553-3001-411) for interpreting system messages.



### **DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Removing and replacing a Fiber Peripheral Controller card

- 1 Load Network and Peripheral Equipment Diagnostic Program LD 32. At the > prompt, type **LD 32** and press the Enter key to access the program.
- 2 Type **DSXP x**, where **x** is the Fiber Peripheral Controller card, and press the Enter key to disable the card. The Fiber Peripheral Controller card is now disabled and you can remove it.
- 3 Disconnect all the Fiber-optic patchcords from the card faceplate.
- 4 Unlatch the card's locking devices by squeezing the tabs and pulling the upper locking device away from the card and the lower locking device downwards.
- 5 Pull the card out of the IPE module or cabinet and place it in an antistatic bag away from the work area.
- 6 Check the replacement card and make sure that the Electro-optical packlets are already installed. If not installed, install the new packlets or remove the packlets from the faulty Fiber Peripheral Controller card and install them on the replacement card if you are sure the packlets are not faulty.
- 7 Hold the replacement card by the card locking devices and insert it partially into the card guides in the module.

- 8 Pull the upper locking device away from the faceplate on the card and the lower locking device downwards and insert the card firmly into the backplane connector. Press the upper locking device firmly against the faceplate and the lower locking device upwards to latch the card inside the module. The Fiber Peripheral Controller card automatically starts the self-test.
- 9 Observe the red LED on the front panel during self-test. If it flashes three times and stays on, it has passed the test. Go to step 11. If it does not flash three times and then stays on, it has failed the test. Pull the card partially out of the module and reinsert it firmly into the module. If the problem persists, troubleshoot or replace the Fiber Peripheral Controller card.
- 10 Connect the Fiber-optic patchcords to the optical connectors of the Fiber Peripheral Controller card faceplate. For a wall-mounted Fiber Remote IPE, plug the Fiber-optic span FC/PC optical connectors into the FC/PC optical connectors on the Fiber Peripheral Controller card faceplate.
- 11 At the prompt in the LD 32 program, type **ENXP x**, where **x** is the Fiber Peripheral Controller card, and press the Enter key to enable the card. If the uppermost red LED on the Fiber Peripheral Controller card faceplate turns off, the card is functioning correctly and is enabled. The outcome of self-test will also be indicated by LD 32 on the MMI terminal connected to the Fiber Peripheral Controller card. If the LED stays on, replace the card.
- 12 Tag the defective card(s) with a description of the problem and prepare them for shipment to your equipment supplier's repair depot.

## NT4N43 cPCI Multi-Media Disk Unit

The Multi-Media Disk Units (MMDUs) in the respective cores can be of any size equal to or greater than 6GB. The MMDUs do not need to be the same size since the VxWorks OS configures each MMDU to exactly 6GB, thus preserving redundancy. This feature is automatically activated during sysload.



## Core card replacement

All cards are factory installed. If you need to replace a card, follow the guidelines below.



### CAUTION WITH ESDS DEVICES

To avoid card damage from static discharge, wear a properly connected antistatic wrist strap.

- 1 To remove a card, hold the card by the faceplate and gently pull it out of the slot.
- 2 To install a card, hold the card by the faceplate and gently push it into the slot until firmly seated and bolted into place.
- 3 Gently push forward to seat the card and lock it in place.

Never force the card into the slot. If the card gets stuck, remove it and try again.

**Note:** It is recommended to power down the Core Net Module when replacing a MMDU if possible. Please note that powering down the Core/Net module disables the half of the network, if assigned in the Core/Net shelf. Not all sites will easily accommodate this recommendation. Therefore, a procedure has been created to replace the MMDU without removing power from the Core/Net shelf.

- 4 Backup the data.
- 5 The MMDU to be replaced should be in the inactive core. If that is not the case, switch CPUs.
- 6 Use the "split" command to split the system.
- 7 Use "Stat CPU" to confirm the cores are split.
- 8 Connect terminal to the inactive side.
- 9 Reset the Call Processor card in the inactive side by pressing the "reset" button located on the faceplate.
- 10 Pay attention to the boot sequence. When the message "Press Control B to Stop" appears, press Control B to interrupt the boot sequence. The [VxWorks Boot] prompt with a flashing cursor should be on your screen. If you do not see this prompt with the flashing cursor, go back to step 9.

- 11 If possible, power down the Core/Net shelf.
- 12 Select the proper replacement procedure below.

## Replacement procedures

Use “Procedure 1: Replace the NT4N43AA cPCI Multi-Media Disk Unit (MMDU) leaving the card cage in place” on [page 202](#), if you have an I/O panel with an access panel and an interior cutout.

Use “Procedure 2: Replace the NT4N43AA cPCI Multi-Media Disk Unit (MMDU) by removing the card cage” on [page 204](#), if you have an I/O panel with an access panel without an interior cutout or an I/O panel with solid metal on the left side.

Use “Procedure 3: Replace the NT4N43BA and NT4N43CA cPCI Multi-Media Disk Unit (MMDU)” on [page 208](#), if you have an NT4N43BA or NT4N43CA cPCI Multi-Media Disk Unit (MMDU).

### **Procedure 1: Replace the NT4N43AA cPCI Multi-Media Disk Unit (MMDU) leaving the card cage in place**

- 1 At the rear of the Call Processor PII (CP PII) module, remove the three cables connected to the back of the MMDU (see Figure 21 on [page 211](#)):
  - a. Push up the tabs and disconnect the bottom CD-ROM and Hard Drive Data Cable (NT4N92AA).
  - b. Push up the tabs and disconnect the middle Floppy Data Cable (NT4N93AA).
  - c. Squeeze the top and bottom tabs and disconnect the top Floppy, CD-ROM, and Hard Drive Power Cable (NT4N95AA).

- 2 At the front of the module, use a slotted or Phillips screwdriver to unscrew the center screws on the top and bottom of the MMDU.

**Note:** Some systems have MMDU screws which are captive, while some systems have MMDU screws which can be removed.

**CAUTION****Damage to Equipment**

Cables are attached to the back of the MMDU.

- 3 Use the MMDU handle to slowly pull the MMDU forward, bringing the attached cables with it.
- 4 Remove the MMDU unit (with the cables attached) from the card cage.
- 5 Remove the cables and reattach them to the new MMDU.
- 6 From the front of the module, bundle and feed the cables attached to the MMDU into the MMDU slot.

**CAUTION****Damage to Equipment**

When you feed the cables into the MMDU slot, be very careful that the cables do not pinch or snag on either side.

- 7 Slowly slide the MMDU three-quarters of the way into the shelf until it is supported in the shelf.
- 8 At the rear of the module, gently pull the attached cables through to clear the backplane edge.

**CAUTION****Damage to Equipment**

Be careful not to pull any cables too hard or you may dislodge them from the unit. If any cables become dislodged, remove the MMDU from the front of the module and reattach the cables.

- 9 Connect the three MMDU cables:

- a. Connect the longer of the two ribbon cables to the connector labeled Floppy Drive.
  - b. Connect the shorter of the two ribbon cables to the slot (below the Floppy Drive) labeled IDE Secondary Channel.
  - c. Open the tabs and push the connector to attach the third cable to the top cable connection labeled +12, GND,GND,VCC.
- 10 From the front of the module, carefully slide the MMDU the remainder of the way into the slot.
- 11 Use a slotted or Phillips screwdriver to secure the center screws on the top and bottom of the MMDU.

**Procedure 2:**

**Replace the NT4N43AA cPCI Multi-Media Disk Unit (MMDU) by removing the card cage**

- 1 Power down the shelf containing the card cage.
- 2 Disconnect the card cage cables:
  - a. Label and disconnect all cables from the front of the module. Tape over the contacts to avoid grounding. Tape or tie all cables to the sides so the working area in front of the card cage is totally clear.
  - b. If there is an I/O safety panel, remove it by turning the screws on each side. Set the cover aside.
  - c. Tag and disconnect all cables from the backplane to the interior of the I/O assembly.
  - d. Tag and disconnect all plugs, wires, and cables from the backplane.
- 3 Remove the card cage:

**Note:** Use two people to remove the Core/Net card cage because of the weight.

- a. Remove the two mounting screws at the bottom rear of the card cage that secure the card cage to the module casting. You need a 1/4" nut driver to remove the screws. It is recommended that you use a magnetized screwdriver to avoid dropping the screws into the base of the UEM module.
  - b. Remove the front trim panels on both sides of the card cage.

- c. Remove the three mounting screws that secure the front of the card cage to the bottom of the module. Save the screws for use with the CP PII card cage.
- d. Pull the card cage forward until it is halfway out of the module.
- e. Remove the orange Logic Return (LTRN) wire from the backplane bolt. Do not drop the nut or lock washer into the pedestal.
- f. Remove the LTRN wire from the frame ground bolt.
- g. Label and disconnect the module power connectors. These are small orange connectors plugged into the module power distribution unit (MPDU) in an AC-powered system, or connected to each other in a DC-powered system.
- h. Label and disconnect the system monitor ribbon cables from J1 and J2.
- i. Remove the card cage from the module. Set it on a table to allow front and back access to the MMDU.

**CAUTION****Damage to Equipment**

Be sure to perform the following step. If you do not tape the EMI shield in position, you will not be able to install the card cage in the module correctly.

- j. Reposition the EMI shield (it looks like a brass grill) in the base of the module. Tape over the front mounting tabs to hold the shield in position. You will remove the tape later.

**CAUTION****Damage to Equipment**

Check for and remove any debris (such as screws) that may have fallen into the base of the UEM module.

- 4 At the rear of the card cage, remove the three cables connected to the back of the MMDU (see Figure 21 on [page 211](#)):

- a. Push up the tabs and disconnect the bottom CD-ROM and Hard Drive Data Cable (NT4N92AA).
  - b. Push up the tabs and disconnect the middle Floppy Data Cable (NT4N93AA).
  - c. Squeeze the top and bottom tabs, and release the top Floppy, CD-ROM, and Hard Drive Power Cable (NT4N95AA).
- 5 At the front of the module, use a slotted or Phillips screwdriver to unscrew the center screws on the top and bottom of the MMDU.  
**Note:** Some systems have MMDU screws which are captive, while some systems have MMDU screws which may be removed.
- 6 Use the MMDU handle to slowly pull the MMDU forward, bringing the attached cables with it.
- 7 Remove the MMDU unit (with the cables attached) from the card cage.
- 8 Remove the cables and reattach them to the new MMDU.
- 9 From the front of the module, bundle and feed the cables attached to the MMDU into the MMDU slot.



**CAUTION**

**Damage to Equipment**

When you feed the cables into the MMDU slot, be very careful that the cables do not pinch or snag on either side.

- 10 Slowly slide the MMDU three-quarters of the way into the shelf until it is supported in the shelf.
- 11 At the rear of the module, gently pull the attached cables through to clear the backplane edge.



**CAUTION**

**Damage to Equipment**

Be careful not to pull any cables too hard or you may dislodge them from the unit. If any cables become dislodged, remove the MMDU from the front of the module and reattach the cables.

- 12** Connect the three MMDU cables:
  - a.** Connect the longer of the two ribbon cables to the connector labeled Floppy Drive.
  - b.** Connect the shorter of the two ribbon cables to the slot (below the Floppy Drive) labeled IDE Secondary Channel.
  - c.** Open the tabs and push the connector to attach the third cable to the top cable connection labeled +12, GND, GND, VCC.
- 13** From the front of the module, carefully slide the MMDU the remainder of the way into the slot.
- 14** Use a slotted or Phillips screwdriver to secure the center screws on the top and bottom of the MMDU.
- 15** Replace the card cage:
  - a.** Check that the power harness at the right rear corner of the card cage is attached.
  - b.** Slide the CP PII card cage halfway into the module.
- 16** To reconnect the card cage cables, hold the card cage firmly and make the following connections at the rear of the module:
  - a.** In **AC** powered systems, connect the remaining module power connectors to J2 on the MPDU.  
  
In **DC** powered systems, connect the module power connectors to each other.
  - b.** Attach the **system monitor** ribbon cables:
    - i.** Connect the ribbon cable that goes down to the pedestal to connector **J1** on the backplane.
    - ii.** Connect the ribbon cable that goes up the column to **J2** on the backplane.
  - c.** Attach the green ground wire to the frame ground bolt on the module. Use a 11/32" socket wrench to attach the wire. Remove the nut and the lock washer at the top of the bolt. Put the frame ground wire terminal over the bolt. Reinstall the top lock washer and the nut, then tighten down the nut.

- d. Attach the orange Logic Return (LRTN) wire. Remove one nut and the lock washer from the LRTN bolt at the rear of the card cage. Put the wire terminal over the bolt, reinstall the lock washer and nut, then tighten down the nut. Use a 1/4" or 2/8" socket wrench.
  - 17 Slide the card cage all the way into the module.
  - 18 Check the position of the EMI shield. If the EMI shield has shifted, reposition it. Remove the tape holding the EMI shield.
  - 19 Pre-route cables NT4N88AA, NT4N88BA, and NT4N90AA before you secure the card cage:
    - a. Route cable **NT4N88AA** from **COM1** on the CP PII faceplate to **J25** on the I/O panel. (NT4N88AA is used to connect a terminal.)
    - b. Route cable **NT4N88BA** from **COM2** on the CP PII faceplate to **J21** on the I/O panel. (NT4N88BA is used to connect a modem.)
    - c. Route cable **NT4N90AA** from **LAN 1** on the CP PII faceplate to **J31 (top)** of the I/O panel.
    - d. Secure the card cage to the module with the three short screws in the front and the two long screws in the rear.
- Note:** You need a minimum 12" long, 3/8" hex head nut driver for the two screws in the rear of the card cage.
- 20 Replace the trim panels on both sides of the card cage.
  - 21 Install the screws at the back of the card cage.
  - 22 Reconnect the LAN 1, COM1, and COM2 cables.
  - 23 Reconnect cables, plugs, and wires to the backplane:
    - a. Reconnect all plugs, wires, and cables to the backplane. Cables include 3PE to cCNI Transition cables, D and E intermodule cable, and the intermodule power harness.
    - b. Position the I/O safety panel. Tighten the screws.

### Procedure 3:

#### Replace the NT4N43BA and NT4N43CA cPCI Multi-Media Disk Unit (MMDU)

- 1 Unscrew the screws that hold the MMDU in place.
- 2 Carefully slide the MMDU until just out of the shelf, turn the front of the MMDU to the left while supporting it with a hand.

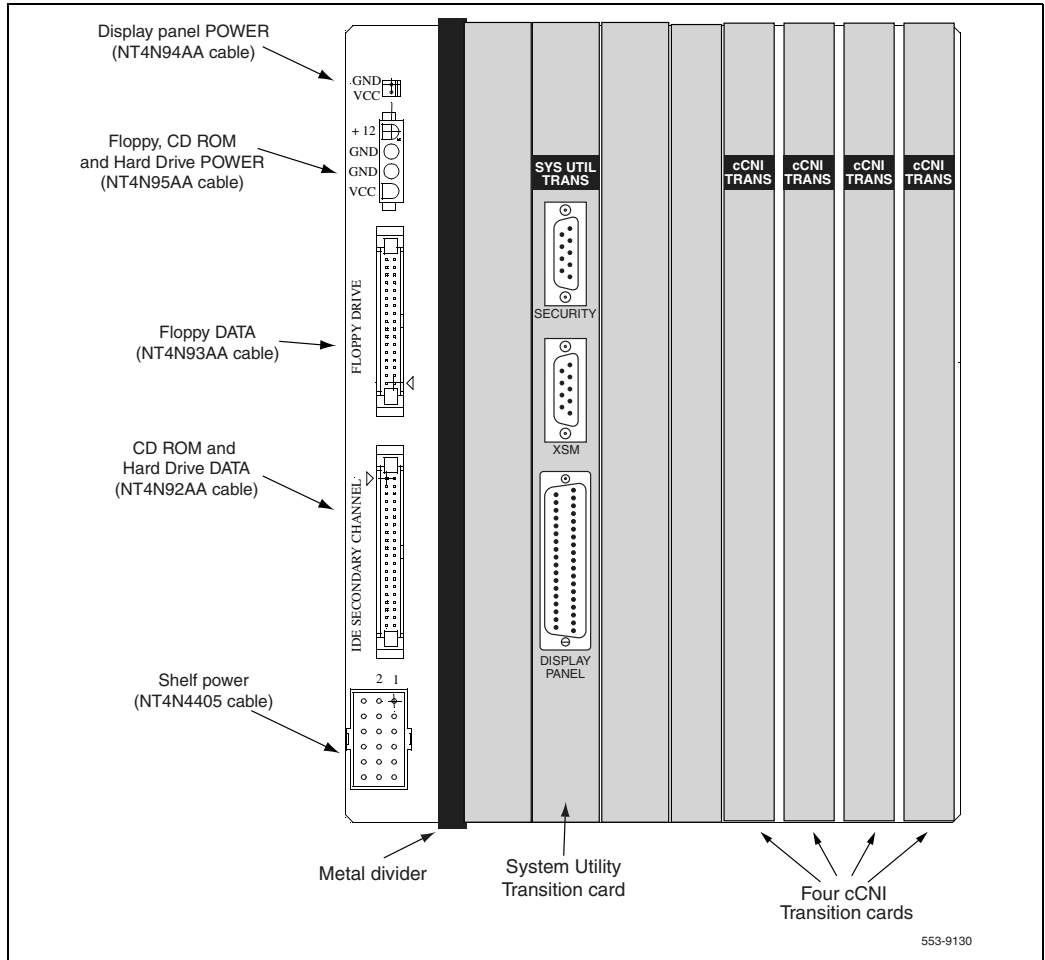


- 3** At the rear of the MMDU, remove the three cables in the following order:
  - a.** Disconnect the NT4N95BA power cable.
  - b.** Disconnect the NT4N93BA cable from the floppy drive.
  - c.** Disconnect the NT4N92BA from the CD-ROM and hard drive.
- 4** Replace the MMDU and attach the three cables in the following order:
  - a.** Attach the NT4N93BA to the floppy drive on the new MMDU.
  - b.** Attach the NT4N95BA power cable.
  - c.** Attach the NT4N92BA to the CD-ROM and hard drive on the new MMDU.
- 5** Carefully slide the MMDU into the shelf. You should not experience any resistance when reinserting the cables if they are properly routed.
- 6** Replace the screws.
- 7** Insert the CD-ROM and the Install Disk in the MMDU and reset the Call Processor card using the "reset" button on the faceplate.
- 8** Follow the steps below only if your system is not able to reboot properly:
  - a.** Remove and reinsert the Call Processor card (hot-swap). If the problem persists, try step b.
  - b.** Remove and reinsert the hard disk and CD-ROM power cords. Press the "reset" button and wait for the boot sequence. If you are not successful, try step c.
  - c.** Remove all the MMDU cables, check the backplane and see if the hard drive and/or the floppy cables are firmly connected to the board. Reconnect the MMDU cables, reset the Call Processor card and try again.
  - d.** If you are still experiencing problems, you will have to power down the Core/Net shelf. Keep in mind, this operation causes half the network to go down and it should only be performed with customer authorization.
- 9** Choose "Install Software,database, CP-BOOTROM" from the Install Menu.

- 10 Install the Operating Software from the Install Disk. See *Large System: Upgrade Procedures* (553-3021-258). Then install the Customer Database.
- 11 Issue the “Join CPU” command to initiate a disk-to-disk copy of the software.

**Note:** If you replace an NT4N43AA with a NT4N43BA/CA, use the cables that come with the NT4N43BA/CA.

**Figure 21**  
**Location of cable connections on MMDU**



## NT4N65, and NT4N66 cPCI Core Network Interface Cards

This section describes how to replace:

- NT4N65 cPCI Core Network Interface Cards.  
See “Procedure 1: Replace the NT4N65 cPCI Core Network Interface (cCNI) card” on [page 212](#).
- NT4N66 cPCI Core Network Interface Transition Cards.  
See “Procedure 2: Replace the NT4N66 cPCI Core Network Interface (cCNI) Transition Card” on [page 213](#).

### Procedure 1:

#### Replace the NT4N65 cPCI Core Network Interface (cCNI) card

- 1 Check that the Core containing the cCNI card to be replaced is inactive:
  - a. The LCD/LED display panel across the top of the Core/Net module core cards has two rows of LEDs.  
If either of the LEDs (top = red or bottom = green) is on for any of the cards, that side is in a test or idle state.
  - b. If the Core containing the cCNI is active, switch cores in LD 135:

<b>LD 135</b>	To load the program.
<b>SCPU</b>	Switch.Core (if necessary).
- 2 In LD 135, software disable the cCNI card:

**DIS CNI c s p**    Disable the cCNI card, where:

c = Core number (0 or 1)  
s = Slot number (9 - 12)  
p = Port number (0, 1)

This software disables both the cCNI card and its associated cCNI Transition card.
- 3 Hardware disable the cCNI card: set the faceplate switch to DIS.
- 4 Use a small-bladed screwdriver to remove the screws from the cCNI card.
- 5 To remove the card, hold the card by the faceplate latches and gently pull it out of the slot.
- 6 To install the replacement card, hold the card by the faceplate latches and gently push it into the slot until the connectors make contact with the backplane.

- 7 Gently push the latches forward to set the card and lock it in place.

**CAUTION****Damage to Equipment**

Never force the card into the slot. If the card gets stuck, remove it and try again.

- 8 Use a small-bladed screwdriver to replace the screws on the card.
- 9 Hardware enable the cCNI card: set the faceplate switch to ENB.
- 10 Software enable the cCNI card:

**LD 135** To load the program.

**ENL CNI c s** Enable the cCNI card, where:

**p** c = Core number (0 or 1)  
 s = Slot number (9 - 12)  
 p = Port number (0, 1)

This software enables both the cCNI card and its associated cCNI Transition card.

**Procedure 2:****Replace the NT4N66 cPCI Core Network Interface (cCNI) Transition Card**

To replace a cCNI Transition Card, you must software and hardware disable the NT4N65 cCNI card associated with the NT4N66 cCNI Transition Card. You must disable the cCNI from the **inactive** core.

- 1 Check that the Core containing the cCNI card to be replaced is inactive:
  - a. The LCD/LED display panel across the top of the Core/Net module core cards has two rows of LEDs.  
 If either of the LEDs (top = red or bottom = green) is on for any of the cards, that side is in a test or idle state.
  - b. If the Core containing the cCNI Transition card is active, make the other Core active:

**SCPU** Switch.Core (if necessary).

- 2 In LD 135, software disable the cCNI card:

**DIS CNI c s p** Disable the cCNI card, where:

c = Core number (0 or 1)

s = Slot number (9 - 12)

p = Port number (0, 1)

This software disables both the cCNI card and its associated cCNI Transition card.

- 3 At the front of the module, hardware disable the NT4N65 cCNI card: set the faceplate switch to DIS.
- 4 At the back of the module, use a small-bladed screwdriver to remove the screws, located on the top and bottom of the cCNI Transition cards. Be careful not to drop the screws into the Pedestal. Refer to Figure 22.
- Note:** cCNI Transition card replacement is more effective when all the cards are removed as a group, the card changed, and the card group replaced.
- 5 Remove the four screws that fasten the 3PE Termination Panel to its mounting bracket. Refer to Figure 23.
- 6 Move the 3PE Termination Panel carefully to the left and out of its mounting bracket.
- 7 Press the card faceplate latches and unseat each card. (The cables are part of the NT4N66 cCNI Transition card assembly.)
- 8 Remove the NT4N66 cCNI Transition cards, cables, and 3PE Termination panel as an assembly.
- 9 Disconnect the cCNI Transition Card cable(s) to be replaced from the 3PE Termination panel.
- Note:** If you remove more than one cable, label the cables to correctly reconnect them later.
- 10 Install the NT4N66 cCNI Transition cards, cables, and 3PE Termination panel as an assembly.

- 11 Gently push the latches forward to set the card and lock it in place

**CAUTION****Damage to Equipment**

Never force the card into the slot. If the card gets stuck, remove it and try again.

- 12 Place the 3PE Termination Panel into its mounting bracket.
- 13 Install the four screws that fasten the 3PE Termination Panel to its mounting bracket.
- 14 Use a small-bladed screwdriver to replace the screws on the cCNI Transition cards.
- 15 At the front of the module, hardware enable the NT4N65 cCNI card: set the faceplate switch to ENB.
- 16 Software enable the NT4N65 cCNI card:

**LD 135** To load the program.

**ENL CNI c s** Enable the cCNI card, where:

**p**

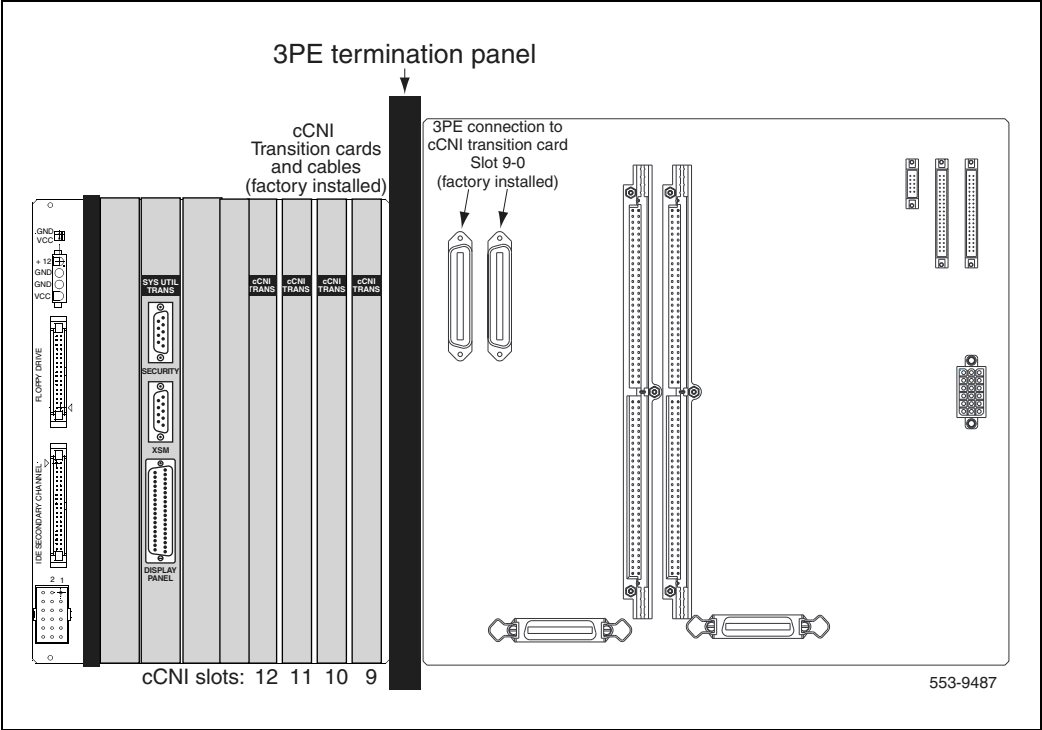
c = Core number (0 or 1)

s = Slot number (9 - 12)

p = Port number (0, 1)

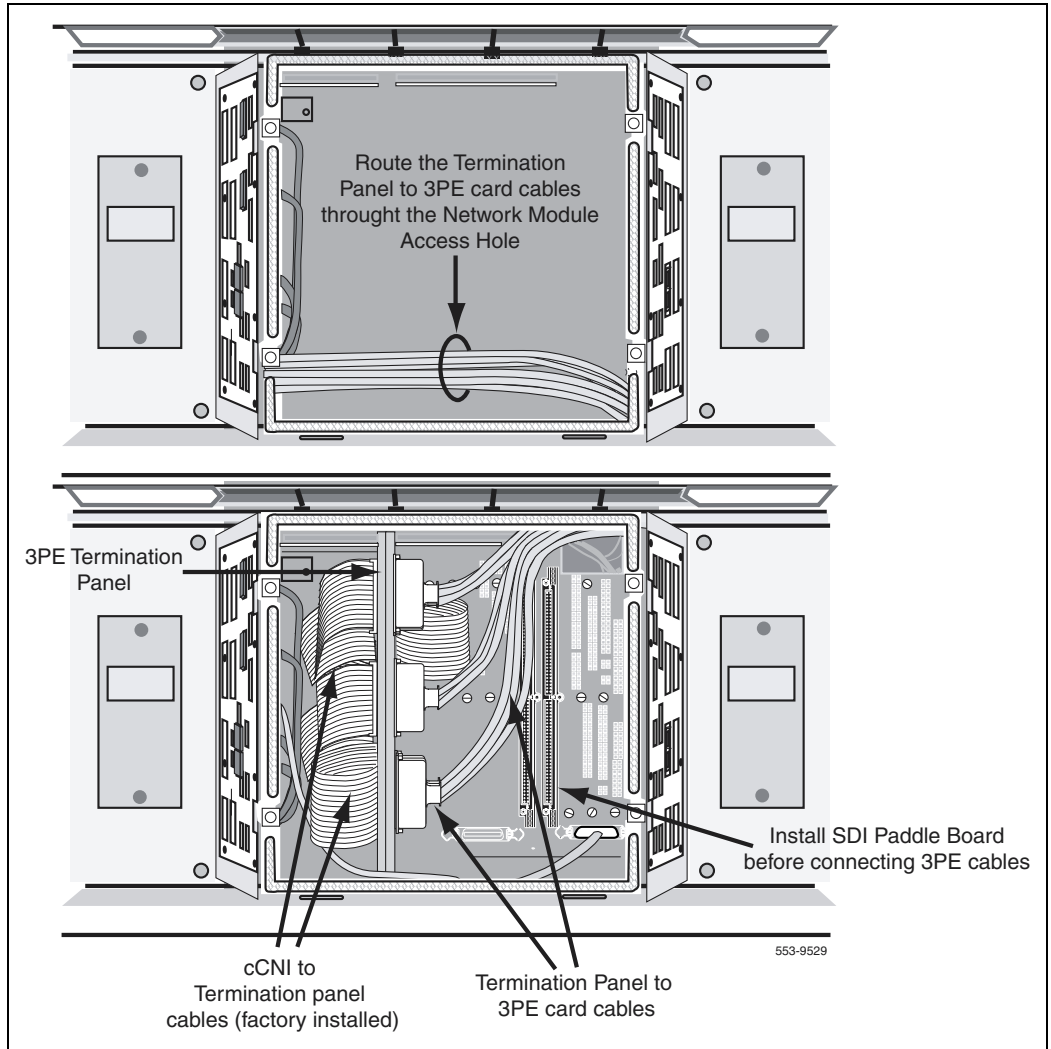
This software enables both the cCNI card and its associated cCNI Transition card.

**Figure 22**  
**Core/Net backplane**





**Figure 23**  
**3PE Termination panel**



## NT4N67 and NT4N68 System Utility cards

This section describes how to replace:

- NT4N67 cPCI System Utility Cards.  
See “Procedure 1: Replace the NT4N67 cPCI System Utility (SYS UTIL) card” on [page 218](#).
- NT4N68 cPCI System Utility Transition Cards.  
See “Procedure 2: Replace the NT4N68 cPCI System Utility Transition (SYS UTILTRANS) card” on [page 220](#).

### Procedure 1:

#### Replace the NT4N67 cPCI System Utility (SYS UTIL) card

- 1 Check that the Core containing the SYS UTIL card to be replaced is inactive:
  - a. The LCD/LED display panel across the top of the Core/Net module core cards has two rows of LEDs.  
If either of the LEDs (top = red or bottom = green) is on for any of the cards, that side is in a test or idle state.
  - b. If the Core containing the SYS UTIL is active, switch cores in LD 135:

<b>LD 135</b>	To load the program.
<b>SCPU</b>	Switch.Core (if necessary).
- 2 In LD 135, split the CPU Cores:  
**SPLIT**
- 3 In LD 135, on the inactive CP, software disable the SYS UTIL card:

<b>DIS SUTL c</b>	Disable the SYS UTIL card, where:
<b>15</b>	c = Core number (0 or 1)
	This software disables both the cPCI System Utility card and its associated cPCI System Utility Transition card.
- 4 Hardware disable the SYS UTIL card: set the faceplate switch to DIS.
- 5 Use a small-bladed screwdriver to remove the screws from the SYS UTI card.

- 6 To remove the card, hold the card by the faceplate latches and gently pull it out of the slot.
- 7 To install the replacement card, hold the card by the faceplate latches and gently push it into the slot until the connectors make contact with the backplane.
- 8 Gently push the latches forward to set the card and lock it in place.

**CAUTION****Damage to Equipment**

Never force the card into the slot. If the card gets stuck, remove it and try again.

- 9 Use a small-bladed screwdriver to replace the screws on the card.
- 10 Hardware enable the SYS UTIL card: set the faceplate switch to ENB.
- 11 In LD 135, software enable the SYS UTIL card:

**ENL SUTL c** Enable the SYS UTIL card, where:

**15**

c = Core number (0 or 1)

This software enables both the cCPI System Utility card and its associated cCPI System Utility Transition card.

- 12 In LD 135, check status:

**STAT SUTL c** This checks the status SYS UTIL status where:

**15**

c = Core number (0 or 1)

This checks the status of both the cCPI System Utility card and its associated cCPI System Utility Transition card.

- 13 In LD 135, on the active CP, rejoin the two CP PII cards:

**JOIN**

**Procedure 2:**  
**Replace the NT4N68 cPCI System Utility Transition**  
**(SYS UTILTRANS) card**

To replace a System Utility Transition Card, you must software and hardware disable the NT4N67 System Utility card associated with the NT4N68 System Utility Transition Card. You must disable the System Utility card from the **inactive** core.

- 1 Check that the Core containing the SYS UTIL TRANS card to be replaced is inactive:

- a. The LCD/LED display panel across the top of the Core/Net module core cards has two rows of LEDs.  
If either of the LEDs (top = red or bottom = green) is on for any of the cards, that side is in a test or idle state.
- b. If the Core containing the SYS UTIL TRANS card is active, make the other Core active:

**LD 135**            To load the program.  
**SCPU**            Switch.Core (if necessary).

- 2 In LD 135, split the CPU Cores:

**SPLIT**

- 3 In LD 135, on the inactive CP, software disable the SYS UTIL card:

**DIS SUTL c**    Disable the SYS UTIL card, where:  
**15**                    c = Core number (0 or 1)  
  
This software disables both the cCPI System  
Utility card and its associated cCPI System  
Utility Transition card.

- 4 At the front of the module, hardware disable the NT4N67 SYS UTIL card:  
set the faceplate switch to DIS.
- 5 Unseat the SYS UTIL card.
- 6 Remove the two cables, and the security device holder from the faceplate  
of the SYS UTIL TRANS card.

- 7 At the back of the module, use a small-bladed screwdriver to remove the screws, located on the top and bottom of the SYS UTIL TRANS card cards. Be careful not to drop the screws into the Pedestal. Refer to Figure 22.
- 8 Install the replaced NT4N68 SYS UTIL TRANS card.
- 9 Gently push the latches forward to set the card and lock it in place

**CAUTION****Damage to Equipment**

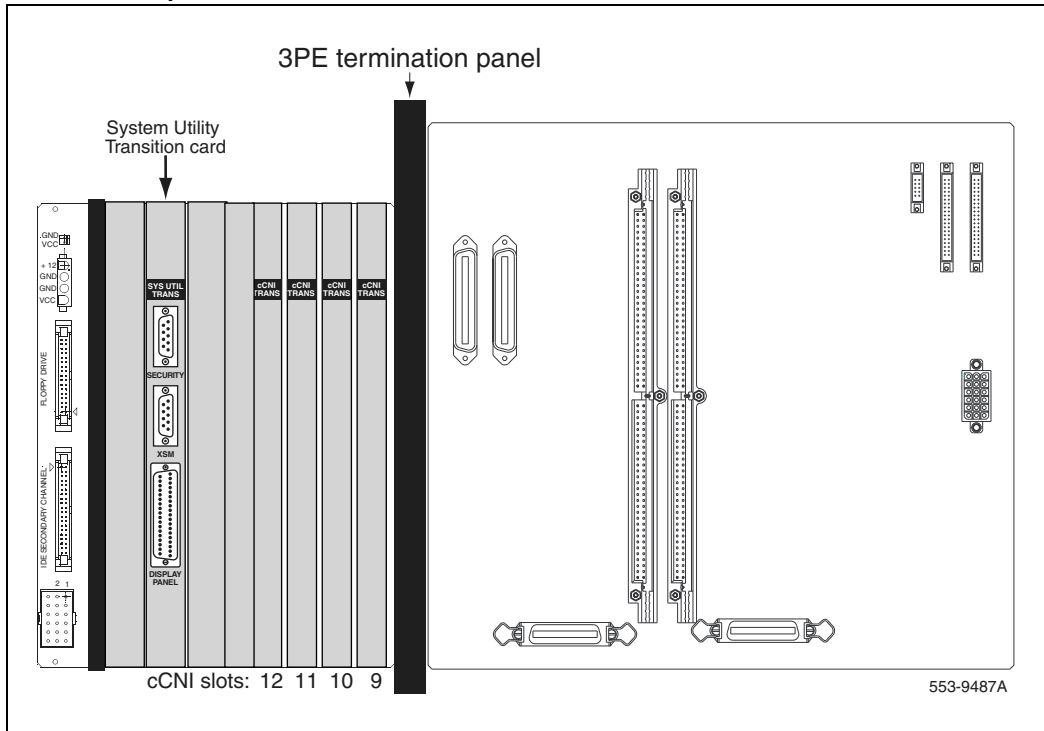
Never force the card into the slot. If the card gets stuck, remove it and try again.

- 10 Use a small-bladed screwdriver to replace the screws on the SYS UTIL TRANS cards.
- 11 Replace the cables and security device connections to the faceplate of the SYS UTIL TRANS card.
- 12 Reseat the SYS UTIL card and push the latches to set the card into the backplane connector.
- 13 At the front of the module, hardware enable the NT4N67 System Utility card: set the faceplate switch to ENB.
- 14 In LD 135, on the inactive CP, software disable the SYS UTIL card:  
**ENL SUTL c** Enable the SYS UTIL card, where:  
**15** c = Core number (0 or 1)  
  
This software enables both the cCPI System Utility card and its associated cCPI System Utility Transition card.
- 15 In LD 135, on the inactive CP, check the SYS UTIL card status:  
**STAT SUTL c** Disable the SYS UTIL card, where:  
**15** c = Core number (0 or 1)  
  
This checks the status of both the cCPI System Utility card and its associated cCPI System Utility Transition card.

16 On the active CP, rejoin the two CP PII cards:

**LD 135** To load the program.  
**JOIN**

**Figure 24**  
**Core/Net backplane**



## NT4N64, and A0810496 Call Processor (CP PII) card

This section describes how to replace the NT4N64, or the A0810496 Call Processor CP PII cards.

**Procedure 1:****Replace the NT4N64, or the A0810496 Call Processor (CP PII) card**

- 1 Check that the Core containing the CP PII card to be replaced is inactive:
  - a. The LCD/LED display panel across the top of the Core/Net module core cards has two rows of LEDs.  
If either of the LEDs (top = red or bottom = green) is on for any of the cards, that side is in a test or idle state.
  - b. If the Core containing the CP PII card is active, switch cores in LD 135:

<b>LD 135</b>	To load the program.
<b>SCPU</b>	Switch.Core (if necessary).
- 2 In LD 135, split the CPU Cores:  
**SPLIT**
- 3 Remove all cables connected to the CPU being replaced.
- 4 Use a small-bladed screwdriver to remove the screws from the CP PII card.
- 5 To remove the card, hold the card by the faceplate latches and gently pull it out of the slot.
- 6 To install the replacement card, hold the card by the faceplate latches and gently push it into the slot until the connectors make contact with the backplane.
- 7 Gently push the latches forward to set the card and lock it in place.

**CAUTION****Damage to Equipment**

Never force the card into the slot. If the card gets stuck, remove it and try again.

- 8 Use a small-bladed screwdriver to replace the screws on the card.
- 9 Replace all cables on the replaced CP PII card.

- 10 After the inactive CP reloads, and in LD 135, check status:  
**STAT CPU**
- 11 In LD 135, on the active CP, rejoin the two CP PII cards:  
**JOIN**
- 12 After the disk sync and memory sync completes, and in LD 135,:  
**STAT CPU** To check for normal system operation.
- 13 In LD 135, verify that the replaced CP PII card can control call processing:  
**SCPU** To check replaced CP PII.

**Note:** Switch CPU back, if necessary.

## NT5D10 68060 Call Processor (CP) Card

Use this procedure to replace an NT5D10 68060 Call Processor (CP) card.

*Software Input/Output: Administration* (553-3001-311) for a description of all maintenance commands, and *Software Input/Output: System Messages* (553-3001-411) for interpretation of system messages.



### **DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.



### **CAUTION**

#### **Service Interruption**

At some point in this procedure, you will be required to warm start your system, causing a momentary interruption in call processing.



## Removing equipment

- 1 To access the Core during the replacement procedure, connect a terminal to the J25 port on the I/O panel in the Core Module or Core/Network Module for the CP card you are replacing. To communicate with the processor, you must use the following settings on the terminal:

**9600 baud, 7 data, space parity, 1 stop bit, full duplex, XOFF**

*Note:* If you are using only one terminal or a switch box, switch the connection from Core to Core as needed.

- 2 The CP card you are replacing must be in the inactive Core. Check the status of the NT5D10 Call Processor cards:

### **LD 135**

**STAT CPU**            determine which CP card is active

If necessary, switch Cores:

**SCPU**                switch Cores

**\*\*\*\***                 exit LD 135

- 3 Set the NORM/MAINT switch on the NT5D10 Call Processor card to MAINT on the *active* Core.
- 4 Set the ENB/DIS switch on all CNI cards on the *inactive* Core to DIS.
- 5 Perform the following three steps on the *inactive* Core in an uninterrupted sequence:
  - a. Press and hold down the MAN RST button on the CP card on the inactive Core.
  - b. Set the NORM/MAINT switch to MAINT.
  - c. Release the MAN RST button.

The system is now in split mode where each Core is functioning independently and the automatic switchover has been disabled.

## Installing equipment

- 1 Set the NORM/MAINT switch to MAINT on the replacement card.
- 2 Insert the Install Program diskette which corresponds with the NT5D10 Call Processor.
- 3 Remove the current CP card and put it in a static bag and box.

- 4    Insert the CP replacement card into its vacated slot and hook the locking devices.
- 5    Press the MAN RST button on the replacement CP card.
- 6    When the NT Logo Screen appears on the terminal, press <CR>.
- 7    Enter the date and time.
- 8    When the Main Menu appears, select <u> to go to the Install Menu.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)  
=====

M A I N   M E N U

The Software Installation Tool will install or upgrade Meridian-1 System Software, Database and the PE-ROM (both CP and IOP ROM). You will be prompted throughout the installation and given the opportunity to quit at any time.

Please enter:

<CR>-->   <u> - To Install menu.

            < t> - To Tools menu.

            < q> - Quit.

Enter choice > **u**

553-7780

- 9** Insert the Keycode diskette when prompted and select **<a>** to continue with the keycode validation.

```

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)
=====

Please insert the diskette with the keycode file into the floppy
drive.

Please enter:
<CR>--> <a> - Continue with the keycode validation
        (the keycode diskette is in the floppy drive).
        <q> - Quit.

Enter Choice > a
553-7729

```

- 10** Select the following options in sequence from the Install Menu:

<b>&lt;g&gt;</b>	to reinstall CP software
<b>&lt;y&gt;</b>	to start installation
<b>&lt;a&gt;</b>	to continue ROM upgrade
<b>&lt;cr&gt;</b>	to return to the Install Menu

- 11** When the Install Menu appears, select the following options in sequence

<b>&lt;e&gt;</b>	to install CP-BOOTROM
<b>&lt;y&gt;</b>	to start installation
<b>&lt;a&gt;</b>	to continue with the upgrade

- 12** A Status Summary is displayed indicating what was installed. Press **<CR>** to return to the Install Menu.

- 13** **Remove the diskette** from the IODU/C.

**14** Select the following options to quit the Install Tool:

- |     |                       |
|-----|-----------------------|
| <q> | to quit               |
| <y> | to confirm quit       |
| <a> | to reboot the system. |

**Note:** The system will reboot. Wait for the “INI” and “DONE” messages to display before continuing. It will take at least 70 seconds between the “DONE” and “INI” messages.

After the system initialization has finished (INI messages are no longer displayed on the system terminal), check for dial tone on a telephone set.

Following a successful dial tone test, perform the following basic sanity tests:

- a. Make sure calls can be placed.
- b. Check for error messages, line noise, chatter, or other problems. Track sources and resolve problems as necessary.

To place the system back in the redundant (normal) mode with automatic switchover capability. Perform the following five steps in uninterrupted sequence on the *inactive* Core (the Core with the replaced CP card):

- 15** Press and hold down the MAN RST button on the CP card of the *inactive* Core.
- 16** While holding down the MAN RST button, set the NORM/MAINT switch on the same CP card to NORM.
- 17** Enable all CNI switches in the inactive Core.
- 18** Release the MAN RST button.
- 19** Set the CP card in the active Core to NORM.

After several minutes, an “HWI533” message is issued by the *active* Core indicating that the *inactive* Core memory is being synchronized with the *active* Core memory.

**20** Log into the system through the terminal, then check the status of the replacement CP card from the active side:

- |                 |                       |
|-----------------|-----------------------|
| <b>LD 135</b>   | load LD 135           |
| <b>STAT CPU</b> | obtain the CPU status |

- 21** If there are CCED messages generated by the STAT CPU command on the replacement CP card, set the NORM/MAINT switch to MAINT, press the reload (MAN RST) button, and set the NORM/MAINT switch back to NORM. (It may take 2 to 4 minutes for memory synchronization to take place.)

After the HWI0533 message is displayed, test the replacement CP card from the active CPU:

**TEST CPU**                      the test causes a cold start on the inactive CPU

If the test results in:

**CCED014**                      “Test failed because unable to enter SPLIT mode”

On the active CP card set the NORM/MAINT switch to NORM, and from the active side enter:

**TEST CPU**                      to test the CP card

- 22** Set the NORM/MAINT switch to NORM on the active CP card (if not already set).

- 23** Check the status of the CPUs:

**STAT CPU**

- 24** Test the CPU.

**TEST CPU**

- 25** Check the status of the CNIs:

**STAT CNI**

- 26** Switch Cores and exit the program:

**SCPU**

\*\*\*\*                      exit LD 135

- 27** The CP card you are replacing must be in the inactive Core. Check the status of the NT5D10 Call Processor cards:

**LD 135**

**STAT CPU**                      determine which CP card is active

If necessary, switch Cores:

**SCPU**                      switch Cores

\*\*\*\*                      exit LD 135

- 28 Set the NORM/MAINT switch on the NT5D10 Call Processor card to MAINT on the *active* Core.
- 29 Set the ENB/DIS switch on all CNI cards on the *inactive* Core to DIS.
- 30 Perform the following three steps on the *inactive* Core in an uninterrupted sequence:
  - a. Press and hold down the MAN RST button on the CP card on the inactive Core.
  - b. Set the NORM/MAINT switch to MAINT.
  - c. Release the MAN RST button.

The system is now in split mode where each Core is functioning independently and the automatic switchover has been disabled.

### Installing equipment

- 1 Set the NORM/MAINT switch to MAINT on the replacement card.
- 2 Insert disk A1 into the IOP/CMDU or CMDU.
- 3 Remove the current CP card and put it in a static bag and box.
- 4 Ensure the NORM/MAINT switch is set to MAINT, and insert the CP replacement card into its vacated slot and hook the locking devices.
- 5 Press the MAN RST button on the replacement CP card.
- 6 Select the following options in sequence from the Install Menu:

<g>	to reinstall CP software
<y>	to start installation
<y>	to continue installation
<a>	to continue with ROM upgrade
<cr>	to return to the Install Menu
- 7 At the Install Menu, select the following options in sequence

<e>	to install CP-BOOTROM
<y>	to start installation
<y>	to continue installation
<a>	to continue with ROM upgrade
<cr>	to return to the Install Menu

**8 Remove the diskette** from the IOP/CMDU or CMDU.

**9** Select the following options to quit:

<q>	to quit
<y>	to confirm quit
<a>	to reboot the system.

**Note:** The system will reboot. Wait for the “INI” and “DONE” messages to display before continuing. It will take at least 70 seconds between the “DONE” and “INI” messages.

After the system initialization has finished (INI messages are no longer displayed on the system terminal), check for dial tone on a telephone set.

**10** Following a successful dial tone test, perform the following basic sanity tests:

- a. Make sure calls can be placed.
- b. Check for error messages, line noise, chatter, or other problems. Track sources and resolve problems as necessary.

To place the system back in the redundant (normal) mode with automatic switchover capability. Perform the following five steps in uninterrupted sequence on the *inactive* Core (the Core with the replaced CP card):

**11** Press and hold down the MAN RST button on the CP card of the *inactive* Core.

**12** While holding down the MAN RST button, set the NORM/MAINT switch on the same CP card to NORM.

**13** Enable all CNI switches in the inactive Core.

**14** Release the MAN RST button.

**15** Set the CP card in the active Core to NORM.

After several minutes, an “HWI533” message is issued by the *active* Core indicating that the *inactive* Core memory is being synchronized with the *active* Core memory.

**16** Log into the system through the terminal, then check the status of the replacement CP card from the active side:

<b>LD 135</b>	load L 135
<b>STAT CPU</b>	obtain the CPU status

- 17** If there are CCED messages generated by the STAT CPU command on the replacement CP card, set the NORM/MAINT switch to MAINT, press the reload (MAN RST) button, and set the NORM/MAINT switch back to NORM. (It may take two to four minutes for memory synchronization to take place.)

After the HWI0533 message is displayed, test the replacement CP card from the active CPU:

**TEST CPU**                      the test causes a cold start on the inactive CPU

If the test results in:

**CCED014**                      “Test failed because unable to enter SPLIT mode”

On the active CP card set the NORM/MAINT switch to NORM, and from the active side enter:

**TEST CPU**                      to test the CP card

- 18** Set the NORM/MAINT switch to NORM on the active CP card (if not already set).

- 19** Check the status of the CPUs:

**STAT CPU**

- 20** Test the CPU.

**TEST CPU**

- 21** Check the status of the CNIs:

**STAT CNI**

iii. Switch Cores and exit the program:

**SCPU**

\*\*\*\*                      exit LD 135

## NT5D12AA Dual DTI/PRI (DDP)

Use this procedure to replace an NT5D12AA DDP card. See *Software Input/Output: Administration* (553-3001-311) for a description of all



maintenance commands, and *Software Input/Output: System Messages* (553-3001-411) for interpreting system messages.

**DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

**CAUTION WITH ESDS DEVICES**

The static discharge bracelet located inside the cabinet must be worn before handling circuit cards. Failure to wear the bracelet can result in damage to the circuit cards.

## Removing the DDP card

- 1 Determine the cabinet and shelf location of the DDP card to be removed.
- 2 Disable Network Loop using Overlay 60. The command is DISL “loop number”.

The associated DCHI may have to be disabled first. The faceplate switch S1 should not be disabled until both PRI loops are disabled first.
- 3 If the DDP card is being completely removed, not replaced, remove data from memory. See *ISDN Primary Rate Interface: Description* (553-3001-369).
- 4 Remove cross connections at the MDF to the wall-mounted cross-connect terminal.
- 5 Tag and disconnect cables from the card.

- 6    Rearrange Clock Controller cables, if required.



**CAUTION**

**System Failure**

Do not route Clock Controller cables connecting the Clock Controller and DDP card through the center of the cabinet past the power harness. Instead, route them around the outside of the equipment shelves.

- 7    In the other circuit of a DDP card is in use, DO NOT remove the card.
- 8    Remove the DDP card if both loops are disabled. Switch S1 (faceplate switch) must be in the OFF (DIS) position before you remove the card.
- 9    Package and store the DDP card and cables.

## Installing the DDP card

Set the option switches on the DDP circuit card before installation; see Table 2 below, where bold font indicates factory settings.

**Table 18**  
**DDP general purpose switch settings**

Switch	Description	S9/S15 Switch Setting
1	Framing mode	<b>off = ESF</b> on = SF
2	Yellow alarm method	<b>off = FDL</b> on = Digit2
3	Zero code suppression mode	<b>off = B8ZS</b> on = AMI
4	Unused	<b>off</b>

**Note:** SW1 (faceplate switch) must be off (DIS) when installing the DDP. SW1 on the DDP corresponds to the faceplate switch on the QPC414 Network card.

- 10 Run and connect the DDP cables.

**CAUTION****System Failure**

Do not route Clock Controller cables connecting the Clock Controller and DDP card through the center of the cabinet past the power harness. Instead, route them around the outside of the equipment shelves.

- 11 Enable faceplate switch S1. This is the “Loop Enable” switch.

The faceplate LEDs should light for four seconds, then go out, and the OOS, DIS, and ACT LEDs should light again and stay lit.

If DDCH is installed, the DCH LED should flash 3 times.

- 12 Run PRI/DTI Verification Test. Refer to the *ISDN Primary Rate Interface: Maintenance* (553-3001-517).
- 13 Run PRI status check. Refer to the *ISDN Primary Rate Interface: Maintenance* (553-3001-517) for the PRI verification tests, DDP self-test, PRI status check, and PRI start-up test.

## NT5D61 Input/Output Disk Unit with CD-ROM (IODU/C)

Use this procedure to replace a faulty IODU/C card with a new IODU/C card.

See *Software Input/Output: Administration* (553-3001-311) for a description of all maintenance commands, and *Software Input/Output: System Messages* (553-3001-411) for interpreting system messages.

**DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.



**CAUTION**

**Service Interruption**

At some point in this procedure the system will warm start, causing a momentary interruption in call processing.

## Performing a data dump

Before starting this procedure, make a backup copy of the customer database on a 4MB diskette using the data dump routine:

- 1 Log into the system
- 2 Load the Equipment Data Dump Program (LD 43). At the prompt, enter  
**LD 43** to load the program
- 3 When “EDD000” appears on the terminal, enter  
**EDD** to begin the data dump
- 4 When “DATADUMP COMPLETE” and “DATABASE BACKUP COMPLETE” appear on the terminal, enter  
**\*\*\*\*** to exit the program



**CAUTION**

**System Failure**

If the data dump is not successful, do not continue; contact your technical support organization. A data dump problem must be corrected before proceeding.

To access the Core during the replacement procedure, connect a terminal to the J25 port on the I/O panel in the *inactive* Core Module or Core/Network Module. To communicate with the processor, you must use the following settings on the terminal:

**9600 baud, 7 data, space parity, 1 stop bit, full duplex, XOFF**

If you are using only one terminal or a switch box, switch the connection from Core to Core as needed.

## Splitting the Cores

- 1 Verify that the disk drives are synchronized:

<b>LD 137</b>	to load the program
<b>STAT</b>	to get the status of the disk drives

If the disks are synchronized, proceed with step 2 on [page 237](#). If they are not synchronized, execute the SYNC command:

<b>SYNC</b>	to synchronize the drives
<b>****</b>	to exit the program

- 2 Verify that the clock controller associated with the faulty IODU/C is *inactive*. If it is not, switch clock controllers:

<b>LD 60</b>	to load the program
<b>SSCK</b>	to get the status of the clock controllers
<b>SWCK</b>	to switch clock controllers (if necessary)
<b>****</b>	to exit the program

- 3 Verify that the IODU/C card you are replacing is on the *inactive* Core:

<b>LD 135</b>	to load the program
<b>STAT CPU</b>	to check CPU status
<b>TEST CPU</b>	to test the CPU

If the IODU/C you are replacing is on the *inactive* Core, proceed with step 5 on [page 237](#). If the IODU/C you are replacing is not on the *inactive* Core, swap Cores and verify again:

<b>SCPU</b>	to swap CPUs
<b>STAT CPU</b>	to check CPU status

- 4 Verify that the faulty IODU/C is *inactive*. You may need to switch IODU/Cs.

<b>LD 137</b>	
<b>STAT</b>	Get the status of IODU/C.
<b>SWAP</b>	Switch IODU/Cs (if necessary).

- 5 Set the MAINT/NORM switch on the CP card to MAINT on the *active* Core.

- 6    Set the ENB/DIS switch on all CNI cards to DIS on the *inactive* Core.
- 7    Perform the following three steps in uninterrupted sequence:
  - a.    press and hold the MAN RST button on the CP card in the *inactive* Core
  - b.    set the MAINT/NORM switch on the CP card in the *inactive* Core to MAINT
  - c.    release the MAN RST button

## Replacing the IODU/C in a redundant system

- 1    Set the ENB/DIS switch on the faulty IODU/C to DIS.
- 2    Unhook the locking devices and remove the IODU/C.
- 3    Remove the round 1/2" diameter IODU/C Security Device from the black round Security Device holder on the top right corner of the IODU/C card being replaced.
- 4    Put the IODU/C being replaced into a static bag and box.
- 5    With the Nortel side facing upward, slide the Security Device between the security device holder and the holder clip in the new IODU/C card. Do not bend the clip more than necessary when inserting the Security Device. Ensure that the Security Device is securely in place.
- 6    Insert the new IODU/C into the following slots:
  - a.    For NT5D21 Core/Net Modules, insert the IODU/C in slots 17, 18, and 19.
- 7    Lock the locking devices by pushing them gently towards the faceplate. Set the ENB/DIS switch to ENB.

A blinking letter "E" and number "5" displayed indicates that a failure occurred. In that case, reseal the Security Device in its holder and reinsert the card.

- 8    Press the MAN RST button on the CP card.

Once the keycode is validated against the Security Device, the Install menu is displayed.

**9** At the Install menu, select <0> to copy the software from the active Core.

===== Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11) =====

### INSTALL MENU

The Software Installation Tool will install or upgrade Meridian-1 System Software, Database and the PE-ROM (both CP and IOP ROM). You will be prompted throughout the installation and given the opportunity to quit at any time.

Please enter:

<CR>--> <a> - To install Software, CP-BOOTROM, IOP-ROM.  
<b> - To install Software, Database, CP-BOOTROM, IOP-ROM.  
<c> - To install Software only.  
<d> - To install Database only.  
<e> - To install CP-BOOTROM only.  
<f> - To install IOP-ROM only.  
<g> - To reinstall CP-Software.  
<o> - To copy System Software from the other Core.  
<t> - To go to the Tools menu.  
<k> - To install Keycode only.  
For Feature Expansion, use OVL143.  
<q> - Quit.

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Enter choice > 0

**10**   Select **<a>** to confirm.

Nortel Meridian - 1   Software/Database/PEROM CDROM INSTALL Tool (x11)

=====

You selected to copy the hard disk /p partition from IODU on Core 1  
to IODU on Core 0.  
60 MB of disk will be copied.  
This wil erase old system files, Database files will NOT be erased.  
Note that ERASED FILES CANNOT BE RECOVERED.

NOTE: Copy progress will be indicated by ... , one '!' per MB.

You may Continue with the copy operation or Quit now  
and leave your system unchanged.

Please enter:

<CR>-->   <a> -Copy /p partition from one Core 1 to Core 0.  
              <q> - Quit.

Enter Choice > **a**

553-7739

**11**   Select **<a>** to confirm the software release to be copied.

**12**   When the software is installed successfully, press **<CR>** to install  
CP-software from the hard disk to Flash EEPROM, and install CP-BOOT  
ROM. Follow the screen directions until the Main Menu returns.

Nortel Meridian - 1   Software/Database/PEROM CDROM INSTALL Tool (x11)

=====

Release: xxxx was installed successfully into /p partition  
on your side

NOTE: In order to complete the install you must install flash ROM  
In order to complete the install you must install CP BOOT ROM

Please press <CR> when ready...

553-7741

**13**   When the Main Menu returns, select **<f>** to install IOP-ROM.



**14** Select **<a>** to continue with the IOP-ROM upgrade.

Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)

You have chosen to Upgrade IOP-ROM in card slot xx from the context: x11xxxx to the context: x11xxxx.

This will replace old IOP-ROM with the ROM image files:  
"/p/os/ioprom".

You may Continue with ROM upgrade or Quit now and leave ROM unchanged.

Please enter:

<CR>--> <a> - Continue with ROM Upgrade.

<q> - Quit.

Enter choice > **a**

553-7787

**15** At the Install Menu, select the following options in sequence to copy the customer database from the redundant disk.

**<d>** to go to the Database menu

**<d>** to copy the database from the redundant disk

<y> to confirm installation status summary

**<a>** to confirm database copy

**16 Remove the diskette** from the IODU/C and select **<q>** to quit and reload the system.

**17** Select **<y>** to confirm quit

**18** Select <a> to reboot the system.

The system will automatically perform a sysload and system initialization during which several messages will appear on the system terminal. Wait until initialization has finished (INI messages are no longer displayed on the system terminal) before continuing.

**19** In the **inactive** Core, enable the NT6D65 CNI cards by setting the ENB/DIS faceplate switches to ENB.

**20** In the **inactive** Core, perform the following steps in uninterrupted sequence:

- a.** press and release the MAN RST button
- b.** when SYS700 messages appear on CP LCD display, set the MAINT/NORM switch to NORM.

Within 60 seconds, the LCD will display the following messages, confirming the process.

**RUNNING ROM OS  
ENTERING CP VOTE**

An “HWI534” message from the CPSI or SDI port indicates the start of memory synchronization. Within 10 minutes, an HWI533 message on the *inactive* Core CPSI or SDI TTY indicates the memory synchronization is taking place. Wait until the memory synchronization is complete.

**21** Switch the NORM/MAINT switch on the **active** CP card to NORM.

**22** Synchronize the disk drives:

<b>LD 137</b>	to load the program
<b>SYNC</b>	to synchronize the drives
<b>****</b>	to exit the program

**Note:** Synchronization may take up to 50 minutes.

## NT5D61 IODU/C Security Device

Use this procedure to replace the Security Device on the NT5D61 Input/Output Disk Unit with CD-ROM (IODU/C) Card.

The Security Device is a field removable component and is located in the upper right corner of an IODU/C card. The device does not contain feature or software release specific information, but it has a unique custom program necessary for each customer. It is intended to serve the customer through numerous upgrade and feature changes.

The Security Device is replaced only if such a replacement is suggested by maintenance and/or diagnostic programs.

See *Software Input/Output: Administration* (553-3001-311) for a description of all maintenance commands, and *Software Input/Output: System Messages* (553-3001-411) for interpreting system messages.

**DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

**CAUTION****Service Interruption**

At some point in this procedure the system will warm start, causing a momentary interruption in call processing.

**Note:** To replace the Security Device, a new Security Device and keycode are required. On redundant systems, the new keycode must validate against the new and existing Security Device.

## Replacing the Security Device on a redundant system

The procedure begins with the validation of the new Keycode against the existing Security Device.

- 1 To access the Core during the replacement procedure, connect a terminal to the J25 port on the I/O panel in the *inactive* Core Module or Core/Network Module. To communicate with the processor, you must use the following settings on the terminal:

**9600 baud, 7 data, space parity, 1 stop bit, full duplex, XOFF**

**Note:** If you are using only one terminal or a switch box, switch the connection from Core to Core as needed.

- 2 Use LD 135 to switch to the Core which contains the non-faulty Security Device.

**LD 135** to load the program  
**SCPU** switch CPUs (if necessary)  
**\*\*\*\*** exit LD 135

- 3 Insert the keycode diskette into the floppy drive on the IODU/C with the non-faulty Security Device.

- 4 In LD 143, print the pending keycode contents. Use "KSHO F0" if your keycode is on the diskette in the floppy drive on Core 0, or "KSHO F1" if your keycode is on the diskette in the floppy drive on Core 1:

**LD 143** to load the program  
**KSHO F0** print the contents of the candidate keycode  
**or**  
**KSHO F1**

- 5 Perform the KDIF command. Use "KDIF F0 REC" if the keycode diskette is inserted in the floppy drive on Core 0, or "KDIF F1 REC" if the keycode is inserted in the floppy drive on Core 1:

**KDIF F0 REC** to print the differences between the candidate and the current keycodes  
**or**  
**KDIF F1 REC**  
**\*\*\*\*** to exit LD 143

- 6 Disable the inactive IODU/C:

**LD 137** to load the program  
**STAT** to find the status of the IODU/Cs  
**DIS CMDU x** to disable the CMDU part of the inactive IODU/C x  
**DIS IOP x** to disable the IOP part of the inactive IODU/C x

Perform the following steps on the *inactive* Core.

- 7 Set the ENB/DIS switch on the IODU/C with the faulty Security Device to DIS.
- 8 Unhook the locking devices and remove the IODU/C.
- 9 Remove the round 1/2" diameter IODU/C Security Device from the black round Security Device holder on the top right corner of the IODU/C card.
- 10 Locate the round 1/2" diameter IODU/C replacement Security Device.

- 11 Make sure the 8-digit code on the Keycode diskette matches the 8-digit code on the replacement Security Device.
- 12 With the Nortel side facing upward, slide the replacement Security Device between the security device holder and the holder clip. Do not bend the clip more than necessary when inserting the Security Device. Ensure that the Security Device is securely in place.
- 13 Reinsert the IODU/C into the following slots:
  - For NT5D21 Core/Net Modules, insert the IODU/C in slots 17, 18, and 19.
- 14 Lock the locking devices by pushing them gently towards the faceplate. Set the ENB/DIS switch to ENB.

A blinking letter “E” and number “5” displayed indicates that a failure occurred. In that case, reseal the Security Device in its holder and reinsert the card.

- 15 Enable the IODU/C in LD 137:

<b>STAT</b>	to see the status of the IODU/Cs
<b>ENL CMDU x</b>	to enable the CMDU part of IODU/C x
<b>ENL IOP x</b>	to enable the IOP part of IODU/C x
<b>STAT</b>	to see the status of the IODU/Cs
<b>****</b>	to exit LD 137

- 16 Perform the KNEW command:

<b>LD 143</b>	to load the program
<b>KNEW HD</b>	to copy the keycode to the other Core
<b>****</b>	to exit the program

- 17 Reboot the system at a time that will minimize service impact.

The new keycode will not take effect until the system reboots.

## NT5D2103 Core/Network Card Cage

To replace a defective backplane in an NT5D21 Core/Network Module, you must replace the card cage.

Use this procedure to replace the card cage in a redundant system by maintaining system operation with the active CPU and replacing the card cage of the standby CPU. See *Software Input/Output: Administration*

(553-3001-311) for a description of all maintenance commands, and *Software Input/Output: System Messages* (553-3001-411) for interpreting system messages.



**DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

## Removing equipment

- 1 To access the Cores during the replacement procedure, connect a terminal to the J25 port on the I/O panel in the rear of each Core/Network Module. You must use the following settings on the terminal:

**9600 baud, 7 data, space parity, 1 stop bit, full duplex, XON**

**Note:** If you are using only one terminal or a switch box, switch the connection from Core to Core as needed.

- 2 The Call Processor (CP) Card must be inactive in the card cage you are replacing.

- a. Check the status of the CP cards:

**LD 135**

**STAT CPU**            determine which CP card is active

If necessary, switch Cores:

**SCPU**                switch Cores

\*\*\*\*                  exit LD 135

- b. Set the NORM/MAINT switch to MAINT on the now *active* CP card.
    - c. Connect the terminal to the port on the inactive Core.

- 3 Set the NORM/MAINT switch to MAINT on the CP card in the card cage you are replacing (the inactive Core). Wait 2 minutes for the system to initialize. (A series of INI messages will be seen on the terminal for the inactive Core.)
- 4 Disable the clock controller card and any QPC720 Primary Rate Interface or QPC472 Digital Trunk Interface (PRI/DTI) Cards in the card cage you are replacing.

- a. Check the status of the clock controller cards:

**LD 60**

**SSCK x**                    “x” is the Core (0 or 1)

If the clock controller card is active, switch to make it inactive:

**SWCK**

Disable the clock controller card:

**DIS CC x**                    “x” is the Core (0 or 1)

- b. Set the ENB/DIS switch to DIS on the clock controller card in the card cage you are replacing.
- c. Disable any PRI/DTI cards in the card cage you are replacing.

**DISL loop**                  disable the network loop and the card  
\*\*\*\*  
exit LD 60

**Note:** If the PRI/DTI cards service loops that cannot be out of service, move the cards to a different module and reenale them.

- 5 Set the ENB/DIS switch to DIS on all CNI cards and the IODV/C in the card cage you are replacing.
- 6 Follow the steps below to disconnect and remove the NT8D22 System Monitor (do *not* turn off the blower unit in the front of the pedestals):

- a. Load LD 37 and software disable the associated SDI port:

**LD 37**

**DIS TTY x**                  disable the device associated with the port  
\*\*\*\*  
exit LD 37

- b. If the card cage you are removing is in the column with the master system monitor (should be column 0):

On the master system monitor (column 0), disconnect the RJ11 cable to J3, then the cable to J6, then pull the system monitor out of the slot.

- c. If the card cage you are removing is in the column with a slave system monitor (should be column 1):

On the master system monitor (column 0), disconnect the RJ11 cable to J3, then the cable to J6, then pull the system monitor out of the slot.

On column 1, disconnect the cables, then pull the system monitor out of the slot.



**CAUTION**

**Service Interruption**

If the system monitors are not removed, the system may shut down.

- 7 Follow the appropriate step below to turn off power to the module:
  - a. With AC power, set the main circuit breaker for the column to OFF (down) in the rear of the pedestal.



**DANGER OF ELECTRIC SHOCK**

Due to hazardous voltage in ac-powered systems, power to the entire column must be shut down. This shuts down all functions in the column including the network group in that column. Relocate essential services from this group before proceeding.

- b. With DC power, set the switch on the NT6D41 CE Power Supply to OFF (down). Set the circuit breaker *for just this module* to OFF (down) in the rear of the pedestal. (All other modules in the column retain power.)
- 8 Follow the steps below to remove all cards from the module:
  - a. Tag and disconnect all cables to the front of the module. Tape over the contacts to avoid grounding. Tape or tie all cables to the sides so the working area in front of the card cage is totally clear.
  - b. Set the ENB/DIS switch to DIS on any cards that are not already set to disable.
  - c. Tag the cards so they can be returned to the same slot in the replacement card cage. Remove the cards, including the bus terminating units (BTUs) between slots 4 and 5.
- 9 Follow the steps below to disconnect cables to the I/O panels and backplane at the rear of the module:



- a. Tag and disconnect cables from the I/O panels.
  - b. Remove the I/O panels and the I/O safety panel over the backplane to access the rear backplane connectors.
  - c. Use the P0741489 Extraction Tool to disconnect cables to the backplane connectors. (See “System cable guidelines” on [page 167](#).)
- 10 Follow the steps below to disengage the module:
  - a. Remove the two mounting screws that secure the rear of the card cage to the module.
  - b. Remove the front trim panels on each side of the card cage.
  - c. Remove the three mounting screws that secure the front of the card cage to the bottom of the module.
  - d. Pull the card cage halfway out of the module.
- 11 Follow the steps below to disconnect power and ground connections at the rear of the module:
  - a. Disconnect the system monitor ribbon cables to J1 and J2.
  - b. Disconnect the module power connectors. These are small orange connectors plugged into the module power distribution unit (MPDU) with AC power, or connected to each other with DC power.
  - c. Disconnect the logic ground (orange) wire from the backplane bolt.
  - d. Disconnect the frame ground (green) wire from the frame ground post.

**CAUTION****Service Interruption**

Do not disconnect the main power connectors (large orange connectors) at the top and bottom of the module.

- 12 Pull the card cage all the way out of the module.

**Note:** For AC-powered systems, after the card cage is out of the module you must remove the MPDU and reinstall it on the replacement card cage. The screw-heads for the MPDU are in the wall of the power supply slot.

- 13 Remove the floating power connector (the black connector) on the rear of the card cage. Using the same mounting screws and nuts, attach the connector to the new card cage.

**Note:** Check the orientation of the connector. Looking at it from the rear of the card cage, the upper left corner pin should be empty (no wire) and the lower right corner pin should have a wire installed. The green wire should be up.

### Installing equipment

- 14 Set the backplane jumpers in the card cage for Core/Network 0 and Core/Network 1. The jumpers are located on the backplane, along the bottom of the front side (the side facing into the card cage assembly):
  - a. For Core/Network 0, verify that the jumper between card slots 14 and 15 is closed.
  - b. For Core/Network 1, verify that the jumper between card slots 14 and 15 is open.



#### **CAUTION** **System Failure**

If the Core/Network Module jumpers are set incorrectly, the system will not load and operate correctly.

- 15 Reposition the EMI shield (it looks like a brass grill) in the base of the module. Tape over the front mounting tabs to hold the shield in position. The tape will be removed later.
- 16 Slide the new card cage about halfway into the module. Hold the card cage firmly while the ground and power connections are attached at the rear of the module:
  - a. Attach the system monitor ribbon cables (J1 goes down to the pedestal, J2 goes up the column).
  - b. Attach the frame ground (green) wire to the frame ground post on the module. (A 5/16" socket wrench is needed for this operation.) Remove the nut and the lockwasher at the top of the post. Put the frame ground connector over the post. Reinstall the top lockwasher and the nut, then tighten the nut down.

- c.** Attach the logic ground (orange) wire. Remove one nut and the lockwasher. Put the connector over the post, reinstall the lockwasher and nut, then tighten the nut down. (A 3/8" socket wrench is needed for this operation.)
- d.** Connect the module power connectors to the MPDU for AC power, or to each other for DC power.

**17** Follow the steps below to install the new card cage in the module:

- a.** Slide the card cage the remainder of the way into the module.
- b.** Check the position of the EMI shield. If it has shifted, reposition it. Remove the tape holding the EMI shield.
- c.** Secure the card cage to the module with the three screws in the front and the two screws in the rear.

**18** Replace the trim panels on both sides of the card cage.

**19** Install the module power supply in the slot labeled "CE pwr sup" in the Core/Network card cage. Perform a hardware sanity check:

- a.** Turn on power to the module:

With AC power, set the main circuit breaker to ON (up) in the rear of the pedestal.

With DC power, set the breaker to ON (up) in the pedestal, then set the switch to ON (up) on the power supply in the module.

- b.** Check the LED pattern for the card cage you are installing:
  - On the NT5D2103 card cage, the LEDs are on the front side of the backplane. The LEDs are in two vertical columns, one on either side of slot 12 (if necessary, remove the CNI card to view the LEDs). The LEDs on the right side of the slot apply to Core 0 and must be (from the top down) OFF-OFF-OFF-OFF. Those on the left side apply to Core 1 and must be ON-OFF-OFF-OFF.
- c.** Shut down power to the module again.

With AC power, set the main breaker for the column to OFF (down).

With DC power, set the switch on the power supply and the pedestal breaker for the module to OFF (down).

- 20** Install the module power supply in the slot labeled “CE pwr sup” in the Core/Network card cage. Follow the steps below to reconnect cables to the backplane:

**a.** Reconnect all cables to the backplane connectors.



**CAUTION**

**Damage to Equipment**

If you try to insert the cable connector at an angle, pins may be bent or broken.

- b.** Route the NTND14 CNI to 3PE cables to the right side (facing the rear) of the module and tie-wrap them to the cable restraint bracket behind the I/O panel.
- c.** Position and secure the I/O panels.
- d.** Position and secure the I/O safety panel.

- 21** Reinstall the 3PE card. Set the ENB/DIS switch to ENB.

- 22** Set the ENB/DIS switch on the clock controller card to DIS. Seat the clock controller card; leave the ENB/DIS switch set to DIS and do not connect the faceplate cables.

- 23** Follow the appropriate step below to turn on power to the column or the module power supply:

- a.** With AC power, set the main circuit breaker in the pedestal to ON (up).
- b.** With DC power, set the breaker to ON (up) in the pedestal. Set the switch to ON (up) on the power supply in the module.

- 24** Follow the appropriate steps below to connect the clock controller cables:

- a.** For a QPC471 Clock Controller card, connect the NT8D79 cables from the primary or secondary reference to the faceplate of the clock controller card. For Meridian 1 Option 81C CP PII, connect the

NT8D74 cable from the NT8D36 InterGroup Module to the clock controller card.

- b. For QPC775 Clock Controller Cards in Meridian 1 Option 81C CP PII, connect the NT8D74 cable from the junctor board to the faceplate of the clock controller card. Then connect the NT8D79 cables from the primary or secondary reference to the faceplate of the clock controller card.
  - c. Leave the ENB/DIS switch set to DIS on QPC471 or QPC775 cards.
- 25** Set the NORM/MAINT switch on the CP card to MAINT. (This will keep the system in split mode when the card is reinstalled.)
- 26** Reinstall the CP card. As the card performs card-level power-up tests, watch the LCD display and output from the CPSI port for error messages:
- a. Following the "Selftest Complete" message, watch the LCD on the CP card for the message "IOP in Slot 16."
  - b. Watch the LCD for the message "Loading Disk OS." As the system attempts to access the hard disk, watch the LCD for error messages.
  - c. Watch for system reload (SYS) and initialization (INI) messages on the terminal.
- 27** Seat all CNI cards, but leave the ENB/DIS switches set to DIS.
- 28** Load LD 135 and check the status of all configured CNI cards:

#### **LD 135**

```

STAT CNI      get the status of all configured CNIs
TEST CNI c s  test each configured CNI on the inactive side
****
              exit LD 135

```

- 29** Set the ENB/DIS switch to ENB on the clock controller card.
- 30** Set the ENB/DIS switch to ENB on all CNI cards.
- 31** Press and release the MAN RST button on the CP card in the new card cage. When SYS700 messages appear on the LCD display, set the NORM/MAINT switch to NORM. Within 60 seconds, the LCD will display the following messages, confirming the process:

```

RUNNING ROM OS
ENTERING CPU VOTE

```

By the active CPU, an HWI533 message from the CPSI or SDI port indicates the memory is shadowed.

**Note 1:** At this point, the other Core is still active and in split mode. The Core in the new card cage is the standby (inactive) side. The memories are shadowed (synchronized), but the hard disks are not synchronized (redundancy is disabled).

**Note 2:** A CNI port LED may not go out if a network loop corresponding to that port is disabled.

- 32** Set the NORM/MAINT switch to NORM on the CP card in the active Core and perform a redundancy sanity test:

**LD 135**

<b>STAT CNI</b>	get the status of all configured CNIs
<b>STAT CPU</b>	get the status of both Cores
<b>TEST CPU</b>	test the inactive CP card and CP to CP cable
<b>TEST CNI c s</b>	test each configured CNI on the inactive side

**Note:** Testing the CP and CNI cards can take 2 minutes or more for each test.

- 33** Switch Cores and test the other side:

<b>SCPU</b>	switch to Core 0
<b>TEST CPU</b>	test the inactive CP card and CP to CP cable

- 34** Get the status of the CP cards and memories, and of the CNIs:

<b>STAT CPU</b>	get the status of both Cores
<b>STAT CNI</b>	get the status of all configured CNIs
<b>****</b>	exit LD 135

- 35** Synchronize the disk drives:

**LD 137**

<b>SYNC</b>	synchronize the hard disks
-------------	----------------------------

**Note:** Synchronization may take up to 50 minutes.

- 36** Test Core functions:

**LD 135**

<b>TEST CPU</b>	test the inactive CP card and CP to CP cable
-----------------	--

**TEST IPB**            test the backplane protocol on the inactive side  
**TEST CNI c s**       test each configured CNI on the inactive side

If all the tests pass, switch Cores and test the side that is now inactive:

**SCPU**                switch to the other Core  
**TEST CPU**           test the inactive CP card and CP to CP cable  
**TEST IPB**           test the backplane protocol on the inactive side  
**TEST CNI c s**       test each configured CNI on the inactive side

**37** Clear displays, major alarms, and minor alarms:

**CDSP**                clear the display  
**CMAJ**                clear all major alarms  
**CMIN ALL**           clear all minor alarms  
**SCPU**                switch to the other Core  
**CDSP**                clear the display  
**\*\*\*\***                  exit LD 135

**38** Software enable, from the active side, the clock controller and PRI/DTI cards:

**a.** Enable the clock controller card:

**LD 60**  
**ENL CC x**  
**TRCK aaa**           if necessary, set tracking

**b.** Enable the PRI/DTI cards:

**ENLL loop**  
**\*\*\*\***                  exit LD 60

**39** Follow the appropriate steps below to reinstall and check the system monitor:

**a.** If you replaced the card cage in the column with the master system monitor:

Reconnect the RJ11 cable to J6, then the cable to J3. Reinstall the system monitor.

- b. If you replaced the card cage in the column with the slave system monitor:

Reinstall the system monitor in column 1 first.

On the master system monitor, reconnect the RJ11 cable to J6, then the cable to J3. Reinstall the system monitor.

- c. Enter:

**LD 37**

**STAT XSM**

\*\*\*\*

check the status of the system monitors

exit LD 37

- 40 Tag defective equipment with a description of the problem and package it for return to a repair center.

## NT5K09 Quad Digitone Receiver

Use the following procedure to replace a defective Quad DIGITONE Receiver Card.

See *Software Input/Output: Administration* (553-3001-311) for a description of all maintenance commands, and *Software Input/Output: System Messages* (553-3001-411) for interpreting system messages.



### **DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.



### **CAUTION**

#### **Service Interruption**

Service is interrupted when a loop is disabled.



### Removing equipment

- 1 Software disable the Quad DTMF Receiver by entering  
**LD 32**  
**DISS I s**  
(“I s” represents loop and shelf number)
- 2 Remove the backplane access plate at the rear of the UEM by removing the screws on each side. Set the plate aside.
- 3 Unhook the locking devices on the card; pull it out of the card cage.

### Installing equipment

- 1 Check that the plug P2 0n the replacement card is oriented in the same way as the card being replaced.
- 2 Insert the replacement card into the vacated slot and hook the locking devices.
- 3 Position the backplane access plate. Replace the screws.
- 4 Software enable each loop on the card by entering  
**ENLS I s**
- 5 End the session in LD 32 by entering  
**\*\*\*\***
- 6 Test each loop on the card by entering  
**LD 30**  
**LOOP I**

If there is a problem, an NWS system message will be produced and the appropriate red LED will light on the faceplate of the card.

- 7 End the session in LD 30 by entering  
**\*\*\*\***
- 8 Tag defective equipment with a description of the problem and package it for return to a repair center.

## NT5K10 Dual Loop Peripheral Buffer Card

Use this procedure to replace a defective Enhanced Dual Loop Peripheral Buffer (IDLB) card.

See *Software Input/Output: Administration* (553-3001-311) for a description of all maintenance commands, and *Software Input/Output: System Messages* (553-3001-411) for interpreting system messages.



**DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.



**CAUTION**

**Service Interruption**

Service is interrupted when a loop is disabled.

## Removing equipment

- 1 Software disable the Dual Loop Peripheral Buffer by entering  
**LD 32**  
**DISS I s**  
("I s" represents loop and shelf number)
- 2 Remove the Backplane access plate at the rear of the UEM by removing the screws on each side. Set the plate aside.
- 3 Tag and disconnect cables to the card you are removing.
- 4 Unhook the locking devices on the card; pull it out of the card cage.

## Installing equipment

- 1 Set option switches on the replacement card the same as on the card you removed.

To check switch settings, see Circuit card installation and testing (553-*Circuit Card: Description and Installation* (553-3001-211)) in the SL-1 installation and maintenance guide.

- 2 Insert the replacement card into the vacated slot and hook the locking devices.
- 3 Connect cables to the replacement card.

- 4 Position the backplane access plate. Replace the screws.
- 5 Software enable each loop on the card by entering  
**ENLS I s**
- 6 End the session in LD 32 by entering  
**\*\*\*\***
- 7 Test each loop on the card by entering  
**LD 30**  
**LOOP I**

If there is a problem, an NWS system message will be produced and the appropriate red LED will light on the faceplate of the card.

- 8 End the session in LD 30 by entering  
**\*\*\*\***
- 9 Tag defective equipment with a description of the problem and package it for return to a repair center.

## NT5K1106 Enhanced Peripheral Equipment Card Cage

To replace a defective NT5K1102 Enhanced Peripheral Equipment Backplane in the NT5K11 EEPE UEM, you must replace the NT5K1106 Enhanced Peripheral Equipment Card Cage Assembly. Use this procedure to replace the unit.

See *Software Input/Output: Administration* (553-3001-311) for a description of all maintenance commands, and *Software Input/Output: System Messages* (553-3001-411) for interpreting system messages.



### **DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

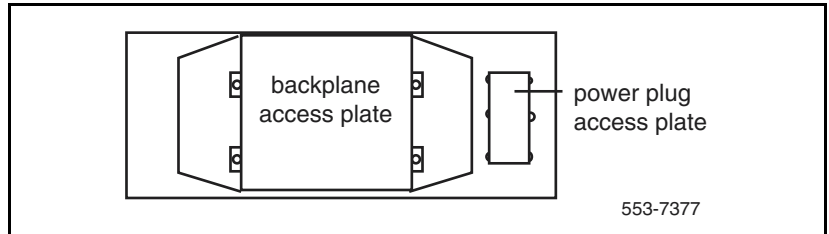
## Removing equipment

- 1 Disable the EEPE Enhanced Peripheral Equipment shelf by entering  
**LD 32**  
**DISS I s**  
(“I s” represents loop, shelf number)

If a second shelf is assigned to a loop, disable that shelf also by entering **DISSI 1 s**

- If the shelf is in single loop mode, two loops are disabled.
  - If the shelf is in dual loop mode, four loops are disabled.
- 2 Turn off power to the UEM power supply by setting the switch on the NT5K12 Enhanced Equipment power supply to OFF(left).
  - 3 Remove all cards from the shelf of the UEM:
    - a. Tag and disconnect cables to all faceplate connectors.
    - b. Tag cards so they can be returned to the same slot. Remove cards.
  - 4 Disconnect cables, plugs, and wires from the back of the UEM to the backplane:
    - a. Remove the Backplane access plate by removing the screws on each side (see Figure 25). Set the panel aside.
    - b. Remove all cards from the back of the UEM.
    - c. Tag and disconnect cables to all faceplate connectors.
    - d. Tag cards so they can be returned to the same slot. Remove cards.
    - e. Tag and disconnect all cables from the backplane to the interior of the I/O assembly.
    - f. Tag and disconnect all plugs, wires, and cables to the backplane.
  - 5 Remove the two mounting screws that secure the back of the card cage to the UEM assembly.
  - 6 Remove the front cover plates on both sides of the card cage.
  - 7 Remove the three mounting screws that secure the front of the card cage to the bottom of the UEM assembly. Pull the card cage out of the UEM.
  - 8 Slide the replacement card cage into position in the UEM leaving approximately 3” clearance between the card cage and the backplane.

**Figure 25**  
**EEPE access plates (rear view)**



- 9** Reconnect cables, plugs, and wires from the UEM to the backplane:
  - a.** Connect all cables from the interior of the I/O assembly to the backplane.
  - b.** Position the backplane access plate. Replace the screws.
  - c.** Connect all plugs, wires, and cables to the backplane.

### **Installing equipment**

- 10** Slide the replacement card cage into position in the UEM taking care not to pinch the cables.
- 11** Install the three mounting screws that secure the front of the card cage to the bottom of the UEM assembly.
- 12** Replace the front cover plates on both sides of the card cage.
- 13** Install the mounting screws at the back of the card cage.
- 14** Reconnect cables, plugs, and wires from the UEM to the backplane:
  - a.** Connect all cables from the interior of the I/O assembly to the backplane.
  - b.** Connect all plugs, wires, and cables to the backplane.
  - c.** Position the power plug access plate. Replace the screws.
- 15** Return cards to their slots at the rear of the UEM. Reconnect all cables to connectors.
- 16** Position the backplane access plate. Replace the screws.
- 17** Return cards to their slots at the front of the UEM. Reconnect all cables to connectors.

**18** Turn on power to the UEM power supply by setting the power supply switch to ON (right):

**19** Enable the shelf by entering  
**ENLS I s**

If a second shelf is assigned to a loop, enable that shelf also by entering  
**ENLS I s**

End the session in LD 32 by entering  
\*\*\*\*

**20** Test the shelf by testing each loop with  
**LD 30**  
**LOOP I s**

If there is a problem, an NWS system message will be produced.

**21** End the session in LD 30 by entering  
\*\*\*\*

**22** Tag defective equipment with a description of the problem and package it for return to a repair center.

## NT5K21AA Extended Multi - Frequency Compelled Sender/Receiver Card

Use this procedure to replace a NT5K21AA card in an IPE Modules.



### **DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

### **Removing equipment**

**1** Software disable the card:  
**LD 32**  
**STAT I s c**  
**DIS I s c**  
(“I s c” represents loop, shelf, and card number)

You will see “NPR011” on the system terminal when the card is disabled. Busy channels will not be disabled until the call is disconnected.

You will see the LED light up when the card becomes disabled.

- 2 Unhook the locking devices on the card; pull it out of the card cage.

### Installing equipment

- 1 Insert the replacement card into the vacated slot and hook the locking devices.

**Note:** When IPE cards are installed, the red LED on the faceplate remains lit for 2 to 5 seconds as a self-test runs. If the self-test completes successfully, the LED flashes three times and remains lit until the card is configured and enabled in software, then the LED turns off. If the LED does not follow the pattern described or operates in any other manner (such as continually flashing or remaining weakly lit), replace the card.

- 2 Software enable the card:

**LD 32**

**ENLC I s c**

When the process is complete, you will receive a system response

**STAT I s c**

Obtain the status of the card to ensure that the card is enabled

\*\*\*\*

To exit the program

- 3 (Optional): Test the card:

**LD 30**

**SHLF I s**

("I s" represents loop, shelf number)

**Note:** This command tests every card on the designated shelf.

If there is a problem, an NWS system message is generated and the red LED(s) on the faceplate of the card will remain lit.

If there is no problem, exit LD 30.

- 4 Tag defective equipment with a description of the problem and package it for return to a repair center.

## NT6D40, NT6D41, NT6D42, Power Supply DC

Use this procedure to replace the following DC power supplies:

- NT6D40 PE Supply DC
- NT6D41 CE Power Supply DC

## NT6D42 Ringing Generator DC



### **DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

### **Removing equipment**

- 1 Set the switch on the front of the power supply to OFF (down).
- 2 Unhook the locking devices on the power supply; pull it out of the card cage.

### **Installing equipment**

- 1 Set the switch on the replacement power supply to OFF (down).  
**Note:** On a replacement NT6D42, set option switches the same as on the one you removed. If there is a vintage change, be sure to check *Circuit Card: Description and Installation* (553-3001-211) for any differences.
- 2 Insert the replacement power supply into the vacated slot and hook the locking devices.
- 3 Set the switch on the replacement power supply to ON (up). The green LED on the power supply should light and stay lit.
- 4 Tag defective equipment with a description of the problem and package it for return to a repair center.

## **NT6D65 and NTRB34 Core to Network Interface Cards**

Use this procedure to replace the Core to Network Interface (CNI) or Core to Network Interface 3 (CNI-3) card. See *Software Input/Output: Administration* (553-3001-311) for a description of all maintenance commands, and *Software Input/Output: System Messages* (553-3001-411) for interpreting system messages.



**DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

Before replacing a CNI or CNI-3 card, you can test it in an unused CNI slot (in case, for example, there is a bent pin on the backplane). If the card works correctly in the new slot, you can leave it there. To switch slots:

- 1 The Core associated with the CNI card must be inactive:

— If you need to switch Cores:

**LD 135****SCPU**

- a. Set the NORM/MAINT switch to MAINT on the *active* CP card.

- 2 Software disable the CNI card:

**DIS CNI c s**      “c” is the CPU (0 or 1), “s” is the card slot (8–12)  
 \*\*\*\*  
 exit LD 135

- 3 Software configure the new slot:

**LD 17**

**EXT x 3PE**      “x” is the number (0–4) of the associated 3PE  
 card(s)

**CNI X s p**      delete the group(s) associated slot

**CNI s p g**      add group(s) to new slot

\*\*\*\*  
 exit LD 17

**LD 43**

**EDD**      datadump the new configuration

\*\*\*\*  
 exit LD 43

- 4 Insert the CNI card in the new slot. Move the cables to the shrouds on the backplane to the connectors for the new slot.
- 5 Enable the CNI card and switch the CP cards:

- a. Set the NORM/MAINT switch to NORM on the *active* CP card.
- b. **LD 135**  
**ENL CNI c s**  
**SCPU**  
**\*\*\*\***

Use the following procedure to replace a CNI card.

### Removing equipment

- 1 The Core associated with the CNI card must be inactive:
  - a. If you need to switch Cores:  
**LD 135**  
**SCPU**
  - b. Set the NORM/MAINT switch to MAINT on the *active* CP card.
- 2 Set the ENB/DIS switch to DIS on the CNI card you are replacing.
- 3 Unhook the locking devices on the card; pull it out of the card cage.

### Installing equipment

- 1 Set the ENB/DIS switch to DIS on the replacement card.
- 2 Insert the replacement card into the vacated slot and hook the locking devices.
- 3 Set the ENB/DIS switch to ENB on the replacement card.
- 4 Set the NORM/MAINT switch to NORM on the *active* CP card.
- 5 Software enable and test the CNI card and configured ports on the card:  
**ENL CNI c s**    “c” is the CPU (0 or 1), “s” is the card slot (8–12)  
**TEST CNI c s**  
**SCPU**  
**\*\*\*\***                      exit LD 135

**Note:** Due to the need to reestablish memory shadowing and contents, the test command may take a minute or more depending on memory size. The LED on the CNI card flashes as the test runs.

If there is a problem, a CCED system message is generated (LEDs on the CNI cards stay lit on the inactive Core).

**Note:** If the network loop corresponding to a CNI port is not enabled, the LED for that port may not go out.

- 6 Tag defective equipment with a description of the problem and package it for return to a repair center.

## NT7D10 Power Distribution Unit DC

Use this procedure to replace the power distribution unit (PDU) for DC-powered systems.



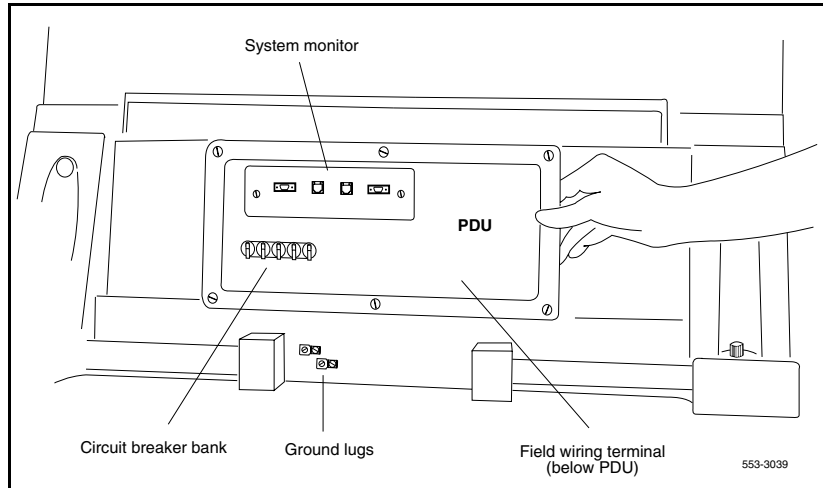
### **DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

### **Removing equipment**

- 1 Disconnect the DC power at the source (not at the PDU).
- 2 Remove the grill on the rear of the pedestal.
- 3 Set all five circuit breakers on the PDU to OFF (down). Figure 26 shows the location of the PDU in the rear of the pedestal.
- 4 Unseat the blower unit in the front of the pedestal:

**Figure 26**  
**NT7D10 Power Distribution Unit DC**



- a. Remove the grill on the front of the pedestal. Set the toggle switch on the front of the unit to OFF (left).
- b. Turn the screws on the front of the unit counterclockwise and pull the unit forward several inches so the connector on the rear disengages.



**DANGER**

Do not pull the blower unit out of the pedestal. The unit is heavy and the blades on the blower may still be rotating up to two minutes after the power is turned off.

- 5 Disconnect cables that run between the module above the pedestal (module 0) and the top of the PDU:
  - a. Remove the rear cover on the module.
  - b. Remove the I/O safety panel over the backplane in the module.

- c. Disconnect the system monitor ribbon cable from the PDU.
- d. Disconnect the large orange power connector (J1) from the PDU.

**Note:** To disconnect the power plug, you must press a latch trip on the front and rear of the plug. You may need to use a screwdriver blade against the latch trip on the front of the plug.

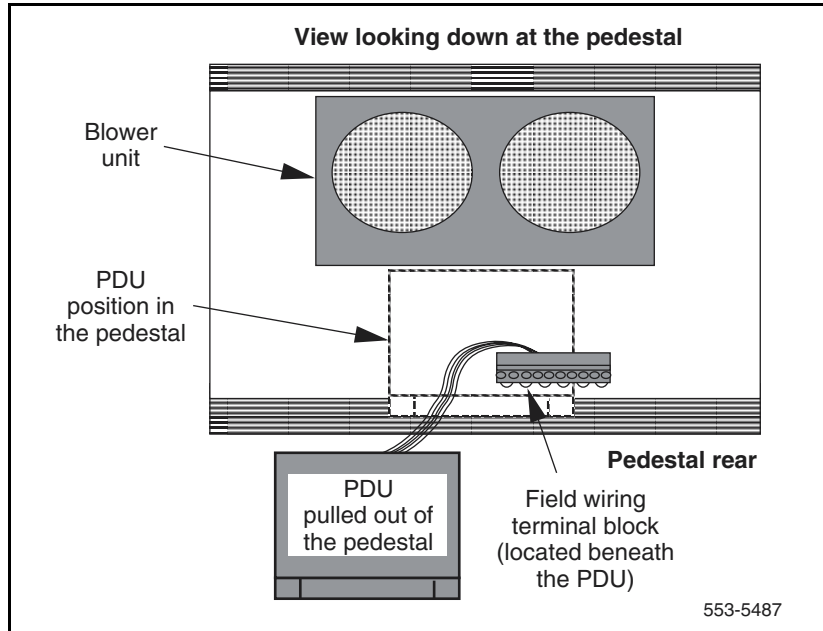
- 6 Tag and disconnect cables to the NT8D22 System Monitor. Loosen the two screws on the system monitor card and remove it from the PDU.
- 7 Remove the six screws that position the PDU. Carefully pull the unit straight forward and set it on the floor next to the pedestal (see Figure 27).

**CAUTION****Damage to Equipment**

The PDU cannot be completely removed from the pedestal until cables to the field wiring terminal block are disconnected. Label wires carefully. Improper wiring can cause system damage.

- 8 Remove the field wiring terminal block:
  - a. Remove the cover over the field wiring terminal block.
  - b. Locate the frame ground wire that runs from the field wiring terminal block to the frame ground bolt inside the pedestal. Disconnect this wire at the terminal block.
  - c. Carefully tag and then disconnect all input wiring to the field wiring terminal block. Take special note of any jumper wires that might be installed. It is not necessary to disconnect wiring that runs from the terminal block to the PDU.
- 9 Remove the four screws that secure the terminal block in place and lift it out of the pedestal.

**Figure 27**  
**Cabling between the PDU and the field wiring terminal block**



### Installing equipment

- 1 Install the replacement field wiring terminal block:
  - a. Position the replacement PDU next to the rear of the pedestal.
  - b. Position the replacement field wiring terminal block and replace its mounting screws.
  - c. Reconnect all wiring to the field wiring terminal block, including any jumpers that might have been present on the terminal block that was removed.
  - d. Reconnect the frame ground wire from the frame ground bolt inside the pedestal to the field wiring terminal block.
  - e. Replace the cover over the field wiring terminal block.

- 2 Gently push the PDU into the pedestal. Replace the screws on the PDU.  
**Note:** Be sure you push the unit straight back so the connector on the rear will seat properly with the connector for the blower unit.
- 3 Reconnect cables from module 0 to the PDU:
  - a. Attach power plug J1 and the system monitor cable.
  - b. Replace the I/O safety panel on the module.
  - c. Replace the rear cover on the module.
- 4 Reseat the blower unit:
  - a. Lift the unit slightly and slide it into the pedestal glides. Set the toggle switch to ON (right).
  - b. Tighten the screws on the front of the unit.
- 5 Insert the system monitor card into the PDU. Tighten the screws on the card. Reconnect cables to the system monitor faceplate.
- 6 Set all five circuit breakers on the PDU to OFF (down). Reconnect the source of DC power.
- 7 One at a time starting with the breaker for the blower unit, set the circuit breakers on the PDU to ON (up). Make sure the green LED lights on the power supply unit(s) in each module.  
**Note:** On initial power up, the blower may rotate slower than expected. As the sensor detects heat, the blower will rotate more rapidly.
- 8 Replace the pedestal grills in the front and rear.
- 9 Tag defective equipment with a description of the problem and package it for return to a repair center.

## NT7D67CB Power Distribution Unit DC

Use this procedure to replace the power distribution unit (PDU) for DC-powered systems.



### **DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

### **Removing equipment**

- 1 Disconnect the DC power at the source (not at the PDU).
- 2 Remove the grill on the rear of the pedestal.
- 3 In the rear of the pedestal, set all five circuit breakers on the PDU to OFF (down). Figure 28 shows the PDU (labeled FLTR/PWR DIST UNIT ASSY on the equipment) and the NT7D10CA System Monitor/Power Supply Assembly (labeled XSM/PWR SUPPLY ASSY on the equipment).
- 4 Unseat the blower unit in the front of the pedestal:
  - a. Remove the grill on the front of the pedestal. Set the toggle switch on the front of the unit to OFF (left).
  - b. Turn the screws on the front of the unit counterclockwise and pull it forward several inches (you will see the L-bracket on the rear of the unit) until the connector disengages from the rear of the PDU.



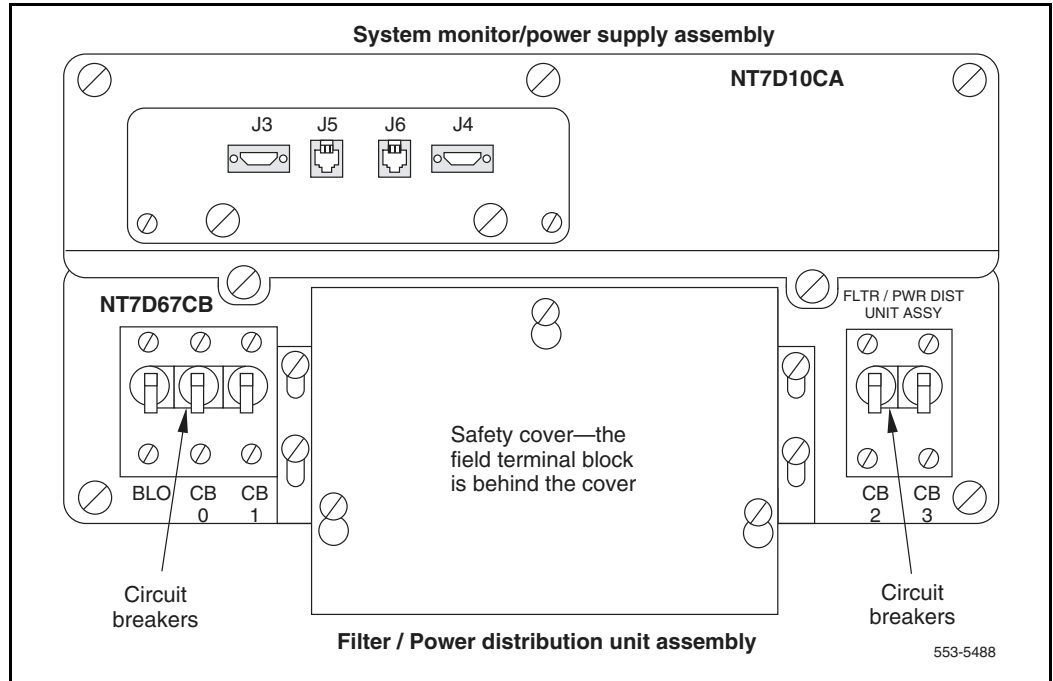
### **DANGER**

Do not pull the blower unit out of the pedestal. The unit is heavy and the blades on the blower may still be rotating up to two minutes after the power is turned off.

- 5 Disconnect cables that run between the module above the pedestal (module 0) and the PDU:



**Figure 28**  
**NT7D67CB Power Distribution Unit DC**



- a. Remove the rear cover on the module.
- b. Remove the I/O safety panel over the backplane in the module.
- c. Disconnect the system monitor ribbon cable from module 0.
- d. Disconnect the large orange power connector (J1) from the PDU.

**Note:** To disconnect the power plug, you must press a latch trip on the front and rear of the plug. You may need to use a screwdriver blade against the latch trip on the front of the plug.

- 6 Tag and disconnect cables to the NT8D22 System Monitor faceplate.
- 7 Loosen the five screws that secure the NT7D10CA system monitor assembly. Pull the assembly out of the pedestal far enough to disconnect the cables to the PDU:

- a. Disconnect the small orange connectors (J2 on the PDU, P2 on the system monitor assembly) on the left side of the PDU.
  - b. Disconnect the flat white connector to the small circuit board (P1 on the PDU, J1 on the system monitor assembly) on the right side of the PDU.
- 8 Pull the system monitor assembly out of the pedestal along with the attached ribbon cable and set it aside until the replacement PDU is installed.
- 9 Remove the plastic safety cover over the terminal block on the PDU:
  - a. Loosen the three screws holding the cover.
  - b. Lift the cover up, then over the three mounting screws on the front panel of the cover.
- 10 Tag and disconnect all wiring to the field wiring terminal block on the PDU (see Figure 29).

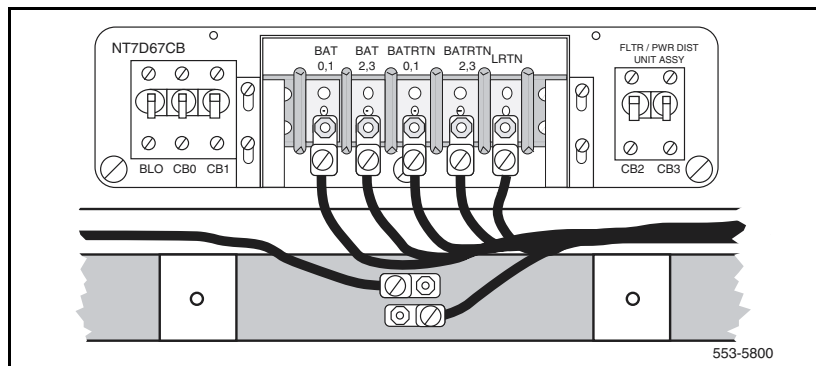


**CAUTION**

**Damage to Equipment**

Label wires carefully. Improper wiring can cause system damage.

**Figure 29**  
**Field wiring terminals in the NT7D67CB PDU**



**11 Remove the PDU:**

**Note:** When a system is shipped, a set of screws secures the leveling bracket at the rear of the PDU to protect against vibration during transit. If the shipping screws were not removed during initial installation, you must remove them now to pull the PDU out of the pedestal. Pull the blower unit all the way out of the pedestal so you can access the shipping screws on the leveling bracket.

- a. Loosen the three screws that secure the PDU.
- b. Remove the two vertical screws located in the rear of the PDU that hold the L-bracket to the lower pedestal.
- c. Pull the PDU out of the pedestal, being careful to not chafe the cables against the pedestal.
- d. Disconnect the frame ground wire from the PDU at the frame ground bolt inside the pedestal.

**Installing equipment****1 Install the replacement PDU:**

- a. Connect the frame ground wire from the PDU to the frame ground bolt inside the pedestal.
- b. Guide the connector for the power cable through the hole in the top of the pedestal (do not allow the PDU to drop).
- c. Gently push the PDU into the pedestal. Position the leveling bracket (attached to the rear of the PDU) in the small opening toward the front of the pedestal. The leveling bracket will support the back of the PDU.

**2 Install the NT7D10CA system monitor assembly:**

- a. Connect the small orange connectors (J2 on the PDU, P2 on the system monitor assembly) on the left side of the PDU.
- b. Connect the flat white connector to the small circuit board (P1 on the PDU, J1 on the system monitor assembly) on the right side of the PDU.
- c. Guide the connector on the free end of the system monitor ribbon cable (from J2) up through the hole in the top of the pedestal and connect it to module 0.

- d. Install and tighten the two vertical screws that attach the L-bracket to the PDU.
  - e. Gently push the system monitor assembly into the pedestal.
- 3 Tighten the screws that secure the PDU and the system monitor assembly.
- 4 Reconnect the remaining cables from module 0:
  - a. Reconnect the large orange power connector (J1).
  - b. Replace the I/O safety panel.
  - c. Replace the rear cover to the module.
- 5 Reconnect all external wiring to the field wiring terminal block on the PDU:

**Note:** All wiring to the PDU must be routed within the cable-tie saddles and under the cable restraint bar at the base of the pedestal.

  - a. Remove the plastic safety cover over the terminal block.
  - b. Connect the red BAT (–48 V) wires to the terminal block:
    - for modules 0 and 1 connect to the BAT 0,1 terminal
    - for modules 2 and 3 connect to the BAT 2,3 terminal

The safety ground/protective earth wires and all wiring to the block in the PDU must be neatly routed within the cable-tie saddles and under the cable restraint bar at the base of the pedestal. This ensures that there is room to install the PDU cover, safety cover, and rear grill.

- c. Connect the black BATRTN (48 V return) wires to the terminal block:
    - for modules 0 and 1 connect to the BATRTN 0,1 terminal
    - for modules 2 and 3 connect to the BATRTN 2,3 terminal
  - d. Connect the orange (or white) wire to the LRTN terminal.
- 6 Reinstall the plastic safety cover over the terminal block.
- 7 Reseat the blower unit:
  - a. Lift the unit slightly and slide it into the pedestal glides. Set the toggle switch to ON (right).
  - b. Tighten the screws on the front of the unit.

- 8 Reconnect cables to the system monitor faceplate.
- 9 Set all five circuit breakers on the PDU to OFF (down). Reconnect the source of DC power.
- 10 One at a time starting with the breaker for the blower unit, set the circuit breakers on the PDU to ON (up). Make sure the green LED lights on the power supply unit(s) in each module.  
**Note:** On initial power up the blower may rotate slower than expected. As the sensor detects heat, the blower will rotate more rapidly.
- 11 Replace the pedestal grills in the front and rear.
- 12 Tag defective equipment with a description of the problem and package it for return to a repair center.

## NT7R51 Local Carrier Interface Card

Use this procedure to replace a Local Carrier Interface card.

See *Software Input/Output: Administration* (553-3001-311) for a description of all maintenance commands, and *Software Input/Output: System Messages* (553-3001-411) for interpreting system messages.



### **DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

### **Removing and replacing a Local Carrier Interface card**

- 1 Disable the Local Carrier Interface card by logging in to the system terminal, loading the Network and Peripheral Equipment Diagnostic Program LD 32, and executing **DISL loop**, where **loop** is the actual loop number of the Local Carrier Interface card.
- 2 Set the ENL/DIS switch to DIS.
- 3 Disconnect the cable from the Local Carrier Interface card faceplate.
- 4 Unlatch the card locking devices by squeezing the tabs and pulling the locking devices away from the card.

- 5    Pull the card out of the network module and place it into an antistatic bag away from the work area.
- 6    Set the replacement card ENL/DIS switch to DIS.
- 7    Hold the replacement card by the card locking devices and insert it partially into the card guides in the module.
- 8    Pull the upper and lower locking devices away from the faceplate on the card and insert the card firmly into the backplane connector. Press the card locking devices firmly against the faceplate to latch the card inside the module.
- 9    Set the replacement card ENL/DIS switch to ENL, the Local Carrier Interface card automatically starts the self-test
- 10   Observe the red LED on the front panel during self-test. If it flashes three times and stays on, it has passed the test. Go to step 11. If it does not flash three times and then stays on, it has failed the test. Pull the card partially out of the module and reinsert it firmly into the module. If the problem persists, troubleshoot or replace the Local Carrier Interface card.
- 11   Connect the cable to the Local Carrier Interface card faceplate connector.
- 12   Enable the Local Carrier Interface card. Load the Network and Peripheral Equipment Diagnostic Program LD 32, and executing **ENLL loop**, where **loop** is the actual loop number of the Local Carrier Interface card.r.
- 13   Tag the defective card(s) with a description of the problem and prepare them for shipment to your equipment suppliers' repair depot.

## NT7R52 Remote Carrier Interface Card

Use this procedure to replace a Remote Carrier Interface card.

See *Software Input/Output: Administration* (553-3001-311) for a description of all maintenance commands, and *Software Input/Output: System Messages* (553-3001-411) for interpreting system messages.



### **DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

**Removing and replacing a Remote Carrier Interface card**

- 1** Load Network and Peripheral Equipment Diagnostic Program LD 32. At the > prompt, type **LD 32** and press the Enter key to access the program.
- 2** Type **DSXP x**, where **x** is the Remote Carrier Interface card number, and press the Enter key to disable the card. The Remote Carrier Interface card is now disabled and you can remove it.
- 3** Unlatch the card locking devices by squeezing the tabs and pulling them away from the card.
- 4** Pull the card out of the IPE module or cabinet and place it into an antistatic bag away from the work area.
- 5** Hold the replacement card by the card locking devices and insert it partially into the card guides in the module.
- 6** Pull the upper and lower locking devices away from the faceplate on the card and insert the card firmly into the backplane connector. Press the card locking devices firmly against the faceplate to latch the card inside the module. The Remote Carrier Interface card automatically starts the self-test.
- 7** Observe the red LED on the front panel during self-test. If it flashes three times and stays on, it has passed the test. Go to step 8. If it does not flash three times and then stays on, it has failed the test. Pull the card partially out of the module and reinsert it firmly into the module. If the problem persists, troubleshoot or replace the Remote Carrier Interface card.
- 8** At the prompt in the LD 32 program, type **ENXP x**, where **x** is the Remote Carrier Interface card number, and press the Enter key to enable the card. If the upper most red LED on the Remote Carrier Interface card faceplate turns off, the card is functioning correctly and is enabled. The outcome of self-test will also be indicated by LD 32 on the MMI terminal connected to the Remote Carrier Interface card. If the LED stays on, replace the card.
- 9** Tag the defective card(s) with a description of the problem and prepare them for shipment to your equipment suppliers' repair depot.

**NT8D01 Controller Card**

Use this procedure to replace a controller card.

See *Software Input/Output: Administration* (553-3001-311) for a description of all maintenance commands, and *Software Input/Output: System Messages* (553-3001-411) for interpreting system messages.



#### **DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

### **Removing equipment**

- 1 Turn off power to the module:
  - With AC power, set the associated circuit breaker on the module power supply (MPDU) to OFF (down).

**Note:** If there are two circuit breakers on the MPDU, the top one is associated with the module power supply, the bottom one with the ringing generator.

- With DC power, set the switch on the module power supply to OFF (down).

- 2 Software disable the controller card (and all cards connected to the controller):

**LD 32**

**DSXP x** “x” is the controller card number

- 3 Unhook the locking devices on the card; pull it out of the card cage.

### **Installing equipment**

- 1 Insert the replacement card into the vacated slot and hook the locking devices.
- 2 Turn on power to the module:
  - With AC power, set the associated circuit breaker on the MPDU to ON (up).
  - With DC power, set the switch on the module power supply to ON (up).
- 3 Watch the controller card as it runs a series of self-tests:



- During the tests, the maintenance display on the card shows the code for each test running (see “HEX” in the *Software Input/Output: System Messages* (553-3001-411)). If the tests complete successfully, the display begins normal operation. If the card continuously fails a test, the code for that test is displayed.
  - When IPE cards are installed, the red LED on the faceplate remains lit for 2 to 5 seconds as a self-test runs. If the self-test completes successfully, the LED flashes three times and remains lit until the card is configured and enabled in software, then the LED goes out. If the LED does not follow the pattern described or operates in any other manner (such as continually flashing or remaining weakly lit), replace the card.
- 4 Software enable and test the controller card (and all cards connected to the controller):
- ENXP x**
- If there is a problem, an NPR, NWS, or SDL system message may be produced and the red LED lights on the controller card.
  - If there is no problem, exit LD 32:
- \*\*\*\*
- 5 Tag defective equipment with a description of the problem and package it for return to a repair center.

## **NT8D02, NT8D03, NT8D09, NT8D14, NT8D15, NT8D16 Intelligent Peripheral Equipment Card**

Use this procedure to replace the following intelligent peripheral equipment (IPE) cards:

- NT5D11 Line Side T1
- NT5D60AA CLASS Modem Card
- NT5K02 Flexible Analog Line Card
- NT5K07 Universal Trunk Card
- NT5K17 Direct Dial Inward Trunk Card
- NT5K18 Central Office Trunk Card

- NT5K19 E&M Trunk Card
- NT5K20 Tone Detector Card
- NT5K36 Direct Inward/Direct Outward Dial Trunk Card
- NT5K48 Tone Detector Card
- NT5K70 Central Office Trunk Card
- NT5K71 Central Office Trunk Card
- NT5K72 E&M Trunk Card
- NT5K82 Central Office Trunk Card
- NT5K83 E&M Trunk Card
- NT5K84 Direct Inward Dial Trunk Card
- NT5K90 Central Office Trunk Card
- NT5K93 Central Office Trunk Card
- NT5K96 Analog Line Card
- NT5K99 Central Office Trunk Card
- NT8D02 Digital Line Card
- NT8D03 Analog Line Card
- NT8D09 Analog Message Waiting Line Card
- NT8D14 Universal Trunk Card
- NT8D15 E&M Trunk Card
- NT8D16 Digitone Receiver (DTR) Card

See *Software Input/Output: Administration* (553-3001-311) for a description of all maintenance commands, and *Software Input/Output: System Messages* (553-3001-411) for interpreting system messages.



**DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

## Removing equipment

- 1 Software disable the card:

**LD 32**

**DIS11 s c** "1 s c" are loop, shelf, and card numbers

You will see "NPR011" on the system terminal when the card is disabled. Busy channels will not be disabled until the call is disconnected.

- 2 Unhook the locking devices on the card; pull it out of the card cage.

## Installing equipment

- 1 Set jumpers on the following replacement cards the same as on the card you removed:

NT8D14 Universal Trunk Card

NT8D15 E&M Trunk Card

To check settings, see *Circuit Card: Description and Installation* (553-3001-211).

- 2 Insert the replacement card into the vacated slot and hook the locking devices.

**Note:** When IPE cards are installed, the red LED on the faceplate remains lit for 2 to 5 seconds as a self-test runs. If the self-test completes successfully, the LED flashes three times and remains lit until the card is configured and enabled in software, then the LED goes out. If the LED does not follow the pattern described or operates in any other manner (such as continually flashing or remaining weakly lit), replace the card.

- 3 Software enable the card:

**ENLC1 s c**

- a. When the process is complete, you will receive a system response.
- b. Exit LD 32:

\*\*\*\*

- 4 Test the card:

**LD 30**

**SHLF1 s**

**Note:** This command tests every card on the designated shelf.

- a. If there is a problem, an NPR system message is generated and the red LED(s) on the faceplate of the card will remain lit.
- b. If there is no problem, exit LD 30:

\*\*\*\*

- 5 Tag defective equipment with a description of the problem and package it for return to a repair center.

## NT8D04 Superloop Network Card, QPC414 Network Card

Use this procedure to replace a superloop network card or network card.

See *Software Input/Output: Administration* (553-3001-311) for a description of all maintenance commands, and *Software Input/Output: System Messages* (553-3001-411) for interpreting system messages.



### **DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.



### **CAUTION**

#### **Service Interruption**

All services on a loop are interrupted while the loop is disabled.

## Removing equipment

- 1 Check the status of each loop on the network or superloop network card:

### LD 32

**STAT loop**      “loop” is a loop number

- If the response is **DSBL** for the loop(s), go to step 2 on [page 285](#).
- If there are responses other than **DSBL**, see “LD 32” in the *Software Input/Output: Administration* (553-3001-311) for an interpretation.

- 2 Set the ENB/DIS switch to DIS.
- 3 Tag and disconnect cables to the card you are removing.
- 4 Unhook the locking devices on the card; pull it out of the card cage.

## Installing equipment

- 1 Set the ENB/DIS switch to DIS on the replacement card.

**Note:** On a replacement QPC414, set jumpers the same as on the card you removed. If there is a vintage change, be sure to check *Circuit Card: Description and Installation* (553-3001-211) for any differences.

- 2 Insert the replacement card into the vacated slot and hook the locking devices.
- 3 Connect cables to the replacement card.
- 4 Set the ENB/DIS switch to ENB on the replacement card.
- 5 Software enable each loop on the card:

### ENLL loop

- a. When the process is complete, you will receive a system response.
- b. The card is tested automatically when all loops are enabled.
- c. If there is a problem, an NWS system message is generated and the red LED on the faceplate of the card will flash (on the NT8D04) or be steadily lit (on the QPC414).
- d. If there is no problem, exit LD 32:

\*\*\*\*

- 6 Tag defective equipment with a description of the problem and package it for return to a repair center.

## NT8D06, NT8D21, NT8D29 Power Supply AC

Use this procedure to replace AC power supplies:

- NT8D06 PE Power Supply AC
- NT8D21 Ringing Generator AC
- NT8D29 CE Power Supply AC



### **DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

### **Removing equipment**

- 1 Turn off power to the module power supply:
  - If there is a Module Power Distribution Unit (MPDU), set the circuit breaker(s) on the associated MPDU to OFF (down).

**Note:** If there are two circuit breakers on the MPDU, the top one is associated with the module power supply, the bottom one with the ringing generator (see Figure 30).

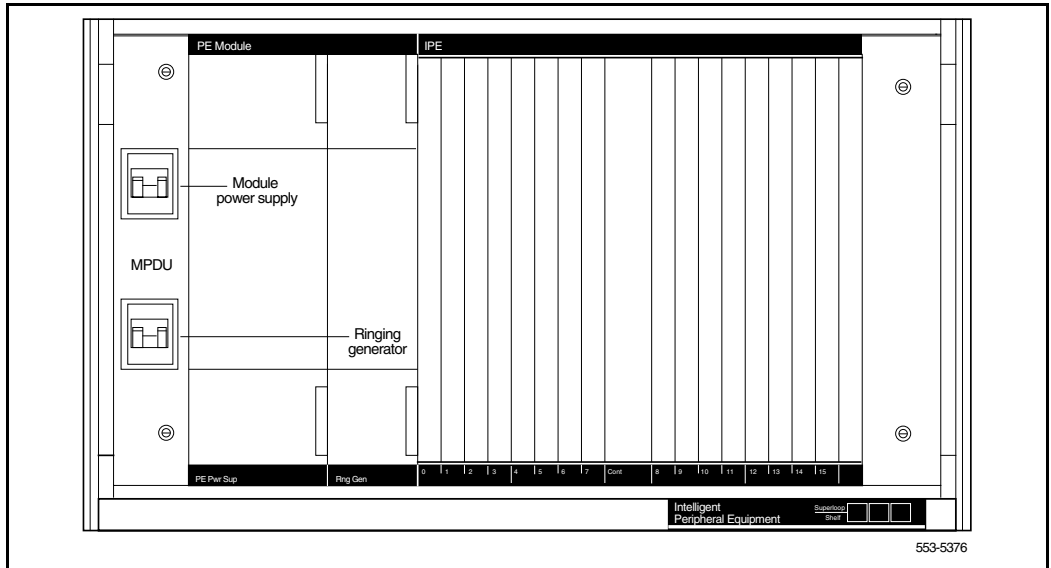
  - If there is no MPDU, set the switch on the power supply faceplate to OFF (down).
- 2 Unhook the locking devices on the power supply. Wait at least 5 minutes, then pull the power supply out of the card cage.



### **DANGER OF ELECTRIC SHOCK**

Power must discharge. Wait five full minutes before you remove the power supply from the module.

**Figure 30**  
**Dual circuit breaker and associated module power supplies**



### Installing equipment

- 1 Insert the replacement power supply into the vacated slot and hook the locking devices.

**Note 1:** If there is a switch on the power supply, set the switch to OFF (down) before you insert the power supply.

**Note 2:** On a replacement NT8D21, set option strapping the same as on the one you removed. If there is a vintage change, be sure to check *Circuit Card: Description and Installation* (553-3001-211) for any differences.

- 2 Turn on power to the module power supply. The green LED on the power supply should light and stay lit:
  - If there is an MPDU, set the circuit breaker(s) to ON (up).
  - If there is no MPDU, set the power supply switch to ON (up).
- 3 Tag defective equipment with a description of the problem and package it for return to a repair center.

## NT8D17 Conference/TDS Card

The conference/TDS card provides conference functions on one loop and both tone and digit switch (TDS) and multi frequency sender (MFS) functions on a second loop. Use this procedure to replace a conference/TDS card.

See *Software Input/Output: Administration* (553-3001-311) for a description of all maintenance commands, and *Software Input/Output: System Messages* (553-3001-411) for interpreting system messages.



### **DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

### Removing equipment

- 1 Software disable the conference/TDS card:

**LD 34 or LD 38 or LD 46**

**DISX loop**

In LD 38 “loop” is the conference loop that is the odd loop of the conference/TDS loop pair. In LD 34 and LD 46 “loop” is the TDS/MFS loop that is the even loop of the conference/TDS loop pair.

**Note:** You must use the command DISX to disable both loops and all hardware functions. Disabling loops with the command DISL prevents software from using the loops but does not disable the card.

- 2 Set the ENB/DIS switch to DIS.
- 3 Unhook the locking devices on the card; pull it out of the card cage.

### Installing equipment

- 1 Set the ENB/DIS switch to DIS on the replacement card.
- 2 Set option switches and jumpers on the replacement card the same as on the card you removed. If there is a vintage change, be sure to check *Circuit Card: Description and Installation* (553-3001-211) for any differences.



- 3 Insert the replacement card into the vacated slot and hook the locking devices. Both red LEDs should flash three times and remain lit if the card is good.
- 4 Set the ENB/DIS switch to ENB on the replacement card.
- 5 Software enable the card:  

<b>ENLX loop</b>	This prompt is available in LD 34, LD 38, and LD 46. Use the appropriate loop number (see step 1 on <a href="#">page 288</a> in “Removing equipment” on <a href="#">page 288</a> ).
------------------	---
- Note:** You must enable the card with the command ENLX. Enabling the loops with the command ENLL does not enable the card.
- 6 Test each loop on the card (when each test completes, enter \*\*\*\*):
  - a. Test TDS capability:  

<b>LD 34</b>	
<b>TDS loop</b>	“loop” is an even loop number
  - b. Test Conference capability:  

<b>LD 38</b>	
<b>CNFC loop</b>	“loop” is an odd loop number
  - c. Test MFS capability:  

<b>LD 46</b>	
<b>MFS loop</b>	“loop” is an even loop number
  - d. If there is a problem, a TDS, CNF, or MFS system message is generated and the appropriate red LED lights on the card faceplate.
- 7 Tag defective equipment with a description of the problem and package it for return to a repair center.

## NT8D22 System Monitor

Use this procedure to replace the system monitor.

See *Software Input/Output: Administration* (553-3001-311) for a description of all maintenance commands, and *Software Input/Output: System Messages* (553-3001-411) for interpreting system messages.

## Removing equipment



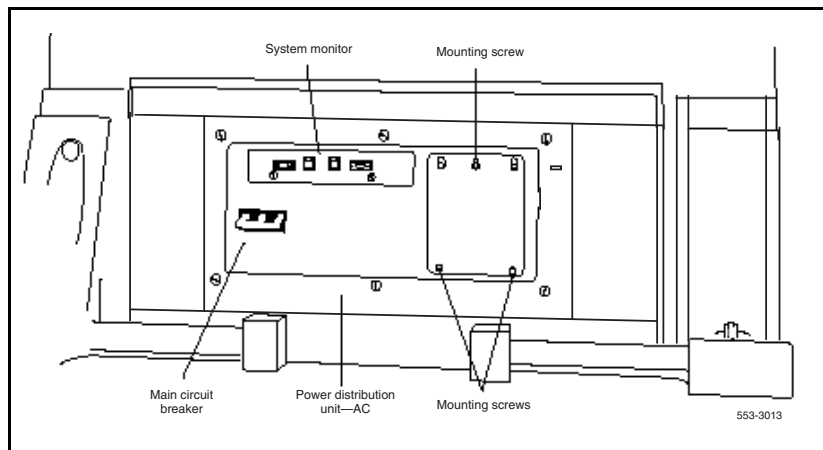
### CAUTION

#### Service Interruption

Be sure to follow the steps in this procedure in the order shown. Removing the system monitor before disconnecting cables may result in loss of power and interruption of telephone service.

- 1 Remove the grill on the rear of the pedestal.
- 2 Tag and disconnect cables to the system monitor. Figure 31 shows the location of the system monitor in the rear of an AC-power pedestal.

**Figure 31**  
**NT8D22 System Monitor in an AC-power pedestal**



- 3 Loosen the two screws on the card and pull it out of the slot.

**Note:** If a slave is removed, the master considers that slave and all slaves with a higher address as disabled. For example, if the slave designated "XSM 2" is disabled, the master also reports slaves 3, 4, and up are disabled.

### Installing equipment

- 1 Set option switches on the replacement card the same as on the card you removed. If there is a vintage change, be sure to check *Large System: Installation and Configuration* (553-3021-210) for any differences.
- 2 Insert the replacement card into the vacated slot and tighten the two screws on the front of the card.
- 3 Connect cables to the replacement card.
- 4 Replace the grill on the rear of the pedestal.
- 5 Test the system monitor:

#### LD 37

#### STAT XSM

- If a single or master system monitor was replaced successfully, you will receive system message "PWR000 XSMC 00 0 0."
- If a slave was replaced successfully, you will receive "PWR053 XSMC xx 0 0" ("x" is the system monitor address).
- If there is a problem with a slave, you will receive system message "PWR013 XSMC xx 0 0."
- If there is no problem, exit LD 37:

\*\*\*\*

- 6 Tag defective equipment with a description of the problem and package it for return to a repair center.

## NT8D41 Dual or Quad Port Serial Data Interface card

The serial data interface (SDI) paddle board attaches to the rear of the backplane in an NT6D39 CPU/Network Module. Use this procedure to replace an SDI paddle board.

See *Software Input/Output: Administration* (553-3001-311) for a description of all maintenance commands, and *Software Input/Output: System Messages* (553-3001-411) for interpreting system messages.



**DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.



**CAUTION**

**Loss of Data**

If the system terminal is assigned to the SDI being replaced, assign it to another port before this SDI is disabled.

**Removing equipment**

- 1    Software disable each port on the SDI paddle board:

**LD 37**

**DIS TTY x**        “x” is the number of the interface device attached to the port

- 2    Remove the rear cover on the module.
- 3    Remove the I/O safety panel by turning the screws on each side. Set the cover aside.
- 4    Set the ENB/DIS switch to the disable position (down) on the paddle board.



**CAUTION**

**Service Interruption**

To avoid interrupting service, set ENB/DIS switches to DIS before disconnecting or connecting cables.

- 5    Tag and disconnect cables to the paddle board you are removing (connector J1 for port 1, connector J2 for port 2).

- 6 Pull the paddle board out of the connector on the backplane.

### Installing equipment

- 1 Set the ENB/DIS switch to the disable position (down) on the replacement paddle board.
- 2 Set option switches on the replacement paddle board the same as on the board you removed. If there is a vintage change, be sure to check *Circuit Card: Description and Installation* (553-3001-211) for any differences.
- 3 Plug the replacement paddle board into the vacated connector on the backplane.
- 4 Connect cables to the replacement paddle board.
- 5 Set the ENB/DIS switch to the enable position (up) on the replacement paddle board.
- 6 Replace the I/O safety panel. Replace the rear cover on the module.
- 7 Software enable and test each port on the paddle board:

ENL TTY x

TTY x

- If there is a problem, an IOD system message is generated and the red LED lights on the faceplate of the card.
- If there is no problem, exit LD 37:

\*\*\*\*

- 8 Tag defective equipment with a description of the problem and package it for return to a repair center.

## NT8D46AC Thermostat Harness

Use this procedure to replace the thermostat harness located in the top cap of each column.



### **DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

## Removing equipment

- 1 Disconnect the system monitor from the circuit breaker system:
  - a. Remove the grill on the rear of the column pedestal.
  - b. Loosen the two screws on the system monitor and pull it out a few inches.



### CAUTION

#### Service Interruption

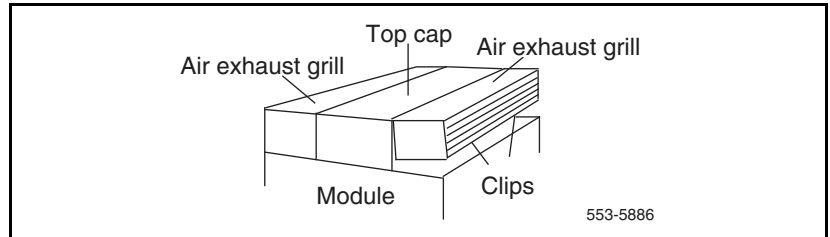
If the system monitor is not unseated, column operation will shut down when the thermostat harness is disconnected.

- 2 Disconnect power to the top cap:
  - a. Remove the rear cover on the module below the top cap.
  - b. Remove the I/O safety panel over the backplane.
  - c. At the top of the rear of the module, disconnect the connector from the module power harness.
  - d. Disconnect the pin headers on connector J2 on the backplane; disconnect the ribbon cable connector.
- 3 Remove the top cap:
  - a. Remove air exhaust grills at the front and rear of the top cap (see Figure 32). Pull forward on the two clips underneath the front edge of each grill and lift up to remove the grill.
  - b. Use a 5/16" socket wrench to remove the six bolts that secure the top cap and perforated panel (see Figure 33). Lift off the top cap only.
- 4 Remove the thermostat harness:

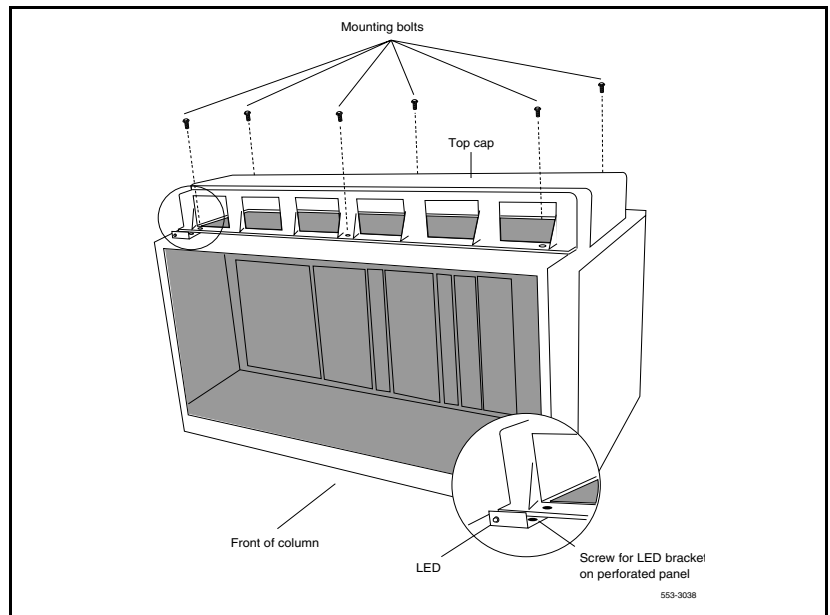
**Note:** The column LED and LED wiring are part of the thermostat harness.

  - a. Pull the LED ring away from the LED mounting bracket (see Figure 34). You may need to loosen it with a standard screwdriver.
  - b. Push the LED back completely out of the collar on the LED mounting bracket.

**Figure 32**  
**Air exhaust grills on the top cap**

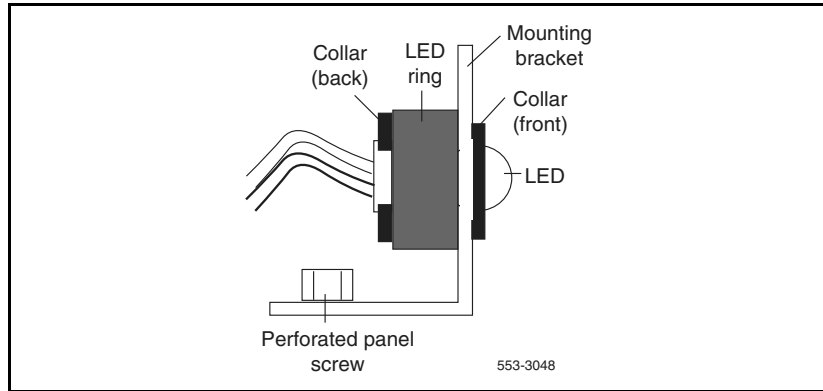


**Figure 33**  
**Top cap assembly**



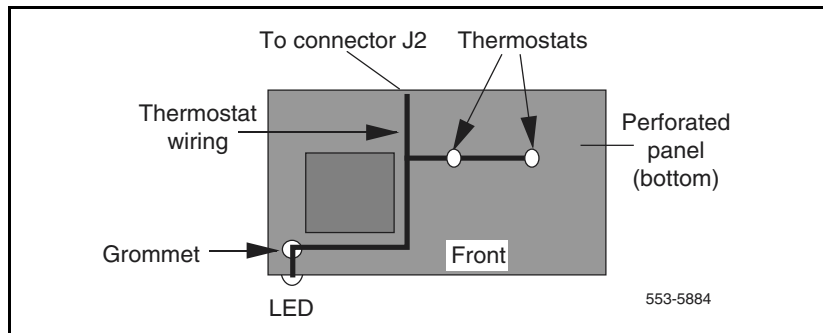
- c. Remove the LED ring by pulling it forward over the LED. Keep the ring handy; you will use it with the replacement equipment.
- d. Remove the screw that secures the perforated panel at the LED mounting bracket.
- e. Slide the perforated panel slightly to the left (looking at it from the rear of the column). Lift the panel and turn it over.

**Figure 34**  
**Mounting for the column LED**



- f. Clip all cable ties that secure the thermostat harness. Be careful not to damage other wiring (such as the air probe harness).
- g. Pull the LED through the rubber grommet at the front of the perforated panel.
- h. Remove the screws (two each) that secure the thermostats. Remove the thermostats and wiring (see Figure 35).

**Figure 35**  
**Thermostat harness**



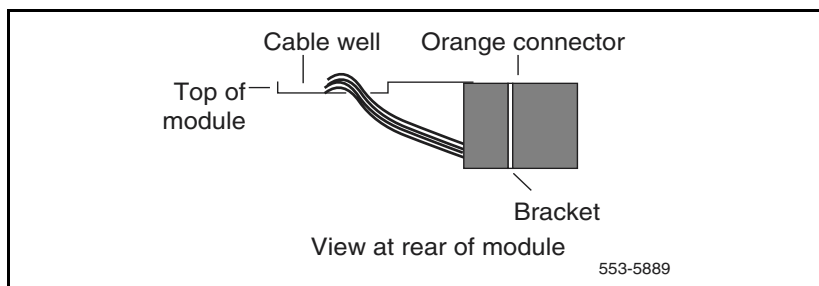


## Installing equipment

- 1 Install the replacement thermostat harness:
  - a. Position the replacement thermostats and install the screws.
  - b. Push the LED through the rubber grommet.
  - c. Route the thermostat wiring on the perforated panel. At the rear edge of the panel, route the wires with wiring for the air probe harness. Secure loose wiring to the perforated panel with cable ties.
- 2 Turn the perforated panel over. Slide it slightly to the right (at the rear of the column) so it is in a secure position. Position wiring from the perforated panel so it rests in the cable well next to the orange connector at the rear of the module (see Figure 36). Position the perforated panel and install the screw that secures it at the LED mounting bracket.
  - a. Slide the LED ring over the LED (see Figure 37). The ring will hang loosely at this point.
  - b. Gently push the LED forward completely through the collar on the LED mounting bracket.
  - c. Push the LED ring into position over the back of the collar and tight against the LED mounting bracket.

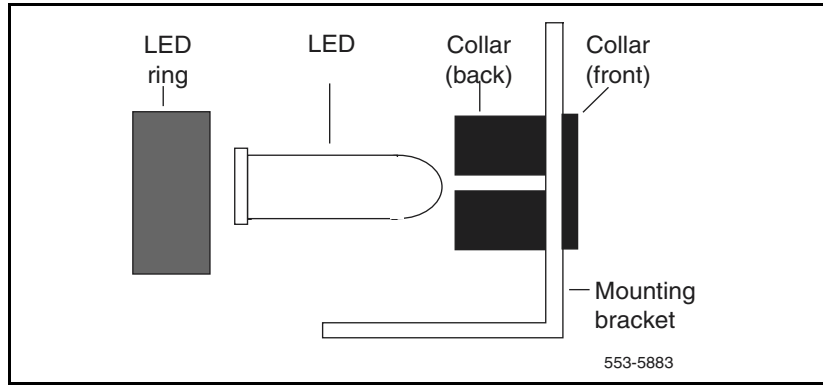
**Figure 36**

### Routing the thermostat harness from the top cap



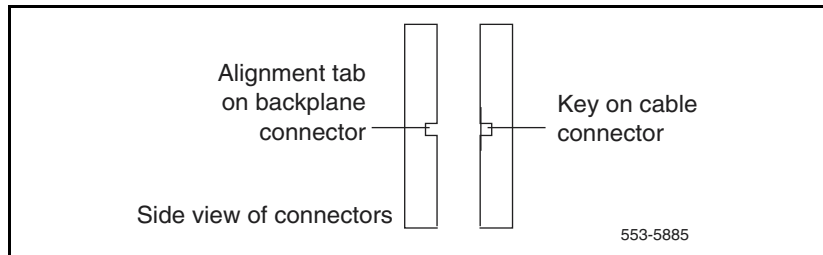
- 3 Install the top cap:
  - a. Position the top cap and install the six bolts that secure the top cap and perforated panel.
  - b. Install the air exhaust grills at the front and rear of the top cap.

**Figure 37**  
**Installing the column LED**



- 4 Reconnect power to the top cap:
  - a. Connect the ribbon cable connector to connector J2 on the backplane. Line up the alignment tab on the connector and snap on the pin headers to position the connector correctly (see Figure 38).

**Figure 38**  
**Aligning the thermostat harness connector**



- b. Connect the orange connector to the module power harness.
    - c. Replace the rear cover on the module.
- 5 Reconnect the system monitor to the circuit breaker system:
  - a. Push the system monitor into position and tighten the screws.
  - b. Replace the grill on the pedestal.

- 6 Tag defective equipment with a description of the problem and package it for return to a repair center.

## NT8D46AM, NT8D46DC Air Probe Harness

Use this procedure to replace the air probe harness located in the top cap of each column.



### **DANGER**

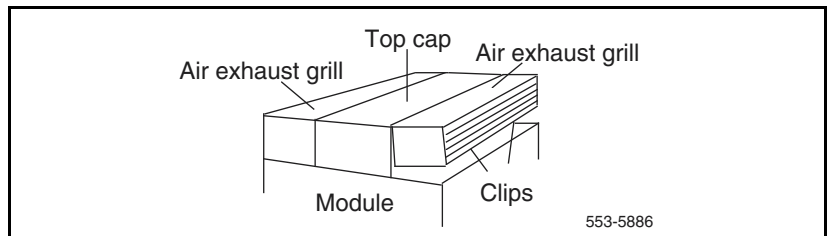
Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

### **Removing equipment**

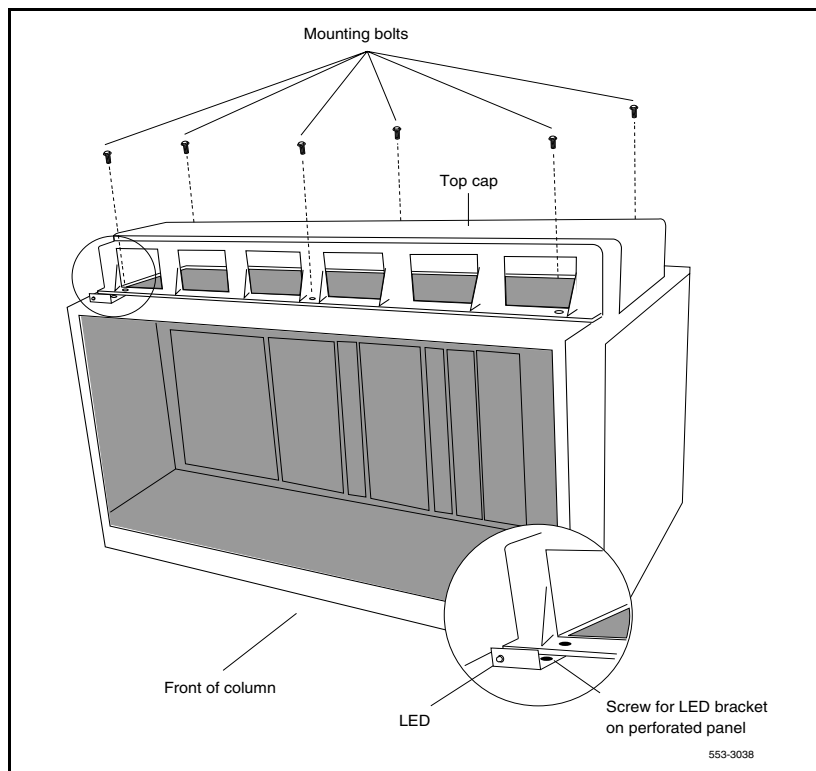
- 1 Disconnect the air probe harness plug:
  - a. Remove the rear cover on the module below the top cap.
  - b. Remove the I/O safety panel over the backplane.
  - c. At the top of the rear of the module, disconnect the orange connector from the module power harness.
- 2 Remove the top cap:
  - a. Remove air exhaust grills at the front and rear of the top cap (see Figure 39). Pull forward on the two clips underneath the front edge of each grill and lift up to remove the grill.
  - b. Use a 5/16" socket wrench to remove the six bolts that secure the top cap and perforated panel (see Figure 40). Lift off the top cap.

**Figure 39**

### **Air exhaust grills in the top cap**

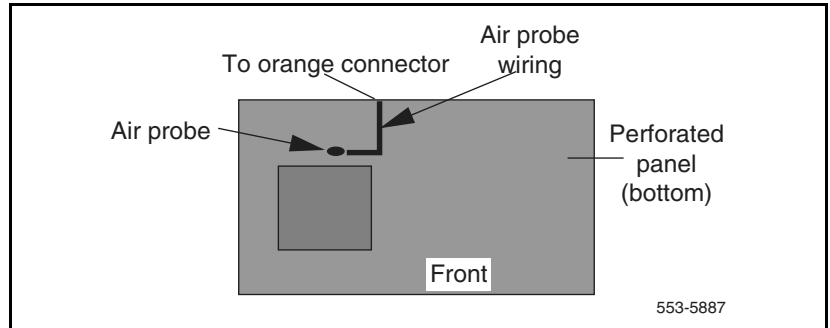


**Figure 40**  
**Top cap assembly**



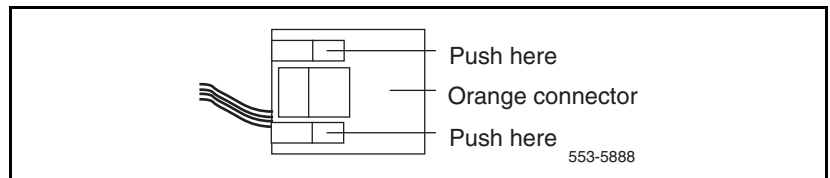
- 3** Remove the air probe harness:
  - a.** Remove the screw that secures the perforated panel at the LED mounting bracket.
  - b.** Slide the perforated panel slightly to the left (looking at it from the rear of the column). Lift the panel and turn it over.
  - c.** Pull the air probe out of the clip holder (see Figure 41).
  - d.** Clip cable ties that secure the air probe wiring. Be careful not to damage other wiring (such as the thermostat harness).
  - e.** Remove the orange connector from the right-angle bracket at the top of the module. Simultaneously push the four small snaps (two on

**Figure 41**  
**Air probe harness**



each side) on the connector to release it from the bracket (see Figure 42).

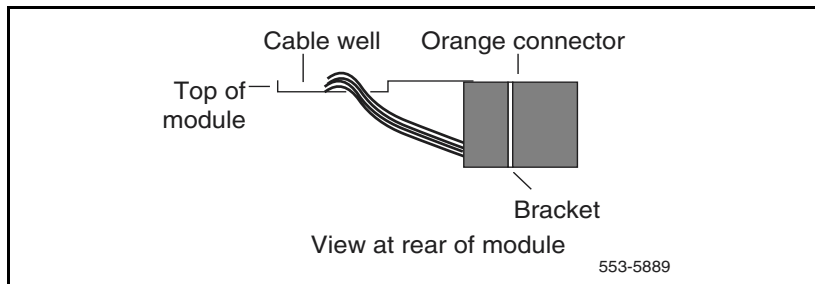
**Figure 42**  
**Connector for the air probe harness**



## Installing equipment

- 1 Install the replacement air probe harness:
  - a. Gently push the air probe into the clip holder.
  - b. Route the air probe wiring on the perforated panel. At the rear edge of the panel, route the wires with wiring for the thermostat harness. Secure loose cabling to the perforated panel with cable ties.
  - c. Turn the perforated panel over. Slide it slightly to the right (at the rear of the column) so it is in a secure position. Position wiring from the perforated panel so it rests in the cable well next to the orange connector at the rear of the module (see Figure 43).
  - d. Insert the orange connector into the right-angle bracket at the top of the module. Simultaneously push the four small snaps on the connector to insert it.

**Figure 43**  
**Routing the air probe harness from the top cap**



- 2** Install the top cap and perforated panel:
  - a.** Position the perforated panel and install the screw that secures it at the LED bracket.
  - b.** Position the top cap and install the six bolts that secure the top cap and perforated panel.
  - c.** Install the air exhaust grills at the front and rear of the top cap.
- 3** Reconnect the air probe harness plug:
  - a.** Connect the orange connector to the module power harness.
  - b.** Replace the I/O safety panel.
  - c.** Replace the rear cover on the module.
- 4** Tag defective equipment with a description of the problem and package it for return to a repair center.

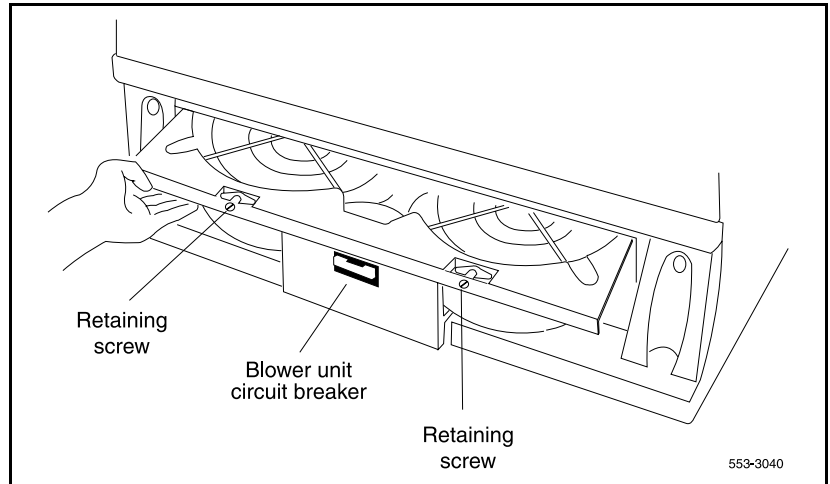
## NT8D52AB, NT8D52DD Pedestal Blower Unit

Use this procedure to replace a blower unit.

### Removing equipment

- 1** Remove the front pedestal grill and set it aside. Figure 44 shows the blower unit and its location in the front of the pedestal.
- 2** Turn off power to the blower unit:

**Figure 44**  
**NT8D52 Blower Unit**



- With AC power, set the circuit breaker on the front of the unit to OFF (down).
- With DC power, set the toggle switch on the front of the unit to OFF (left).



**DANGER**

Impellers in the blower unit do not stop instantly when the power is turned off. Wait two full minutes before you remove the unit.

- 3** Loosen the two screws on the front of the blower unit by turning them counterclockwise.
- 4** Grasp the lip at the top edge of the blower unit. Slide the unit out of the glides and onto the bottom ledge of the pedestal. Lift the unit out of the pedestal.

**Note:** Store the blower unit in an upright position.

### Installing equipment

- 1 Set the replacement blower unit on the bottom ledge of the pedestal.
- 2 Tilt the back of the blower unit up slightly so it will slide into the pedestal glides (you may need to lift the unit). Gently push the unit into position.
- 3 Tighten the screws on the front of the unit.
- 4 Turn on power to the blower unit:
  - With AC power, set the circuit breaker to ON (up).
  - With DC power, set the toggle switch to ON (right).

**Note:** On initial power up the blower may rotate slower than expected. As the sensor detects heat, the blower will rotate more rapidly.

- 5 Fit the grill into the holes in the bottom ledge of the pedestal. Push the grill back into a locked position.
- 6 Tag defective equipment with a description of the problem and package it for return to a repair center.

## NT8D53CA Power Distribution Unit AC

Use this procedure to replace the power distribution unit (PDU) for AC-powered systems.



### **DANGER**

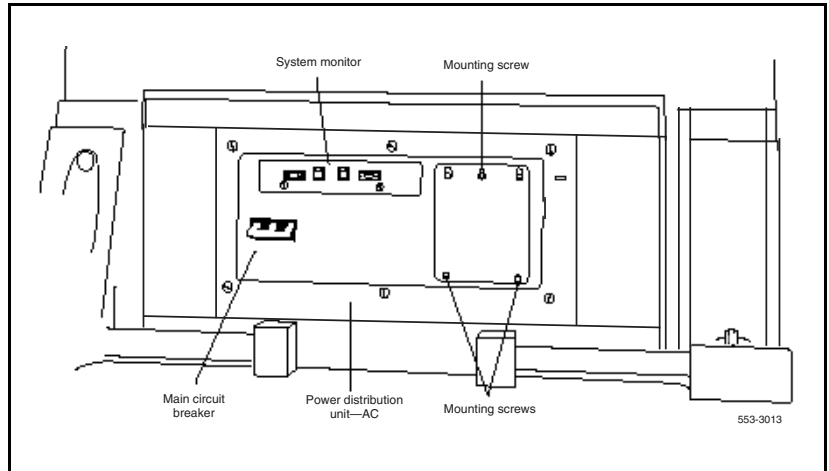
Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

### Removing equipment

- 1 Turn off power at the distribution box. If the column is not hardwired, unplug the power cable.
- 2 Remove the grill on the rear of the pedestal. Figure 45 shows the location of the unit in the rear of the pedestal.
- 3 Loosen the three mounting screws that secure the field wiring access plate. Lift the plate over the screws and set it aside.



**Figure 45**  
**NT8D53CA Power Distribution Unit AC**



- 4 Tag and disconnect wiring to the LRTN, GND, L2, and L1 connections on the right side of the field wiring terminal (see Figure 46). Push all the wires down into the empty area under the pedestal



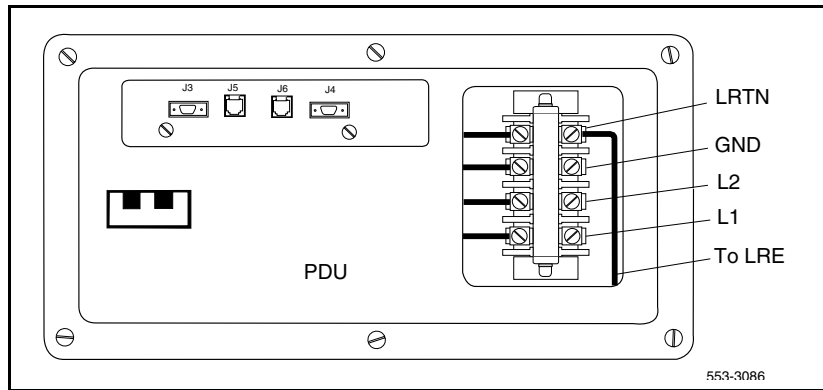
**CAUTION**

**Damage to Equipment**

Label wires carefully. They must be reconnected correctly or the system may be damaged.

- 5 Tag and disconnect cables to the NT8D22 System Monitor. Loosen the two retaining screws on the system monitor. Remove the card.
- 6 Disconnect cables to the module above the pedestal (module 0):

**Figure 46**  
**Connections at the field wiring terminal**



- a. Remove the rear cover on the module.
- b. Remove the I/O safety panel over the backplane in the module.
- c. Disconnect the power plug (J1) and system monitor ribbon cable to the module.

**Note:** To disconnect the power plug, you must press a latch trip on the front and rear of the plug. You may need to use a screwdriver blade against the latch trip on the front of the plug.

- 7 Remove the six screws that position the PDU. Carefully pull the unit straight forward out of the pedestal.

## Installing equipment

- 1 Set the main circuit breaker on the replacement PDU to OFF (down).
- 2 Position the replacement PDU and gently push it into the pedestal.

**Note:** Be sure you push the unit straight back, so the connector on the rear will seat properly with the blower unit connector. It may be easier to position the PDU if you temporarily pull the blower unit out several inches.

- 3 Reconnect cables to module 0:
  - a. Attach power plug J1 and the system monitor cable.
  - b. Replace the I/O safety panel.
  - c. Replace the rear cover.

- 4 Insert the system monitor. Tighten the screws on the card. Reconnect cables to the system monitor faceplate.
- 5 Connect wiring to the right side of the field wiring terminal.
- 6 Position the field wiring access plate over the three mounting screws. Tighten the screws.
- 7 Turn on power at the distribution box or plug in the power cable.
- 8 Set the main circuit breaker to ON (up).
- 9 Replace the pedestal grill.
- 10 Tag defective equipment with a description of the problem and package it for return to a repair center.

## NT8D56AA, NT8D56AC, NT8D57 Module Power Distribution Unit

Use this procedure to replace the following module power distribution units (MPDUs):

- NT8D56AA single-breaker MPDU for the NT8D29 CE Power Supply AC
- NT8D56AC single-breaker MPDU for the NT7D14 CE/PE Power Supply AC
- NT8D57 dual-breaker MPDU for the NT8D06 PE Power Supply AC and NT8D21 Ringing Generator AC



### **DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

## Removing equipment

- 1 Remove the rear grill on the column pedestal. Set the main circuit breaker to OFF (down).



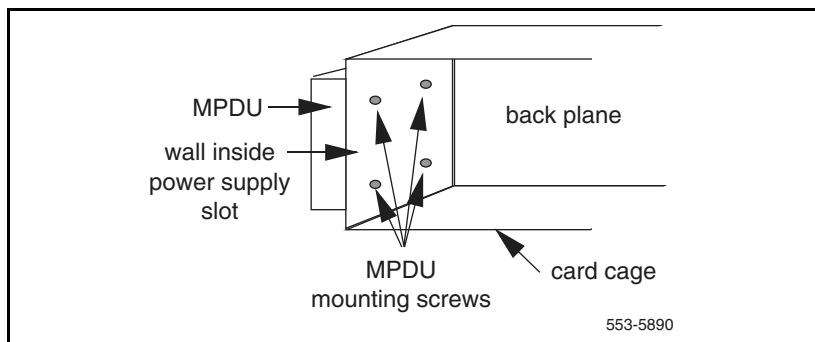
### CAUTION

#### Service Interruption

Shutting off the main circuit breaker disables the entire column.

- 2 Remove the I/O safety panel over the backplane.
- 3 Tag and disconnect the power plugs to the MPDU.
- 4 Remove the metal plate covering the MPDU in the front of the module by removing the mounting screw in each corner.
- 5 Unhook the locking devices on the power supply next to the MPDU. Pull the power supply out of the card cage.
- 6 Remove the mounting screws for the MPDU; the screw-heads are in the wall of the power supply slot (see Figure 47). (Be careful—do not let the screws fall into the module below.) Lift the unit out of the module.

**Figure 47**  
**Mounting screws for the MPDU**



## Installing equipment

- 1 Set the circuit breaker(s) on the replacement MPDU to OFF (down).
- 2 Position the replacement MPDU in the module. Install the mounting screws through the wall of the power supply slot.

- 3 Reinsert the power supply and hook the locking devices.
- 4 Position the metal plate in front of the MPDU and install the mounting screw in each corner.
- 5 Connect the power plugs to the rear of the MPDU.
- 6 Position the I/O safety panel. Tighten the screws.
- 7 Set the circuit breaker(s) on the replacement MPDU to ON (up).
- 8 Reset the main circuit breaker in the column pedestal to ON (up) and replace the pedestal grill.
- 9 Tag defective equipment with a description of the problem and package it for return to a repair center.

## NT8D3503/NT8D3507 Network Module Card Cage

The NT8D3503 Network Module Card Cage uses BTUs, however, the NT8D3507 Network Module Card Cage does not use BTUs, it uses hybrid terminators that are an integral part of the backplane. To replace a defective backplane in an NT8D35 Network Module, you must replace the card cage. Use this procedure to replace the Network Module card cage.



### **DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

## Connect groups 1 through 7: shelf 0 to shelf 1

On the back of each Network module backplane are five connectors: A, B, C, D and E. See Figure 48 on page 311. The connectors from shelf 0 of each Network group 1 through 7 must be connected to the connectors in shelf 1 of the same Network group.

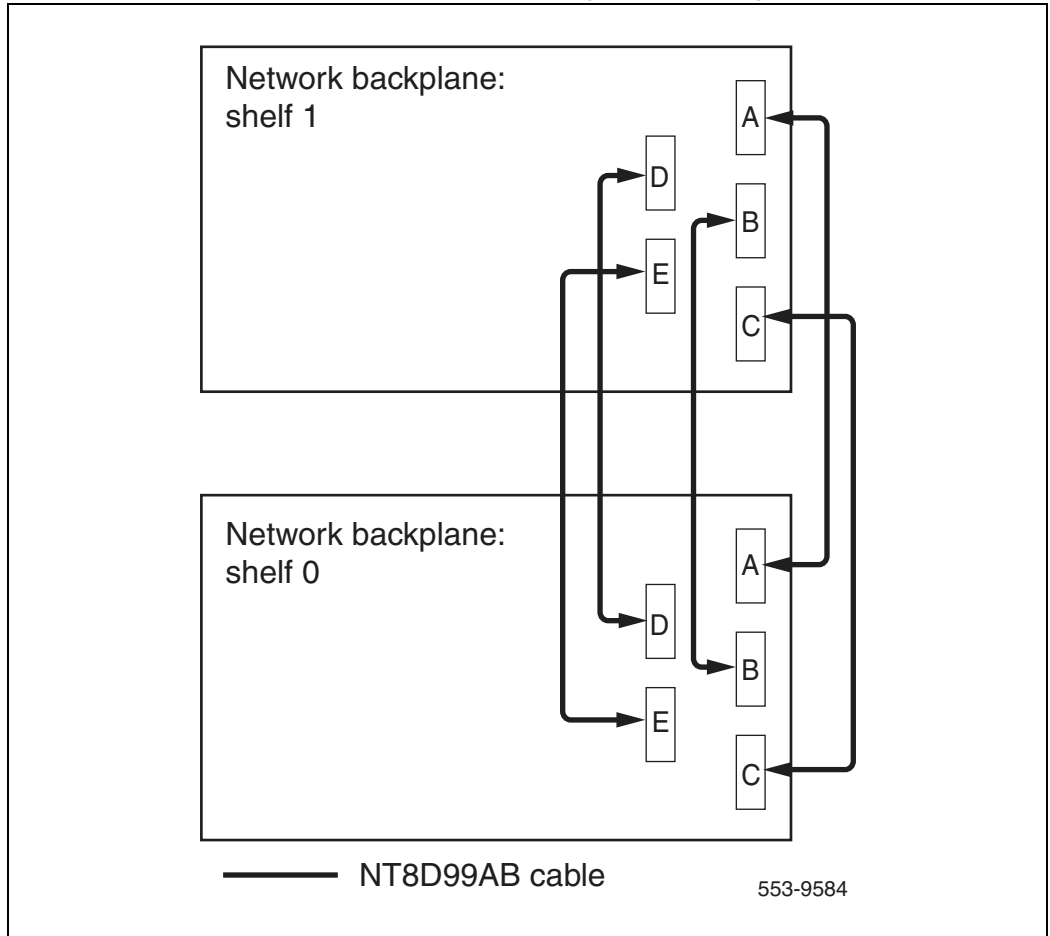
**Note:** In North American systems, these connections are made in the factory. In shipments outside North America, the Network shelves are shipped separately. These connections must be made in the field

This connection is NOT made for Network group 0 in the Core/Net modules.

- 1 Connect an NT8D99AB cable from the **A** connector in shelf 0 of Network group 1 to the **A** connector in shelf 1 Network group 1.
- 2 Connect the **B** connector in shelf 0 to the **B** connector in shelf 1.
- 3 Connect the **C** connector in shelf 0 to the **C** connector in shelf 1.
- 4 Connect the **D** connector in shelf 0 to the **D** connector in shelf 1.
- 5 Connect the **E** connector in shelf 0 to the **E** connector in shelf 1.
- 6 Connect the A, B, C, D, and E connectors between shelf 0 and shelf 1 for all other Network groups in the system (except group 0)

**Note:** All connections are made with an NT8D99AB cable.

**Figure 48**  
**Network shelf 0 to shelf 1 backplane connections (groups 1 through 7)**

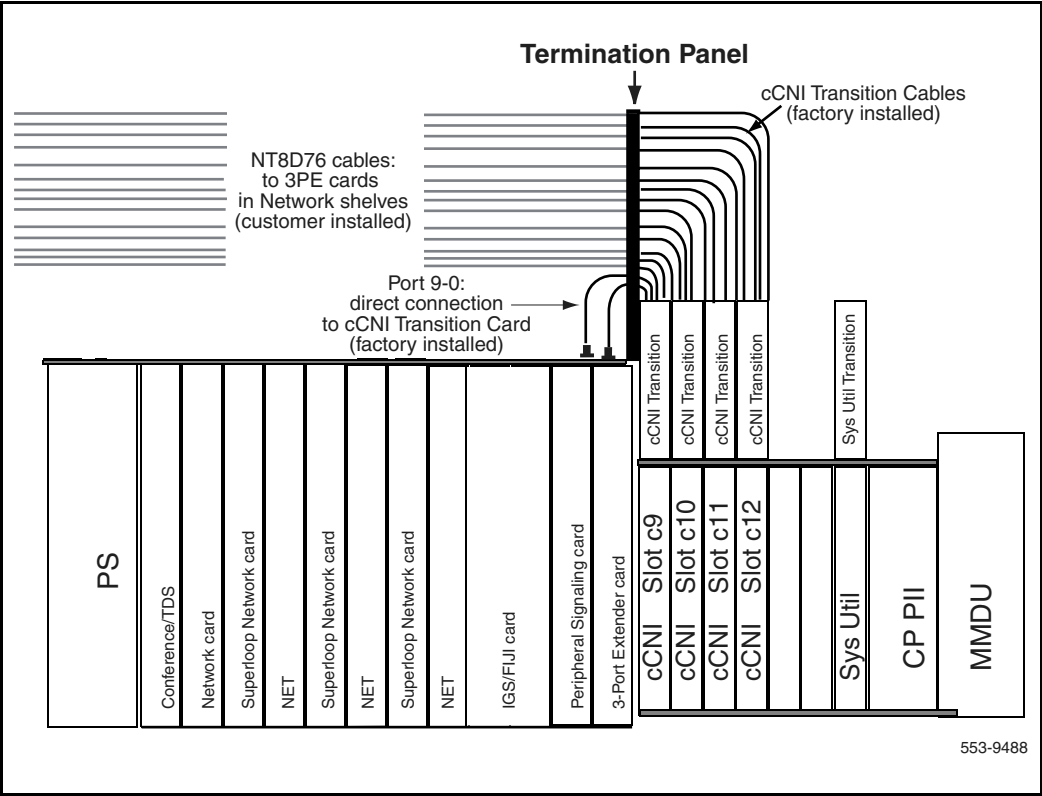


### Connect the Network modules to the Core/Net modules

Each Network shelf contains one 3PE card. These 3PE cards are connected to the Termination Panel in the back of the Core/Net shelves.

Figure 49 on page 312, Figure 50 on page 313 and Figure 50 on page 313 show the location of the Termination Panel and 3PE cables on the Core/Net backplane.

**Figure 49**  
**3PE Termination Panel in the Core/Net module (top view)**

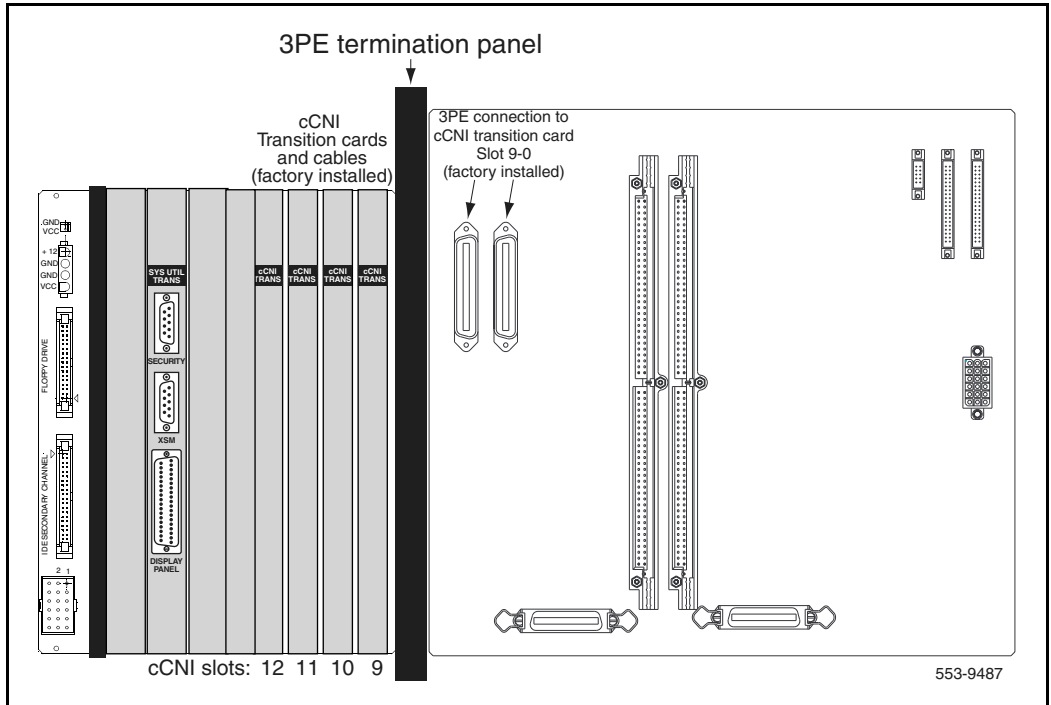


**cCNI slot and port assignments**

Each system contains a minimum of one and a maximum of four CNI cards.  
Each cCNI card contains two ports to support up to two Network groups.



**Figure 50**  
**Core/Net backplane (rear view)**



cCNI cards are identified by slot and port. Each port is assigned in software to a specific Network group. Use the System Layout Plan to determine the connections for your system.

- Each 3PE card has two faceplate connections: J3 and J4. Two cables are used for each card.
- 3PE cards in Network shelves “0” are connected to the 3PE Termination Panel in Core/Net 0.
- 3PE cards in Network shelves “1” are connected to the 3PE Termination Panel in Core/Net 1.

**Figure 51**  
**3PE Termination Panel (rear module view)**

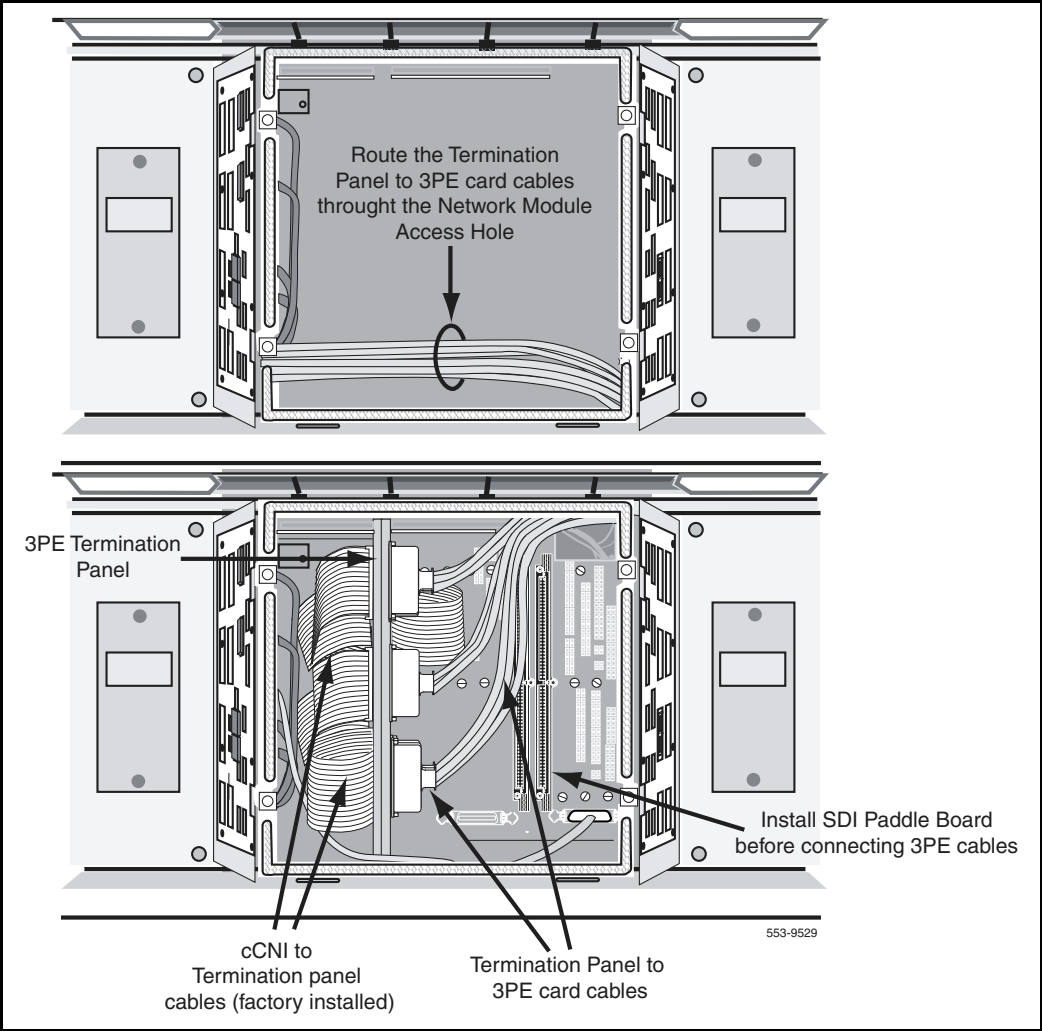


Table 19 on page 315 specifies the default Network group assignments for each cCNI slot and port. These designations can be changed in software if necessary.

**Table 19**  
**cCNI Network group designations**

cCNI card slot	cCNI card port	3PE Termination Panel label	Connected to Network group
c9	0	N/A (factory installed directly to the Core/Net backplane)	0
c9	1	Port 9-1	1
c10	0	Port 10-0	2
c10	1	Port 10-1	3
c11	0	Port 11-0	4
c11	1	Port 11-1	5
c12	0	Port 12-0	6
c12	1	Port 12-1	7

## cCNI to 3PE Termination Panel cable connections

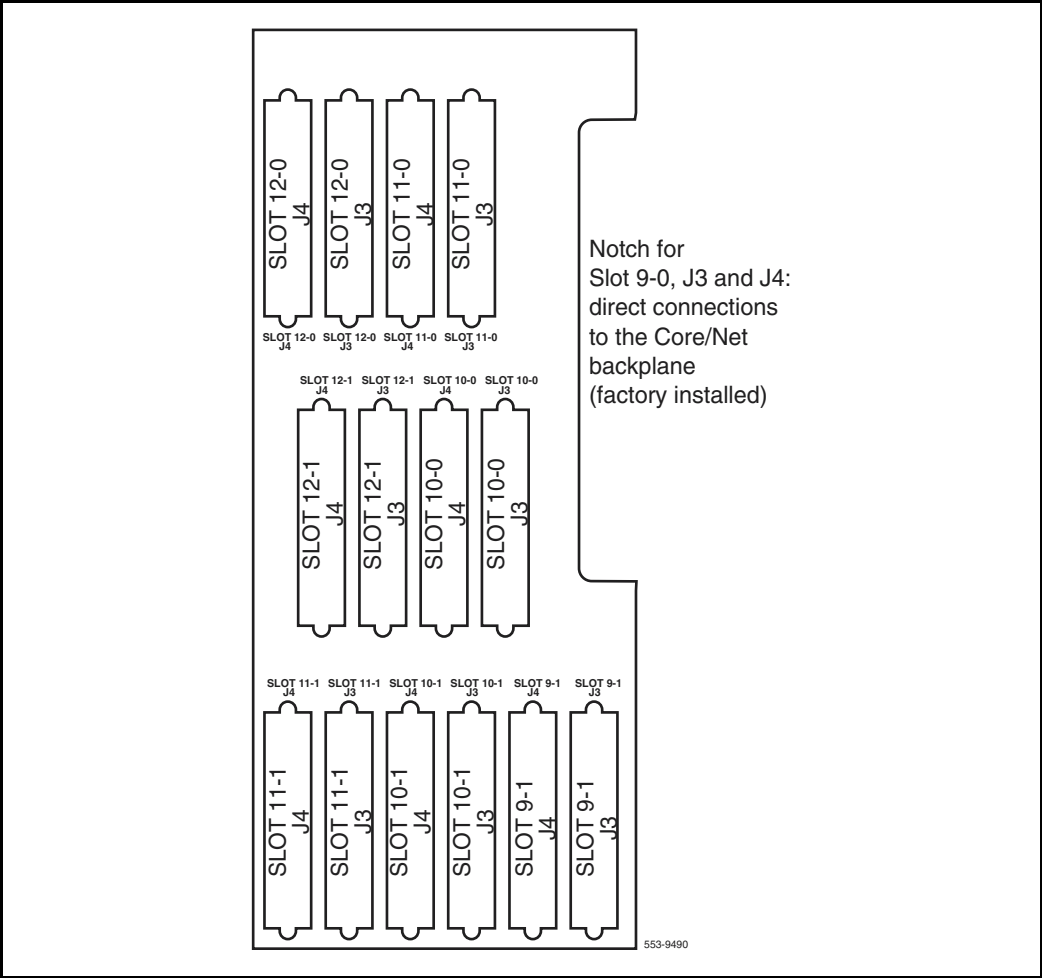
The cCNI slot and port connections are labeled on the 3PE Termination Panel. See Figure 52 on page 316. Each 3PE card is connected with two cables: one to J3 and one to J4. Table 19 on page 315 specifies the Network group that connects to each slot.

## Connect the 3PE cables to the 3PE Termination Panels

Two NT8D76 cables connect from J3 and J4 of each 3PE faceplate to the 3PE Termination Panel. See Figure 53 on page 318.

Refer to Table 19 on page 315 for cCNI port and slot assignments. Connect shelf 0 3PE cards to the Core/Net 0 panel; connect shelf 1 3PE cards to the Core/Net 1 panel. The 3PE cables for Network group 0 are factory installed.

**Figure 52**  
**3PE Termination Panel (Core/Net module)**



**Connect the Network shelf 0 3PE cards to Core/Net 0**

- 1 Connect a NT8D76 cable of the appropriate length from J3 on the 3PE card faceplate in **Network group 1, shelf 0** to the **Port 9-1, J3** connection on the 3PE Termination Panel in **Core/Net 0**.
- 2 Connect a NT8D76 cable of the appropriate length from J4 on the 3PE card faceplate in **Network group 1, shelf 0** to the **Port 9-1, J4** connection on the 3PE Termination Panel in **Core/Net 0**.
- 3 Connect a NT8D76 cable of the appropriate length from J3 on the 3PE card faceplate in **Network group 2, shelf 0** to the **Port 10-0, J3** connection on the 3PE Termination Panel in **Core/Net 0**.
- 4 Connect a NT8D76 cable of the appropriate length from J4 on the 3PE card faceplate in **Network group 2, shelf 0** to the **Port 10-0, J4** connection on the 3PE Termination Panel in **Core/Net 0**.
- 5 Install the remaining cables according to the assignments in Table 19 on page 315.

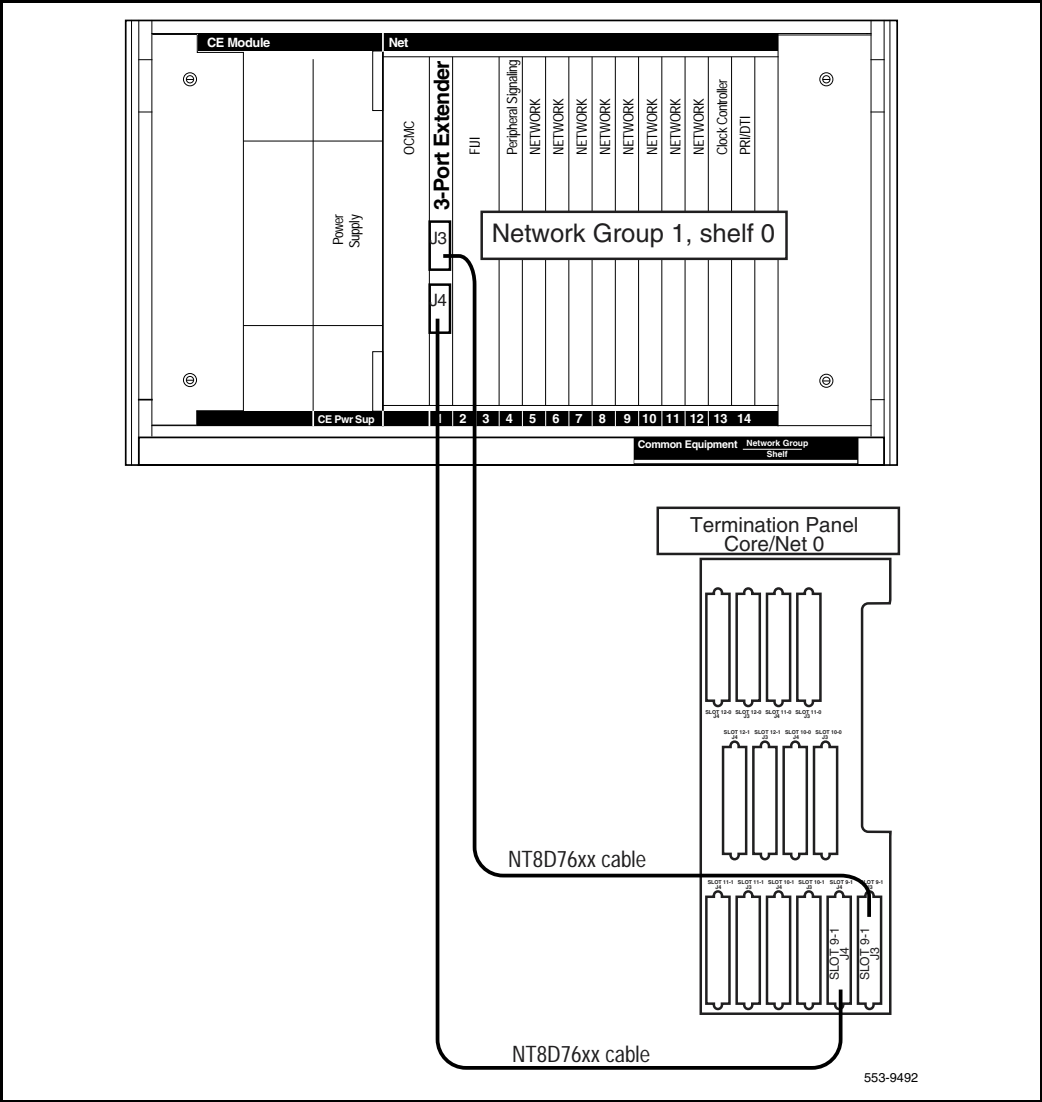
**Connect the Network shelf 1 3PE cards to Core/Net 1**

- 1 Connect a NT8D76 cable of the appropriate length from J3 on the 3PE card faceplate in **Network group 1, shelf 1** to the **Port 9-1, J3** connection on the 3PE Termination Panel in **Core/Net 1**.
- 2 Connect a NT8D76 cable of the appropriate length from J4 on the 3PE card faceplate in **Network group 1, shelf 1** to the **Port 9-1, J4** connection on the 3PE Termination Panel in **Core/Net 1**.
- 3 Connect a NT8D76 cable of the appropriate length from J3 on the 3PE card faceplate in **Network group 2, shelf 1** to the **Port 10-0, J3** connection on the 3PE Termination Panel in **Core/Net 1**.
- 4 Connect a NT8D76 cable of the appropriate length from J4 on the 3PE card faceplate in **Network group 2, shelf 1** to the **Port 10-0, J4** connection on the 3PE Termination Panel in **Core/Net 1**.
- 5 Install the remaining cables according to the assignments in Table 19 on page 315.

## NT8D3703 IPE Module Card Cage

To replace a defective backplane in an NT8D37 IPE Module, you must replace the card cage. Use this procedure to replace the IPE Module card cage.

**Figure 53**  
**Example of 3PE faceplate to 3PE Termination Panel connection**



See *Software Input/Output: Administration* (553-3001-311) for a description of all maintenance commands, and *Software Input/Output: System Messages* (553-3001-411) for interpreting system messages.

**DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

**Removing equipment**

- 1 Software disable the controller card (and all cards connected to the controller):  
**LD 32**  
**DSXP x**                    “x” is the controller card number
- 2 Turn off power to the column or the module power supply and ringing generator (if equipped):
  - With AC power, set the main circuit breaker for the column to OFF (down) in the rear of the pedestal.

**DANGER OF ELECTRIC SHOCK**

Due to hazardous voltage in AC-powered systems, power to the entire column must be shut down. This shuts down all functions in the column.

- With DC power, set the switch on the NT6D40 PE Power Supply and NT6D42 Ringing Generator to OFF (down). Set the circuit breaker *for just this module* to OFF (down) in the rear of the pedestal. (All other modules in the column retain power.)

- 3 Remove the NT8D22 System Monitor in the rear of the pedestal. (Do *not* turn off the blower unit in the front of the pedestal.)

**Note:** If this is the master system monitor, disconnect the RJ11 cables before you pull the system monitor out of the pedestal.



**CAUTION**

**Service Interruption**

If the system monitor is not removed, the system may shut down.

- 4 Remove all cards from the module:
  - a. Tag and disconnect cables to all faceplate connectors.
  - b. Tag cards so they can be returned to the same slot. Remove cards.
- 5 Disconnect cables, plugs, and wires from the rear of the module to the backplane:
  - a. Remove the I/O safety panel by turning the screws on each side. Set the cover aside.
  - b. Tag and disconnect all cables from the backplane to the interior of the I/O assembly.
  - c. Tag and disconnect all plugs, wires, and cables to the backplane.
- 6 Remove the two mounting screws that secure the rear of the card cage to the module.
- 7 Remove the front cover plates on both sides of the card cage.
- 8 Remove the three mounting screws that secure the front of the card cage to the bottom of the module. Pull the card cage out of the module.

**Installing equipment**

- 1 Slide the replacement card cage into position in the module. Install the mounting screws at the front of the card cage.
- 2 Replace the front cover plates on both sides of the card cage.
- 3 Install the mounting screws at the rear of the card cage.
- 4 Reconnect cables, plugs, and wires from the rear of the module to the backplane:



- a. Connect all cables from the interior of the I/O assembly to the backplane.
  - b. Connect all plugs, wires, and cables to the backplane.
  - c. Position the I/O safety panel. Tighten the screws.
- 5 Return cards to their slots. Reconnect all cables to faceplate connectors.
- 6 Reinstall the system monitor. If this is the master system monitor, reconnect the RJ11 cables after it is installed.
- 7 Turn on power to the column or the module power supply and ringing generator:
  - With AC power, set the main circuit breaker in the pedestal to ON (up).
  - With DC power, set the breaker to ON (up) in the pedestal. Set the switch to ON (up) on the power supply and the ringing generator in the module.
- 8 Software enable and test the controller card (and all cards connected to the controller):  
**ENXP x**                    “x” is the controller card number  
**\*\*\*\***                        exit LD 32
- 9 Test the shelf by testing each loop:  
**LD 30**  
**SHLF l s**                “l s” are the loop and shelf numbers
  - If there is a problem, an NWS system message is generated.
  - If there is no problem, exit LD 30:  
  
**\*\*\*\***
- 10 Tag defective equipment with a description of the problem and package it for return to a repair center.

## NT9D19 68040 Call Processor (CP) Card replacement in systems equipped with NT5D61 IODU/C cards

Use this procedure to replace an NT9D19 68040 Call Processor (CP) card in systems equipped with NT5D61 IODU/C cards.

**Note:** This procedure may also be used to replace a 64 MB NT9D19 CP card with a 96 MB NT9D19 CP card.

See *Software Input/Output: Administration* (553-3001-311) for a description of all maintenance commands, and *Software Input/Output: System Messages* (553-3001-411) for interpretation of system messages.



### **DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.



### **CAUTION**

#### **Service Interruption**

At some point in this procedure, you will be required to warm start your system, causing a momentary interruption in call processing.

## Removing equipment

- 1 To access the Core during the replacement procedure, connect a terminal to the J25 port on the I/O panel in the Core Module or Core/Network Module for the CP card you are replacing. To communicate with the processor, you must use the following settings on the terminal:

**9600 baud, 7 data, space parity, 1 stop bit, full duplex, XOFF**

**Note:** If you are using only one terminal or a switch box, switch the connection from Core to Core as needed.

- 2 The CP card you are replacing must be in the inactive Core. Check the status of the NT9D19 Call Processor cards:

**LD 135**

**STAT CPU**            determine which CP card is active

If necessary, switch Cores:

**SCPU**                switch Cores

**\*\*\*\***                exit LD 135

- 3 Set the NORM/MAINT switch on the NT9D19 Call Processor card to MAINT on the *active* Core.
- 4 Set the ENB/DIS switch on all CNI cards on the *inactive* Core to DIS.
- 5 Perform the following three steps on the *inactive* Core in an uninterrupted sequence:
  - a. Press and hold down the MAN RST button on the CP card on the inactive Core.
  - b. Set the NORM/MAINT switch to MAINT.
  - c. Release the MAN RST button.

The system is now in split mode where each Core is functioning independently and the automatic switchover has been disabled.

**Installing equipment**

- 1 Set the NORM/MAINT switch to MAINT on the replacement card.
- 2 Insert the Install Program diskette which corresponds with the NT9D19 (68040) Call Processor card.
- 3 Remove the current CP card and put it in a static bag and box.
- 4 Insert the CP replacement card into its vacated slot and hook the locking devices.
- 5 Press the MAN RST button on the replacement CP card.

**6**    At the Main Menu select <u> to go to the Install Menu.

```
Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)
== == == == == == == == == == == == == == == == == == == == == ==
                                M A I N   M E N U

The Software Installation Tool will install or upgrade Meridian-1
System Software, Database and the PE-ROM (both CP and IOP ROM).
You will be prompted throughout the installation and given the
opportunity to quit at any time.

Please enter:
<CR>--> <u> - To Install menu.
        <t> - To Tools menu.
        <q> - Quit.

Enter choice > u
```

553-7780

— Insert the Keycode diskette when prompted and select <a> to continue with the keycode validation.

```
Nortel Meridian - 1 Software/Database/PEROM CDROM INSTALL Tool (x11)
== == == == == == == == == == == == == == == == == == == == == ==

Please insert the diskette with the keycode file into the floppy
drive.

Please enter:
<CR>--> <a> - Continue with the keycode validation
        (the keycode diskette is in the floppy drive).
        <q> - Quit.

Enter Choice > a
```

553-7729

**7**    Select the following options in sequence from the Install Menu:

<g>	to reinstall CP software
<y>	to start installation
<y>	to continue installation

<a>	to continue with ROM upgrade
<cr>	to return to the Install Menu

**8** At the Install Menu, select the following options in sequence

<e>	to install CP-BOOTROM
<y>	to start installation
<y>	to continue installation
<a>	to continue with ROM upgrade
<cr>	to return to the Install Menu

**9** **Remove the diskette** from the IODU/C.

**10** Select the following options to quit:

<q>	to quit
<y>	to confirm quit
<a>	to reboot the system.

**Note:** The system will reboot. Wait for the “INI” and “DONE” messages to display before continuing. It will take at least 70 seconds between the “DONE” and “INI” messages.

After the system initialization has finished (INI messages are no longer displayed on the system terminal), check for dial tone on a telephone set.

**11** Following a successful dial tone test, perform the following basic sanity tests:

- a.** Make sure calls can be placed.
- b.** Check for error messages, line noise, chatter, or other problems. Track sources and resolve problems as necessary.

**12** To place the system back in the redundant (normal) mode with automatic switchover capability. Perform the following five steps in uninterrupted sequence on the *inactive* Core (the Core with the replaced CP card):

**13** Press and hold down the MAN RST button on the CP card of the *inactive* Core.

**14** While holding down the MAN RST button, set the NORM/MAINT switch on the same CP card to NORM.

**15** Enable all CNI switches in the inactive Core.

**16** Release the MAN RST button.

**17** Set the CP card in the active Core to NORM.

After several minutes, an “HWI533” message is issued by the *active* Core indicating that the *inactive* Core memory is being synchronized with the *active* Core memory.

**18** Log into the system through the terminal, then check the status of the replacement CP card from the active side:

**LD 135**                      load LD 135

**STAT CPU**                obtain the CPU status

**19** If there are CCED messages generated by the STAT CPU command on the replacement CP card, set the NORM/MAINT switch to MAINT, press the reload (MAN RST) button, and set the NORM/MAINT switch back to NORM. (It may take 2 to 4 minutes for memory synchronization to take place.)

After the HWI0533 message is displayed, test the replacement CP card from the active CPU:

**TEST CPU**                the test causes a cold start on the inactive CPU

If the test results in:

**CCED014**                “Test failed because unable to enter SPLIT mode”

On the active CP card set the NORM/MAINT switch to NORM, and from the active side enter:

**TEST CPU**                to test the CP card

**20** Set the NORM/MAINT switch to NORM on the active CP card (if not already set).

**21** Check the status of the CPUs:

**STAT CPU**

**22** Test the CPU.

**TEST CPU**

**23** Check the status of the CNIs:

**STAT CNI**

**24** Switch Cores and exit the program:

**SCPU**

\*\*\*\*

exit LD 135

## NTAG26 Extended Multi-frequency receiver

Use the following procedure to replace a defective NTAG26 Multi-frequency Receiver Card (XMFR) in the IPE module.

See *Software Input/Output: Administration* (553-3001-311) for a description of all maintenance commands, and *Software Input/Output: System Messages* (553-3001-411) for interpreting system messages.



### **DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.



### **CAUTION**

#### **Service Interruption**

Service is interrupted when a loop is disabled.

## **Removing equipment**

- 1** Software disable the XMFR by entering  
**LD 32**  
**DISS I s**  
("I s" represents loop and shelf number)
- 2** Unhook the locking devices on the card; pull it out of the card cage.

### Installing equipment

- 1 Insert the replacement card into the vacated slot and hook the locking devices.
- 2 Software enable the loop on the card by entering  
**ENLS I s**
- 3 End the session in LD 32 by entering  
**\*\*\*\***
- 4 Test the loop on the card by entering  
**LD 30**  
**LOOP I**

If there is a problem, an NWS system message will be produced and the appropriate red LED will light on the faceplate of the card.

- 5 End the session in LD 30 by entering  
**\*\*\*\***
- 6 Tag defective equipment with a description of the problem and package it for return to a repair center.

## NTBK51AA Downloadable D-Channel Daughterboard

Use this procedure to replace the Downloadable D-Channel Daughterboard (DDCH).

See *Software Input/Output: Administration* (553-3001-311) for a description of all maintenance commands, and *Software Input/Output: System Messages* (553-3001-411) for interpreting system messages.



#### **DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.



**CAUTION WITH ESDS DEVICES**

The static discharge bracelet located inside the cabinet must be worn before handling circuit cards. Failure to wear the bracelet can result in damage to the circuit cards.

## Removing the DDCH Daughterboard

- 1 The DDCH can only be removed when it is disabled in software.
- 2 Both ports of the associated DDP circuit card must be disabled.
- 3 Disable the faceplate switch on the DDP.
- 4 Remove the DDP and DDCH.

## Installing the DDCH Daughterboard

**Note 1:** Test procedures require a 24-hour minimum bit error-rate testing before being used. Refer to the Nortel Networks technical publication (NTP), *ISDN PRI Description and Administration* (553-2901-100) for these procedures.

**Note 2:** Dual DTI/PRI loops must be configured in software before defining DCH links.

Set the address for the DDCH; refer to Table 20 on page 330 for DCH mode and address select switch settings. If a DDCH is present on a DDP card then

an external D-Channel should NOT be connected to JC. If a DDCH is present, the LED “DCH” will light up.

**Table 20**  
**DCH mode and address select switch settings**

Switch	Description	S3 switch setting
1-4	D-Channel Daughterboard Address	See Table 21 on <a href="#">page 331</a> .
5-7	For future use	off
8	External DCH or Onboard DDCH	off - MSDL or DCHI card  on - Onboard DDCH Daughterboard

- 1    The DDCH can be mounted on any DDP card.
- 2    Unpack and inspect the DDCH daughterboard.
- 3    Push the four stand-offs on the DDCH daughterboard into the four corresponding mounting holes on the DDP.

**Note:** The DDCH daughterboard mounts to mate correctly with P2 and P3 on the DDP motherboard.

**Table 21**  
**DDCH daughterboard address select switch settings**

Device Addr. <sup>1</sup>		Switch Setting		
0 <sup>2</sup>	OFF	OFF	OFF	OFF
1	ON	OFF	OFF	OFF
2	OFF	ON	OFF	OFF
3	ON	ON	OFF	OFF
4	OFF	OFF	ON	OFF
5	ON	OFF	ON	OFF
6	OFF	ON	ON	OFF
7	ON	ON	ON	OFF
8	OFF	OFF	OFF	ON
9	ON	OFF	OFF	ON
10	OFF	ON	OFF	ON
11	ON	ON	OFF	ON
12	OFF	OFF	ON	ON
13	ON	OFF	ON	ON
14	OFF	ON	ON	ON
15	ON	ON	ON	ON

**Note 1:** The maximum number of DCHI, MSDL, and DDCH devices in the system is 16.

The Device Addresses are equivalent to the MSDL DNUM designations. For programming information on the MSDL, refer to the Nortel Networks technical publications (NTPs) *Multi-purpose Serial Data Link description 553-3001-195* and *X11 input/output guide*.

**Note 2:** Device address 0 is commonly assigned to the System Monitor.

## FIJI Card replacement

Follow the steps in Procedure 4 to remove the FIJI card.

*Note:* When removing a FIJI card, disable the ring and set the Faceplate switch to disable before removing the FIJI.

### Procedure 4 Removing the FIJI card

- 1    Verify the status of the system clocks.

**LD 60**  
**SSCK**                      Get status of system clock (x=0 or 1)

- 2    Switch system clocks, if it is necessary to ensure that the inactive clock is associated with the ring that includes the target FIJI card to be replaced.

**LD 60**  
**SSCK**                      Switch system clock from active to standby.  
**\*\*\*\*Exit**

- 3    Obtain the status of both rings.

**LD 39**  
**STAT RiNG x**            Obtain status of ring (x=0 or 1). Normal response  
                                 is Half/Half  
**\*\*\*\*Exit**

- 4    Query the alarm condition for all FIJI cards.

**LD 39**  
**STAT ALRM x y**        Query status of all alarms (active and inactive) for  
**FULL**                      FIJI card in group x, side y.  
**\*\*\*\*Exit**

- 5    Disable auto-recovery.

**LD 39**  
**ARCV OFF**              Disable auto-recovery operation for ring.

- 6 Switch call processing to ring with active clock.  
**LD 39**  
**SWRG y** Switch call processing to ring ( $y = 0$  or  $1$ ).
  
- 7 Obtain the status of both rings.  
**LD 39**  
**STAT RING x** Get status of ring on side  $x$  ( $x = 0$  or  $1$ ).
  
- 8 Disable the idle ring.  
**LD 39**  
**DIS RING x** Disable all FIJI cards on ring ( $x = 0$  or  $1$ ).
  
- 9 Confirm the ring is disabled.  
**LD 39**  
**STAT RING x** Disable all FIJI cards on ring ( $x = 0$  or  $1$ ).
  
- 10 Set the ENB/DIS switch to DIS on the target FIJI card.

**CAUTION — Service Interruption**

To avoid interrupting service, set ENB/DIS switches to DIS before disconnecting or connecting cables.

- 11 Tag and disconnect cables to the card being removed.
- 12 Unhook the locking devices on the card.
- 13 Pull the card out of the card cage.

Follow the steps in Procedure 5 to install the FIJI card.

**Procedure 5**  
**Installing the FIJI card**

- 1    Set the ENB/DIS switch to DIS on the replacement FIJI card.
- 2    Insert the replacement FIJI card into the vacated slot.
- 3    Hook the locking devices.
- 4    Connect cables to the replacement FIJI card.
- 5    Set the ENB/DIS switch to ENB on the replacement FIJI card.

**Note:** Wait until the FIJI finishes the Self Test before proceeding. When the display indicates the Group and Shelf where the FIJI card is located, the self test is completed.

- 6    Software enable the ring.

**LD 39**

**ENL RING x**      Enable all FIJI cards on ring (x = 0 or 1).

- 7    Confirm the ring is enabled.

**LD 39**

**STAT RING x**      Get status of ring on side x (x = 0 or 1).

- 8    Test the replacement FIJI card.

**TEST 360 x y z**    Perform 360 test on FIJI card group (x = group 0 to 7, y = side 0 or 1, z = time in 2 second intervals. Repeat this test on the next FIJI card in the ring for a complete test.

- 9    Reset the threshold for switchover functionality.

**LD 39**

**RESET**              Reset the threshold for switchover functionality.

- 10 Restore the ring.

**LD 39**

**RSTR**

Restore ring.

- 11 Enable auto-recovery.

**LD 39**

**ARCV ON**

Enable auto-recovery operation for ring.

- 12 Confirm ring is enabled and in Half/Half state.

**LD 39**

**STAT RING x**

**\*\*\*\*Exit**

Get status of ring (x = 0 or 1).

- 13 Verify status of system clocks.

**LD 60**

**SSCK x**

**\*\*\*\*Exit**

Get status of system clock, where x = 0 or 1.

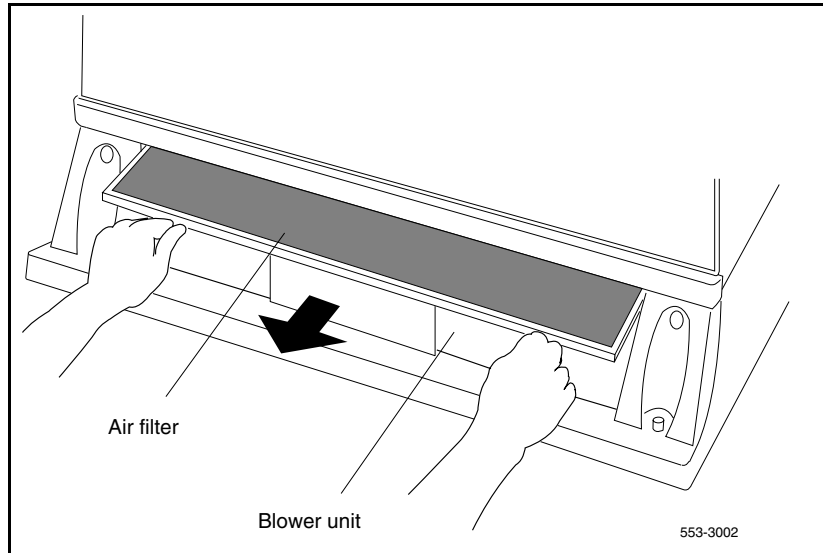
## P0699798 Air Filter

Use this procedure to replace the air filter in the pedestal.

**Note:** You do not need to power down the system to perform this procedure.

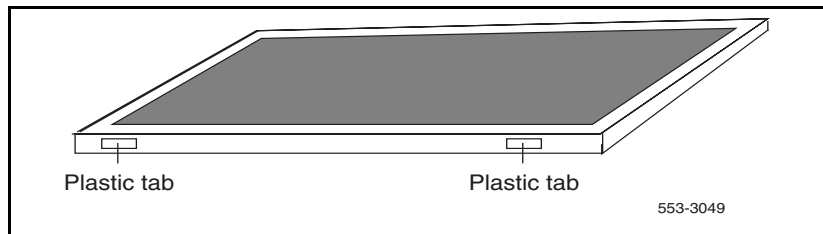
- 1 Remove the pedestal front grill and set it aside. The air filter is directly above the blower unit in a slot in the pedestal (see Figure 54).
- 2 Grasp the plastic tabs on the front of the air filter. Pull the filter out of the pedestal.
- 3 To install a clean, dry air filter:

**Figure 54**  
**Blower unit and air filter in the front of the pedestal**



- a. Make sure the plastic tabs will be on the front of the filter (see Figure 55).
- b. Gently push the filter into the pedestal slot until it seats fully in the back.

**Figure 55**  
**Pull-tab locations on the air filter**



- 4 To reinstall the pedestal grill:



- a. Fit the bottom of the grill into the holes on the bottom edge of the pedestal.
- b. Push the grill into a locked position against the pedestal.
- c. If there are captive screws on the grill, tighten the screws.

## QPC43 Peripheral Signaling Card

Use this procedure to replace a peripheral signaling card.

See *Software Input/Output: Administration* (553-3001-311) for a description of all maintenance commands, and *Software Input/Output: System Messages* (553-3001-411) for interpreting system messages.



### **DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.



### **CAUTION**

#### **Service Interruption**

Disabling or removing a peripheral signaling card from a network shelf disables all loops on that shelf.

## Removing equipment

- 1 Check the status of the peripheral signaling card:

**LD 32**

**STAT PER x**

Table 22 on page 339 lists peripheral signaling card numbers specified by “x”

- a. If the response is **DSBL**, go to See “Set the ENB/DIS switch to DIS.” on [page 338](#)..
- b. If the response is **ENBL**, enter **DSPS x** to disable the card, then go to step 2 on [page 338](#).

- 2    Set the ENB/DIS switch to DIS.
- 3    Unhook the locking devices on the card; pull it out of the card cage.

### Installing equipment

- 1    Set the ENB/DIS switch to DIS on the replacement card.
- 2    Set the jumper plug on the replacement card the same as on the card you removed. If there is a vintage change, be sure to check *Circuit Card: Description and Installation* (553-3001-211) for any differences.
- 3    Insert the replacement card into the vacated slot and hook the locking devices.
- 4    Set the ENB/DIS switch to ENB on the replacement card.
- 5    Software enable the card and loops serviced by the card:

#### ENPS x

- a.   When the process is complete, you will receive a system response.
- b.   If there is a problem, an NPR system message is generated and the red LED lights on the faceplate of the card.
- c.   If there is no problem, exit LD 32:

\*\*\*\*

- 6    Test each loop serviced by the peripheral signaling card:

#### LD 30

**LOOP loop**        “loop” is a loop number (see Table 22 on  
page 339)

\*\*\*\*                exit LD 30

- 7 Tag defective equipment with a description of the problem and package it for return to a repair center.

**Table 22**  
**Peripheral signaling card numbers**

Group/ shelf	Peripheral signaling card	Loops disabled/enabled		
0 / 0	0	0	—	15
0 / 1	1	16	—	31
1 / 0	2	32	—	47
1 / 1	3	48	—	63
2 / 0	4	64	—	79
2 / 1	5	80	—	95
3 / 0	6	96	—	111
3 / 1	7	112	—	127
4 / 0	8	128	—	143
4 / 1	9	144	—	159
5 / 0	10	160	—	175
5 / 1	11	176	—	191
6 / 0	12	192	—	207
6 / 1	13	208	—	223
7 / 0	14	224	—	239
7 / 1	15	240	—	255

## QPC441 Three-Port Extender Card

Use this procedure to replace a three-port extender (3PE) card. To software disable the 3PE card:

- You must disable the associated NT6D65 Core to Network Interface (CNI) Card. Go to step 1 on [page 340](#).

**Note 1:** In any Network Module, before you hardware disable the 3PE card you must software disable the QPC43 Peripheral Signaling Card, the QPC412 Intergroup Switch (IGS) Card, and any serial data interface (SDI) cards in the card cage.

**Note 2:** If you are replacing the 3PE card in the Core/Network, before you hardware disable the 3PE card you must software disable the QPC471 or QPC775 Clock Controller Card on the same CPU. Make sure the replacement card is QPC441 vintage F or later.

See *Software Input/Output: Administration* (553-3001-311) for a description of all maintenance commands, and *Software Input/Output: System Messages* (553-3001-411) for interpreting system messages.



**DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.



**CAUTION**

**Service Interruption**

At some point in this procedure the system may initialize, causing a momentary interruption in call processing.

**Removing equipment**

- 1 Software disable the 3PE. The CPU associated with the CNI card must be inactive:
  - a. Check the status of all configured CNI cards and the network group number of both ports on each CNI card:

**STAT CNI**

- 2 The CPU associated with the CNI card must become inactive. If you need to switch CPUs:

**LD 135**  
**SCPU**

- 3 Disable the CNI port associated with the 3PE card:

**DIS CNI c s p** “c” is the CPU (0 or 1), “s” is the card slot  
(8–12), “p” is the port (0 or 1)  
\*\*\*\* exit LD 135

- 4 If the 3PE card is in the Core/Network Module, you must disable the clock controller card in that module. Check the status of the clock:

**LD 60**  
**SSCK x** “x” is the CPU (0 or 1)

- 5 If the clock is active, switch the clock to make it inactive:

**SWCK**

- 6 Disable the clock:

**DIS CC x**  
\*\*\*\* exit LD 60

Go to step 9 on [page 343](#).

- 4 Software disable the associated peripheral signaling card:

**LD 32**  
**DSPS x** Table 23 on page 342 lists peripheral signaling card  
numbers specified by “x”  
\*\*\*\* exit LD 32

**Table 23**  
**Peripheral signaling card numbers**

Group/ shelf	Peripheral signaling card	Loops disabled/enabled		
0 / 0	0	0	—	15
0 / 1	1	16	—	31
1 / 0	2	32	—	47
1 / 1	3	48	—	63
2 / 0	4	64	—	79
2 / 1	5	80	—	95
3 / 0	6	96	—	111
3 / 1	7	112	—	127
4 / 0	8	128	—	143
4 / 1	9	144	—	159
5 / 0	10	160	—	175
5 / 1	11	176	—	191
6 / 0	12	192	—	207
6 / 1	13	208	—	223
7 / 0	14	224	—	239
7 / 1	15	240	—	255

- 7 Software disable each port on any associated SDI cards:

**LD 37**

**DIS TTY x** “x” is the number of the interface device attached to a port  
 \*\*\*\* exit LD 37



**CAUTION**

**Loss of Data**

If the system terminal is assigned to an SDI port that will be disabled, assign it to another port before the SDI is disabled.

- 8 Software disable the associated IGS cards:

**LD 39**

**DIS IGS x** “x” is the IGS card number—0 to 19  
 \*\*\*\* exit LD 39

You will see **ISR043** on the system terminal when the card is disabled. Busy channels will not be disabled until the call is disconnected.

- 9 Set the ENB/DIS switch on the 3PE to DIS.
- 10 Tag and disconnect cables to the 3PE.
- 11 Unhook the locking devices on the card; pull it out of the card cage.

### Installing equipment

- 1 Set the ENB/DIS switch to DIS on the replacement 3PE card.
- 2 Set option switches on the replacement card the same as on the card you removed. If there is a vintage change, be sure to check *Circuit Card: Description and Installation* (553-3001-211) for any differences.
- 3 Insert the replacement card into the vacated slot and hook the locking devices.
- 4 Connect cables to the replacement card.
- 5 Set the ENB/DIS switch to ENB on the replacement card.
- 6 Enable cards.

Enable and test the CNI and 3PE cards:

#### **LD 135**

**ENL CNI c s p** CPU (0 or 1). Slot 12, port 0.  
 \*\*\*\* exit LD 135

If the LED on the 3PE card turns off, go to step 7 on [page 343](#). If the LED stays lit, press the Man Int button to initialize the system.

If the 3PE card is in the Core/Network, enable the clock controller card:

#### **LD 60**

**ENL CC x**  
 \*\*\*\* exit LD 60

If there is a problem, a CED or CCED system message is generated and the red LED lights on the faceplate of the appropriate card.

- 7 Check to see that all cards were enabled.

- 8 Check the status of the IGS card:  
**LD 39**  
**STAT IGS x**      “x” is the IGS card number—0 to 19
- 9 If the card is still disabled, enable it:  
**ENL IGS xx**  
**\*\*\*\***                      exit LD 39
- 10 Check the status of SDI ports:  
**LD 37**  
**STAT**
- 11 If any port still disabled, enable it:  
**ENL TTY x**  
**\*\*\*\***                      exit LD 37
- 12 Check the status of the peripheral signaling card:  
**LD 32**  
**STAT PER x**      Table 23 on page 342 lists peripheral signaling card numbers
- 13 If the card is still disabled, enable it:  
**ENPS x**  
**\*\*\*\***                      exit LD 32
- 14 Tag defective equipment with a description of the problem and package it for return to a repair center.

## QPC471, QPC775 Clock Controller Card

Use this procedure to replace a clock controller (CC) card.

**Note:** The QPC775 Clock Controller is used in Canadian and International applications. QPC775 and QPC471 cards cannot be combined in one system.



See *ISDN Basic Rate Interface: Maintenance* (553-3001-518) for a description of all maintenance commands, and *Software Input/Output: System Messages* (553-3001-411) for interpreting system messages.



### **DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

## **Removing equipment**

- 1 The clock controller card must be on the inactive CPU. If you need to switch the active CPU:

**LD 135**

**SCPU**

\*\*\*\*

- 2 Disable the clock controller card:

- The card you are removing must be inactive:

**LD 60**

- In a single-CPU system:

Disable the clock controller card.

**DIS CC x**      “x” is the card number—0 or 1

- In a dual-CPU system:

Check the status of the clock controller card you are removing.

**SSCK x**      “x” is the card number—0 or 1

If the clock is active, switch clocks.

**SWCK**      switch system clock from active to standby

Make sure the card you are removing is disabled and the other clock controller card is active and in free run mode.

**SSCK x**

**TRCK FRUN**

Disable the clock controller card you are removing.

**DIS CC x**      “x” is the card number—0 or 1

- 3 Set the ENB/DIS switch to DIS on the card you are removing.



**CAUTION**

**Service Interruption**

To avoid interrupting service, set ENB/DIS switches to DIS before disconnecting or connecting cables.

- 4 Tag and disconnect cables to the card you are removing.
- 5 Unhook the locking devices on the card; pull it out of the card cage.

**Installing equipment**

- 1 Set the ENB/DIS switch to DIS on the replacement card.
- 2 Set option switches on the replacement card. If there is a vintage change, be sure to check *Circuit Card: Description and Installation* (553-3001-211) for any differences.
- 3 Insert the replacement card into the vacated slot and hook the locking devices.
- 4 Connect cables to the replacement card.
- 5 Set the ENB/DIS switch to ENB on the replacement card.
- 6 Software enable the card:

**ENL CC x**

**Note:** With a vintage H clock controller card, do not issue the tracking (TRCK) or status (SSCK) commands at this time. If you do issue these commands, the system may respond with an inaccurate error condition.

- In a single-CPU system, complete the replacement procedure by exiting LD 60:

\*\*\*\*

- In a dual-CPU system proceed with the following steps.

- 7 Switch CPUs:

**LD 135**

**SCPU**

\*\*\*\*

- 8 Activate the newly installed card and verify that it is active:

**LD 60**  
**SWCK**  
**SSCK x**

- 9 If applicable, issue a tracking command:

**TRCK aaa**      “aaa” is PCK for track primary clock, SCLK for track secondary clock, or FRUN for free run mode

**Note:** Set the clock source to the status it was in before the replacement procedure.

- 10 Verify clock switch-over and tracking:

**SWCK**  
**SSCK x**  
\*\*\*\*                      exit LD 60

- 11 Tag defective equipment with a description of the problem and package it for return to a repair center.

## QPC477 Bus Terminating Unit

Use this procedure to replace a bus terminating unit (BTU).

**Note:** Check the codes on all replacement BTUs.

QPC477-A10 and QPC477-B10 BTUs are interchangeable in NT8D35 Network Modules.



**DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

- 1 Turn off power to the module:
  - With AC power, set the circuit breaker on the Module Power Distribution Unit (MPDU) to OFF (down).
  - With DC power, set the switch on the power supply to OFF (down).

- 2 Remove enough cards on both sides of the BTU to access the unit.

See *Circuit Card: Description and Installation* (553-3001-211) for BTU slot locations.

- 3 Gently pull the BTU out of the card cage.
- 4 Insert the replacement BTU into the vacated slot.
- 5 Reinstall the cards on both sides of the BTU.
- 6 Turn on power to the module:
  - With AC power, set the MPDU circuit breaker to ON (up).
  - With DC power, set the power supply switch to ON (up).

**Note:** As necessary, software reenable cards in the module. See the appropriate replacement procedures in this document.

- 7 Tag defective equipment with a description of the problem and package it for return to a repair center.

## QPC659 Dual Loop Peripheral Buffer Card

Use this procedure to replace a dual loop peripheral buffer (DLB) card.

See *Software Input/Output: Administration* (553-3001-311) for a description of all maintenance commands, and *Software Input/Output: System Messages* (553-3001-411) for interpreting system messages.

**DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

**CAUTION****Service Interruption**

Service is interrupted when a loop is disabled.

**Removing equipment**

- 1 Software disable the dual loop peripheral buffer:  
**LD 32**  
**DISS l s**                    “l s” are the loop and shelf numbers
- 2 Set the ENB/DIS switch to DIS.
- 3 Tag and disconnect cables to the card you are removing.
- 4 Unhook the locking devices on the card; pull it out of the card cage.

**Installing equipment**

- 1 Set the ENB/DIS switch to DIS on the replacement card.
- 2 Set option switches on the replacement card the same as on the card you removed. If there is a vintage change, be sure to check *Circuit Card: Description and Installation* (553-3001-211) for any differences.
- 3 Insert the replacement card into the vacated slot and hook the locking devices.
- 4 Connect cables to the replacement card.
- 5 Set the ENB/DIS switch to ENB on the replacement card.

- 6 Software enable the replacement card by enabling the shelf:

**ENLS 1 s**

- When the process is complete, you will receive a system response.
- If there is no problem, exit LD 32:

\*\*\*\*

- 7 Test each shelf:

**LD 30**

**SHLF 1 s**

- If there is a problem, an NWS system message is generated and the appropriate red LED lights on the faceplate of the card.
- If there is no problem, exit LD 30:

\*\*\*\*

- 8 Tag defective equipment with a description of the problem and package it for return to a repair center.

## QPC841 Serial Data Interface Card

Use this procedure to replace a serial data interface (SDI) card.

See *Software Input/Output: Administration* (553-3001-311) for a description of all maintenance commands, and the *Software Input/Output: System Messages* (553-3001-411) for interpreting system messages.



**DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

**CAUTION****Loss of Data**

If the system terminal is assigned to the SDI being replaced, assign it to another port before this SDI is disabled.

**Removing equipment**

- 1 Software disable each port on the SDI:

**LD 37**

**DIS TTY x** “x” is the number of the interface device attached to a port

- 2 Set the ENB/DIS switch to DIS.

**CAUTION****Service Interruption**

To avoid interrupting service, set ENB/DIS switches to DIS before disconnecting or connecting cables.

- 3 Tag and disconnect cables to the card you are removing.
- 4 Unhook the locking devices on the card; pull it out of the card cage.

**Installing equipment**

- 1 Set the ENB/DIS switch to DIS on the replacement card.
- 2 Set option switches on the replacement card the same as on the card you removed. If there is a vintage change, be sure to check *Circuit Card: Description and Installation* (553-3001-211) for any differences.
- 3 Insert the replacement card into the vacated slot and hook the locking devices.
- 4 Connect cables to the replacement card.
- 5 Set the ENB/DIS switch to ENB on the replacement card.

- 6 Software enable each port on the card:

**ENL TTY x**

- When the process is complete, you will receive a system response.
- If there is a problem, an IOD system message is generated and the red LED lights on the faceplate of the card.
- If there is no problem, exit LD 37:

\*\*\*\*

- 7 Tag defective equipment with a description of the problem and package it for return to a repair center.

## Replacing an NT7D10 PDU with an NT7D67CB PDU

Use this procedure to replace an NT7D10 PDU with an NT7D67CB PDU in DC-powered systems.

**Note 1:** The NT7D67CB PDU replaces the NT7D10 PDU. However, both PDUs can be used in a system.

**Note 2:** Conduit is not required with the NT7D67CB PDU but can be used.

Before you begin this procedure, prepare for the installation:

- Additional wire may be required (see step 1 on [page 353](#)).
- An electric drill, fitted with a .234-in. metal bit must be available.
- A Rear Mount Conduit Kit (NT7D0902) must be available



**DANGER**

Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.



## Removing equipment

- 1 Check the length of existing wire to the PDU. Due to the location of the field wiring terminal block on the NT7D67CB PDU, 6 to 9 inches more length is required to reach its terminals than is required to reach those on the NT7D10 PDU.

**Note 1:** The existing service loop where wire enters the pedestal may have enough excess length or enough slack wire may exist in the conduit path from the power plant to allow pulling a sufficient amount through to the pedestal. Figure 59, located further on in this procedure, shows the location on the NT7D67CB PDU to which wiring must extend. If existing wiring will not reach, replace the entire wire run from the power plant. Do *not* splice short pieces of wire onto the end of existing wiring.

**Note 2:** If a QCAD321 or an NT6D53 junction box is installed on the power feed to the console, the wiring from the power plant may have to be altered as follows:

- If five #4 AWG wires are run from the power plant to the junction box (two BAT, two RTN, and one LRTN), then the junction box must *not* be used. The junction box must be removed and the entire wire run from the power plant to the pedestal must be replaced. Do *not* splice short pieces of wire onto the end of existing wiring.
- If nine #4 AWG wires are run from the power plant to the junction box (four BAT, four RTN, and one LRTN), then the junction box can be used. However, the #10 AWG wires from the junction box to the pedestal may have to be replaced to provide sufficient length. Do *not* splice short pieces of wire onto the end of existing wiring.

- 2 Disconnect DC power at the source (not at the PDU).

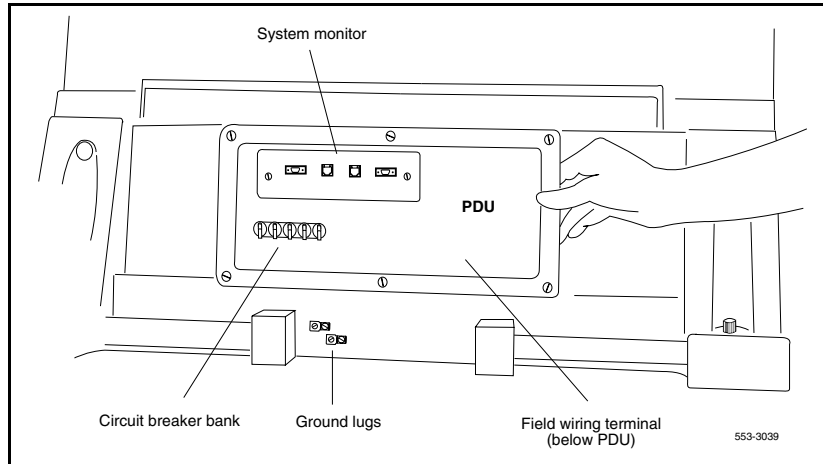


### **DANGER**

Before performing these procedures, disconnect the power at the source; simply turning off the circuit breakers does not shut off power to the system monitor.

- 3 Remove the grill on the rear of the pedestal.
- 4 Set all five circuit breakers on the PDU to OFF (down). Figure 56 shows the NT7D10 PDU in the rear of the pedestal.
- 5 Unseat the blower unit in the front of the pedestal:

**Figure 56**  
**NT7D10 Power Distribution Unit DC**



- a. Remove the grill on the front of the pedestal. Set the toggle switch on the front of the unit to OFF (left).
- b. Turn the screws on the front of the unit counterclockwise and pull the unit out several inches so the connector on the rear disengages.



**DANGER**

The unit is heavy and the blades on the blower may still be rotating up to two minutes after the power is turned off.

- 6 Disconnect cables to the module above the pedestal (module 0):
  - a. Remove the rear cover on the module.
  - b. Remove the I/O safety panel over the backplane in the module.

- c. Disconnect the system monitor ribbon cable from the PDU and from the module and set it aside for reconnection with the replacement NT7D67CB PDU.
- d. Disconnect the large orange power connector (J1) from the PDU.

**Note:** To disconnect the power plug, you must press a latch trip on the front and rear of the plug. You may need to use a screwdriver blade against the latch trip on the front of the plug.


- 7 Tag and disconnect cables to the NT8D22 System Monitor card. Loosen the two screws on the card faceplate and remove it.
- 8 Remove the six screws that position the NT7D10 PDU. Carefully pull the unit straight out and set it on the floor next to the pedestal (see Figure 57)

**CAUTION****Damage to Equipment**

The PDU cannot be completely removed from the pedestal until wires to the field wiring terminal block are disconnected. Label wires carefully. Improper wiring can cause system damage.

- 9 Tag and then disconnect all wiring to the field wiring terminal block.
- 10 Locate the frame ground wire from the field wiring terminal block to the frame ground bolt inside the pedestal. Disconnect this wire at the ground bolt.
- 11 Remove the field wiring terminal block:
  - a. Remove the cover over the terminal block.
  - b. Remove the four screws that secure the terminal block and lift it out of the pedestal.
- 12 Move the NT7D10 PDU out of the work area.

Installing equipment



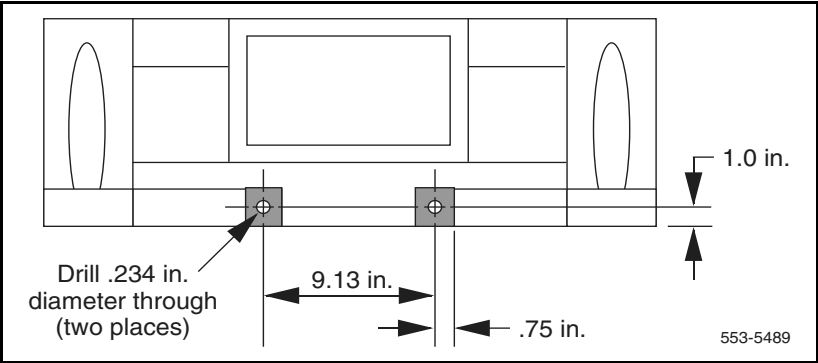
**DANGER**

The NT7D67CB PDU is much heavier than the NT7D10 PDU.

**Note:** The conduit attachment plate provided in the NT7D0902 Rear Mount Conduit Kit must be installed as a safety cover and to restrain wiring to the terminal block.

- 1    Drill two .234-in. screw holes in the rear of the pedestal (see Figure 57). The holes will be used to install the conduit attachment plate.

**Figure 57**  
**Dimensions for drilling holes on the pedestal**

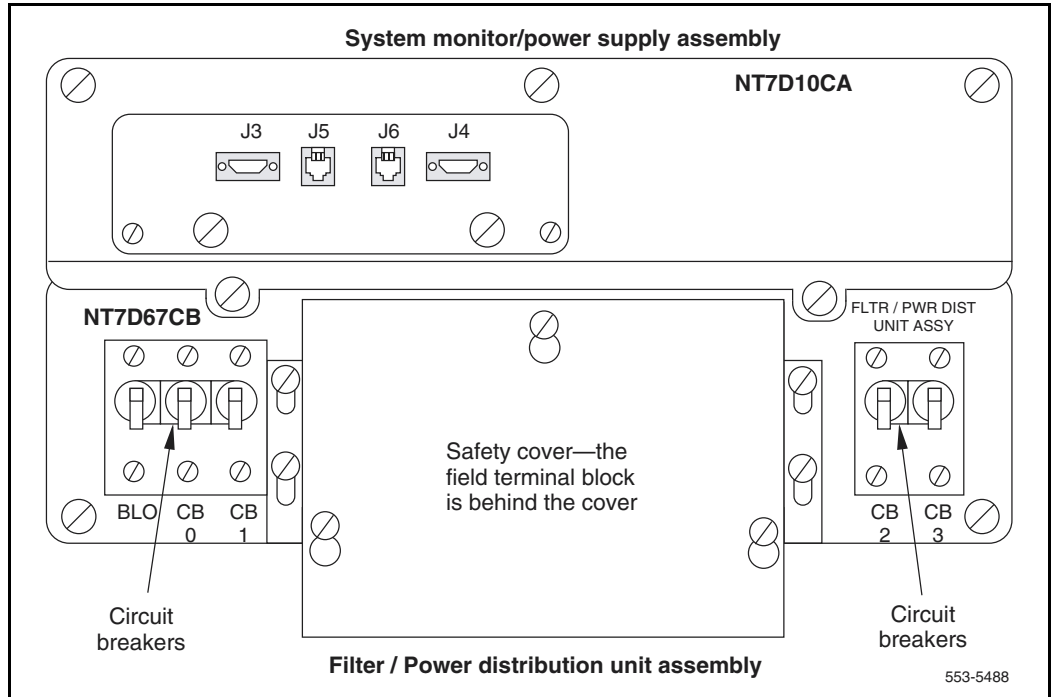


- 2    Place the NT7D67CB PDU next to the pedestal.

Figure 58 shows the PDU (labeled FLTR/PWR DIST UNIT ASSY on the equipment) and the NT7D10CA System Monitor/Power Supply Assembly (labeled XSM/PWR SUPPLY ASSY on the equipment).

**Note:** The NT7D09CA Pedestal has a brace that supports a leveling bracket on the rear of the PDU. There is no room for the leveling bracket in the NT7D09AA Pedestal, so the bracket must be removed before the PDU is installed.

**Figure 58**  
**NT7D67CB Power Distribution Unit DC**



- 3 Remove the two screws that secure the leveling bracket on the rear of the PDU. Reinstall the screws to hold the rear cover on the PDU in place.



### **DANGER**

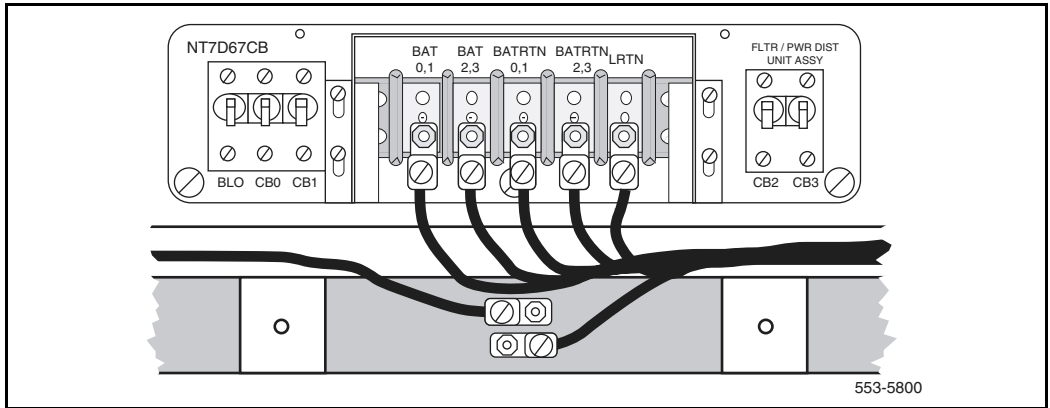
You should support the PDU as far into the pedestal as you can without letting it drop to the bottom of the pedestal, but watch your hands! It becomes more difficult to support the PDU the further into the pedestal it is inserted. The PDU is held in its proper position only when the mounting screws on its faceplate are tightened.

- 4 Install the NT7D67CB PDU:

- a.** Connect the green frame ground wire from the PDU to the frame ground bolt inside the pedestal.
  - b.** Guide the power cable connector through the hole in the top of the pedestal. Set the PDU in the pedestal and tighten the three screws that secure it to the pedestal.
- 5** Install the NT7D10CA system monitor assembly:
  - a.** Connect the small orange connectors (J2 on the PDU, P2 on the system monitor assembly) on the left side of the PDU.
  - b.** Connect the flat white connector to the small circuit board (P1 on the PDU, J1 on the system monitor assembly) on the right side of the PDU.
  - c.** Connect the ribbon cable (set aside when the NT7D10 PDU was removed) to the system monitor (J2). Guide the connector on the other end of the cable through the hole in the top of the pedestal and connect it to module 0.
  - d.** Gently push the system monitor assembly into the pedestal.
- 6** Tighten the screws that secure the system monitor assembly.
- 7** Reconnect the cables from module 0:
  - a.** Reconnect the large orange power connector (J1).
  - b.** Replace the I/O safety panel.
  - c.** Replace the rear cover on the module.
- 8** Reconnect all external wiring to the terminal block on the PDU (see Figure 59):
  - a.** Remove the plastic safety cover over the terminal block.
  - b.** Connect the red BAT (–48 V) wires:
    - for modules 0 and 1 connect to the BAT 0,1 terminal
    - for modules 2 and 3 connect to the BAT 2,3 terminal
  - c.** Connect the black BATRTN (48 V return) wires:

- for modules 0 and 1 connect to the BATRTN 0,1 terminal
  - for modules 2 and 3 connect to the BATRTN 2,3 terminal
- d. Connect the orange (or white) wire from the ground bus/LRE in the power plant to the LRTN terminal.

**Figure 59**  
**Field wiring terminals in the NT7D67CB PDU**



- 9 Position the conduit attachment plate on the rear of the pedestal (over the newly drilled holes) and secure it with two screws, nuts, and washers.
- 10 Reinstall the plastic safety cover over the terminal block.
- 11 Reseat the blower unit:
  - a. Lift the unit slightly and slide it into the pedestal glides. Set the toggle switch to ON (right).
  - b. Tighten the screws on the front of the unit.
  - c. Replace the front pedestal grill.
- 12 Insert the system monitor card. Tighten the screws on the card faceplate. Reconnect cables to the system monitor.
- 13 Set all five circuit breakers on the PDU to OFF (down). Reconnect the source of DC power.

- 14 One at a time, starting with the breaker for the blower unit, set the circuit breakers on the PDU to ON (up). Make sure the green LED lights on the power supply unit(s) in each module.

**Note:** On initial power up the blower may rotate slower than expected. As the sensor detects heat, the blower will rotate more rapidly.

- 15 Replace the rear pedestal grill.
- 16 Tag defective equipment with a description of the problem and package it for return to a repair center.



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## Technical assistance service

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Customer Technical Support (CTS) mission is to resolve Nortel Networks Product defects. CTS will provide technical assistance for systems experiencing problems, even if it has been determined that the problem is not a product defect. However, CTS will charge the distributor for the support of non-defect related problems as described in this document. CTS requires an open Purchase Order number on file. Otherwise, the purchase number is required at the time of call generation.

***Note:*** Based on warranty billing programs within the North America regions, an invoice may or may not be generated.)

The availability of assistance, both product defect and non-product defect, is prioritized based upon specific priority classifications. These classifications are known as Emergency, Service Affecting, and Non-Service Affecting, and are defined as follows:

- diagnosing and resolving software problems not covered by support documentation
- diagnosing and resolving hardware problems not covered by support documentation
- assisting in diagnosing and resolving problems caused by local conditions

Technical assistants receive three types of service requests:

- Emergency requests receive an immediate response; see Table 24 on page 363. Service for emergency requests is continuous until normal system operation is restored.

- Descriptions of Service-Affecting requests are listed in Table 25 on page 362. Equipment for which these requests are intended are operable but are missing critical functionality.
- Non-Service Affecting requests, also shown in Table 25, list customer-manageable problems or problems that could be resolved at the distributor level.

Except as excluded by the provisions of warranty or other agreements with Nortel Networks, a fee for technical assistance may be charged, at rates established by Nortel Networks. Information on rates and conditions for services are available through Nortel Networks representatives.

Collect the information listed in Table 26 on page 362 before you call for service

**Table 25**  
**Service affecting and non-service affecting systems**

<p><b>Service Affecting:</b> system is operational, but critical functionality is being impacted.</p> <p>Customer's key business elements are functioning, but severe impact to the operation is occurring. This classification reflects the customer's needs and is set by the COAMS or distributor's authorized caller at the time the CSR is opened.</p>
<p><b>Non Service Affecting:</b> Problems experienced have no, or isolated affect on majority of users.</p> <p>Customer's key business elements are functioning without impact. Some isolated service impact is noticed by some system end users. This classification also reflects the customer's needs and is set by the COAMS or distributor's authorized caller at the time the CSR is opened.</p> <ul style="list-style-type: none"> <li>• CTS will provide assistance for emergency problems 24 hours a day, 7 days a week.</li> <li>• CTS will provide assistance for service-affecting and non-service affecting problems only during regular business hours.</li> </ul>

**Table 26**  
**Checklist for service requests**

Name of person requesting service _____ Company represented _____
--

**Table 26**  
**Checklist for service requests**

Telephone number	_____
System option number/identification	_____
System serial number	_____
Installed software generic and issue (located on data disk)	_____
Modem telephone number and password (if applicable)	_____
Request classification (see Tables 24 and 25)	_____
Description of assistance required	_____

**Table 24**  
**Emergency requests to CTS**

<p><b>Emergency</b> - System is down or, essentially, is operable. Restoration of basic functionality to pre-incident condition is a top priority. Support is offered 24 hour, 7 days a week. response is within 30 minutes and resolution continues until emergency condition is cleared. applies to full commissioned, functioning switches and any of the following:</p> <ul style="list-style-type: none"> <li>• System ceased call processing</li> <li>• System degradation such that 10% or 100 or more voice or data lines are not processing calls</li> <li>• Loss of auxiliary processor (Meridian MAX, Meridian MAIL, Meridian CCR, Meridian LINK, Symposium CCS)</li> <li>• Stand-by CPU out of service</li> <li>• Two or more system-initiated sysloads per day</li> <li>• Two or more system initiated initializations per day</li> <li>• Tape or disk drive failure</li> <li>• Potential system degradation or outage</li> <li>• Loss of critical trunk group</li> <li>• Slow dial tone (8 seconds or more)</li> <li>• Customer declares critical functionality - see Raised Priority in this section</li> </ul>
--

For non-product defect problems, such as a customer manageable problem or a problem that could be resolved at the distributor level, CTS may charge for the service provided. Charges for these Services may be found in the Nortel Product Catalog/Price Manual under Technical Support.

CTS will make every attempt to work with the distributor to understand the impact of a service problem to the End Customer's business. When contacting CTS, distributors are requested to verify the priority classification at the time the customer service report is opened. This will assist CTS in prioritizing calls within the Service Affecting and Non-Service Affecting categories.

### **Raised priority**

Nortel recognizes that non-emergency service requests may be of high impact and be critical to a customer's business. The authorized caller should identify the critical business impact or time sensitive nature of an incident directly to the engineer at the time the customer service request is opened or anytime thereafter to raise the priority. Specific agreements or expectations pertaining to this incident should be reached at this time. Under these circumstances, the problem may be raised to an Emergency priority and treated as such. For these customer critical situations, the following will apply:

- Emergencies by definition will take precedence.
- Service Affecting and Non-Service Affecting problems will need the appropriate distributor management approval to proceed with the problem resolution.
- Outside of normal business hours a valid purchase order number will be required prior to proceeding with the problem resolution.
- Refer to the Nortel Networks Product Catalog/Price Manual for CTS charges.

When prioritizing Customer Impact priorities, CTS will always give the highest priority to emergency-based businesses such as hospitals, fire departments, police departments, and rescue squads.

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## List of terms

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**3PE card**

QPC441 Three-Port Extender Card

**BTU**

QPC477 Bus Terminating Unit

**CBT**

Core Bus Terminator

**CE**

Common Equipment

**CE/PE**

Common/Peripheral Equipment

**CMA card**

Changeover and Memory Arbitrator Card

**CMDU card**

Core Multi Disk Unit Card

**Conference/TDS card**

NT8D17 Conference/Tone and Digit Switch Card

**CNI**

Core to Network Interface

**CP**

Call Processor

**CPU**

Central Processing Unit

<b>DLB card</b>	QPC659 Dual Loop Peripheral Buffer Card
<b>DTR card</b>	Digitone Receiver Card
<b>Network/DTR card</b>	NT8D18 Network/Digitone Receiver Card
<b>FDI card</b>	QPC742 Floppy Disk Interface Card
<b>FDU</b>	NT8D68 Floppy Disk Unit
<b>FN card</b>	QPC579 CPU Function Card
<b>IF card</b>	QPC580 CPU Interface Card
<b>IOP</b>	Input/Output Processor
<b>IPE</b>	Intelligent Peripheral Equipment
<b>MDU</b>	NT8D69 Multi Disk Unit
<b>MSI card</b>	QPC742 Mass Storage Interface Card
<b>PE</b>	Peripheral Equipment
<b>PS card</b>	QPC43 Peripheral Signaling Card
<b>ROM cards</b>	Read Only Memory Cards
<b>SBE</b>	QPC215 Segmented Bus Extender Card

**SDI cards**

Serial Data Interface Cards

**UPS**

Uninterruptible Power Supply





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Meridian 1, Succession 1000M

## **Large System**

### **Maintenance**

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