HP 3000 and HP 9000 PA-RISC Computer Systems

# CE Handbook

## Series 9x8LX/RX Family and Model 800 Ex5 Class


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First Edition ..... December 1993

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All ..... December 1993

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This product and related documentation must be reviewed for familiarization with safety markings and instructions before operation. The following figure shows some of the safety symbols used on the product to indicate various safety considerations.

Instruction manual symbol: the product will be marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect the product against damage.

Indicates hazardous voltages.

Indicates earth (ground) terminal (sometimes used in manual to indicate circuit common connected to grounded chassis).

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**Warning**

**The WARNING sign denotes a hazard. It calls attention to a procedure, practice, of the like, which if not done correctly or adhered to, could result in injury. Do not proceed beyond a WARNING sign until the indicated conditions are fully understood and met.**

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**Caution**

The CAUTION sign denotes a hazard. It calls attention to an operating procedure, practice, of the like, which if not done correctly or adhered to, could damage or destroy part or all of the product. Do not proceed beyond a CAUTION sign until the indicated conditions are fully understood and met.

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# Preface

This edition of the *CE Handbook* contains technical information about HP 3000 Series 9x8 Family and HP 9000 Model 800 Ex5 Class Computer Systems.

At the time of publication, this family included the following models:

| HP 3000 | HP 9000 |
|---|---|
| Series 908LX | Model E25 - 2 slot |
| Series 918LX | Model E25 - 4 slot |
| Series 918RX | Model E35 - 2 slot |
| Series 928LX | Model E35 - 4 slot |
| Series 928RX | Model E45 - 2 slot |
| Series 968LX | Model E45 - 4 slot |
| Series 968RX | |
| Series 978RX | |

The HP 3000 Series 9x8LX/RX does not include the older HP 3000 systems, Series 948 and Series 958.

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# Product Information

## General Description

The HP 3000 Series 9x8 Family and HP 9000 Model 800 Ex5 Class computers are shown in Figure 1-1. The systems have two or four I/O slots.

The basic system is made up of a CPU Card, memory, power supply, backplane, Multifunction I/O card, one or more disks, and a removable media device. It can include DDS, CD-ROM, QIC and floppy drives. The electrical and environmental specifications, functional description, and troubleshooting are similar for all models.

HP 3000 9x8LX/RX Family models use the MPE-iX operating system. They are summarized in Table 1-1.

HP 9000 Model 800 Ex5 Class systems use the HP-UX operating system. They are summarized in Table 1-2.

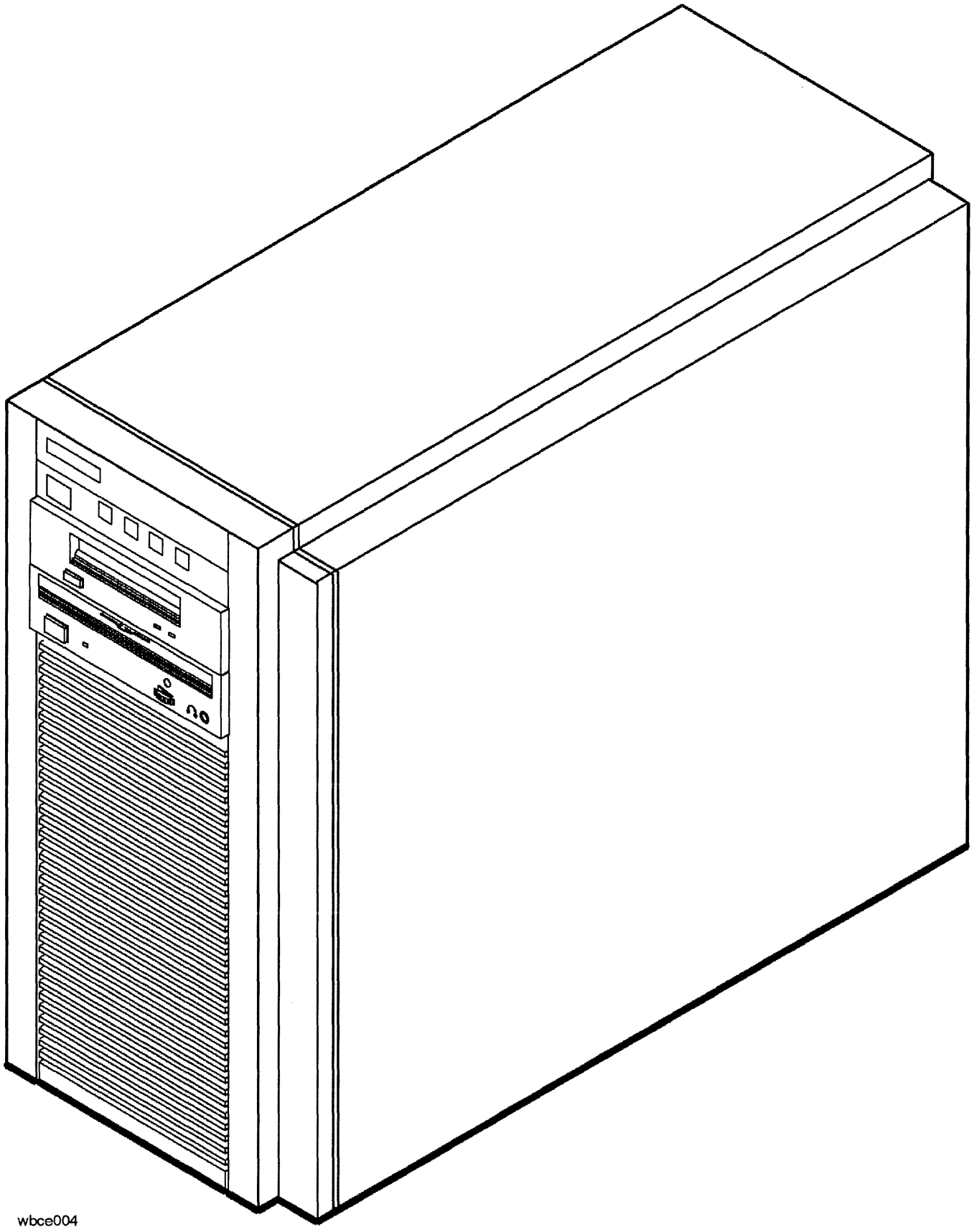



**Figure 1-1. HP 3000 Series 9x8 Family and HP 9000 Model 800 Ex5 Class Systems**

**Table 1-1. HP 3000 System Description**

| | HP 3000 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Series 908LX | Series 918LX | Series 918RX | Series 928LX | Series 928RX | Series 968LX | Series 968RX | Series 978RX |
| CPU Type | PCX-L | | | | | | | |
| Clock Speed | 24 MHz[1] | 34 MHz[1] | 34 MHz[1] | 48 MHz | 48 MHz | 64 MHz | 64 MHz | 80 MHz |
| Floating Point | Integrated | | | | | | | |
| Integrated Cache | 64 KB | 64 KB | 64 KB | 64 KB | 64 KB | 256 KB | 256 KB | 256 KB |
| HP-PB I/O Slots | 2 | 2 | 4 | 2 | 4 | 2 | 4 | 4 |
| Main Memory (minimum) | 32 MB | 32 MB | 32 MB | 32 MB | 32 MB | 64 MB | 64 MB | 64 MB |
| Main Memory (maximum) | 512 MB | 512 MB | 512 MB | 512 MB | 512 MB | 512 MB | 512 MB | 512 MB |
| OS Release (minimum) | 4.0[2] | 4.0[2] | 4.0[2] | 4.0[2] | 4.0[2] | 4.0[2] | 4.0[2] | 4.0[2] |
| Internal 3.5 in. SCSI Disk(s)[3] | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Internal DDS[3] | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| CD-ROM[3] | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |

[1] Reduced with software

[2] With patches

[3] Represents the maximum number of each device that can be installed. The total number of supported internal peripheral devices depends on the types and quantities of internal peripherals installed.

**Table 1-2. HP 9000 System Description**

| | HP 9000 | | | | | |
|---|---|---|---|---|---|---|
| | Model E25 | Model E25 | Model E35 | Model E35 | Model E45 | Model E45 |
| CPU Type | PCX-L | | | | | |
| Clock Speed | 48 MHz | 48 MHz | 64 MHz | 64 MHz | 80 MHz | 80 MHz |
| Floating Point | Integrated | | | | | |
| Integrated Cache | 64 KB | 64 KB | 256 KB | 256 KB | 256 KB | 256 KB |
| HP-PB I/O Slots | 2 | 4 | 2 | 4 | 2 | 4 |
| Main Memory (minimum) | 16 MB | 16 MB | 16 MB | 16 MB | 16 MB | 16 MB |
| Main Memory (maximum) | 512 MB | 512 MB | 512 MB | 512 MB | 512 MB | 512 MB |
| OS Release (minimum) | 9.04 | 9.04 | 9.04 | 9.04 | 9.04 | 9.04 |
| Internal 3.5 in. SCSI Disk(s)[1] | 2 | 2 | 2 | 2 | 2 | 2 |
| Internal DDS[1] | 2 | 2 | 2 | 2 | 2 | 2 |
| CD-ROM[1] | 2 | 2 | 2 | 2 | 2 | 2 |
| QIC Tape Drive[1] | 2 | 2 | 2 | 2 | 2 | 2 |
| 8mm Tape Drive[1] | 2 | 2 | 2 | 2 | 2 | 2 |
| Floppy Disk Drive[1] | 2 | 2 | 2 | 2 | 2 | 2 |

[1] Represents the maximum number of each device that can be installed. The total number of supported internal peripheral devices depends on the types and quantities of internal peripherals installed.

## Major Assemblies

Figure 1-2 and Figure 1-3 show the major assemblies in the chassis. The figures and the list of major assemblies represent a generalized system and do not represent any one system.

The major assemblies are:

- Peripheral Drawer, which contains
  - Removable Media Devices
  - Mass Storage Devices
- Power Supply and Fan
- Multifunction I/O Card (system dependent)
- CPU Card
- Memory SIMMs

The peripheral drawer contains the removable media devices and one to two 3.5-inch disks.

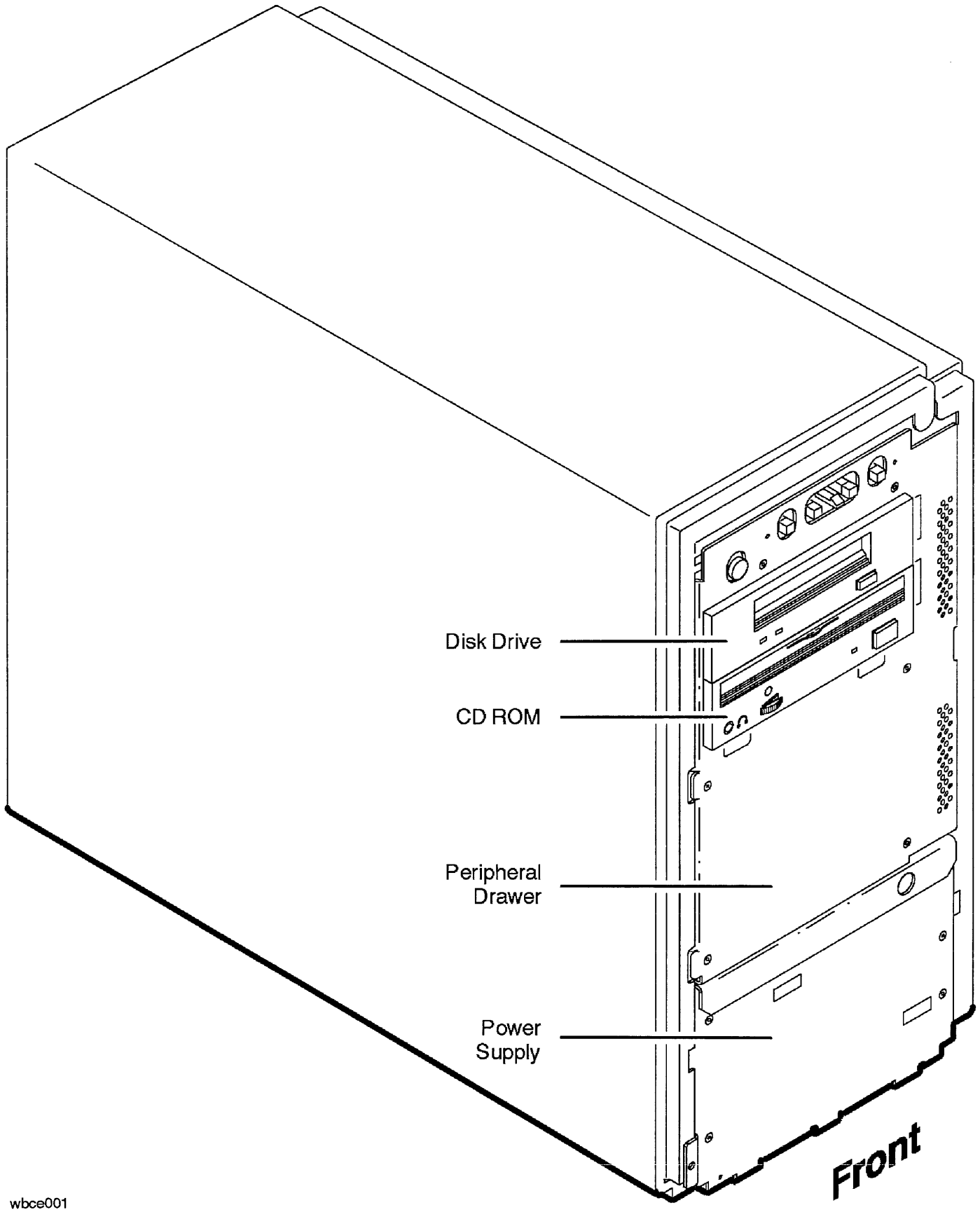



**Figure 1-2. Chassis Major Assemblies - Front**

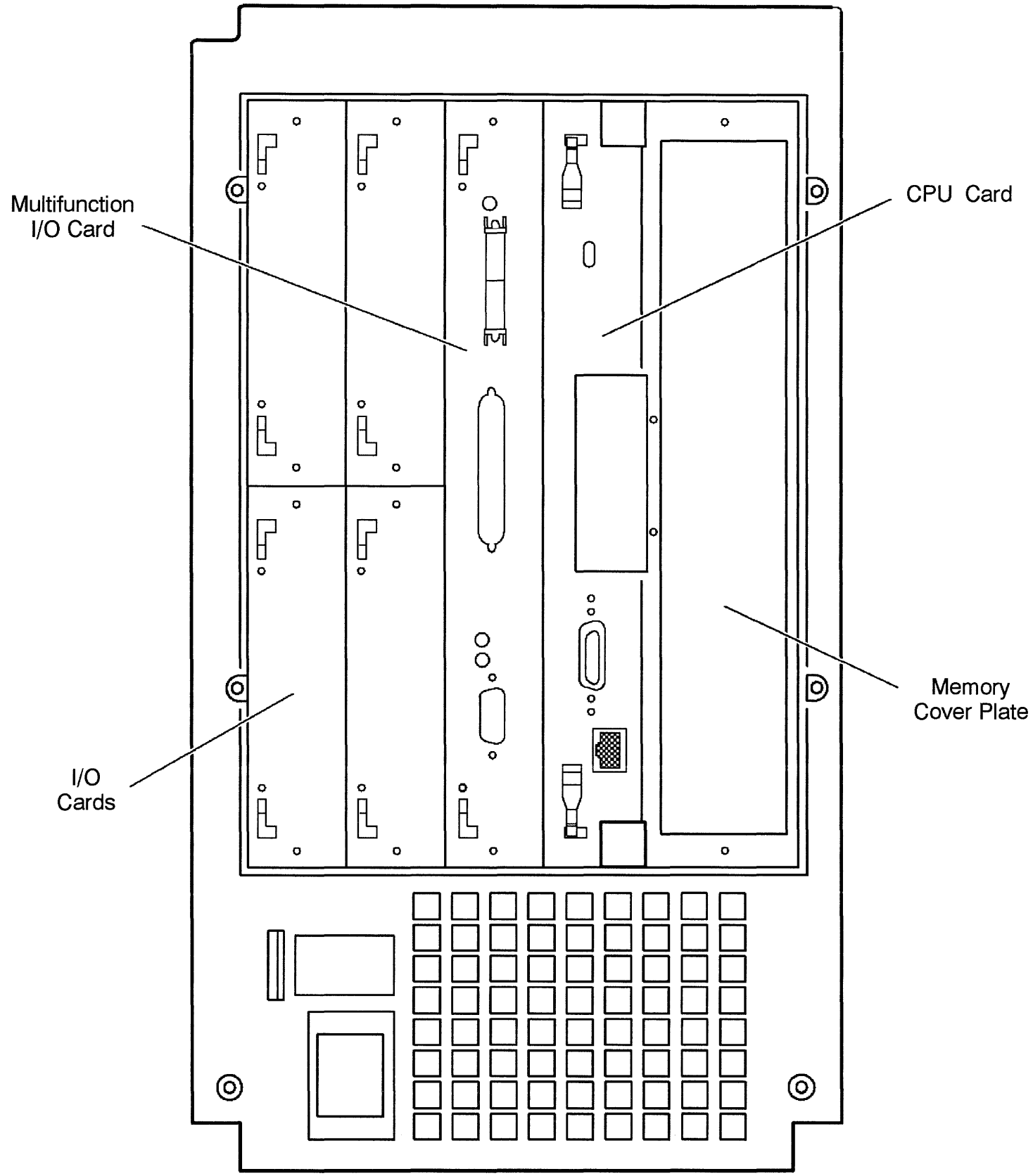



Figure 1-3. Chassis Major Assemblies - Rear

## Multifunction I/O Card Connection

Each of the systems has a special I/O slot reserved for a Multifunction I/O card. The card provides connections for internal and external I/O devices.

The **SCSI/Console/LAN** card, P/N A1703-60003, is used in the HP 3000 systems. See Figure 1-4 and Table 1-3.

The **SCSI/Parallel/APMUX** card, P/N A1703-60022, is used in the HP 9000 systems. See Figure 1-5 and Table 1-4.

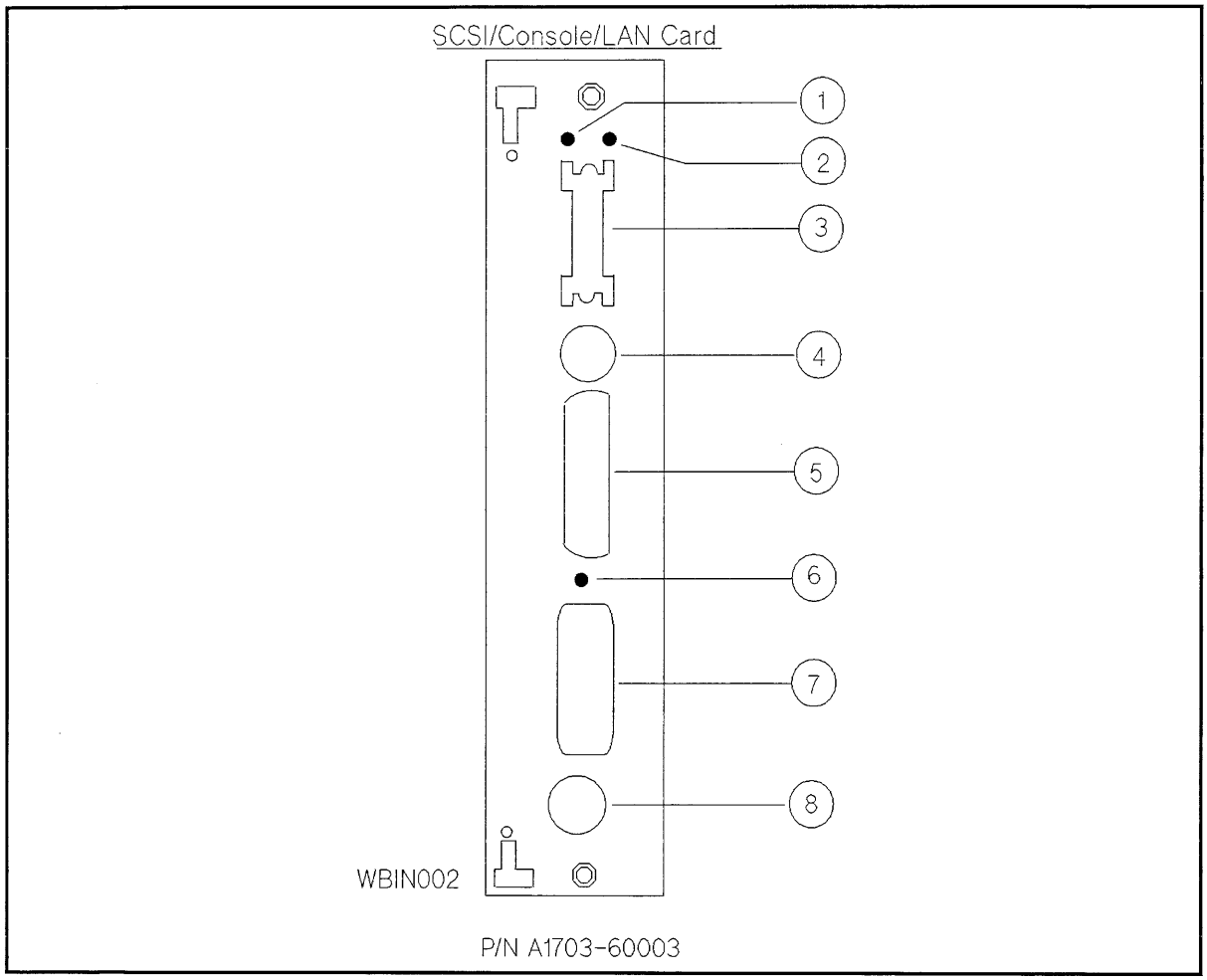



**Figure 1-4. SCSI/Console/LAN Card Connector and LED Layout, P/N A1703-60003**

**Table 1-3.**
**Connectors and LEDs of SCSI/Console/LAN Card, P/N A1703-60003**

| Callout | Component | Callout | Component |
|---|---|---|---|
| 1 | Term Power LED | 5 | Modem Connector |
| 2 | SCSI Selftest LED | 6 | Console/LAN Selftest LED |
| 3 | SCSI (Single-ended) Connector | 7 | AUI Connector |
| 4 | Console Connector | 8 | ThinLAN Connector |

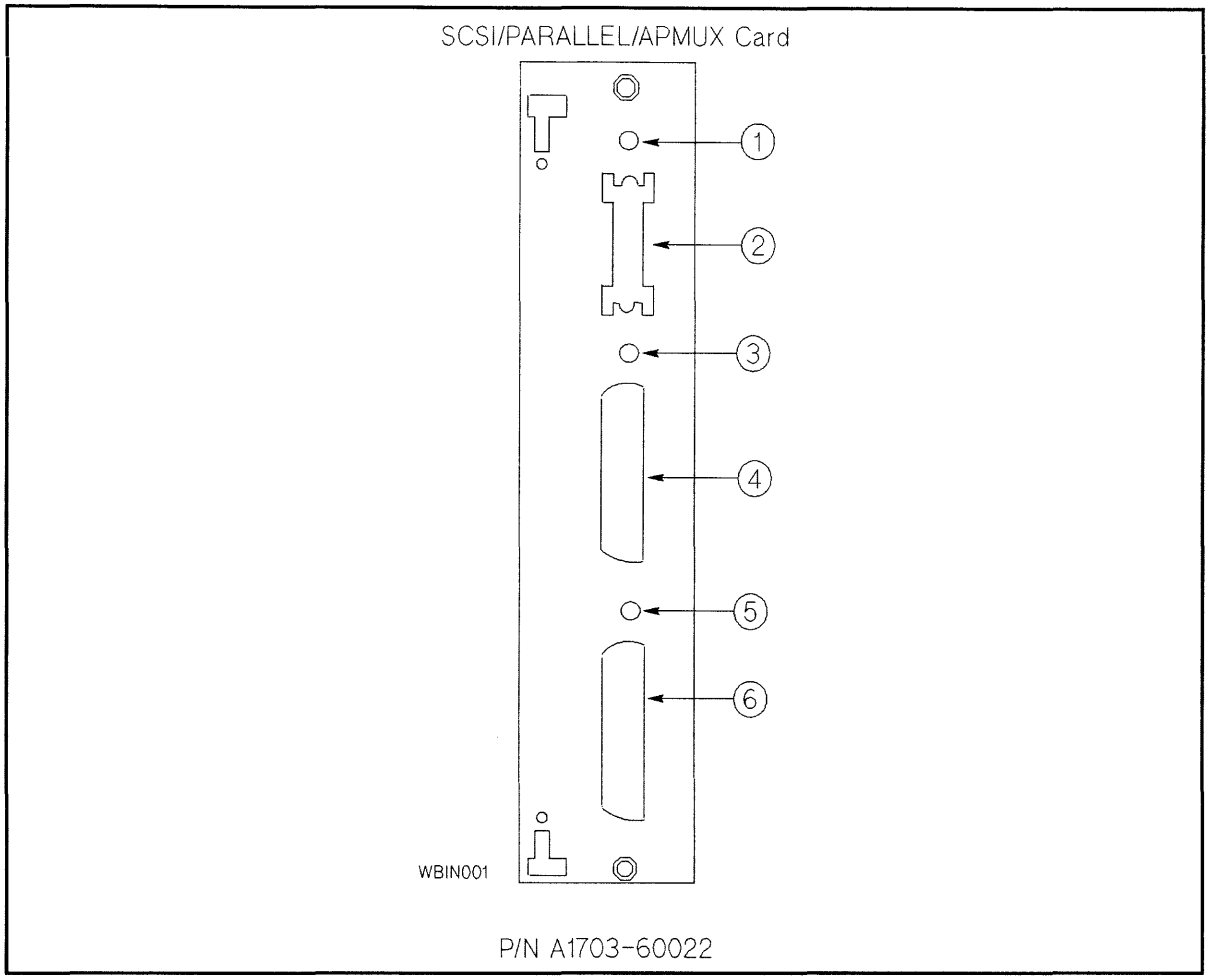



**Figure 1-5. Multifunction I/O Card Connector and LED Layout, P/N A1703-60022**

**Table 1-4.**
**Connectors and LEDs of SCSI/Parallel/APMUX Card, P/N A1703-60022**

| Callout | Component |
|---|---|
| 1 | Term Power LED |
| 2 | SCSI (Single-ended) Connector |
| 3 | SCSI Selftest LED |
| 4 | Parallel Printer Port Connector |
| 5 | MUX Status LED |
| 6 | Connector to MDP/DDP |

# System Operation

## Introduction

The status of system operation is displayed on the system front panel and on the console. Tape drive operation is displayed on the tape drive front panel. System operation can be controlled and modified with the Processor Dependent Commands (PDC) and the Access Port commands.

## System Status Displays

### System Front Panel and Status Displays

The system front panel switch and indicators are shown in Figure 1-6. The DC ON/OFF switch controls the application of DC power to the system. Table 1-5 shows the valid states of the Operating State indicators.

The Remote Indicator is lit if the system remote console path has been enabled.

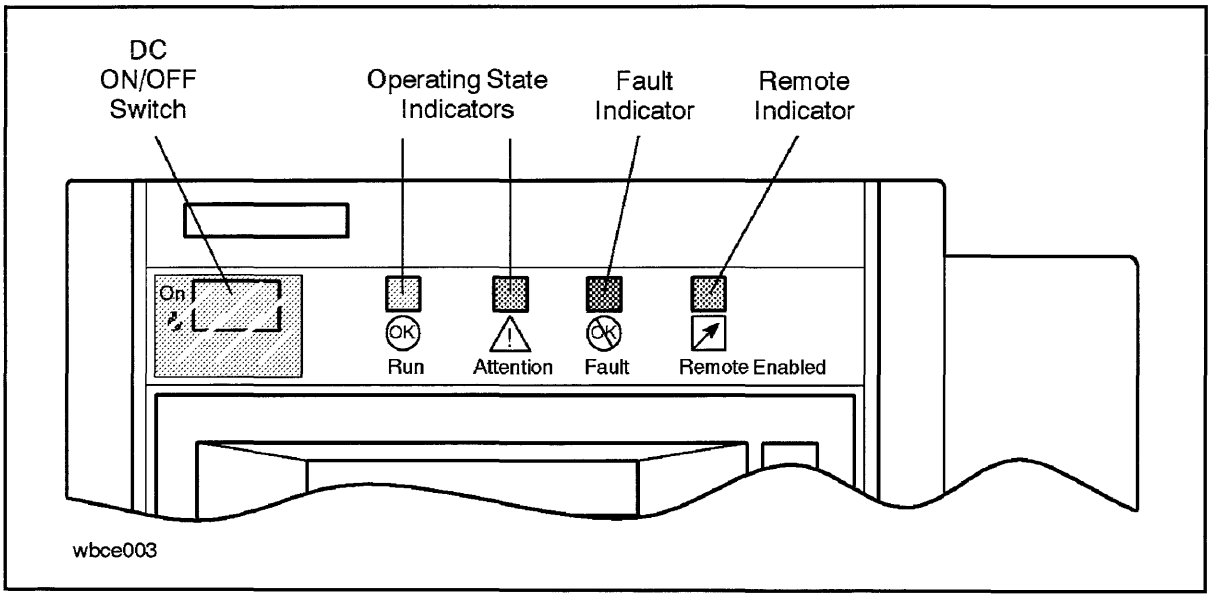



**Figure 1-6. System Front Panel Switches and Indicators**

**Table 1-5. Front Panel LEDs and Operating States**

| Green RUN | Yellow ATN | Orange FAULT | Other Indicators | Condition |
|---|---|---|---|---|
| | | | | No DC power |
| | | ⓞ | ostat = FLT | Fault mode |
| | ⓨ | | ostat = Test<br>ostat = Init | PDC Mode<br>ISL Mode |
| ⓖ | | | Prompt | OS running |
| ⓖ | ⓨ | | Overtemp<br>Online warning | Warning |
| ⓖ | ⓨ | ⓞ | | PDC has not executed |

Figure 1-7 shows how the front panel indicators are related to the fields of the system console banner. The OSTAT field contains the alphabetic characters shown in the OSTAT Display field of Table 1-5.

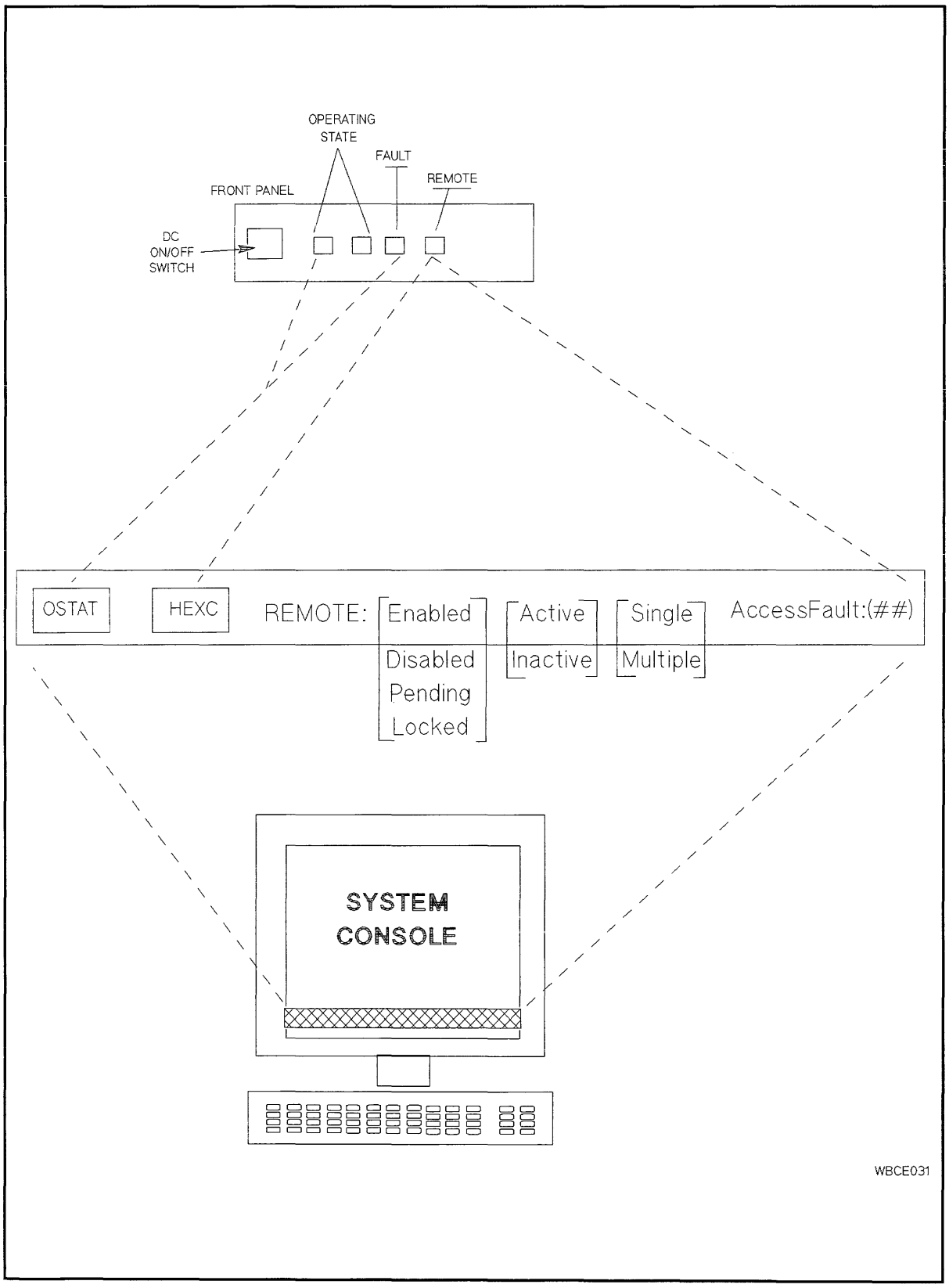



**Figure 1-7. Front Panel and System Console Indicators**

## Processor Dependent Code (PDC) Commands

Figure 1-8 shows the main menu of the PDC commands. Four other menus, shown in Figure 1-9, Figure 1-10, Figure 1-11, and Figure 1-12 provide groups of more specialized commands for controlling and modifying system operation. Type

**HE**lp [<menu>|<command>]

for an explanation of each menu and command.

```
---- Main Menu ---------------------------------------------------------

     Command                          Description
     -------                          -----------
     BOot [PRI|ALT|<path>]            Boot from specified path
     PAth [PRI|ALT|CON] [<path>]      Display or modify a path
     SEArch [DIsplay|IPL] [<path>]    Search for boot devices

     COnfiguration menu               Displays or sets boot values
     FIrmware menu                    Displays firmware information
     INformation menu                 Displays hardware information
     SERvice menu                     Displays service commands

     DIsplay                          Redisplay the current menu
     HElp [<menu>|<command>]          Display help for a menu or command
     REset                            Restart the system

----
Main Menu: Enter command or menu >
```

**Figure 1-8. Main Menu**

```
---- Configuration Menu -------------------------------------------

Command                                 Description
-------                                 -----------

AUto [BOot|SEarch] [ON|OFF]             Display or set specified flag
BootInfo                                Display boot-related information
BootTimer [<option>]                    Display or set system boot delay time
DEfault                                 Set the system to predefined values
FastBoot [ON|OFF]                       Display or set memory test execution
LanAddress [<addr>]                     Display LAN station address
OS [<os_name>]                          Display or specify operating system
PAth [PRI|ALT|CON|UPDATE][<path>]       Display or modify a path
PRocessor [<proc>][ON|OFF]              Configure specified processor
SEArch [DIsplay|IPL] [<path>]           Search for boot devices
SECure [ON|OFF]                         Display or set Secure boot mode
TIme [c:y:m:d:h:m:[s]]                  Read or set the real time clock

BOot [PRI|ALT|<path>]                   Boot from specified path
DIsplay                                 Redisplay the current menu
HElp [<command>]                        Display help for the specified command
REset                                   Restart the system
MAin                                    Return to Main Menu
----
Configuration Menu: Enter command>
```

**Figure 1-9. Configuration Menu**

```
---- Firmware Menu -------------------------------------------------

  Command                 Description
  -------                 -----------
  VERsion                 List installed firmware revisions
  SELect                  Select firmware bank to be active at next power up.
  UPdate <name>           Update inactive firmware from LIF file <name>


  BOot [PRI|ALT|<path>]   Boot from specified path
  DIsplay                 Redisplay the current menu
  HElp [<command>]        Display help for the specified command
  REset                   Restart the system
  MAin                    Return to Main Menu


----
Firmware Menu: Enter command>
```

**Figure 1-10. Firmware Menu**

```
---- Information Menu ----------------------------------------------------

   Command                 Description
   -------                 -----------
   ALL                     Display all hardware information
   BootInfo                Display boot-related information
   CAche                   Display cache information
   COprocessor             Display coprocessor(s) information
   IO                      Display I/O interface information
   MEmory                  Display memory information
   PDC                     Display PDC version
   PRocessor               Display processor(s) information


   BOot [PRI|ALT|<path>]   Boot from specified path
   DIsplay                 Redisplay the current menu
   HElp [<command>]        Display help for specified command
   REset                   Restart the system
   MAin                    Return to Main Menu

 ----
 Information Menu: Enter command>
```

**Figure 1-11. Information Menu**

```
---- Service Menu -------------------------------------------------

   Command                      Description
   -------                      -----------
   MemRead <address> [<len>]    Read memory and I/O locations
   PIM [HPMC|LPMC|TOC]          Display PIM information
   TEst <test module>           Execute selftest on specified module

   BOot [PRI|ALT|<path>]        Boot from specified path
   DIsplay                      Redisplay the current menu
   HElp [<command>]             Display help for the specified command
   REset                        Restart the system
   MAin                         Return to Main Menu

----
Service Menu: Enter command>
```

**Figure 1-12. Service Menu**

## Access Port Commands

Table 1-6 provides a brief summary of the Access Port commands. The commands are available after you type Ctrl B at the console. A complete discussion of these commands is provided in "Access Port" in Chapter 9.

**Table 1-6. Access Port Command Summary**

| CONTROL MODE COMMANDS | | Valid At | |
|---|---|---|---|
| **Command** | **Description** | **LC** | **RC** |
| CA | Configure Remote Support Modem Port | Y | Y |
| CO | Return to Console Mode | Y | Y |
| CS* | Copy Screen | Y | Y |
| DI | Disconnect Remote Console | N | Y |
| DR | Disable Remote Operator Access | Y | Y |
| DS | Disable SPU Status Display | Y | Y |
| ER | Enable Remote Operator Access | Y | N |
| ES* | Enable SPU Status Display | Y | Y |
| HE | Print Help Menu | Y | Y |
| LR | Lock Remote Support Modem Access | Y | Y |
| RS | Reset SPU | Y | Y |
| SE | Enter Session Mode on Remote Port | N | Y |
| SO | Security Options | Y | Y |
| TC | Initiate SPU Transfer of Control | Y | Y |
| TA | Initiate Self Test | Y | Y |
| TE | Tell | Y | Y |
| UR | Unlock Remote Support Modem Access | Y | N |

* Not available if non-HP consoles are used.

LC = Local Console
RC = Remote Console

## Normal Power-on Sequence

Table 1-7 describes each of the steps and the results of the power-on sequence. The Access port described in Table 1-7 is located on the Multifunction I/O card.

**Table 1-7. Normal Power-On Sequence**

| Step | Description | Results |
|---|---|---|
| 1 | System power-on by pressing DC On/Off switch | All front panel indicators will momentarily light. The yellow and green indicators will remain lit throughout system selftest. |
| 2a | Access Port Selftest begins. (The Access Port is on the Multifunction I/O card | SCSI Selftest LED on Multifunction I/O card is lit. Console LAN Selftest LED is lit - HP 3000. Mux Status LED is lit - HP 9000. |
| 2b | System Selftest begins execution. | CPU, memory, and I/O are tested. |
| 3 | Access Port Selftest completes. | Selftest LED goes out. |
| 4 | Access Port sends the system banner to the system console. | The system console displays the HEX code and the OSTAT fields in the system banner. |
| 5 | Access Port sends System Selftest HEX codes and OSTAT data to the console. | Access Port updates the banner information as System Selftest proceeds. |
| 6 | System Selftest finishes. Console path is tested. | Bootpath message appears on the system console. **Note:** If the system status banner has not been enabled with the ES command, the status banner will disappear at this time. |

# Removable Media Devices

## DDS Front Panel and Status Display

The tape drive in the HP 3000/9x8 and HP 9000 800 Ex5 Class systems is shown in Figure 1-13.

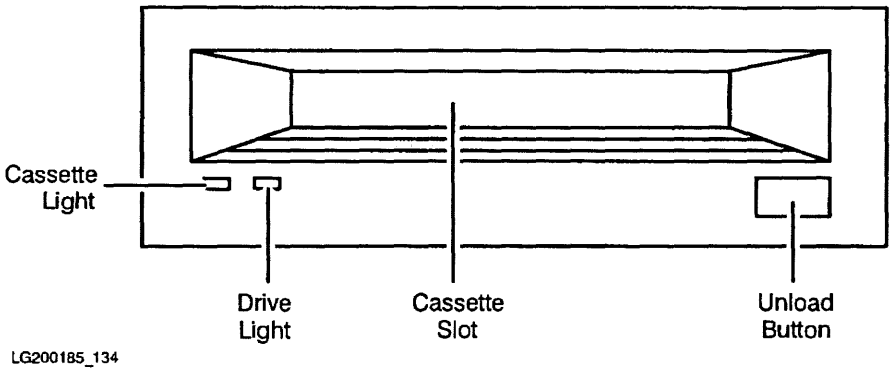



**Figure 1-13. C1504B 3.5-inch DDS-Format Tape Drive Front Panel**

**Cassette Slot:** is where the tape cassette is inserted and removed.

**Unload Button:** stops any tape operation, rewinds the tape, and ejects the cassette from the tape drive.

**Cassette Light and Drive Light:** indicate the status of the tape drive. Both lights are capable of displaying yellow or green colors. The combinations of colors plus being off (no light) show normal operation status, operation with write protect, and caution states, as listed below.

The various status states you will see the indicators display are shown in the following tables. Table 1-8 is for the 3.5 inch tape drive.

The Cassette indicator and the Drive indicator are bi-color Light Emitting Diodes (LEDs). They can show green or yellow light.

**Table 1-8. C1504B 3.5 inch DDS-Format Tape Drive**

| Cassette Light | Drive Light | Condition |
|---|---|---|
| **No Cassette States** | | |
| Off | Off | No cassette loaded or power is off. |
| Flash Yellow | Flash Yellow | Self-test in progress. |
| Off | Flash Green | No cassette, tape drive is active. |
| **Write Enable States** | | |
| On Green | On Green | Cassette loaded, tape drive online. |
| On Green | Flash Green | Cassette loaded, tape drive active. |
| Pulse Green | Pulse Green | Loading, unloading, or ejecting cassette. |
| On Green | Off | Tape drive offline. Cassette loaded. |
| **Write Protect States** | | |
| On Yellow | On Green | Read only cassette loaded, tape drive online. |
| On Yellow | Flash Green | Read only cassette loaded, tape drive active. |
| Pulse Yellow | Pulse Green | Loading, unloading, or ejecting cassette. |
| On Yellow | Off | Tape drive offline. Read-only cassette loaded. |
| **Error States** | | |
| On Green | Pulse Green/Yellow | Caution[1] (media warning). |
| On Yellow | On Yellow | Moisture detected or no termination resistors[2]. |
| Pulse Yellow | On Yellow | Fault[3]. |

[1] This occurs during writes where an excessive number of read after write errors occur and during reads where an excessive level of C3 correction being applied. This indication would persist until the cassette is unloaded.

[2] The termination resistor problem would only occur at power on time and the tape drive will appear to have *hung* during self-test.

[3] Indicates a failure of the DDS Field Replaceable Unit.

### Ordering HP DDS cassettes

The 60 meter cassette tape, product number *HP 92283A*, can hold up to 1.3 gigabytes (1300 megabytes) of data. They are packaged in a red box of 5 cassettes. Use the 60 meter cassettes in either the full height (5.25 inch) DDS tape drive, or the half height (3.5 inch) DDS tape drive.

The 90 meter cassette tape, product number *HP 92283B*, can hold up to 2 gigabytes (2000 megabytes) of data and are packaged in yellow. Use the 90 meter cassettes only in the half height (3.5 inch) DDS tape drive.

The cleaning cassette tape is product number *HP 92283K*.

Table 1-9 shows the types of DDS tapes available and which tape drive they are compatible with. This is important to know before loading a DDS cassette into a tape drive for operation.

**Table 1-9. DDS Tape Requirements**

| | HP 3.5 inch | Non-HP DDS Device |
|---|---|---|
| 60M (red) | Read (yes)<br>Write (yes) | Read (yes)<br>Write (yes) |
| 90M (yellow) | Read (yes)<br>Write (yes) | Read (*)<br>Write (*) |

* Refer to the manufactures specification.

## CD-ROM Front Panel and Status Displays

Figure 1-14 shows the CD-ROM controls and indicators.

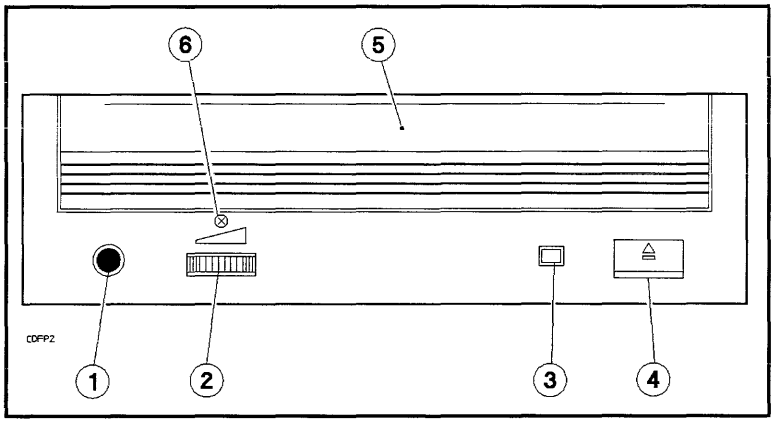



**Figure 1-14. CD-ROM Drive Front Panel**

1. Headphone Jack
2. Volume Control Knob
3. Drive Status Light
4. CD-ROM Eject Button[1]
5. Door (CD-ROM Caddy Loading Slot)
6. Emergency Eject Access[2]

[1]Ejects a CD-ROM within 5 seconds; will not function if there is no power or if a software application has disabled operations

[2]To eject a CD-ROM when drive power is off, remove screw and insert the end of a paper clip into this hole.

Table 1-10 shows drive status light indications during normal operation and fault conditions.

**Table 1-10. Drive Status Light Indications**

| Status | Explanation |
|---|---|
| ON | No CD-ROM detected, CD-ROM insertion error detected, or no CD-ROM is in the caddy. |
| OFF | Drive power is off, self-test passed, or no activity with the host. |
| FLASHING | Activity with the host. |

## Quarter-Inch Cartridge (QIC) Tape Drive Front Panel and Status Displays

Figure 1-15 shows the QIC tape drive front panel and indicator.

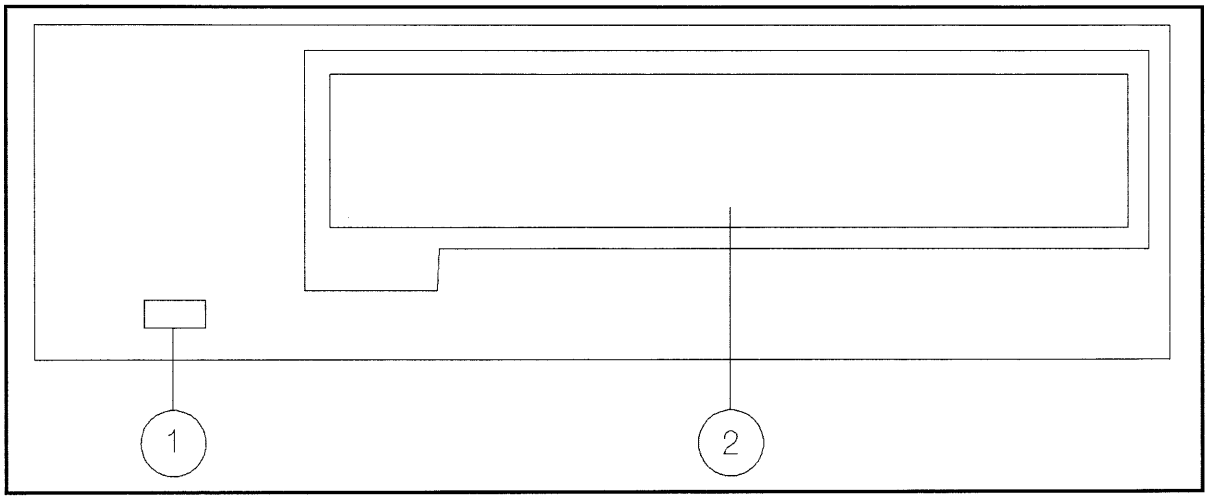



**Figure 1-15. Quarter-Inch Cartridge (QIC) Tape Drive Front Panel**

1. Drive Activity Light 2. Tape Access Door

**Drive Activity Light:** is lit when the drive is being accessed, such as when the motor is running, when the heads are being positioned, when a command is being executed, and when data is being transferred.

The QIC drive can store up to 1.2 Gbytes, depending upon the QIC format in which the data is written and which cartridge type is used. Refer to Table 1-11. The QIC drive reads and writes the formats shown in Table 1-12.

**Table 1-11. QIC Tape Cartridge Compatibility**

| Tape | Write | Read |
|---|---|---|
| 1.2 GB | QIC-1000C | QIC-1000C |
| 1.0 GB | QIC-1000C | QIC-1000C |
| 525 MB | QIC-525, QIC-150, QIC-120 | QIC-525, QIC-150, QIC-120, QIC-24 |
| 320 MB | QIC-525, QIC-150, QIC-120 | QIC-525, QIC-150, QIC-120, QIC-24 |
| 250 MB | QIC-150, QIC-120 | QIC-525, QIC-150, QIC-120, QIC-24 |
| 150 MB | QIC-150, QIC-120 | QIC-150, QIC-120, QIC-24 |
| 60 MB | QIC-120 | QIC-120, QIC-24 |
| 45 MB | N/A | QIC-24 |

**Table 1-12. QIC Tape Drive Read and Write Formats**

| Read | Write |
|---|---|
| QIC 24 | |
| QIC 120 | QIC 120 |
| QIC 150 | QIC 150 |
| QIC 525 | QIC 525 |
| QIC 1000 | QIC 1000 |

The drive reads tapes by sensing the previously written format and by sensing the cartridge type. The drive writes a tape in a particular QIC format only if the cartridge supports recording that format. For example, a QIC 525 tape can be written with a QIC 150 format or a QIC 525 format. However, a tape written in the QIC 1000 format only supports the QIC 1000 format.

You specify the format to be written through specific device files.

Use the following command to determine the available QIC special device files:

```
>ll /dev/rmt/&<LU>qic
```

where <LU> is the logical unit number of the tape drive.

Although QIC tapes support multiple QIC formats, you cannot write data on a tape in more than one format. For example, a QIC 525 tape supports both the QIC 150 and QIC 525 formats. However, you must either write data in the QIC 150 format or the QIC 525 format. The 1.2GB tapes can only be written in the QIC 1000 format. If a cartridge has data recorded in a particular format, it can be overwritten with a different format.

ALL HP-supplied QIC backup media, such as the Install Tape, Update/SE Tape, User Enhancement Environment Tape, and Support Tape will be in the QIC 1000 format.

**Note**

The QIC drive is **NOT** compatible with the 914x drives. You should not load a QIC tape into a 914x tape drive, or vice versa.

## Floppy Disk Drive

Figure 1-16 shows the front panel and controls of the floppy disk drive. Table 1-13 describes the front panel. The Drive Activity light is lit when data is being transferred to or from the disk.

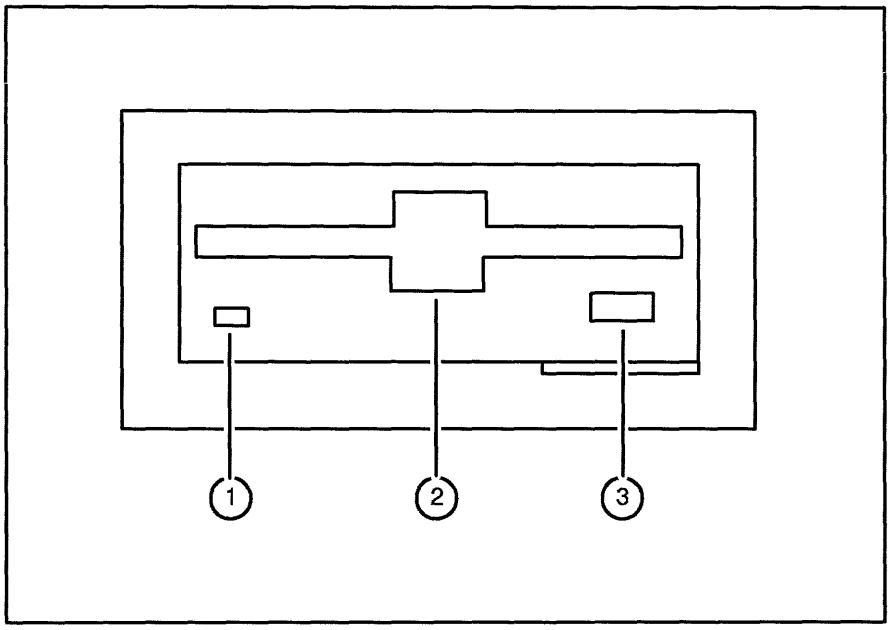



**Figure 1-16. Floppy Disk Drive Front Panel**

**Table 1-13. Floppy Disk Drive Front Panel**

| Callout | Component |
|---|---|
| 1 | Drive Activity Light |
| 2 | Disk Slot |
| 3 | Disk Eject Button |

## 8mm Tape Drive

Figure 1-17 shows the front panel of the 8mm tape drive.

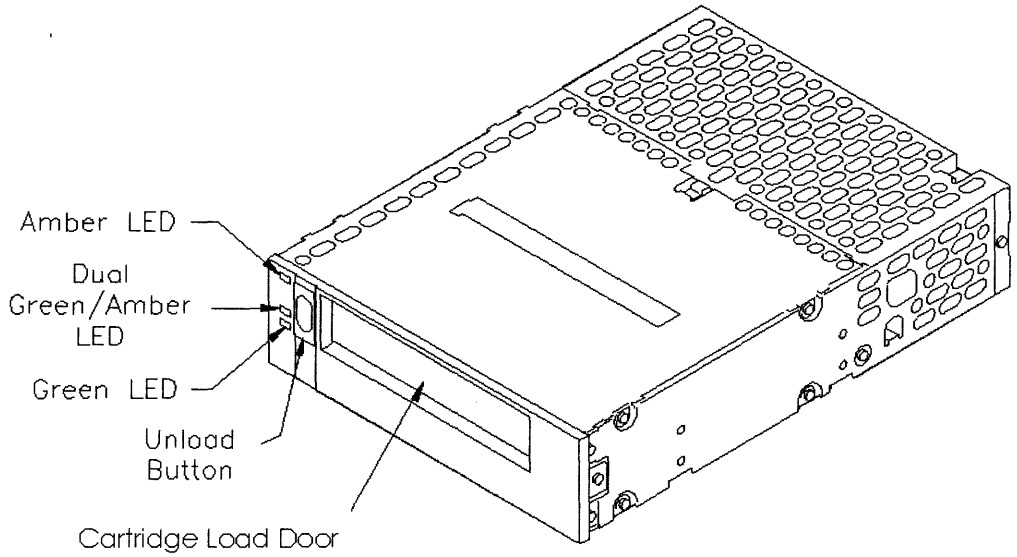



**Figure 1-17. 8mm Tape Drive Front Panel**

The LEDs show the state of the tape device.

- If the top (amber) LED flashes, the device has an error or needs to be cleaned.
- If the middle LED flashes, SCSI bus activity is occurring.
  - If the LED is amber, the tape loaded is in compressed format.
  - If the LED is green, the tape loaded is in uncompressed format.
- If the bottom LED flashes, normal tape operation is occurring.

Table 1-14 provides a detailed description of the device LED states.

**Note**

The UNLOAD button can also be used to clear servo and other errors. If a hardware error or servo error occurs, press the UNLOAD botton to reset the drive. Then, if necessary, wait a few seconds and press the button again to eject the tape.

**Table 1-14. 8mm Tape Drive Front Panel LED States**

| Top (Amber) LED | Middle (Green/Amber) LED | Bottom (Green) LED | Device State |
|---|---|---|---|
| On | On | On | Self-test (initial) |
| On | Off | Off | Self-test (in progress) |
| Off | Off | Off | Drive on-line (no tape loaded) |
| Off | Off | On | Drive on-line (tape loaded) |
| Off | Flashing | Flashing | Tape motion |
| On | Off | On | SCSI bus reset |
| Flashing | Flashing | Off | Error |
| Flashing | Off | Flashing | Time to clean |

# 2

# Environmental Information

## Specifications

**Table 2-1. Environmental Specifications**

| | |
|---|---|
| Operating Temperature | 5°C to 40°C (41°F to 104°F) |
| Non-operating Temperature | -40°C to 65°C (-40°F to 149°F)<br>(without internal DDS-format drive)<br><br>-40°C to 45 °C (-40°F to 113°F) (with internal DDS-format drive - tape media limit) |
| Maximum Rate of Temperature Change | 20°C (36°F)/hour (without tape media)<br>10°C (18°F)/hour (with tape media) |
| High Speed Fan (Activated) | 30°C to 38°C (86°F to 100.4°F) |
| Overtemp Warning | 40°C to 48°C (104°F to 118.4°F) |
| Overtemp Hardware Shutdown | **Overtemp Warning** +2°C (≈3°F) |
| Operating Humidity | 20% to 80% RH max wet bulb = 26°C,<br>non-condensing |
| Non-operating Humidity | 5% to 80% RH, non-condensing,<br>less than 30% RH/hr rate of change |
| Operating Altitude | 0 to 3048 meters (10,000 ft) |
| Nonoperating Altitude | 0 to 4573.2 meters (15,000 ft) |
| Heat Dissipation (max load) | 1300 BTU/hr |
| Operating Vibration (random) | 0.0001 $g^2$/Hz, 5 to 350 Hz<br>-6dB/Octave, 350-500 Hz<br>0.00005 $g^2$/Hz, 500 Hz<br>(≈ 0.21 $G_{rms}$ ) |
| Non-operating Vibration (sine) | 0.5g (peak), 5 to 500 Hz |
| Shock (nonoperating) | Edge drop from 2.5 in. above floor |
| Sound Power | < 37°C = < 45 dB(A) sound pressure at operator's position.<br>< 5.5 bels(A) sound pressure<br>> 37°C = < 50 dB(A) sound pressure at operator's position.<br>< 6.0 bels(A) sound pressure |

**Table 2-2. 2-Slot and 4-slot Chassis Power Specifications**

| Description | Specification |
|---|---|
| AC Input Voltage Range[1] | 90 to 132 VAC and 180 to 264 VAC |
| AC Input Current | 6.5 A maximum load @ 100 VAC<br>3.5 A maximum load @ 240 VAC<br><br>2.4 A typical load @ 100 VAC & 50 Hz<br>2.1 A typical load @ 120 VAC & 60 Hz<br>1.3 A typical load @ 208 VAC & 60 Hz<br>1.3 A typical load @ 220 VAC & 50 Hz<br>1.2 A typical load @ 240 VAC & 50 Hz |
| AC Inrush Current | 50 amperes peak, one cycle |
| AC Input Power | 380 watts maximum, 230 watts typical |
| Power Supply Output Rating | 240 watts DC continuous |
| AC Input Line Frequency | 47 to 63 Hz |
| Transient Tolerance<br><br>Low Energy<br>High Energy | <br><br>3000 volts, 10$\mu$s, 500 ns rise/fall<br>1000 volts, 1.2$\mu$s rise |
| Holdup without System Reset | 20 ms @ 50 Hz (1 cycle) |
| Battery Backup Time | 15 minutes with optional<br>600 VA PowerTrust UPS |

**Note**

[1] The power supply is an auto-ranging power supply. It does not have to be reconfigured to operate over its rated operating ranges. However, the system should not be operated at voltages between the two input voltage ranges.

The power supply can provide power for up to four internal peripherals.

**Table 2-3. 2-Slot and 4-Slot Chassis DC Power Specifications [3]**

| Nominal Voltage | Minimum Current | Maximum Current | Minimum Voltage | Maximum Voltage | P-P Ripple |
|---|---|---|---|---|---|
| +5V[4] | 3A | 27A | +5.10V | +5.25V | 50 mV |
| +5V_S | 0A | 5A | +5.10V | +5.25V | 100 mV |
| +12V | 0A | 6.67A | +11.69V | +12.36V | 100 mV |
| -12V | 0A | 2A | -11.69V | -12.60V | 100 mV |

**Note**

[3] Total power must not exceed 240 watts.

[4] +5V current includes +5V_S current.

**Table 2-4. Electromagnetic Susceptibility Specifications**

| | |
|---|---|
| Radiated | 3V/m, 28 MHz to 1 GHz |
| Conducted | 3V rms, 30 Hz to 100 MHz<br>1V rms, 100 MHz to 400 MHz |
| Radiated Magnetic Field Immunity | 1 gauss p-p, 48 Hz to 198 kHz |
| Electrostatic Air Discharge | 5 kV - no effect<br>25 kV - no hardware failure |
| Electrostatic Contact Discharge | 4 kV |

**Table 2-5. 2-Slot and 4-Slot Chassis Physical Specifications**

| Description | Specification |
|---|---|
| Width | 222 mm (8.74 in.) |
| Height | 430 mm (16.93 in.) |
| Depth | 533 mm (20.98 in.) |
| Weight | 31.8 kg (70 lbs) |

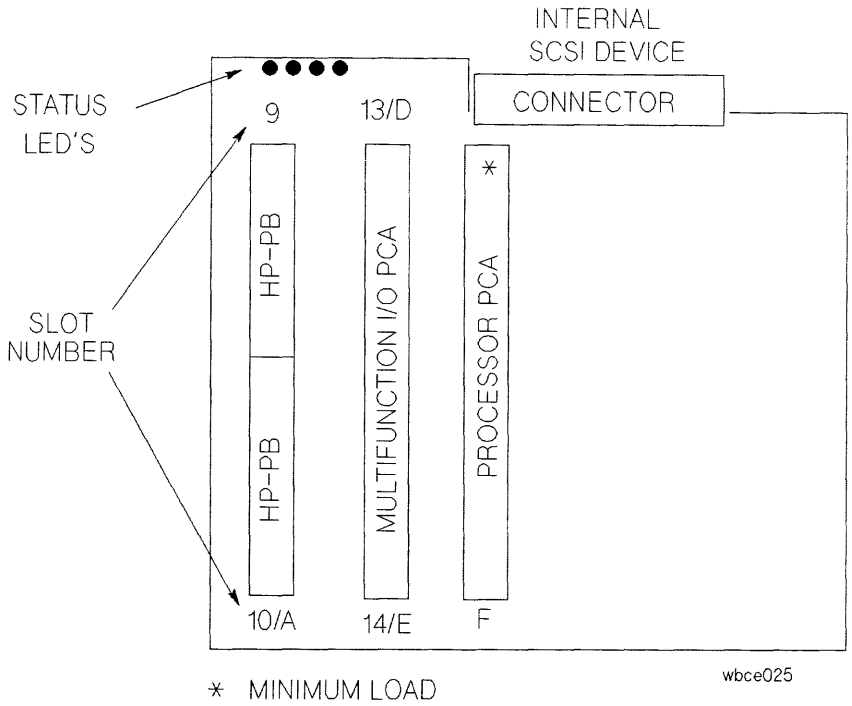



**Figure 2-1. 2-Slot Chassis Backplane Layout and Minimum Load**

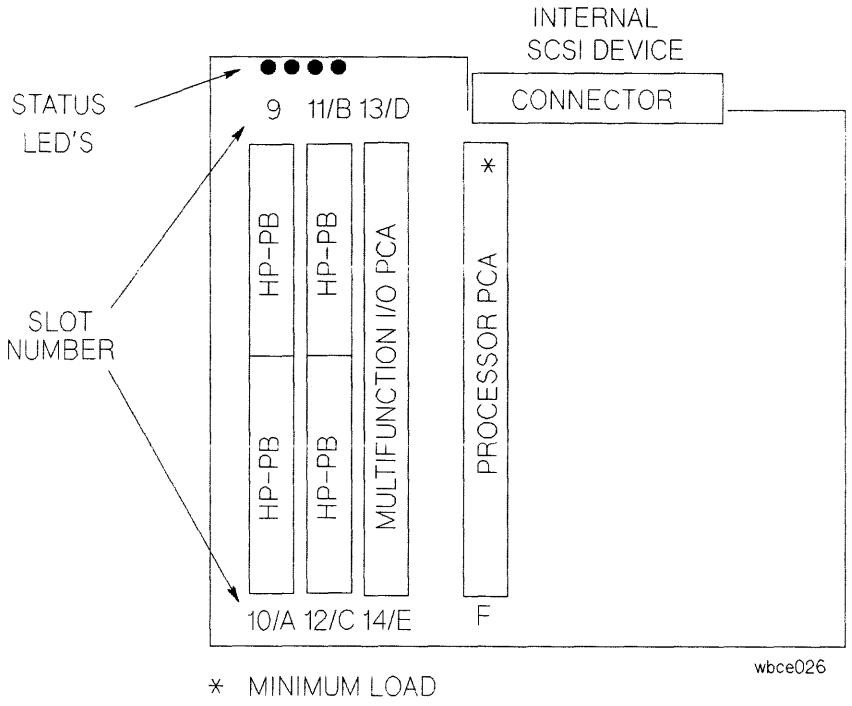



**Figure 2-2. 4-Slot Chassis Backplane Layout and Minimum Load**

# 3

# Installation and Preventive Maintenance

## Introduction

This chapter provides a checklist of the steps required to install the system and the peripherals shipped with the system. More complete installation information is provided in the installation manuals shipped with the system. If a problem occurs at any point in the installation process, refer to Chapter 5.

Preventive maintenance information is also provided.

**Warning**

**The power cord is the main AC power disconnect device. The system must be positioned near an AC outlet that is free of obstacles and is easily accessible.**

## Stand-alone System Installation

1. Unpack the system.
2. Inspect for damage.
3. Move the equipment to where it will be used.
4. Install any additional I/O PCAs.
5. Install and configure any external peripherals.

**Note**

If no SCSI peripherals are connected to the Multifunction I/O PCA, install SCSI terminator, P/N 1252-3932, on the **SCSI** connector.

6. Cable everything to the system. Refer to the system Installation and Configuration manual for specific cabling instructions.
7. Power up the external peripherals.
8. Power up the system.
9. At the ISL prompt, verify the I/O hardware configuration with MAPPER in the Offline Diagnostic Environment (ODE).
10. Boot the operating system.
11. Customize the system.

## Rack System Installation

### A-Series Rack Installation

1. Unpack the system.
2. Inspect for damage.
3. Move the system to where it will be used.
4. Cable the LAN, if necessary.
5. Connect power to the rack.
6. Power up the system.
7. At the ISL prompt, verify the I/O hardware configuration with MAPPER in the Offline Diagnostic Environment (ODE).
8. Boot the operating system.
9. Customize the system.

### C-Series Rack Installation

1. Unpack the system.
2. Inspect for damage.
3. Move the system to where it will be used.
4. Install equipment in the rack.
5. Install any additional I/O PCAs.
6. Install and configure any external peripherals.
7. Connect power to all equipment.
8. Connect power to the rack.
9. Power up the system.
10. At the ISL prompt, verify the I/O hardware configuration with MAPPER in the Offline Diagnostic Environment (ODE).
11. Boot the operating system.
12. Customize the system.

## Preventive Maintenance

### HP A3024A 8mm Tape Drive Maintenance

The 8mm Tape Drive should be cleaned every 30 hours of tape drive operation or when the top and bottom LEDs flash rapidly and the middle LED flashes irregularly.

Table 1-14 shows the state of the LEDs when the drive should be cleaned.

1. Insert the cleaning cartridge into the drive.
2. Cleaning begins automatically.
3. When cleaning is completed, the cartridge is automatically ejected.
4. After the drive has been successfully cleaned, the top and bottom LEDs on the front panel should no longer be flashing.

**Note**

Do not attempt to rewind and reuse the cleaning cartridge. Reusing the cleaning cartridge may reintroduce damaging debris to the tape drive head.

## Quarter-inch Cartridge (QIC) Tape Drive Maintenance

See Table 3-1 for the suggested drive preventive maintenance schedule.

**Table 3-1. Recommended Preventive Manintenance Schedule**

| Item | Interval (hours) |
|---|---|
| Head Cleaning | 8 (or as required)<br>(2 hours with new tapes) |
| Capstan Cleaning | 20 (or as required) with used tapes |

### Read/Write Head Cleaning Procedure

Head cleaning ensures that the head is free of contamination for proper tape-to-head contact and to prevent the loss of data. The head should be cleaned after two hours of use with a new tape. Thereafter, it should be cleaned after every eight hours of use.

It is recommended that you use the QIC Drive Cleaning Cartridge (part number 92281C) to clean the heads. The cartridge is a mock tape cartridge with a cleaning pad and cleaning solution. The cartridge is inserted into the drive like a normatl tape cartridge. Before inserting the cleaning cartridge, apply a few drops of the cleaning solution to the pad. Cleaning occurs automatically when the cartridge is inserted. After 10 to 15 seconds of cleaning, unload the cartridge and continue with normal operation.

DO NOT USE DENATURED ALCOHOL. It breaks down the laminations in the heads.

### Capstan Cleaning Procedure

The capstan should be cleaned using a cotton swab soaked with **water only**. Wipe the cotton swab around the circumference of the capstan until the debris is removed. Allow the capstan to dry completely before inserting a tape cartridge. **NEVER** clean the capstan with the head cleaning solution. Severe head damage will result.

### QIC Handling Tips

The drive shipping insert must be in place when the drive is shipped. The insert must also be in place when the system is moved.

Do not touch the head assembly when handling the drive.

The head arm can be bent when you handle the mechanism. (You can do this by sticking your fingers in the notches.) If the arm is bent, Read/Write operations might be OK, but you may have problems changing cartridges.

The shipping insert also has a moisture absorption pack. Moisture on the head can cause the tape to stick to the head. It can also cause head corrosion.

When a cartridge is installed, it should be inserted and released briskly to ensure good seating. If you do not do this, you may have problems changing cartridges.

New cartridges should be run through a retention cycle or an erase cycle when they are loaded for the first time. This stabilizes tape tension and removes dirt, thus decreasing the error rate.

# 4

# Configuration

## Introduction

Use Table 4-1 and the associated procedures to configure the HP 3000 Series 9x8LX/RX Family and HP 9000 Model 800 Ex5 Class systems.

**Table 4-1. I/O Card Configuration Guidelines**

| Product No. | Description | Form Factor | Slot Locations |
|---|---|---|---|
| A1747A | PBA-IB Interface | Double-high | 9 or 11 |
| J2092A | 16-port RS-232 MUX | Single-high | 9 through 12 |
| J2146A | 802.3 LAN | Single-high | 9 through 12 |
| J2157A | HP-PB FDDI | Double-high | 9 or 11 |
| J2166A | 802.5 Token Ring LAN | Single-high | 9 through 12 |
| J2167A | 802.5 Token Ring LAN | Single-high | 9 through 12 |
| J2220A | HP-UX SNAplus | Single-high | 9 through 12 |
| A28616A | HP-PB HP-FL | Double-high | 9 or 11 |
| 28642A | SCSI Interface | Single-high | 9 through 12 |
| 28655A | SCSI Interface | Single-high | 9 through 12 |
| 28696A | Fast/Wide SCSI-2 | Double-high | 9 or 11 |
| 30291A | PSI (SNA/SDLC) | Single-high | 9 through 12 |
| 32007A | PSI (BSC) | Single-high | 9 through 12 |
| 36922A | PSI (NS pt-to-pt) | Single-high | 9 through 12 |
| 36923A | 802.3 LAN | Single-high | 9 through 12 |
| 36960A | X.25 WAN | Single-high | 9 through 12 |
| 40299B | 8-port MUX | Single-high | 9 through 12 |

## Configuration Rules for HP 9000 Model 800 Ex5 Class Systems

There are no power supply constraints for supported I/O cards and peripherals.

You can not install more than two 3.5-inch SCSI-2 disks and two removable media devices.

You can install up to four single-high I/O cards or two double-high cards in the systems, depending on the number of I/O slots.

**Note**

Please consult the most current configuration guides for additional configurations of new HP-PB cards.

## Configuration Rules for HP 3000 Series 9x8 Systems

The Series 9x8 systems require power budgeting, because they cannot support all combinations of IO cards and internal peripherals.

In general, if PBA-IB Interface cards and HP-FL cards are not installed in the system, all other combinations of cards, memory, and peripherals are supported.

### Configuration Guidelines

1. Memory modules can use either two or four memory SIMM slots. However, enter the current requirements in only one of the slot positions. Refer to Table 4-2 for the current requirements of the memory modules.
2. When double-high I/O cards are installed, two single-high slots are used. However, enter the current requirements in only one of the slot positions. Refer to Table 4-2 for the current requirements of the I/O cards.
3. Refer to Table 4-2 for the current requirements of the internal peripherals.
4. The current requirements for the CPU card and the multifunction I/O card have already been taken into account in the worksheet calculations.

### Calculating Current Consumption

Use the current tables and worksheet as follows, referring to Table 4-3.

1. Enter the current (amps) for each row corresponding to the selected memory SIMMs, I/O cards, and internal peripherals. Be sure to enter the current values for all three voltages.
2. Sum each column and compare the results with the current limits at the bottom of the worksheet. The **Total Current Available** already contains a 5% margin over the total current available. If the configuration exceeds the available current shown, the configuration must be modified to be supported.

**Table 4-2. HP 3000 - Component Power Consumption**

| Component | Memory SIMMs, I/O Card, and Peripheral Current Requirements (Amps) | | |
|---|---|---|---|
| | +12V | +5V | -12V |
| **MEMORY SIMMs** | | | |
| 16 MB memory (2x8 MB SIMMs) | 0.00 | 0.30 | 0.00 |
| 32 MB memory (4x8 MB SIMMs) | 0.00 | 0.60 | 0.00 |
| 64 MB memory (2x32 MB SIMMs) | 0.00 | 0.30 | 0.00 |
| 128 MB memory (2x64 MB SIMMs) | 0.00 | 0.60 | 0.00 |
| **INTERNAL PERIPHERALS** | | | |
| 1 GB 3.5-inch Disk | 0.85 | 1.03 | 0.00 |
| 2 GB 3.5-inch Disk | 1.12 | 1.18 | 0.00 |
| 2 GB DDS Tape | 0.58 | 0.90 | 0.00 |
| CD-ROM | 0.40 | 0.79 | 0.00 |
| **I/O CARDS** | | | |
| A1747A (PBA-IB Interface) | 0.09 | 5.46 | 0.07 |
| J2167A (802.5 Token Ring LAN) | 0.00 | 1.66 | 0.00 |
| 28616A (HP-PB HP-FL) | 0.04 | 3.93 | 0.05 |
| 28642A (SCSI Interface) | 0.00 | 0.90 | 0.00 |
| 30291A (PSI SNA/SDLC) | 0.08 | 2.36 | 0.09 |
| 32007A (PSI BSC) | 0.08 | 2.36 | 0.09 |
| 36922A (PSI point-to-point) | 0.08 | 2.36 | 0.09 |
| 36923A (802.3 LAN) | 0.50 | 2.13 | 0.00 |

**Table 4-3. HP 3000 - Power Consumption Worksheet**

| | +12V | +5V | -12V | Allowed Components |
|---|---|---|---|---|
| **MEMORY SIMMs** | | | | |
| | | | | Memory SIMMs |
| | | | | Memory SIMMs |
| | | | | Memory SIMMs |
| | | | | Memory SIMMs |
| **INTERNAL PERIPHERALS** | | | | |
| | | | | Removable Media Device |
| | | | | Removable Media Device |
| | | | | 3.5-inch Disk |
| | | | | 3.5-inch Disk |
| **I/O CARDS** | | | | |
| Slot 9 | | | | Any supported I/O card |
| Slot 10 | | | | Any supported I/O card |
| Slot 11 | | | | Any supported I/O card |
| Slot 12 | | | | Any supported I/O card |
| | | | | |
| **TOTAL CURRENT REQUIRED** | | | | |
| **TOTAL CURRENT AVAILABLE** | 6.46 | 11.92 | 1.54 | |

# Multifunction I/O Card Configuration

## SCSI Configuration

Figure 4-1 and Figure 4-2 show the location of the SCSI terminator fuse and the SCSI address switch on each of the Multifunction I/O cards. The SCSI address switches are preset at the factory. The default setting is address = 7, parity = enable.

## LAN Configuration

Refer to Figure 4-1. The LAN Connector Configuration jumper allows the card to be connected to Thin LAN or Thick LAN. You cannot connect to Thin LAN and Thick LAN at the same time. Figure 4-1 shows the jumper positions for both options. The AUI port allows connection to medium attachment units (MAU) as well.

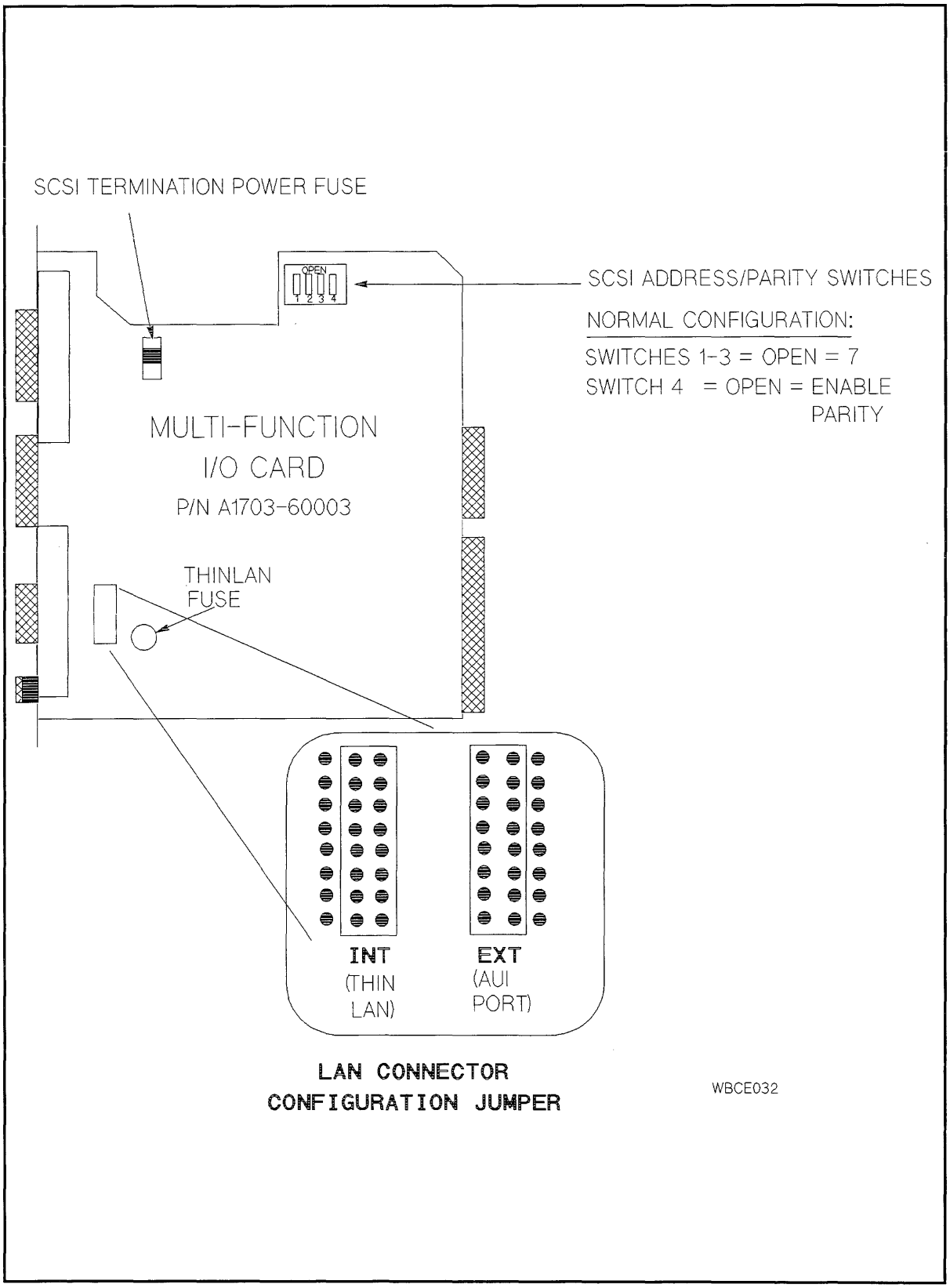



**Figure 4-1. HP 3000 Series 9x8 Multifunction I/O Card Layout**

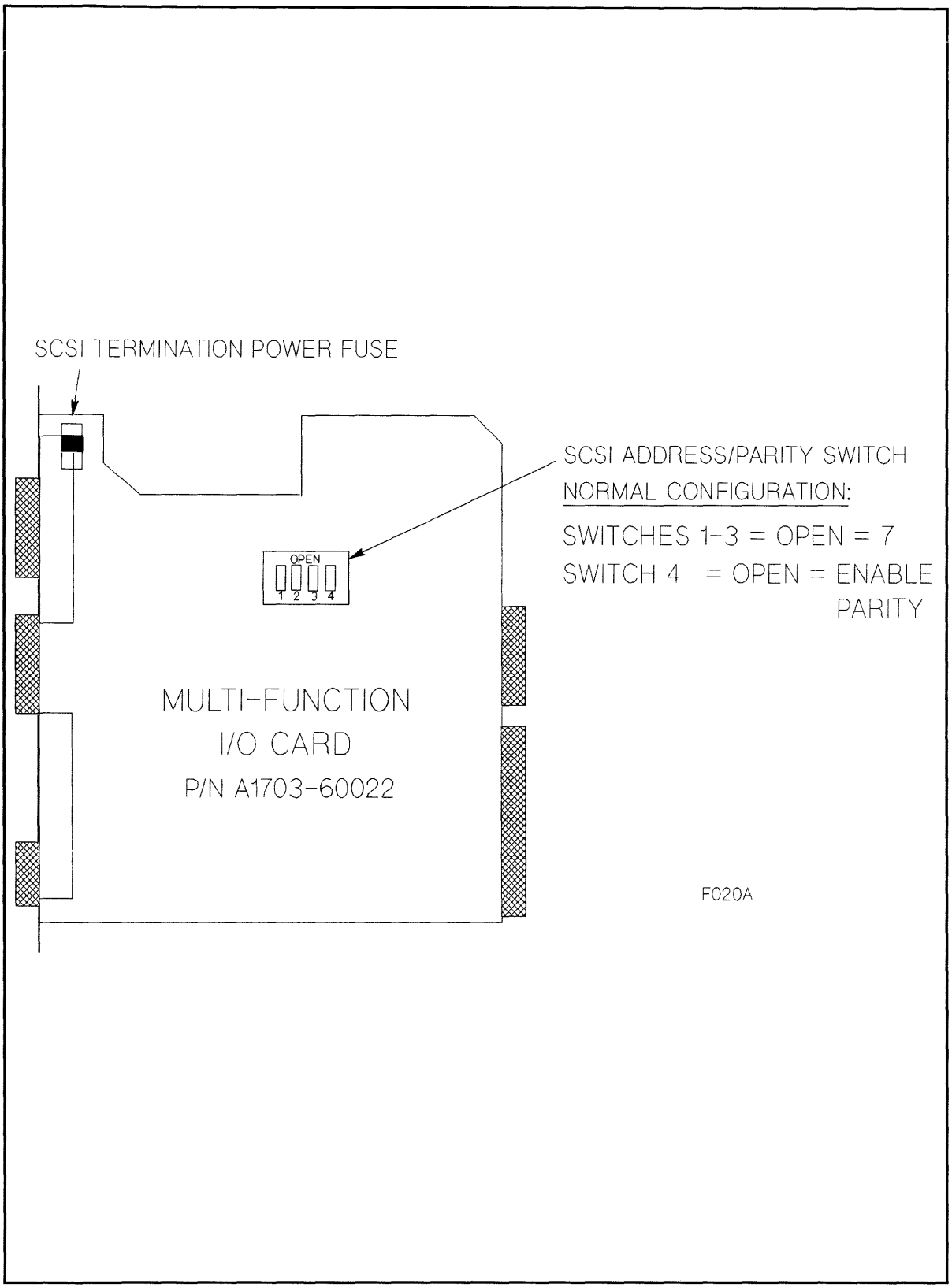



**Figure 4-2. HP 9000 Series 8x8 Multifunction I/O Card Layout**

## SCSI Configuration Rules

Table 4-4 shows the amount of internal SCSI cabling in the systems. It also shows the resulting maximum external SCSI cable that can be attached to the system Multifunction I/O PCA.

Table 4-5 lists the specifications of the SCSI bus.

Figure 4-3 is an example of internal SCSI cabling and configuration. The last peripheral on the internal bus always has termination for the internal SCSI bus. A separate SCSI terminator is added to the end of the SCSI internal bus in a diskless system.

Figure 4-4 shows a typical external SCSI device rear panel. It shows the location of the address and parity switches.

Figure 4-5 is an example of external SCSI cabling and configuration.

**Table 4-4. SCSI Cable Lengths**

| System | Internal SCSI Cable | Maximum External SCSI Cable |
|---|---|---|
| 2- and 4-slot Chassis | 1.5 meter[1] | 4.5 meters |

**Note**

[1] A high-to-low density SCSI cable is required to connect external peripherals to the Multifunction I/O card. Refer to Table 8-1 for the correct part number.

**Table 4-5. SCSI Bus Specifications**

| Parameter | Characteristics |
|---|---|
| Features | 8-bit bus.<br>Connects up to 7 devices per adapter.<br>Bus arbitration<br>Parity Checking (default = parity enabled) |
| Maximum Cable Length (single-ended SCSI bus) | 6 meters, including any internal lengths in all devices. |
| SCSI Bus Connection | Single-ended |
| Termination Requirement | The SCSI bus requires termination. The terminator MUST be connected to the last device on each end of the bus. |
| Active Terminator[1] | The last SCSI device must have +5V termination power enabled. |
| Address | 0 - 7<br>7 = host (highest priority)<br>0 = lowest priority |

**Note**

[1]Active termination is required outside the system cabinet. Passive termination is allowed in the system cabinet.

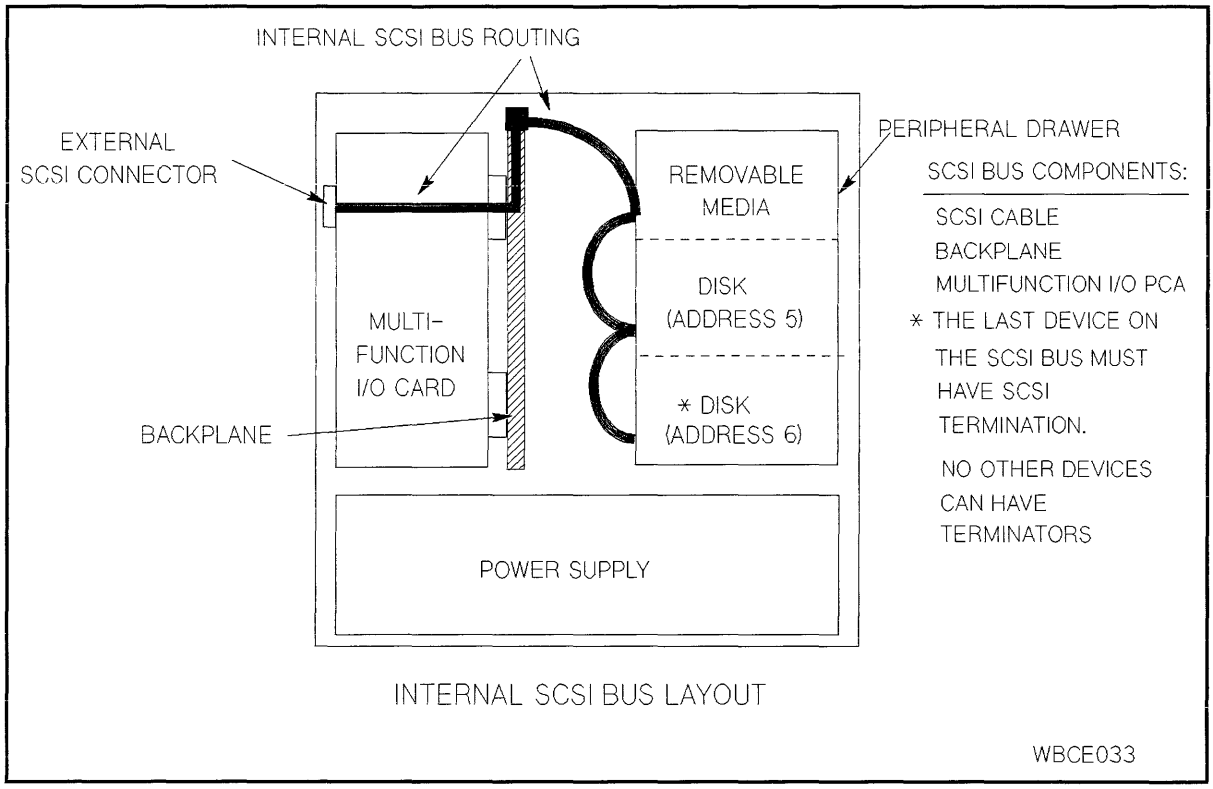
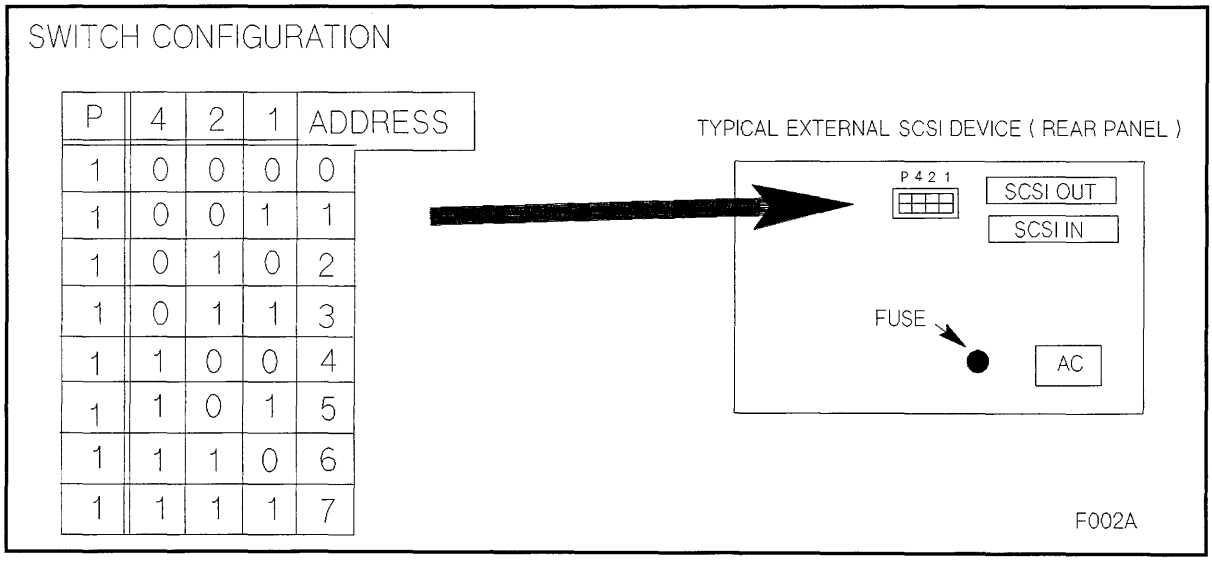



**Figure 4-3. System Internal SCSI Cabling and Configuration**




| P | 4 | 2 | 1 | ADDRESS |
|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 1 | 1 |
| 1 | 0 | 1 | 0 | 2 |
| 1 | 0 | 1 | 1 | 3 |
| 1 | 1 | 0 | 0 | 4 |
| 1 | 1 | 0 | 1 | 5 |
| 1 | 1 | 1 | 0 | 6 |
| 1 | 1 | 1 | 1 | 7 |

**Figure 4-4. Typical External SCSI Device Rear Panel and Switch Configuration**

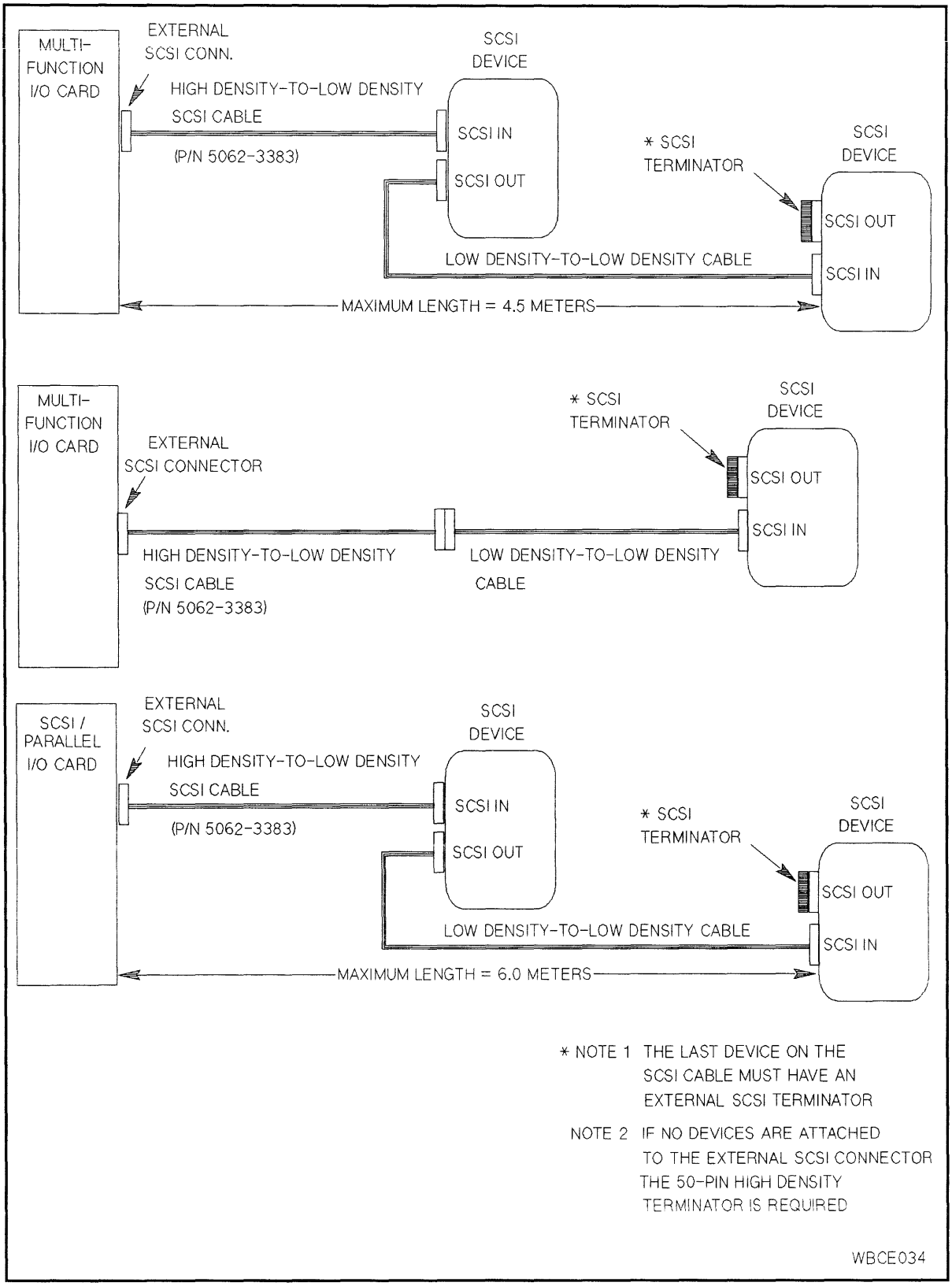



**Figure 4-5. System External SCSI Cabling and Configuration**

# HP-IB Configuration Rules

Refer to Figure 4-6 for the following discussion.

## Load Factors

Two load factors must be considered when calculating the cabling parameters of the HP-IB:

1. **Internal Load Factor.** The internal load factor of the Device adapter is seven loads.
2. **External Load Factor.** The external load factor of the peripherals is dependent upon the individual peripherals and interconnect cables. (Refer to *HP 3000 Computer Systems Configuration Guide, P/N 5954-9354, Appendix 1* for peripheral load values.) A basic rule for determining load values is you must have at least one electrical load for each meter of HP-IB cable.

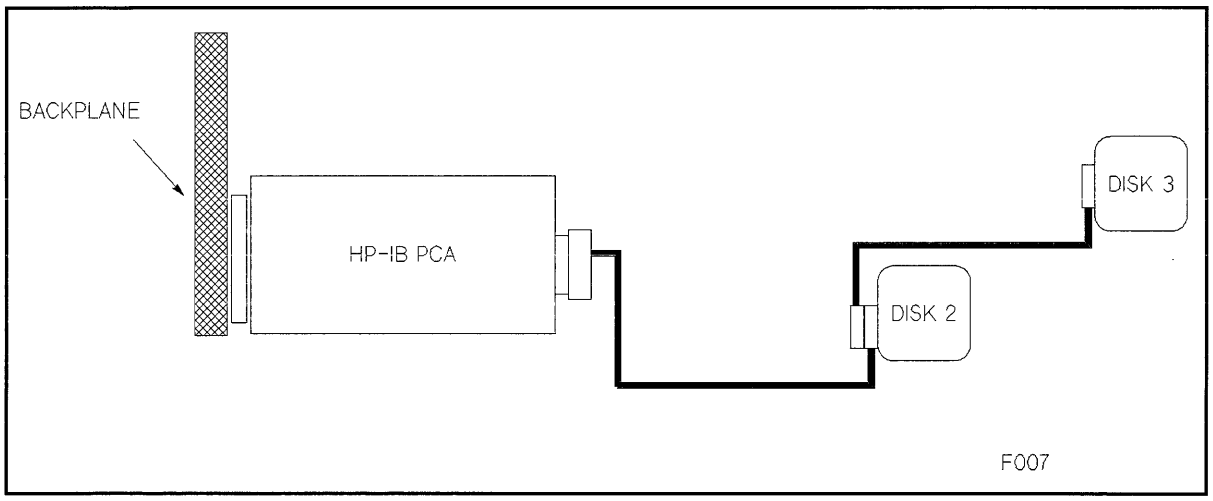



**Figure 4-6. HP-IB Configuration Example**

## HP-IB Cable Length

The maximum total length of HP-IB cable that can be connected to a device adapter is 15 meters. When testing a configuration, use the following rules:

1. No more than eight HP-IB devices per HP-IB Device Adapter. It is recommended that no more than six devices be connected.
2. Maximum of 15 device loads (internal + external).
3. Maximum HP-IB cable length must not exceed one meter per device load (maximum = 15 meters).
4. Daisy-chain (serial) cabling only
5. "Star" cabling not supported.

## Console-less Configuration (HP 9000 only)

At this time, the "no local console" configuration is supported only in Japan. Refer to the current HP 9000 configuration guide to see if additional areas support this configuration.

The HP 9000 Model 800 Ex5 Class systems can be sold without a console. However, the system must have a local or remote console. The end-user must choose a standard HP block-mode terminal (e.g. 700/96), the HP 700/60 terminal (in VT320 mode), or a VT100, VT320, or WYSE 60 third party terminal as the system console. Consult the current HP 9000 configuration guide for current information on supported console devices.

Hewlett-Packard supports Model 800 Ex5 Class systems without a console being directly attached to port 0 of the local system. A system console must still be accessible through a modem connection. The modem device is provided to the customer if they order a support contract.

Three additional components must be ordered by the customer if they want to install the system without a directly connected console terminal. The components are:

- Two RS-232 cables
- RS-232 Switchbox

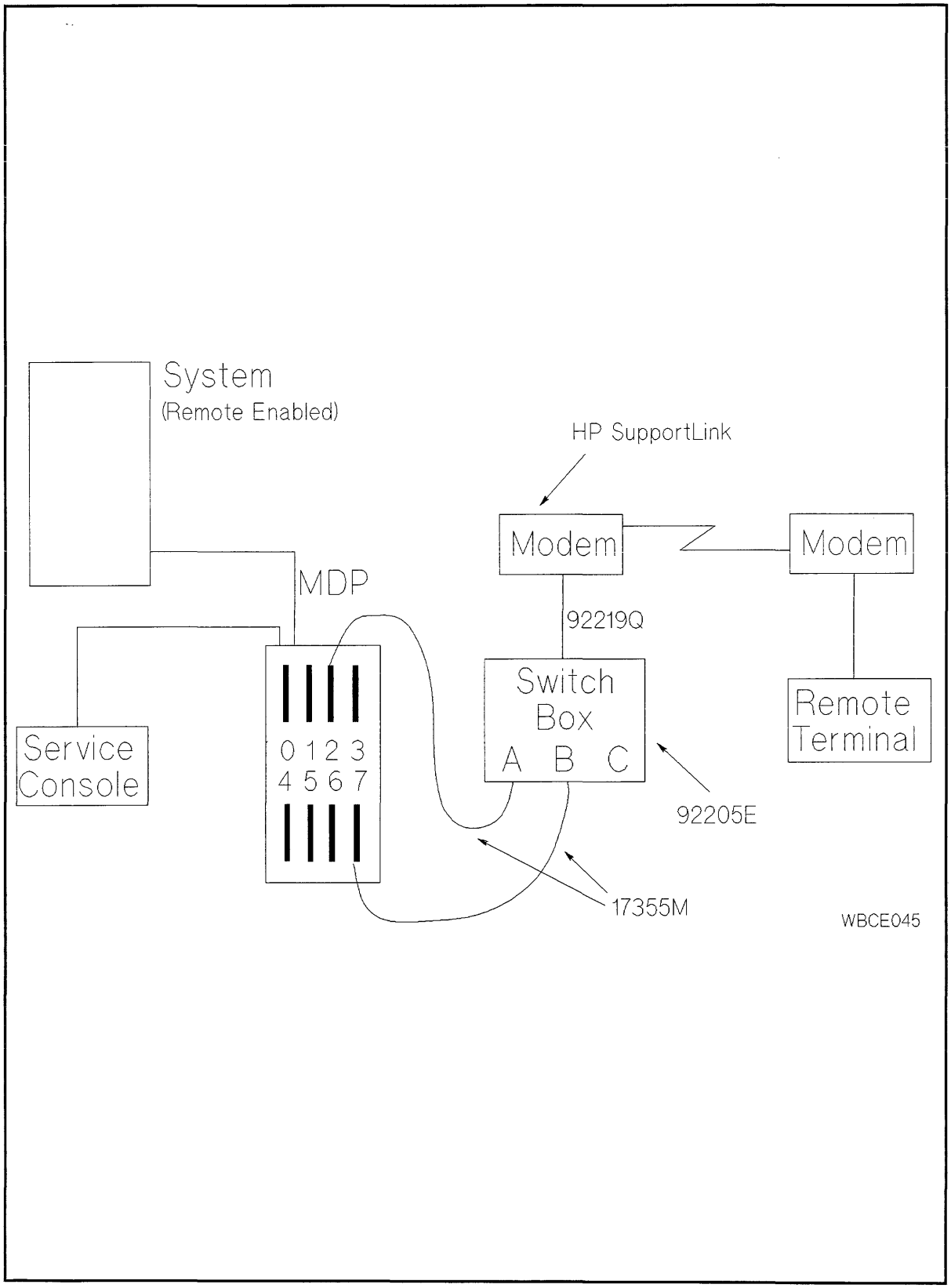



**Figure 4-7. Console-less System Support Configuration**

The switchbox performs a function similar to that of the Access Port "Enable Remote" command.

If the switchbox is set to position "A", a session through the modem is created through port 2 on the local system. This is the normal "session access" to the system for Response Center personnel and end-users for remote system administration.

If the switchbox is set to position "B", access through the modem is to port 7 on the local system. The local system must be configured with the remote console permanently enabled (AP ER command). This setup allows access to the console port and is considered the "remote console" connection that is traditionally provided by the Access Port.

Note that the local console port is left open for local console usage as needed. Onsite support by authorized service providers may be performed through the attachment of a terminal device to port 0.

Hewlett-Packard Customer Engineers (CEs) in Japan use the HP Omnibook 300 PC with an HP terminal emulator and a 9-pin to 25-pin serial cable as a "service console". Users of this and other terminal emulation devices should set the device to 9600 baud, 8 data bits, 1 stop bit, and no parity. Omnibook users should select "COMM 1", and use a 24542M or similar 9-pin to 25-pin serial cable for connection to port 0.

## Memory Subsystem Configuration

The memory subsystem consists Single In-line Memory Modules (SIMMs) that plug into the CPU card assembly.

**Note**

HP 9000/800 Ex5 Class memory SIMMs are not interchangeable (or compatible) with any HP 9000/800 F, G, H, or I Class memory SIMMs.

Also, HP 3000/9X8LX/RX memory SIMMs are not interchangeable (or compatible) with HP 3000/9X7LX/RX/SX memory SIMMs.

Figure 4-8 shows the memory SIMM card slot numbering scheme. Notice that there are four slots, numbered 0 to 3 right to left, with two connectors per slot (A and B). These memory slots are located on the CPU card near the card bulkhead.

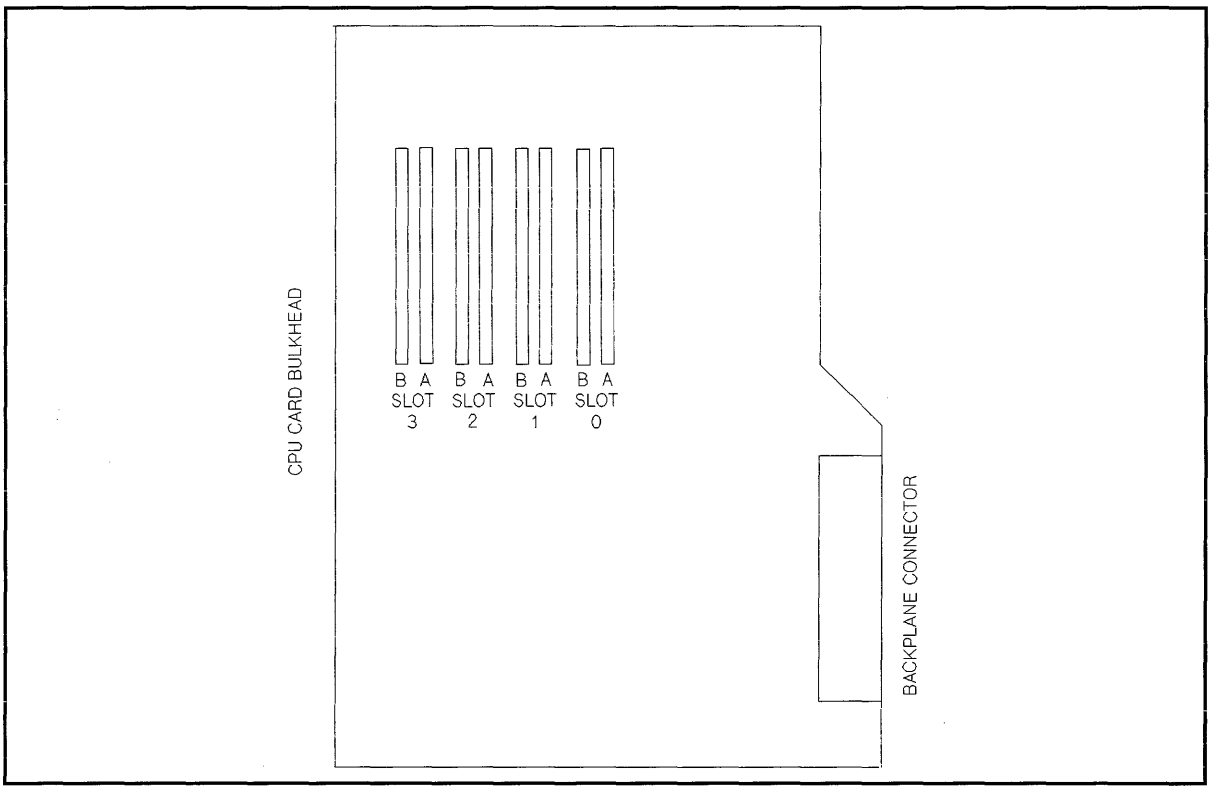



**Figure 4-8. Memory Slot Identification**

## Memory Configuration Rules

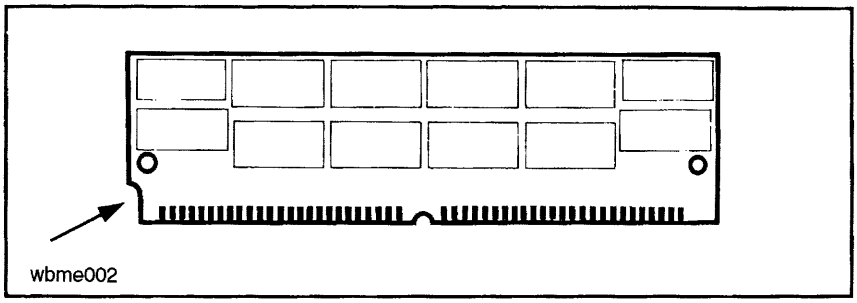
The following configuration guidelines apply to all HP 3000 9X8 and HP 9000 800 Ex5 Class systems.

1. Memory SIMMs **MUST** be installed in pairs.
2. Each memory SIMM installed in a slot pair must be the same size (e.g., 8MB and 8MB, 32MB and 32MB, or 64MB and 64MB).
3. The slots should be loaded starting with slot 3 (A and B) then slots 2 through 0 sequentially. This is due to the angle the SIMMs are inserted into the connectors during installation.

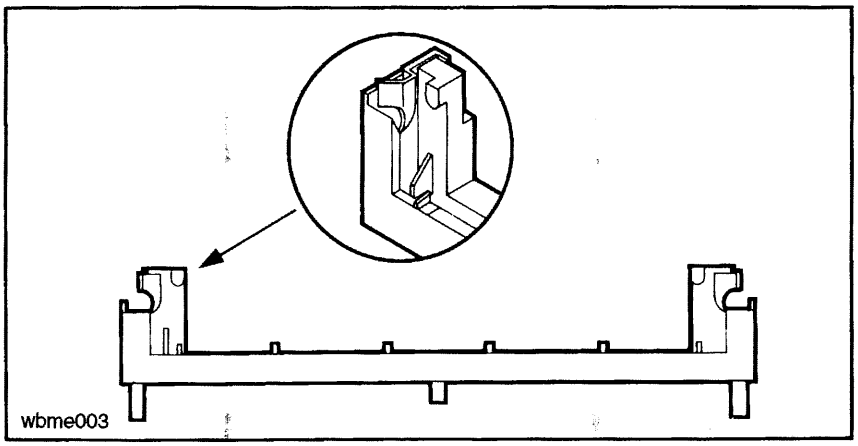
Perform the following steps to add memory SIMMs to the computer:

1. Perform a system shut down.
2. Press the ON/OFF switch to remove DC power from the system.
3. Disconnect the power cord from the wall outlet to remove AC power. If the computer is connected to a UPS, put the UPS *Output* switch in the OFF (O) position, then remove the line cord from the computer.
4. Loosen the two captive mounting screws on the Memory/CPU cover plate and remove the cover plate.
5. Loosen the two captive mounting screws on the CPU card and remove the CPU card.

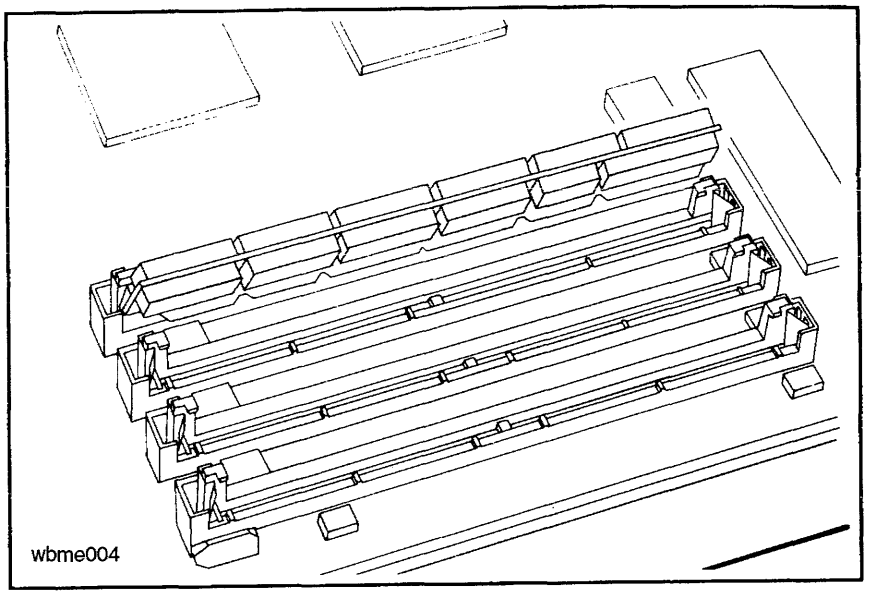
6. Place the CPU card on an anti-static pad.
7. Locate the notch in the memory SIMM to be installed.



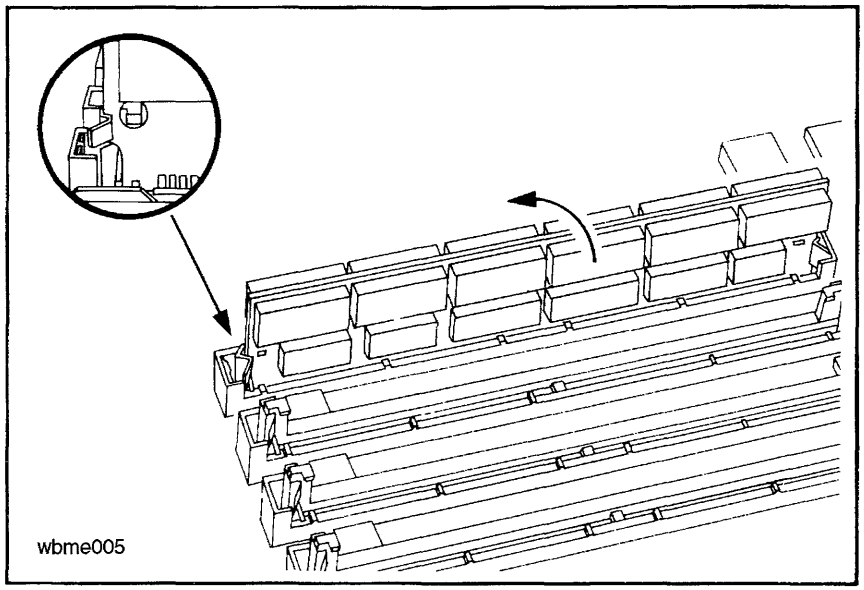

8. Locate the key on the CPU connector memory slot.




9. Insert the SIMM into the connector at approximately a 45 degree angle.




10. Press firmly on the SIMM to seat it into the connector.
11. Rotate the SIMM in its connector until the retaining clips hold the SIMM firmly in place. Be sure that the post protrudes through the hole in the SIMM.




12. Repeat steps 7 through 11 for each SIMM.

**Note**

Be sure to start the SIMM insertion in the highest slot number, inserting the B connector first then the A connector. Then insert the next SIMM pair into the next lower sequential slot number (connector B then A).

13. When all memory SIMMs are installed on the CPU card, replace the CPU card into the computer.
14. Replace the cover plate.
15. Re-attach the power cord that was removed.
16. Turn ON the computer. When the computer completes self-test, the amount of configured and tested memory is displayed, note the displayed number and verify that all installed memory is recognized.

The computer system is now ready to complete the boot process. The new memory is automatically configured into the computer during the power up and self-test process.

**Caution** 

During power on CPU selftest, PDC checks the memory configuration. If PDC finds an invalid memory configuration it will issue a selftest halt code (hex 707C) and stop the boot process.

## Remote Support Modem Configuration

This section contains information for connecting specific modems to the HP 3000 Series 9x8 Family and HP 9000 800 Ex5 Class system Multifunction I/O (MFIO) modem interface connectors. This section also discusses the signal line behavior of the Multifunction I/O modem interface to aid in configuring modems that are not listed.

General rules for configuring modems:

- The modem must be set up to respond to DTR.
- CTS should follow RTS.
- DSR must follow OH, not DCD.
- For Bell mode, the modem should disregard RTS.
- Both modems should either be set to the same compression mode or both should be set to no data compression. If you have problems connecting two modems, usually the fault is that one is enabled for some MNP level and the other modem is set for no data compression.

If the modem sends up-modem dialog with all of the signals asserted, it is possible that the user will be logged off immediately when a password is enabled for the Access Port (AP). Fix this by setting the modem so it does not report connection status via the data path.

**Note** 

V.22bis/V.25bis modes are not supported on the HP 9000 8x7 Multi-function I/O interfaces.

The supported modems are described below.

## HP Support Link (HP50759A)

Supported modes:

- Bell
- CCITT_OM
- CCITT_AM
- CCITT_BIS_OM
- CCITT_BIS_AM

Supported cables:

- HP 92219Q - Bell, CCITT_OM, CCITT_AM
- A1703-63006 - CCITT_BIS_OM, CCITT_BIS_AM

Autodial modes: Hayes

This modem is the standard HP Support Link. It supports V.22bis line discipline, but does not support V.25bis autodialing. In order for V.22bis answer mode to work properly, DSR must follow OH. Data Compression should be set *OFF*. Setting data compression *ON* can cause problems when connecting to other modems that do not have data compression.

**Table 4-6. 8-Position DIP Switch Option Settings**

| Switch | Position | Description | Option Command |
|---|---|---|---|
| SW1 | up | DTR Normal | &D2 |
| SW2 | xx* | Verbose Responses | V1 |
| SW3 | up | Suppress Responses | &Q0 |
| SW4 | up | Enable Echo of commands | E1 |
| SW5 | up | Enable Auto Answer | S0=1 |
| SW6 | up | DCD/DSR Normal | &C1 &S1 |
| SW7 | xx* | Depends on phone line | |
| SW8 | down | Enable Command Mode | |

* xx means do not care.

**Table 4-7. 4-Position DIP Switch Option Settings**

| Switch | Position | Description | Option Command |
|---|---|---|---|
| SW1 | down | CTS Normal | &R0 |
| SW2 | down | DSR Follows OH | &S1 |
| SW3 | down | Use HP Defaults | &E0 &E3 &E6 &E10 &E14 $BA1 |
| SW4 | down | No ENQ/ACK Pacing | &E8 |

**Note** An AT1517 command should have the following output:

```
B0 E1 M1 Q0 V1 X0 &E0 &E3 &E6 &E8 &E10 &E14 &Q0
$MB2400 $SB2400 $BA1 &W1

&A0 $A0 &B0 &BS1 &C1 &D2 $D0 $F1 &G0 &I0 &M0 $MI0 &R0 $R0 &S1 &T5 &V1 &W1
```

```
OK
```

## Hayes Smartmodem 2400

Supported modes:

- Bell
- CCITT_OM
- CCITT_AM

Supported cables:

- Must use 92219Q modem cable.

Autodial modes: Hayes.

This modem drives circuit 111 (Pin 23) instead of using it as an input. With either cable (92219Q or A1703-63006), the Multifunction I/O PCA drives this line and the modem drives the same line.

**Caution** 

This modem should not be used because all HP cables connect circuit 111 to the modem. If this modem is connected, both the Multifunction I/O PCA and the modem drive circuit 111. This modem has been used in the past with the CIO-based AP card and had the same problem.

Turn off all data compression modes.

The Hayes defaults for the modem lines must be changed to the following:

**Table 4-8. Switch Option Settings**

| Switch | Position | Description | Option Command |
|---|---|---|---|
| SW1 | up | DTR normal | AT&D3&W |
| SW2 | xx* | | |
| SW3 | down | Result codes disabled | ATQ1&W |
| SW4 | up | Characters echoed | ATE1&W |
| SW5 | up | Auto-Answer enabled | ATS0=1&W |
| SW6 | up | Detect Carrier | AT&C1&S1&W |
| SW7 | up | RJ-11 | AT&J0&W |
| SW9 | down | CCITT | ATB0&W |
| SW10 | down | Return to command state | AT&D3&W |

* xx means do not care.

## Black Box V.32 Plus (Version 2.01.01)

Supported modes:

- Bell
- CCITT_OM
- CCITT_AM

Supported cables:

- Must use 92219Q modem cable.

Autodial modes: Hayes.

This modem does not work with v.22bis because it does not supply 112 and because the sense of 111 is backwards (TRUE means low speed, FALSE means high speed). The fact that 111 is backwards is not too big a problem because the modem can be configured to ignore 111. Change so that DTE Fallback is *Disabled*. This is the factory default. Not supplying 112 means that the Multifunction I/O PCA always thinks it is running at the lower speed. If you set the speed for twice the desired speed, then it will work at the desired speed. It is best not to use this modem with any of the CCITT bis protocols.

The Black Box defaults for all of the modem lines are incorrect and must be changed before this modem will work properly. To do this from the front panel, go into the Change DTE Parameters and set the following:

Responds to DTR
DSR is Normal
DCD is Normal
CTS follows RTS

This can be done with the following AT command: `AT&D2&S1&C1&R`

For Hayes dialing, make certain that the AT command set is enabled. It is normally good to disable status messages to the host by using the `ATQ1` command.

The current configuration can become the power-on configuration by using the `AT&W` command.

This modem does not do any rate shifting. So the DTE rate and the DCE rate must be the same.

This modem seems to work in AP mode with the protocol set to either Bell or CCITT. It does not work with the modem protocol set to CCITT_BIS. Make certain to configure the modem to ignore 111, or configure the Access Port to set FS low. It also seems to work fine in normal mode (i.e. under host control).

## Multitech MT224EH7

Supported modes:

- Bell
- CCITT_OM
- CCITT_AM
- CCITT_BIS_OM
- CCITT_BIS_AM

Supported cables:

- HP 92219Q - Bell, CCITT_OM, CCITT_AM
- A1703-64006 - CCITT_BIS_OM, CCITT_BIS_AM

Autodial modes: Hayes, V.25bis.

**Note**

The version of the modem has a problem when dialing with V.25bis where if the number that is dialed is busy, DSR does not drop. This same problem causes V.25bis error indications to be improperly decoded, meaning that the modem timeout timer must expire before we know that the attempt failed. This also means that multiple dialing attempt will always fail. If the DSR jumper is set so that DSR follows DCD, this problem goes away.

The configuration of the hardware switches on the modem are:

8-position DIP-Switch:

```
Switch:   1    2    3    4    5    6     7    8
-------------------------------------------------
         UP   UP  DOWN   UP   UP   UP   DOWN  DOWN
```

4-position DIP-Switch:

```
Switch:   1    2    3    4
-----------------------------
        DOWN  UP   UP  DOWN
```

For Hayes mode to work correctly, `AT&R0` must be set so that it drops CTS when the connection goes down. For Hayes, `AT$V0` must be set. For V.25bis dialing, `VT$V1` and `AT$BA1` must be set.

Hayes dialing parameters:

```
B0 E1 M1 Q0 R0 V1 X0 &E1 &E4 &E6 &E8 &E10 &E13 &E15
$MB2400 $SB2400 $BA1 &W0

S0   S2   S3   S4   S5   S6   S7   S8   S9   S10  S11  S12  S24  S25  S30
001  043  013  010  008  002  030  002  006  007  070  050  020  000  000

$A0 &A0 &B0 &BS1 &C1 $D0 &D2 #DB0 $EB0 $F1 &G0 #L0 $MI0 &M0
&P0 #P2 &Q0 &Q3 $R0 &R1 &S1 $T1 &T4 $V0 $VD0 &X0 Y0
$MB2400 $SB2400 $BA1 &W0

OK
```

For V.22bis autoanswer, internal jumper DSR must be set so that DSR follows OH. The factory default is for DSR to follow CD. This is different from the Support Link where the factory default was for DSR to follow OH. There does not seem to be an AT command that does this.

V.25bis dialing parameters:

```
B0 E1 M1 Q0 R0 V1 X0 &E1 &E4 &E6 &E8 &E10 &E13 &E15
$MB2400 $SB2400 $BA1 &W0

S0   S2   S3   S4   S5   S6   S7   S8   S9   S10  S11  S12  S24  S25  S30
001  043  013  010  008  002  030  002  006  007  070  050  020  000  000

$A0 &A0 &B0 &BS1 &C1 $D0 &D2 #DB0 $EB0 $F1 &G0 #L0 $MI0 &M0
&P0 #P2 &Q0 &Q3 $R0 &R1 &S1 $T1 &T4 $V1 $VD0 &X0 Y0
$MB2400 $SB2400 $BA1 &W0
VAL
```

To modify a MT224E7B:

- Open modem and change the DSR jumper.
- Set switches on the bottom of the box to above.
- Send AT&R0
- For Hayes dialing, send `AT$V0`.
- For V.25bis dialing, send `AT$V1`.

## HP 37212B

Supported modes:

- Bell
- CCITT_OM
- CCITT_AM
- CCITT_BIS_OM
- CCITT_BIS_AM

Supported cables:

- HP 92219Q - Bell, CCITT_OM, CCITT_AM
- A1703-64006 - CCITT_BIS_OM, CCITT_BIS_AM

Autodial modes: None

It is best to use this modem in CCITT mode because it causes the Access Port to hang up if used in Bell mode at 1200 baud. It can be used in Bell mode at 2400 baud, or either 1200 or 2400 in CCITT mode. This modem can not be dialed with either Hayes or V.25BIS autodial protocols.

**Table 4-9. HP 37212B Switch Configuration**

| Switch | Position | Description |
|---|---|---|
| S1 | down | Computer mode operation (HP command set) |
| S2 | down | |
| S3 | up | |
| S4 | down | Primary channel |
| S5 | down | 1 start, 8 data and 1 stop |
| S6 | down | |
| S7 | down | Error correction disabled |
| S8 | up | No Flow control |
| S9 | up | |
| S10 | down | DSR/CTS/CD to RS-232-C definition |
| S11 | up | |
| S12 | up | DTR behaves to RS-232-C definition |

**Note**

Although this modem claims to be able to dial using V.25bis, it only uses the V.25bis line discipline. The command set does not match the set specified in the V.25bis specification.

## Modem Cable Pin-out

The following pin-out is for the 92219Q cable, which is most often used to connect the Access Port to the support modem.

**Table 4-10. 92219Q Cable Pin-out**

| Computer End | Signal Name | Modem End |
|---|---|---|
| 2 | TD | 3 |
| 3 | RD | 2 |
| 8 | RTS | 4 |
| 22 | CTS | 5 |
| 20 | DSR | 6 |
| 6 | DTR | 20 |
| 9 | RI | 22 |
| 4 and 5 | DCD | 8 |
| 23 | FS | 23 |
| 7 | GROUND | 7 |

The pinout for the A1703-63006 cable is the same except that pin 9 on the computer end is routed to pin 12 on the modem end and that Line functions as Rate Select (RS). This cable is only used with the A1703-60003 SCSI/Console/LAN Multifunction I/O interface for V.22bis/V.25bis applications.

## Multifunction I/O PCA Modem Line Behavior

### CCITT Mode - AP protocol 0

This protocol is known as HP-UX CCITT. The card waits for RI before raising DTR. It also raises RTS when it raises DTR. If DSR does not come up within 25 seconds, DTR goes back down. The connection also depends on CTS and DCD. DCD can drop for up to 400ms before the connection will drop. CTS must stay high always. Once CTS drops, the connection starts to drop. A new connection cannot occur until DSR, DCD and CTS all drop. FS can be programmed to either state via the `CA` command.

### Bell Mode - AP protocol 1

This is sometimes called Bell simple protocol. It raises DTR when it can accept a connection. The connection is valid when it sees DCD. It drives RTS whatever it was when Remote is enabled (usually, RTS is low) and does not look at DSR or CTS. When a disconnect is done, DCD must drop before a new connection can be made (i.e. it will not raise DTR until DCD drops).

### CCITT_BIS Mode - AP protocol 2

This protocol is CCITT V.22bis. It requires the special cable A1703-63006 which is just like the 92219Q cable with the exception that pin 9 on the computer end is routed to pin 12 (RS) rather than pin 22 (RI). DTR is raised whenever a connection is allowed. RTS follows DSR. A connection is established when DSR is high. CTS can drop for an indefinite amount of time without dropping the connection. The card will not send data to the modem when CTS is

low. DCD can drop for up to 400ms before the connection is dropped. Once the connection is dropped, DSR, DCD and CTS must all go low before a new connection can be made. RS controls what speed the card sends to the modem. If RS is high, the programmed baud rate is used. If RS is low, half of the programmed baud rate is used. If you use the 92219Q cable, the baud rate will most certainly be half the programmed baud rate, since RI will almost always be down. FS can be programmed to either state via the `CA` command.

## Modem Settings (HP Predictive Support)

The *HP Predictive Support User's Guide for HP 3000 Series 900* (p/n 50779-90012) contains additional information on HP predictive support modem settings. Table 4-11 contains a quick reference description of the modem switch settings for autodial modems connected to the LAN/Console port.

**Note**

Some of the settings in Table 4-11 are different than those described in the first part of the Appendix. This is true for modems connected to a DTC or manually dialed modems. Please refer to HP Predictive Support on-line help for proper switch settings. Also be aware that the modems listed here are not necessarily recommended or supported as Remote Support Modems.

**Table 4-11. Predictive Support Modems and Switch Settings**

| Modem Type | Switch Settings[1] |
|---|---|
| HP 50759A (Support Link) | X1, X2, X4, S4, and S8; Down<br>All others; Up |
| HP 50759B | S2, S3, S4, S7, S8, S9, S12, and S16; Down<br>All others; Up |
| HP 37212A | All switches; Open |
| HP 37212B | S3, S11, and S12; Up<br>All others; Down |
| Hayes Smartmodem | S4, S8, and S10; Down |
| Support Link I | Option 1: Code 3<br>Option 1: Code 2<br>Option 8: Code 2<br>Option 15: Code 2<br>Option 16: Code 2<br>Option 22: Code 1 for pulse<br>Option 22: Code 2 for tone<br>Option 22: Code 3 for autoselect<br>Option 24: Code 2 |
| Support link II | Option 1: Code 3<br>Option 1: Code 2<br>Option 8: Code 2<br>Option 15: Code 2<br>Option 16: Code 2<br>Option 22: Code 1 for autoselect<br>Option 22: Code 2 for tone<br>Option 22: Code 3 for pulse |

**Note**

[1] The switch settings are for autodial modems connected to the LAN/Console port.

# Adding Peripherals to OS Configuration

## MPE-iX

The goal of this procedure is to help you find the device path and driver before you shut the system down.

1. Configure the new device. If you know how to configure the new device, continue with SYSGEN.

   If you do not know how to configure the new device, check the IODEFAULT file **iodfault.pw.sys** using the Editor to find the correct driver.
2. Configure the device on an available path with like devices.
3. Make sure the system has been backed up.
4. Make sure that the operating system is ready to be shut down.
5. Shut down the operating system.
6. Connect the device to the system. Make sure the address of the device is set correctly to match the configuration in SYSGEN.
7. Power up the device and the system. At the PDC prompt, access the PDC Information menu. Use the **All** command to display all system configuration and card path information.

   Or you can bring the system up to ISL and run IOMAP to check the device configuration and device ID.

   You can also load the Offline Diagnostic Environment (ODE) from whatever removable media you have. Then run MAPPER to check the device configuration and device ID.
8. Bring up the operating system and finish testing the new device.

## HP-UX

1. Login as superuser (SU) or root.
2. Enter **ioscan -fC disk**. This indicates the current disk configurations: the used and unused SCSI addresses.
3. Shut down the OS as you normally do.
4. Set the jumpers on the new disk to an unused address.
5. Open the system and install the disk. Note the termination. If you are installing the disk at the end of the cable, make sure the SCSI terminators are installed on the disk.
6. Boot to ISL and run MAPPER in the Off-line Diagnostic Environment (ODE), or IOMAP, to confirm that the hardware configuration is correct.
7. Boot to HP-UX. Enter **ioscan -fC disk** to confirm that the changes have been made to the system tables. Further information is available with the **diskinfo** command. The syntax is:

   **diskinfo /dev/rdsk/cxd0s2**

   where **x** represents the logical unit number (SCSI address) of the disk in question.

## Determining Hardware Device Paths

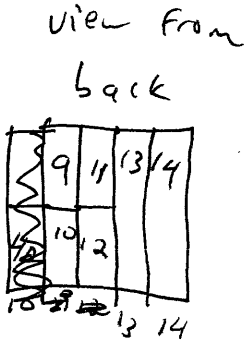
Use Table 4-12 and Table 4-13 to determine which valid device path addresses are associated with the backplane slot numbers.

The device path address is calculated with this formula.

```
<(HP-PB slot number * 4) + module number> . <device address> = device path address
```

**Table 4-12. Slot Path Addresses and Device Path Addresses**

| Slot Number | Device Path Address (without Precision Bus Adapter) | Device Path Address (with Precision Bus Adapter) |
|---|---|---|
| 9 | 56/36.<device address> | Not useable |
| 10 | 56/40.<device address> | 56/40.0.<device address> |
| 11 | 56/44.<device address> | Not useable |
| 12 | 56/48.<device address> | 56/48.0.<device address> |
| 13 | Special slot. Refer to Table 4-13 | |
| 14 | Special slot. Refer to Table 4-13 | |




#14 is right most, viewed from Rear

**Table 4-13. Slot 13 and 14 Path Addresses for Multifunction I/O Cards**

| System Model | Slot Number | Device Path Address | Path Name |
|---|---|---|---|
| HP 9000 Systems | 13 | 56/52.<device address> | SCSI |
| | 13 | 56/53.0<device address> | Parallel Printer Port |
| | 14 | 56/56.0 | Console |
| | 14 | 56/56 Port 7 | Remote Console |
| | 14 | 56/56 Port 1 | UPS |
| | 14 | 60/6 | LAN |
| HP 3000 Systems | 13 | 56/52.<device address> | SCSI |
| | 14 | 56/56.0 | Console |
| | 14 | 56/56.1 | Remote Console |
| | 14 | 56/56.3 | UPS |
| | 14 | 56/56 | LAN |

## Peripheral Upgrade Configuration Rules

Refer to Figure 4-9 for a matrix of the physical location and SCSI addresses of the removable media peripherals that can be installed. Note that the 8mm Tape Drive can be installed in the same location as the QIC Tape Drive.

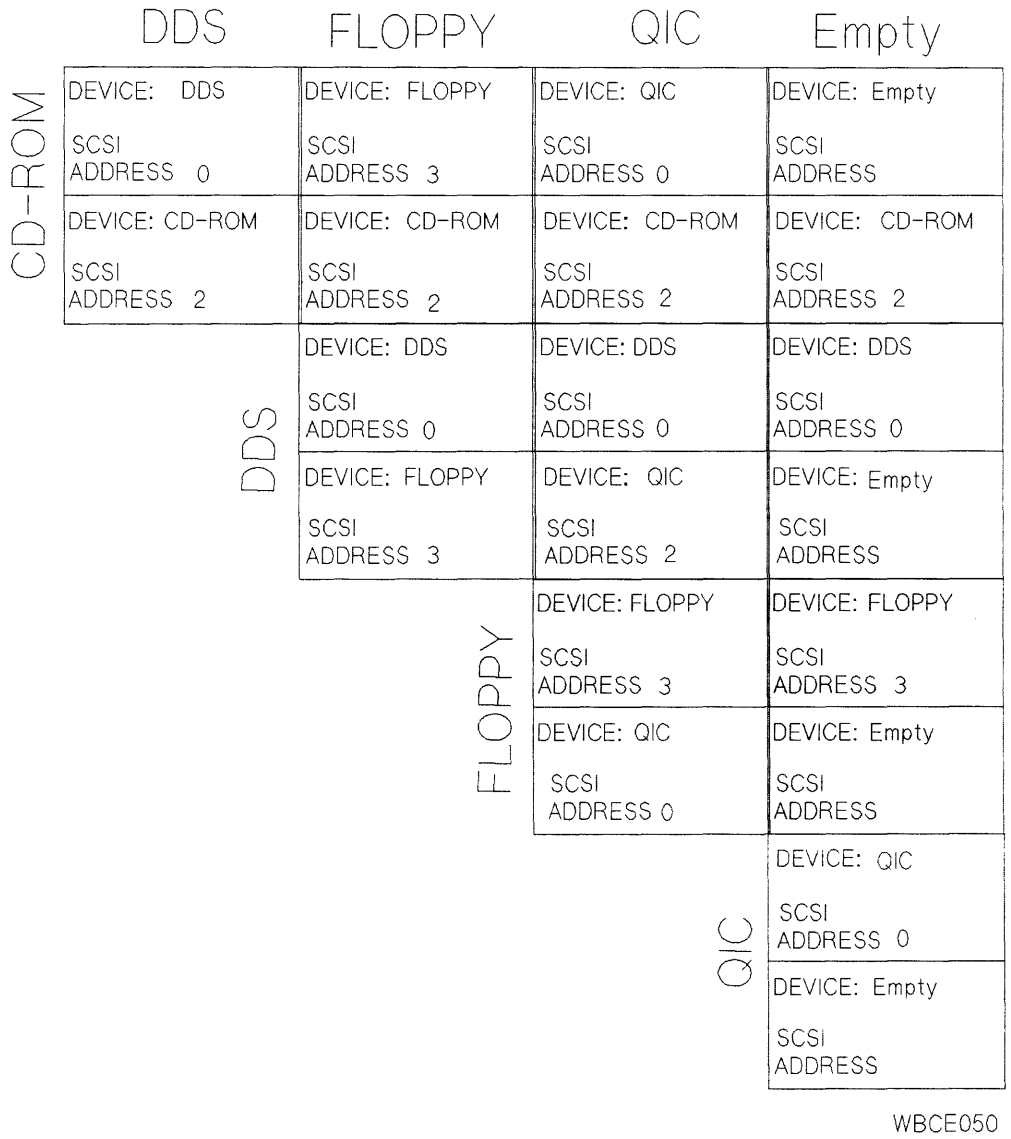



**Figure 4-9. Removable Media Peripheral Locations and SCSI Addresses**

## Disk Part Numbers

Table 4-14 lists the product and part numbers associated with the disk drives introduced with the HP 3000 9x8 Family and HP 9000 Model 800 Ex5 Class systems.

**Table 4-14. Disk Numbers**

| Disk Size Capacity | Product Number | Manufacturing Product Number | Part Number on Disk | Exchange Part Number |
|---|---|---|---|---|
| 3.5-inch 1GB | A2445A | C2247 | 0950-2362 | C2247-69365 |
| 3.5-inch 535MB | A2958A | N/A | A2958-60001 | A2958-69001 |
| 3.5-inch 2GB | A3087A | C2490 | C2490-60635 | C2490-69635 |

## 3.5-inch Hard Disk Drive (A2445A and A3087A) Configuration

**Caution**

- The drive configuration is set for the system it is installed in. Changing the configuration may cause the drive to malfunction.
- Devices outside the system will be configured differently.
- The connector jumpers are not interchangeable from one connector to another. Interchanging the jumpers may damage the connectors.

The drive configuration is set with jumpers on the address/option connector (see Figure 4-10). A pin-set is shorted with a jumper installed or open without a jumper. Table 4-16 lists pin-set functions

**Table 4-15.**
**Option Settings for 3.5-inch Hard Disk Drives (A2445A and A3087A)**

| Function | Pin-set | Setting |
|---|---|---|
| Write Protect/ Power-Fail Reset | 1 | Open |
| Unit Attention | 2 | Open |
| SDTR | 3 | Jumpered |
| Parity | 4 | Jumpered |
| Auto Spin-up | 5 | Jumpered |
| Sync Spindle | 7,8 | Jumpered, Open |
| SCSI Address | 10,11,12 | Device address |
| SCSI-1/SCSI-2 | | Open |
| Power-Fail Reset Enable | | Open |
| Terminator Power | | See Note below. |
| Terminator Enable | | See Note below. Jumpered-Terminated Open-No Termination |

**Note**

Terminator Power and Terminator Enable must both be set open or must both be jumpered. They must be jumpered if the disk is the last device on the bus.

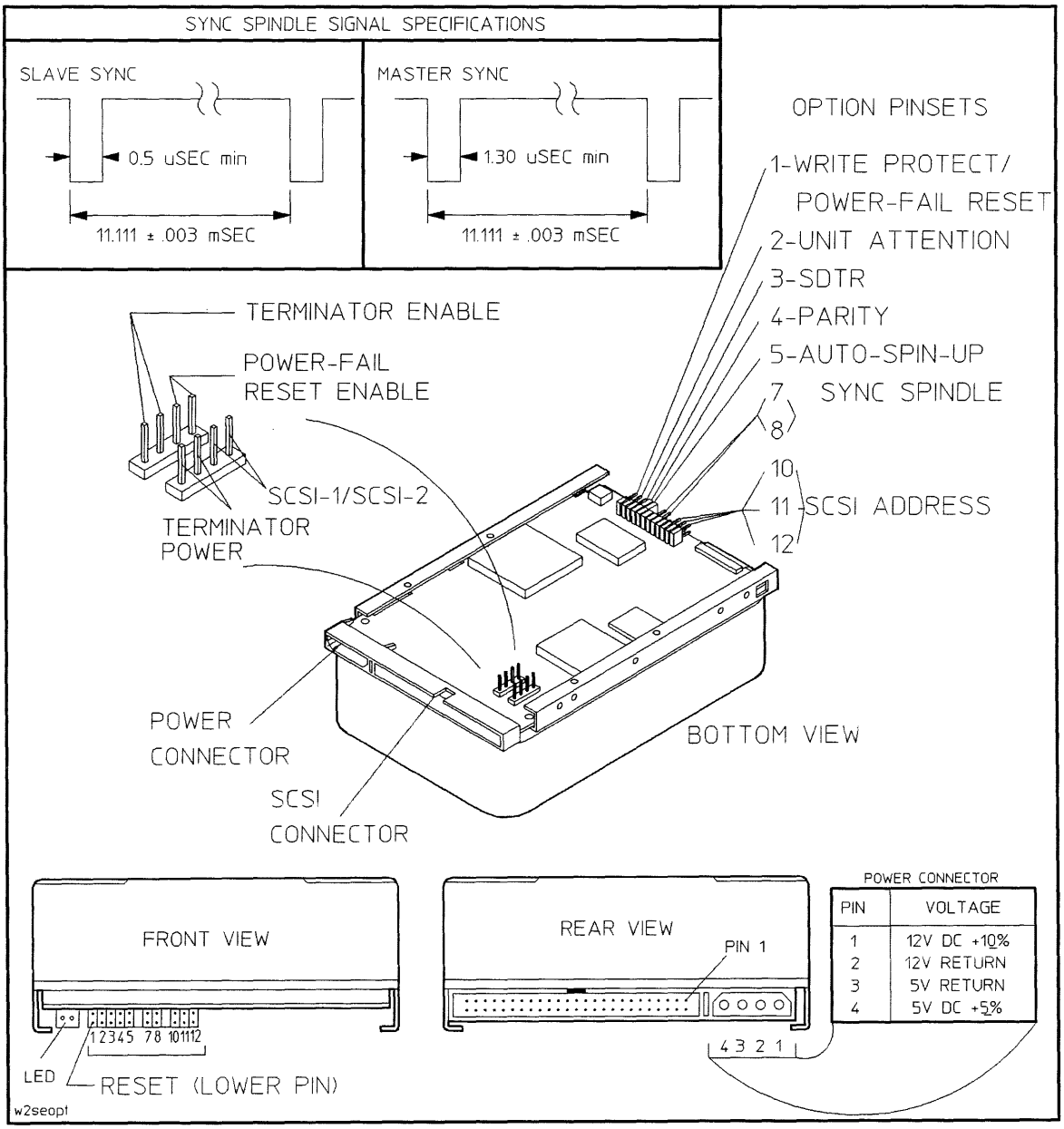



**Figure 4-10. Single-Ended Drive Connectors**

**Table 4-16. Address/Option Connector Configurations**

| Pin-set | Function | | Configuration |
|---|---|---|---|
| | Upper Pin[1] | Lower Pin[1] | |
| 1 | Not Used | Power-Fail Reset/ Write Protect | Used in multiuser systems to provide fault tolerance. *Do not* short this pin-set. |
| 2 | Gnd | Unit Attention | **Open:** Enable Unit Attention.<br>**Shorted:** Inhibit Unit Attention. |
| 3 | Gnd | SDTR | **Open:** Inhibit drive initiation of SDTR message.<br>**Shorted:** Enable drive initiation of SDTR message at Power-On and Reset. |
| 4 | Gnd | Parity | **Open:** Inhibit parity checking.<br>**Shorted:** Enable parity checking. |
| 5 | Gnd | Auto Spin-Up | **Open:** Drive will not spin up until Initiator sends Start Unit Command.<br>**Shorted:** Drive will spin up automatically at Power-On. |
| 6 | Key: No pins. | | |
| 7 | Gnd | SCSI pin 29 | **Note:** Pin-sets 7 and 8 have no effect if Sync Spindle Mode is disabled.<br>**7 Open, 8 Open:** *Not Allowed.*<br>**7 Open, 8 Shorted:** Connects Sync Spindle line to SCSI pin 29. When pin-set 8 is shorted, pin-set 7 *must* be open.<br>**7 Shorted, 8 Open:** Connects SCSI pin 29 to ground. Upper pin of pin-set 8 is sync output in Master mode, or sync input in Slave mode. When pin-set 7 is shorted, pin-set 8 *must* be open.<br>**7 Shorted, 8 Shorted:** *Not Allowed.* |
| 8 | SCSI pin 29 | Sync Spindle | |
| 9 | Key: No pins. | | |

1 Refers to the pin's orientation when the disk drive is viewed in the right-side-up position (see Figure 4-10, "FRONT VIEW").

**Table 4-16. Address/Option Connector Configurations (continued)**

| Pin-set | Function | | Configuration |
|---|---|---|---|
| | Upper Pin[1] | Lower Pin[1] | |
| 10 | Gnd | Unit Select 1 | O = Open, S = Shorted<br><br>SCSI Address 0: 10 = O, 11 = O, 12 = O<br>SCSI Address 1: 10 = O, 11 = O, 12 = S<br>SCSI Address 2: 10 = O, 11 = S, 12 = O<br>SCSI Address 3: 10 = O, 11 = S, 12 = S<br>SCSI Address 4: 10 = S, 11 = O, 12 = O<br>SCSI Address 5: 10 = S, 11 = O, 12 = S<br>SCSI Address 6: 10 = S, 11 = S, 12 = O<br>SCSI Address 7: 10 = S, 11 = S, 12 = S |
| 11 | Gnd | Unit Select 2 | |
| 12 | Gnd | Unit Select 3 | |
| | | | |
| SCSI-1/SCSI-2 | | | **Open:** Default = SCSI-2.<br>**Shorted:** Drive is forced to respond as a SCSI-1 device. |
| Power-Fail Reset Enable | | | **Shorted:** Reset enabled. Used in multiuser systems to provide fault tolerance. A Reset signal from the power supply is routed to pin-set 1 (see pin-set 1 description) to warn of impending power loss; the drive finishes writing the current sector then resets.<br>**Open:** Reset disabled (also reverts pin-set 1 to Write Protect function). |

## 3.5-inch Hard Disk Drive (A2958A) Configuration

**Caution**

- The drive configuration is set for the system it is installed in. Changing the configuration may cause the drive to malfunction.
- Devices outside the system will be configured differently.
- The connector jumpers are not interchangeable from one connector to another. Interchanging the jumpers may damage the connectors.

The drive options are selected on J2. The drive SCSI ID (address) is set on J5 (see Figure 4-11). Table 4-17 shows how the option pin-sets for the 3.5-inch hard disk drive (A2958A) should be set. Table 4-18 provides a functional description of the J2 jumpers.

A pin-set is shorted with a jumper installed or open without a jumper. The J5 option settings are shown on Figure 4-11.

**Table 4-17. J2 Option Settings for 3.5-inch Hard Disk Drive (A2958A)**

| Function | Pin-set | Setting |
|---|---|---|
| Terminator Power (**TP**) | 1, 2 | Open (Position A) if last device on bus.See Figure 4-11. |
| Reserved (**RES**) | 3 | Open |
| Parity (**PE**) | 4 | Jumpered |
| Write Protect (**WP**) | 5 | Open |
| Motor Enable (**ME**) | 6 | Open |
| Delay Start (**DS**) | 7 | Open |

**Table 4-18. J2 Jumper Function Description**

| Jumper | | Jumper Function Description |
|---|---|---|
| **TP** | **TP** | |
| Off | Off | No terminator power is connected to drive terminators or SCSI bus I/O pin 26. |
| On | Off | Drive supplies its own terminator power only. |
| Off | On | Drive supplies power to I/O pin 26 of SCSI bus, none to internal terminators. |
| On | On | Drive supplies terminator power to itself (internal connection) and to I/O pin 26 of SCSI bus. |
| **TP POSITION A** | | |
| On | | This horizontally positioned jumper across the two **TP** positions nearest the PCB edge connects terminator power from SCSI bus I/O pin 26 to the drive's internal terminators. (For single-ended only.) **Set if it is the last device on the bus.** |
| **RES** | | |
| Off | | Reserved. |
| **PE** | | |
| On | | Parity checking and parity error reporting by the drive is enabled. |
| Off | | Drive does not report result of parity checking to host. |
| **WP** | | |
| On | | Entire drive is write protected. |
| Off | | Drive is not write protected. |
| **DS** | **ME** | |
| Off | Off | Spindle starts immediately after power up. |
| Off | On | Drive spindle does not start until Start unit command is received from host. |
| On | Off | Spindle Startup is delayed by SCSI ID times 12 seconds after power is applied, i.e. drive 0 spindle starts immediately when DC power is connected, drive 1 starts after 12-second delay, drive 2 after 24-second delay, etc. |
| On | On | Drive spindle starts when Start Unit command is received from the host. Delayed start feature is overridden and does not apply when the **ME** jumper is installed. |
| **RES** | | |
| Off | | Reserved |

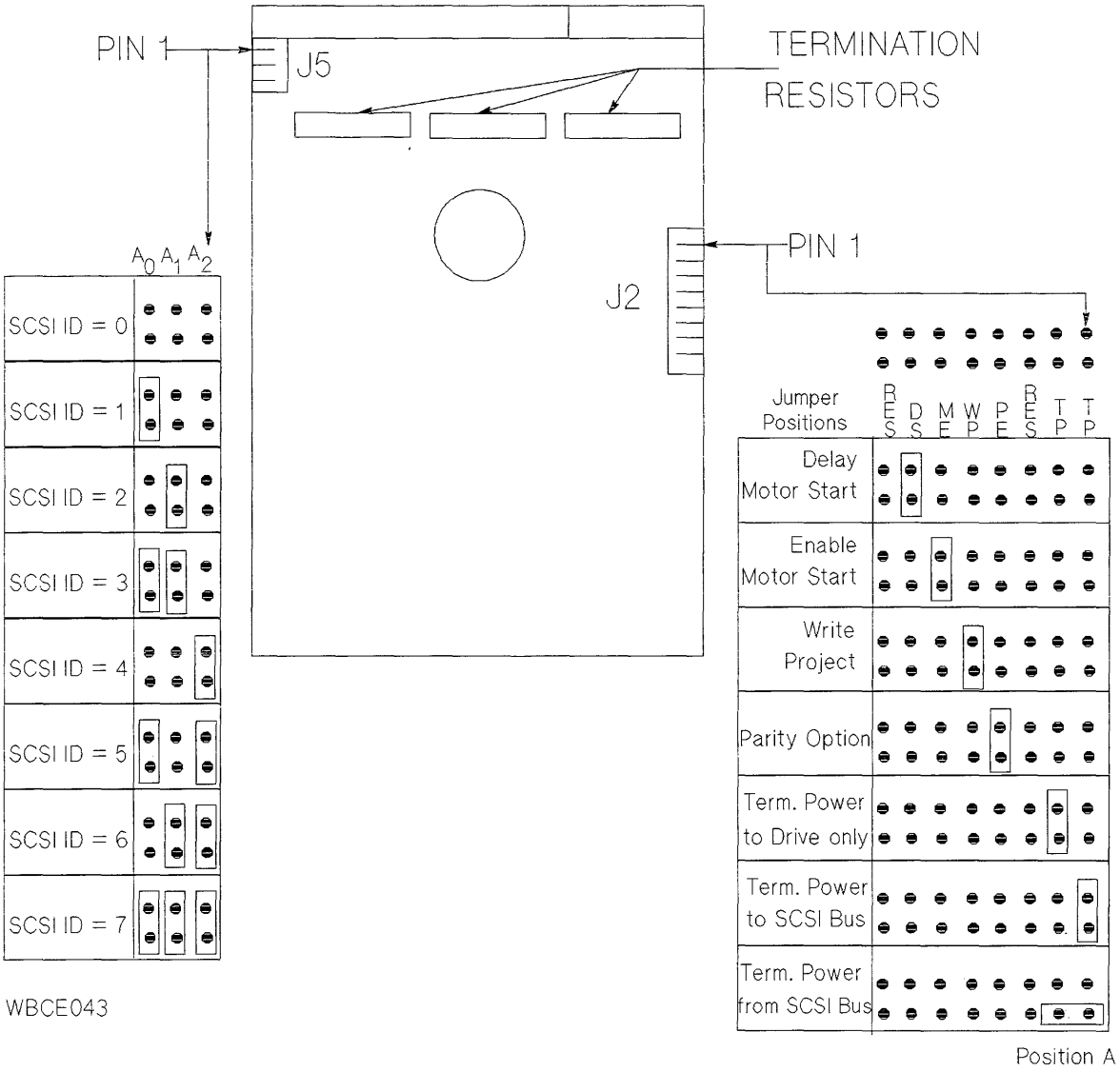



**Figure 4-11. A2958A 3.5-inch Hard Disk Drive Option Select Connectors**

# DDS-Format DAT Drive Configuration - C1503B and C1504B

**Caution**

The drive configuration is set for the system it is installed in. Changing the configuration may cause the drive to malfunction.

Devices installed outside the system will be configured differently.

**Note**

All of the configuration information for the C1504B 3.5-inch DAT drive is the same as that for the C1503B 3.5-inch DAT drive

## Options

The drive configuration is set with jumpers on the option connector (see Figure 4-12). A pin-set is shorted with a jumper installed, or open without a jumper.

## SCSI Address

**Note**

Some drives include an address cable that is connected to the SCSI Address pin-sets.

On drives that do not include an address cable, the SCSI address is set using jumpers. Figure 4-12 shows jumper settings for SCSI address 0 through 7. Avoid using address 7. It is usually reserved for the host bus adapter (HBA).

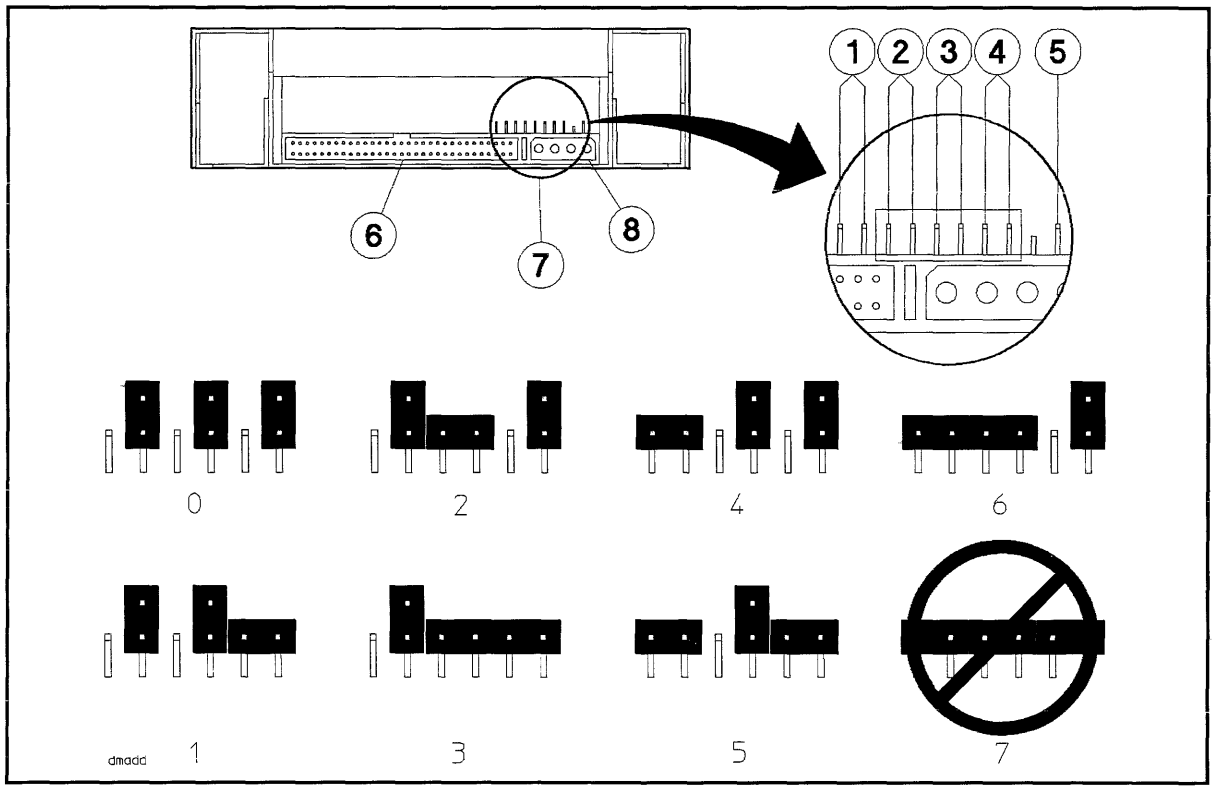



**Figure 4-12. Option Connector Pin-sets and SCSI Address Options**

1. Pin-set 1 (Terminator Power)
2,3,4. Pin-sets 2,3,4 (SCSI Address)
5. Pin 5 (NO CONNECTION)
6. SCSI Connector
7. Option Connector
8. DC Power Connector

**Table 4-19. Option Connector Settings for 800 Ex5 Class and 9x8 Systems**

| Pin-set | Setting |
|---|---|
| 1 | Open |
| 2,3,4 | Set to SCSI address |
| 5 - 8 | Open |

### Optional Configuration Jumper Switch

Set the switches on the bottom of the drive as shown in Figure 4-13.

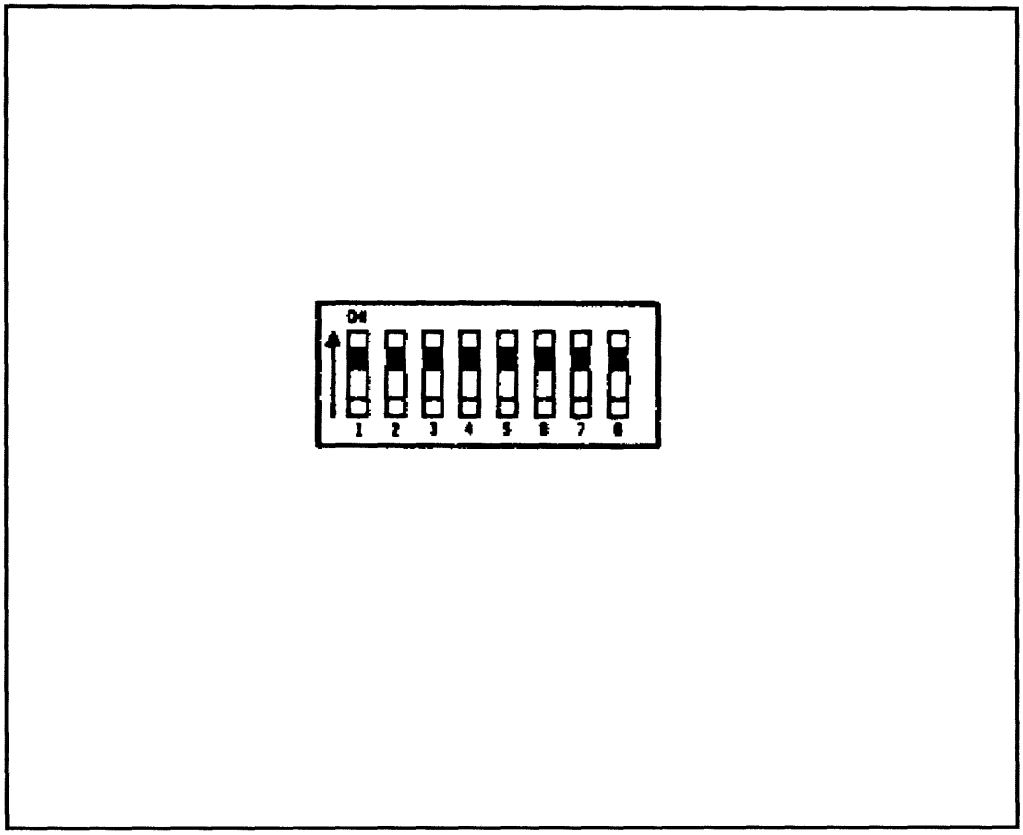



**Figure 4-13. Optional Configuration Jumper Switch**

## CD-ROM Drive Configuration

**Caution**

The drive configuration is set for the system it is installed in. Changing the configuration may cause the drive to malfunction.

Devices installed outside the system will be configured differently.

### Options

The drive configuration is set with jumpers on the option connector (see Figure 4-14). A pin-set is shorted with a jumper installed, or open without a jumper. Table 4-21 lists the option connector pin-set functions.

## SCSI Address

Figure 4-14 shows jumper settings for SCSI address 0 through 7. It is usually reserved for the host bus adapter (HBA).

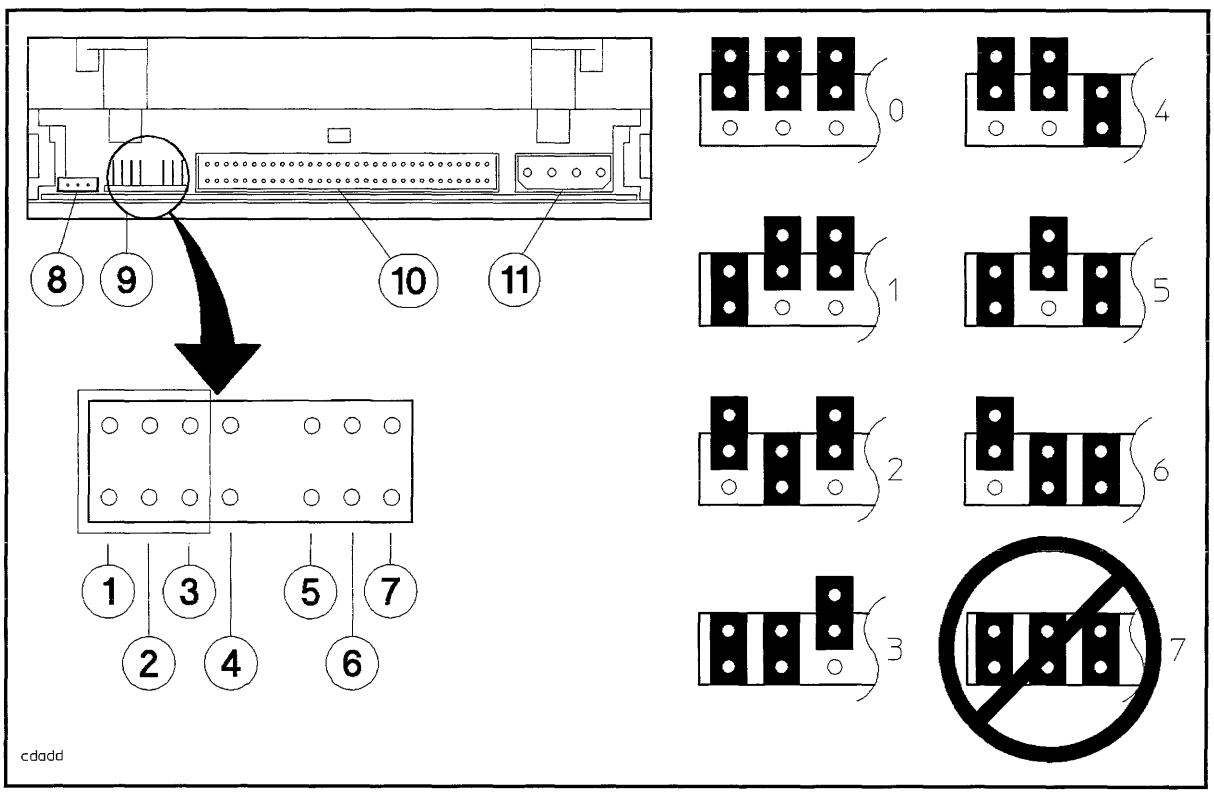



**Figure 4-14. Configuration Pin-sets**

1,2,3. Pin-sets 1,2,3 (SCSI Address)
4. Pin-set 4 (Parity)
5. Pin-set 5 (Prevent/Allow)
6. Pin-set 6 (Test)
7. Pin-set 7 (Terminator Power)
8. Audio output (not used)
9. See above

**Table 4-20. Configuration Settings for 800 Ex5 Class and 9x8 Systems**

| Pin-set | Setting |
|---|---|
| 1,2,3 | Set to SCSI address |
| 4 | Jumpered |
| 5 - 7 | Open |

**Table 4-21. Option Connector Pin-set Functions**

| | |
|---|---|
| **Pin-sets 1,2,3 (SCSI Address):** (See Figure 4-14 for address settings.) | |
| **Pin-set 4 (Parity):** | |
| open | Disable parity |
| shorted | Enable parity |
| **Pin-set 5 (Prevent/Allow):** | |
| open | Allow the CD-ROM to be ejected from the drive. |
| shorted | Prevent the CD-ROM from being ejected from the drive. The eject button will not function. |
| **Pin-set 6 (Test):** | |
| open | Disable continuous audio on a CD. |
| shorted | Enable continuous audio on a CD. |
| **Pin-set 7 (Terminator Power):** | |
| open | Terminator power is supplied by the host computer. |
| shorted | Terminator power is supplied by the drive. |

# Quarter-inch Cartridge (QIC) Tape Drive Configuration

**Caution**

The drive configuration is set for the system it is installed in. Changing the configuration may cause the drive to malfunction.

Devices installed outside the system will be configured differently.

The location of the jumpers and termination resistors on the Drive Controller PCA is shown in Figure 4-15. The location of the jumpers on the Motor Driver PCA is shown in Figure 4-16.

See Table 4-22 andFigure 4-15 . JP1 determines the SCSI address of the QIC drive. In this system, the internal tape drive is always set to address zero. No jumpers are installed.

JP2 pin 1 determines the type of SCSI interface. A jumper is always installed on pin 1 to select the SCSI-2 interface.

JP2 pin 2 through 9 are never jumpered.

The termination resistors are located at RN1, RN2, and RN3. All termination resistors must be removed before the tape unit is installed.

See Figure 4-16. JP1 is always jumpered. The jumper provides a logic ground to chassis ground connection.

**Table 4-22. QIC Tape Drive SCSI ID Address**

| SCSI ID Address | ID3 | ID2 | ID1 |
|---|---|---|---|
| 0 | OFF | OFF | OFF |
| 1 | OFF | OFF | ON |
| 2 | OFF | ON | OFF |
| 3 | OFF | ON | ON |
| 4 | ON | OFF | OFF |
| 5 | ON | OFF | ON |
| 6 | ON | ON | OFF |
| 7 | ON | ON | ON |

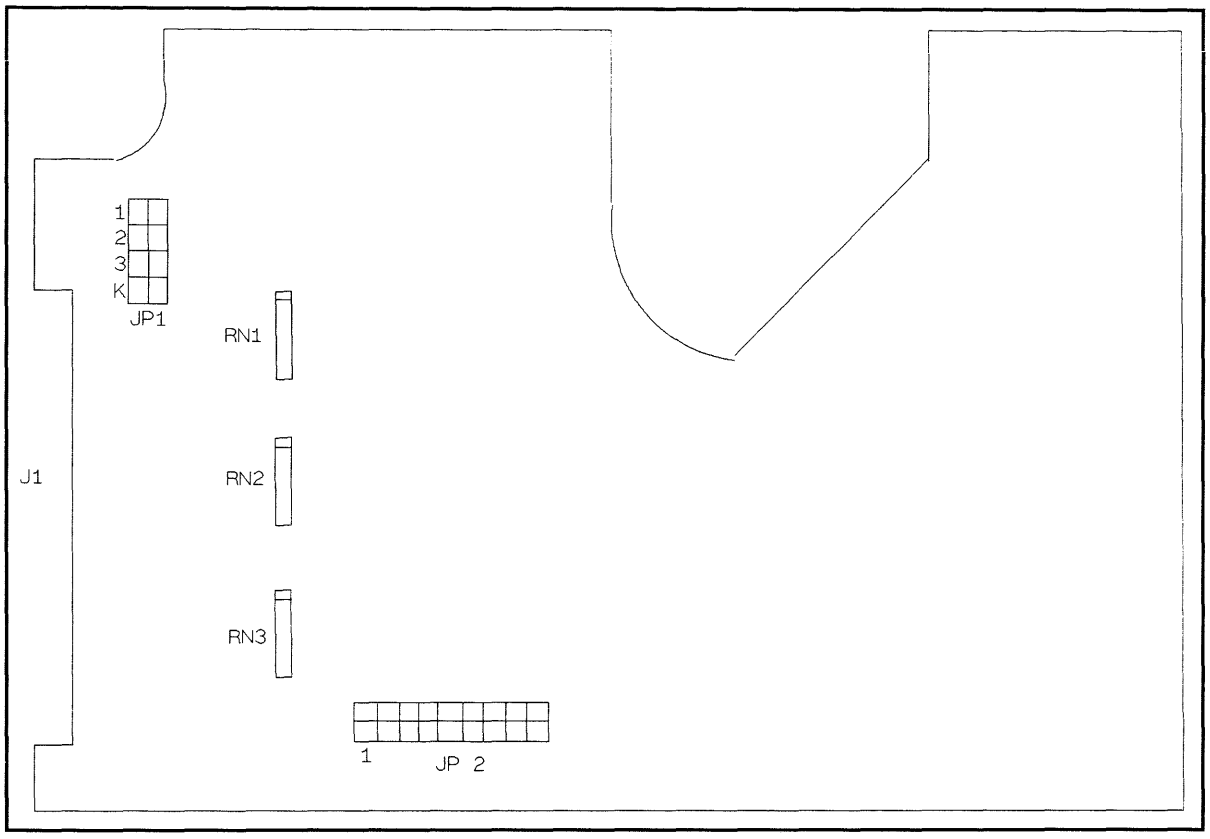



**Figure 4-15. QIC Tape Drive Controller PCA Configuration**

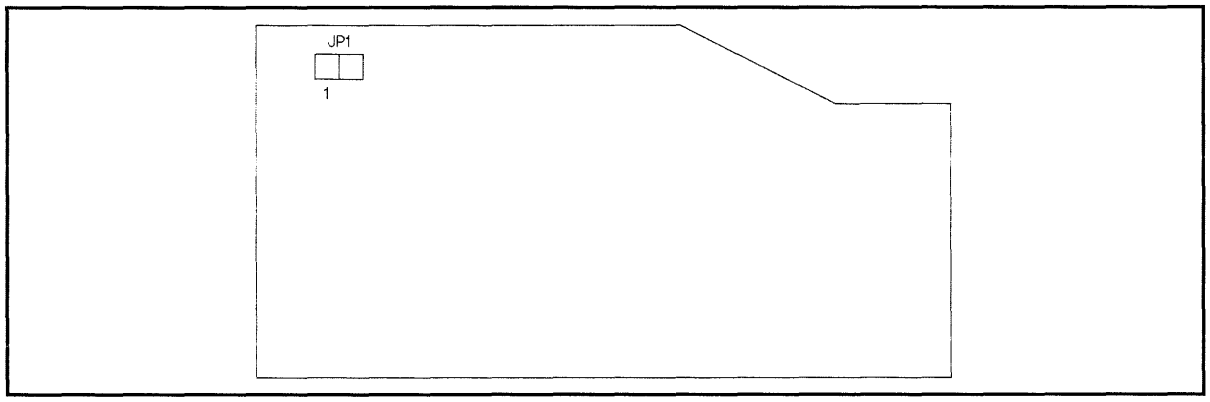



**Figure 4-16. QIC Tape Drive Motor Driver PCA Configuration**

## 8mm Tape Drive (A3024A) Configuration

The location of the address jumpers on the 8 mm tape drive is shown in (xref fig12gsa>. Set the address to one of the valid addresses, shown in Figure 4-18. Address 7 is reserved and can not be used as a device address.

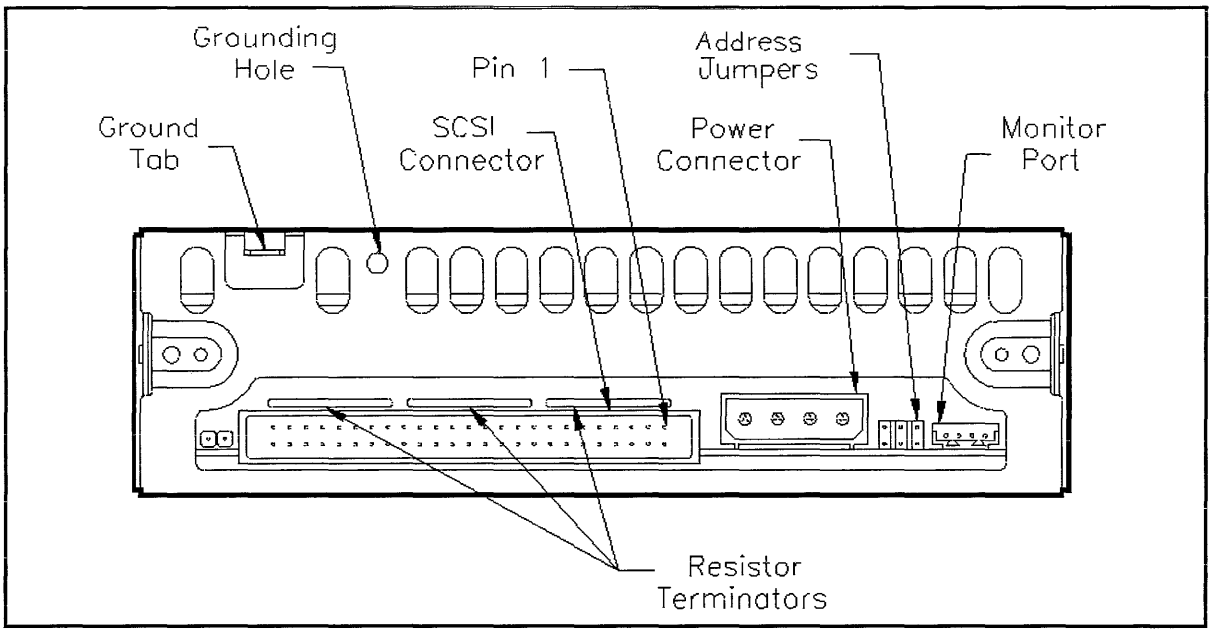



**Figure 4-17. 8mm Tape Drive (A3024A) Configuration**

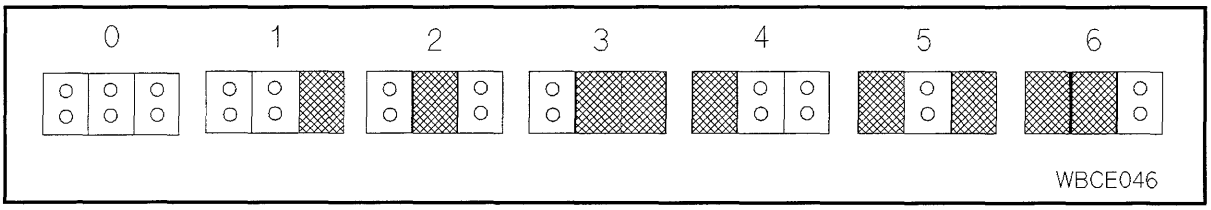



**Figure 4-18. 8mm Tape Drive (A3024A) Address Jumper Settings**

## Floppy Disk Drive Configuration

The jumpers for configuring the floppy disk drive are shown in Figure 4-19.

Refer to Table 4-23. The SCSI ID address of the drive should always be set to **3**.

**Note** A logical 1 is indicated by the absence of a jumper.

Jumpers must always be on **H**, **H1**. and **H2**. This sets the floppy disk density to 2 MB.

Jumpers must always be on **HDS**, and **PAR**.

If you are replacing a floppy disk drive in the field, the two termination resistors must be removed.

**Table 4-23. Floppy Disk Drive SCSI ID Address**

| SCSI ID Address | ID2 | ID1 | ID 0 |
|---|---|---|---|
| 0 | ON | ON | ON |
| 1 | ON | ON | OFF |
| 2 | ON | OFF | ON |
| 3 | ON | OFF | OFF |
| 4 | OFF | ON | ON |
| 5 | OFF | ON | OFF |
| 6 | OFF | OFF | ON |
| 7 | OFF | OFF | OFF |

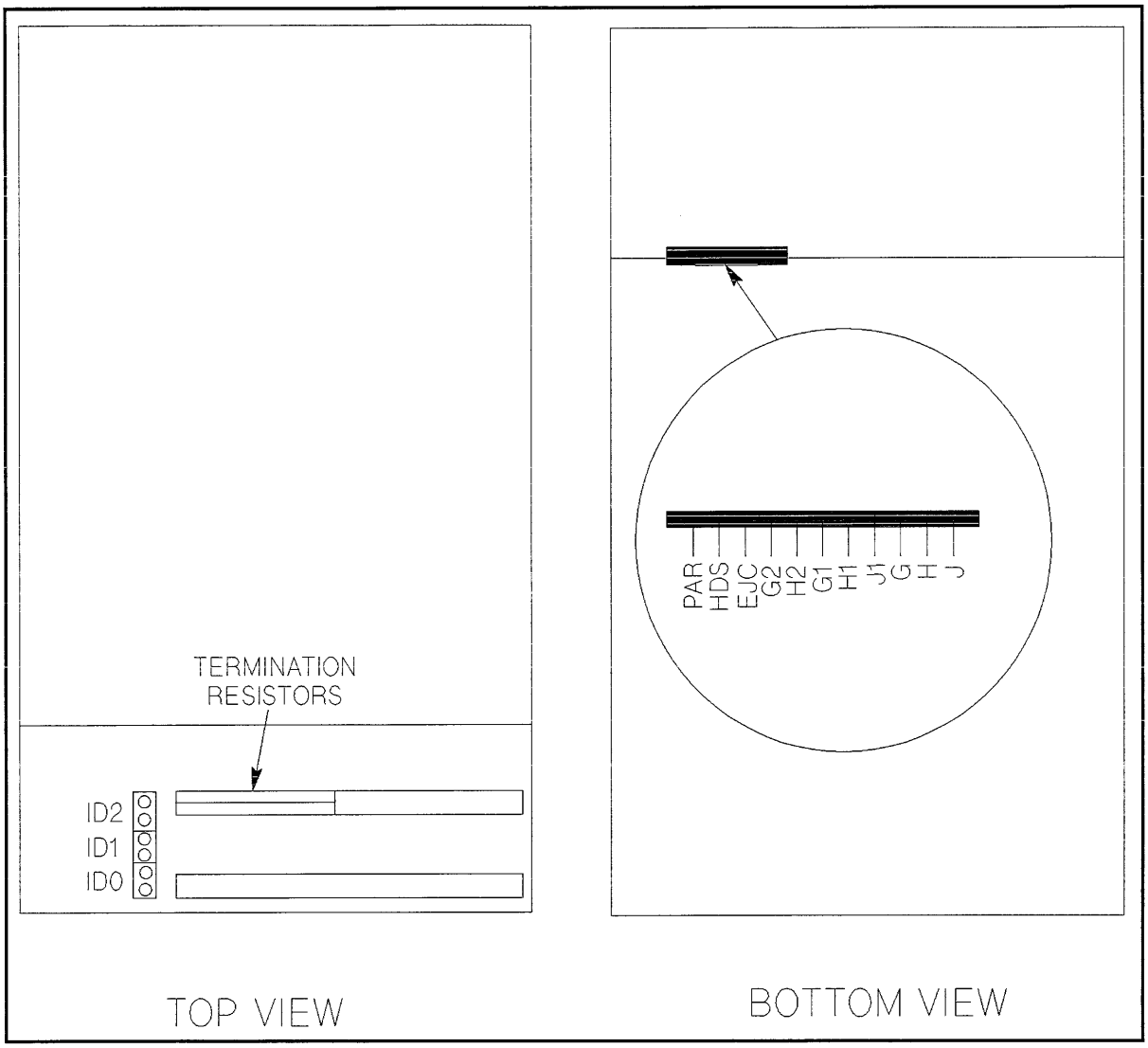



**Figure 4-19. Floppy Disk Drive Configuration**

## Cabinet Overview

The cabinets are shipped from the factory as either fully integrated (racked components), or standalone. Table 4-24 shows all cabinet products. Note the columns labeled **EIA** and **Maximum Current**. They are important in properly configuring a supported system.

**Table 4-24. Cabinet Overview**

| Product number | Factory Integrated | EIA Units (Racking Space) | Power Distribution | Maximum Current (Single Phase) | AC Plug Type | |
|---|---|---|---|---|---|---|
| | | | | | U.S. | Europe |
| C2785A | No | 21 | 100-120V | 16A | 5-20P | No Plug |
| 1.1 Meters | | | 200-240V | 16A | L6-20P | No Plug |
| A1883A | Yes | 21 | 100-120V | 16A | 5-20P | No Plug |
| 1.1 Meters | | | 200-240V | 16A | L6-20P | No Plug |
| A1896A | Yes | 21 | 100-120V | 16A | 5-20P | No Plug |
| 1.1 Meters | | | 200-240V | 16A | L6-20P | No Plug |
| C2786A | No | 32 | 200-240V | 16A | L6-20P | No Plug |
| 1.6 Meters | | | | | | |
| A1884A | Yes | 32 | 200-240V | 16A | L6-20P | No Plug |
| 1.6 Meters | | | | | | |
| A1897A | Yes | 32 | 200-240V | 16A | L6-20P | No Plug |
| 1.6 Meters | | | | | | |

## Cabinet Configuration Rules

Although the cabinets are designed to accommodate a variety of components mounted in just about any configuration, there are some basic rules that apply to mounting a computer system. These rules allow for weight distribution, accessibility of the components, and cable management inside the rack-mount cabinet. The rules are as follows:

- The computer is always mounted on top.
- The HP 2345A (DTC-48) is always mounted on the bottom.
- The C246XR (disk drive cabinet) goes under the computer unless an HP 7980S/SX (tape drive) is being put in, then the HP 7980S/SX goes under the computer first.
- The installation of an HP 7980S/SX also requires the installation of counter ballast weights (C2786-60017 at 13.61 kg each with three required).
- MDPs are mounted on an MDP mounting bracket, starting as low as possible on the rear mounting columns.

These rules are noted in case the customer wants to add any optional equipment or change the position of the components in the cabinet. Figure 4-20 and Figure 4-21 show examples of the cabinet configuration for the HP computer system. The cabinet can also be used to house the peripherals for a computer system.

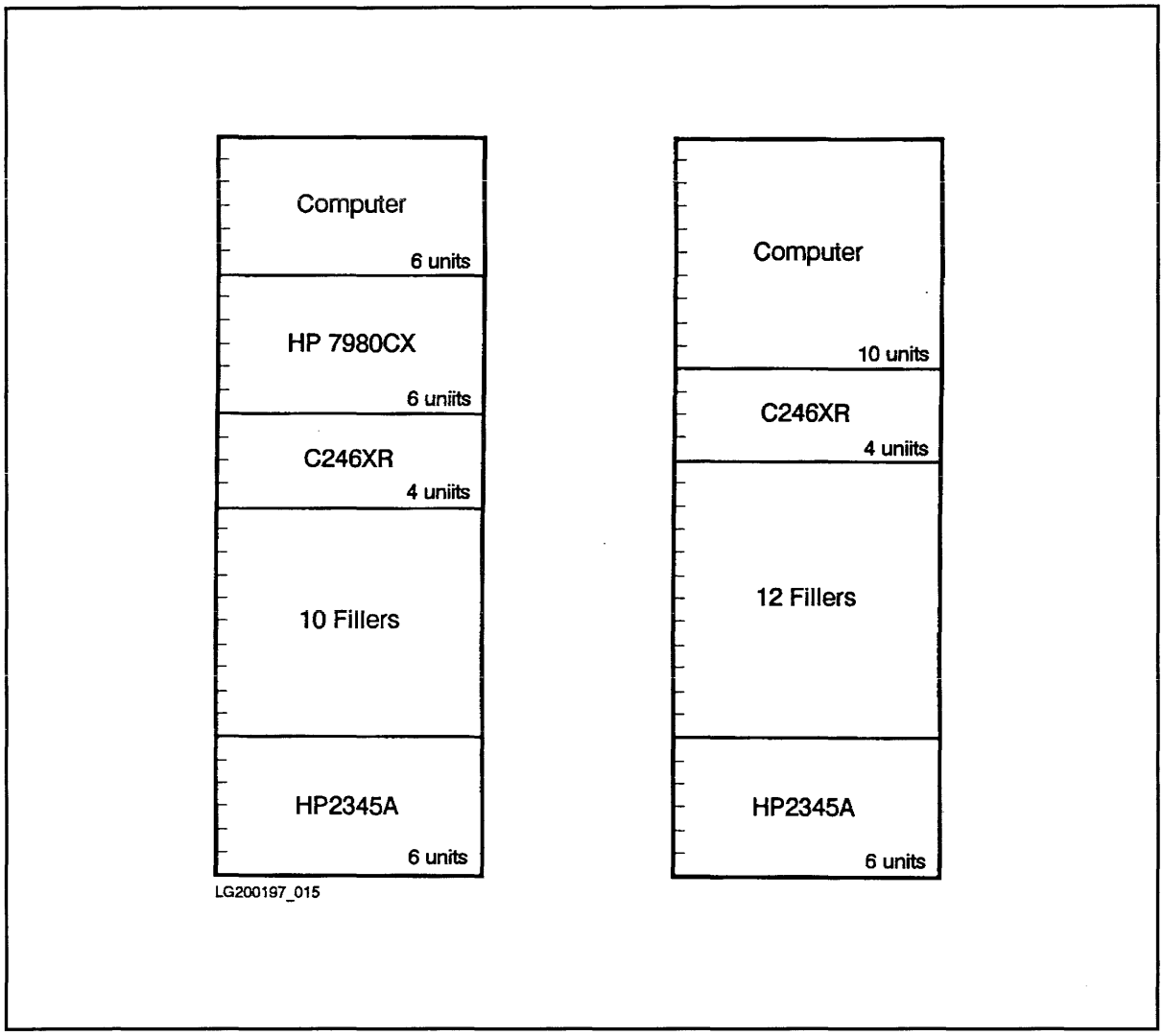



**Figure 4-20. 1.6 Meter Cabinet Configuration Example**

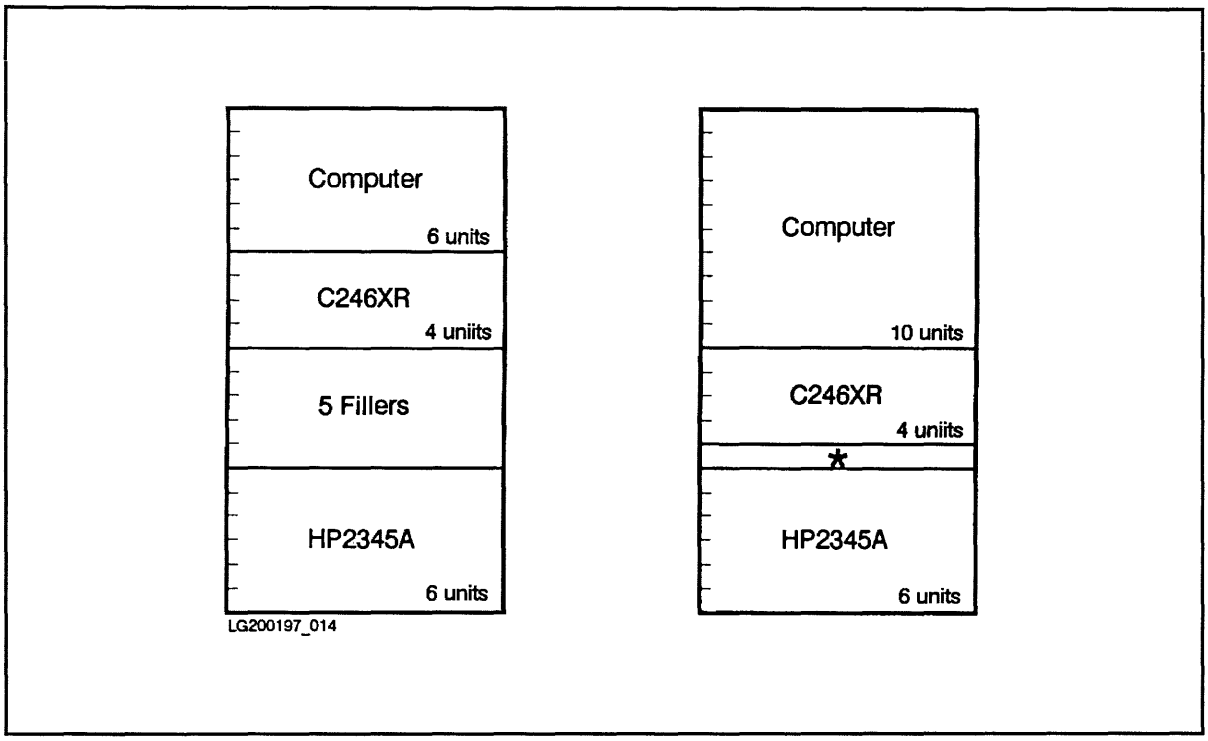



**Figure 4-21. 1.1 Meter Cabinet Configuration Example**

* 1 filler panel.

## I/O Products Supported in the Cabinets

Table 4-25 and Table 4-26 show the I/O products that are supported in cabinets for HP3000 and HP9000 system configurations.

**Table 4-25. HP3000 Supported I/O Products (Cabinet Installation)**

| Peripheral Type | Product Number | EIA Units | Rack Kit | Current Consumption | |
|---|---|---|---|---|---|
| | | | | 100-120V | 200-240V |
| Tape Drives | 7979A | 5 | opt. 1A4 + * C2790A | 2.81A | 1.46A |
| | 7980A | 5 | opt. 1A4 + * C2790A | 2.81A | 1.46A |
| | 7980XC | 5 | opt. 1A4 + * C2790A | 2.81A | 1.46A |
| Series 6000 SCSI | C2462R | 4 | included | 2.6A | 1.5A |
| Device Package | C2464R | 4 | included | 2.6A | 1.5A |
| | 2465R | 4 | included | 2.6A | 1.5A |
| HP-FL Disk Array | C2252HA | 6 | included | 4.0A | 2.0A |
| | C2254HA | 6 | included | 4.0A | 2.0A |
| | C2252B | 6 | included | 4.0A | 2.0A |
| | C2254B | 6 | included | 4.0A | 2.0A |
| Data Terminal | 2340A | 6 | 35199E | 2.0A | 1.0A |
| Connects | 2345A | 6 | C2799A | 2.0A | 1.0A |

* **C2790A** - Anti-tip ballasts, three must be ordered for each 1/2inch tape drive ordered.

**Table 4-26. HP9000 Supported I/O Products (Cabinet Installation)**

| Peripheral Type | Product Number | EIA Units | Rack Kit | Current Consumption | |
|---|---|---|---|---|---|
| | | | | 100-120V | 200-240V |
| Tape Drives | 7979A | 5 | opt. 1A4 + * C2790A | 2.81A | 1.46A |
| | 7980A | 5 | opt. 1A4 + * C2790A | 2.81A | 1.46A |
| | 7980XC | 5 | opt. 1A4 + * C2790A | 2.81A | 1.46A |
| | 7980S | 5 | opt. 1A4 + * C2790A | 2.81A | 1.46A |
| | 7980SX | 5 | opt. 1A4 + * C2790A | 2.81A | 1.46A |
| Series 6000 SCSI | C2460R | 4 | included | 2.6A | 1.5A |
| Device Package | C2461R | 4 | included | 2.6A | 1.5A |
| | 2462R | 4 | included | 2.6A | 1.5A |
| | 2463R | 4 | included | 2.6A | 1.5A |
| HP-FL Disk Array | C2252HA | 6 | included | 4.0A | 2.0A |
| | C2254HA | 6 | included | 4.0A | 2.0A |
| | C2252B | 6 | included | 4.0A | 2.0A |
| | C2254B | 6 | included | 4.0A | 2.0A |
| Data Terminal | 2340A | 6 | 35199E | 2.0A | 1.0A |
| Connects | 2345A | 6 | C2799A | 2.0A | 1.0A |

* **C2790A** - Anti- tip ballasts, three must be ordered for each 1/2inch tape drive ordered.

**Table 4-27. Rackmounting Hardware**

| Product Number | Description | EIA Units |
|---|---|---|
| C2788A | Generic Rail Kit for Non-standard 19in peripherals | 1 |
| C2792A | MDP Rack-mount Kit for Rear of Cabinet | none |

## Special Considerations

The following is a special list of items which should be considered when configuring a system cabinet.

- Unless a cabinet is ordered with a 120V option, all cabinets will contain a 220V PDU (including the USA).
- Peripheral connection to the cabinet PDU requires a special power cord, P/N 8120-1860. The power cord ships with all supported components **EXCEPT FOR** the 1/2inch tape drive and any DTC's acquired from previous system installations.
- A special power cord (P/N 8120-1860) MUST be ordered for all racked equipment not listed in the tables.

# 5

# Troubleshooting

## Introduction

This chapter presents the overall strategy for troubleshooting failures on HP 3000/9x8LX/RX and HP 9000 800 Ex5 Class systems, and provides some procedures you can follow that will help you isolate most system failures.

The chapter is organized so that you can diagnose failures in a logical way from the "top down". Regardless of your experience, you can use the information and procedures in this chapter to isolate and correct nearly all system hardware failures. If a failure occurs that is not covered here, you should consult more experienced support personnel within your organization or contact the nearest Hewlett-Packard Response Center for assistance.

Before taking any other steps to remedy a failure, always collect as much information as possible about the failure. Never swap out any of the field replaceable units until you have made notes of the following:

- the failure symptoms
- all indicators
- display information
- system configuration
- number of users
- application and/or tasks being done at the time of failure
- any other information that you could possibly use to describe the nature of the failure.

Use this information, along with the procedures in this chapter, to choose the most appropriate corrective action. Keep a log of all actions you take for future reference.

If you are an experienced service provider, you may wish to skip the procedural sections and directly consult the error tables and replaceable parts sections.

There are two basic types of failures:

- Hard Failures
- Soft Failures

## Hard Failures

Hard failures are solid failures. They usually occur during selftest and system initialization, and halt the system. The steps to take when troubleshooting a hard failure are to:

- Determine the environment.
- Follow the appropriate procedure.
- Replace the failed part.

To determine the environment, do the following:

- Check the indicator LEDs on the Front Panel (Table 5-1).
- Check the operating state and chassis code displayed on the console (Table 5-1).
- Check the indicator LEDs on I/O cards or peripherals (Table 5-2).
- Decode the PIM dump when an HPMC occurs (Table 5-13).

Once you have observed the status of the front panel LEDs and the system status and chassis code on the console banner, use the procedures in the following sections to isolate the failure. For most failures, these procedures should help you to isolate the problem to the field replaceable unit (FRU).

## Check System Front Panel LEDs

Look at the front panel LEDs and at the console to determine the state of the system. Then refer to Table 5-1 to determine the next action.

**Table 5-1. Front Panel LEDs and Operating States**

| Green RUN | Yellow ATN | Orange FAULT | Other Indicators | Condition | Action |
|---|---|---|---|---|---|
| | | | | No DC power | Refer to "Troubleshooting the Power System" Procedure |
| | | On | ostat = FLT | Fault mode | Refer to "Troubleshooting System Hardware Faults" Procedure |
| | On | | ostat = Test<br>ostat = Init | PDC Mode<br>ISL Mode | Comes on during selftest and initialization.<br>If flashing hex codes are displayed on the console, no action is required; wait for selftest and initialization process to complete. The system will display boot messages and menu on the console.<br>If system halts or hangs, go to the "Boot and System Initialization Failures" procedure to troubleshoot the problem. |
| | | | Floating Point or LAN failure warning | | Refer to "Other Warning Messages". |
| On | | | Prompt | OS running | This is the normal state of the system. No action required. |
| | | | No prompt | OS running | Refer to "Operating System Problems" Procedure |
| On | On | | Overtemp<br>Online warning | Warning | Refer to "Warnings" Procedure |
| On | On | On | | PDC has not executed | Refer to "Boot and System Initialization Failures" Procedure |

## Check I/O Card and Device LEDs

**Table 5-2. System Troubleshooting Reference Guide**

| Device | State of Indicators | Action |
|---|---|---|
| Multifunction I/O PCA | SCSI Selftest LED = ON | Replace Multifunction I/O PCA. |
| | MUX Selftest LED = ON | Replace Multifunction I/O PCA. |
| | Term Power LED = OFF | Remove Multifunction I/O PCA and replace on-board termination power fuse. |
| MDP | Power on LED = OFF | No power from MUX. Check cable connection or replace Multifunction I/O PCA. |
| | LINK Status LED = ON | Check MDP cable connections. |
| | | Replace MDP cable. |
| | | Replace MDP. |
| DDS Tape Drive | Drive LED = yellow | Replace DDS Tape Drive assembly. |
| | Drive LED = yellow and Cassette LED = yellow | Overhumidity condition. Do not use tape drive until LED pattern changes. |
| | Cassette jam | Hold button in for 10 seconds to eject. |
| Internal Disk(s) | Disk Status LED = blinking or flashing (only valid prior to an IPL boot attempt) | Replace the disk mechanism. |

## Troubleshooting the Power System

If none of the front panel LEDs are lit, DC power is absent and AC power is possibly absent.

**Note**

The system uses an auto-ranging power supply. If a severe line transient occurs when the system is being powered up, the power supply may attempt to operate in the 220 VAC range. If this occurs and the line voltage is 110 VAC, the system will not power up correctly. Do the following:

1. Place the power switch in the OFF position.
2. Unplug the system line cord for one minute.
3. Plug in the system line cord and power up the system.

Check for AC power and then DC power source by following the procedure below until the problem is solved.

**Note**

If the system appears to function correctly, e.g., Operating System prompts are returned on a user terminal if (Return) is pressed, and there are no front panel LEDs on, the LEDs on the backplane have probably failed. The backplane should be replaced at a convenient time.

**Table 5-3. Power System Troubleshooting Procedure**

| CAUSE/SYMPTOM | ACTION |
|---|---|
| 1. System powered on? | Depress the power switch and check the front panel LEDs. |
| 2. PowerTrust UPS installed? | **No.** Skip to Step 3.<br>**Yes.** Continue with this step.<br>a. Check that the power output cable is connected from the PowerTrust UPS output receptacle to the system AC input receptacle.<br>Check that the AC power cord from the PowerTrust UPS is plugged into the AC power source receptacle. Set the PowerTrust UPS output switch to the ON position.<br>b. Connect the power cable to a different output receptacle on the PowerTrust UPS. Try each PowerTrust UPS output receptacle.<br>c. Disconnect the power cable from the system AC input receptacle. Disconnect the AC power cord from the PowerTrust UPS, connect it to the system AC input receptacle, and then plug it into the AC power source.<br>If the front panel LEDs are lit, replace the PowerTrust UPS. Otherwise, continue to Step 3. |
| 3. Tripped circuit breaker? | Check for AC power at the power source. Plug another device into the receptacle.<br>Check the circuit breaker or breaker panel. Reset the circuit breaker if necessary. |

**Table 5-3. Power System Troubleshooting Procedure (continued)**

| CAUSE/SYMPTOM | ACTION |
|---|---|
| 4. Yellow Power Supply Shutdown LED on the System Power Control Module (SPCM) board lit? | Remove the system front bezel to view the yellow SPCM LED. The LED is located at the far right side of the chassis, about six inches above the bottom, and is about six inches inside the chassis.<br><br>**Perform the following steps until the SPCM LED remains out, the front panel LEDs come on, and the system initializes.**<br><br>**1a.** Back out all I/O cards and the Multifunction I/O card from the backplane.<br><br>**1b.** If the SPCM LED goes out and the front panel LEDs come on, insert the I/O cards, one at a time, until the faulty card is found.<br><br>**2a.** Replace the system processor board.<br><br>**3a.** Unplug all of the power plugs of the internal peripherals.<br><br>**3b.** If the SPCM LED goes out and the front panel LEDs come on, connect the internal peripheral power plugs, one at a time, until the faulty device is found.<br><br>**4a.** Replace the power supply.<br><br>**5a.** Replace the backplane.<br><br>**6a.** Contact the Hewlett-Packard Response Center for further assistance. Refer to the "Calling the Response Center" section for more information. |

## Troubleshooting System Hardware Faults

**Table 5-4. System Fault Troubleshooting Procedure**

| CAUSE/SYMPTOM | ACTION |
|---|---|
| **Check Chassis Code Status (front panel or console banner)** | |
| 1. Chassis code 1xxx through 3xxx displayed? | **YES.** CPU, TLB, MIOC, Cache, or PDH Selftest Failure<br>Replace the CPU Card and reboot the system.<br>If the problem persists, call the Response Center. Refer to the "Calling the Response Center" section for more information.<br>**NO.** Go to Step 2. |
| 2. Chassis code 503F displayed? | **YES.** HPMC due to bus transaction error.<br>Reset system. At PDC menu, execute the **PIM HPMC** command from the PDC Service menu to look at the HPMC error log and HPMC PIM.<br>Examine requestor/responder information at the end of the log and replace the I/O card.<br>If this does not solve the problem, replace the CPU card.<br>If the problem persists, call the Response Center. Refer to the "Calling the Response Center" section for more information.<br>**NO.** Go to Step 3. |
| 3. Chassis code 7xxx displayed? | **YES.** Memory error. Refer to the "Troubleshooting Memory Failures" procedure.<br>**NO.** Go to Step 4. |
| 4. Chassis code 8200 displayed? | **YES.** Geckoboa Register Test failure.<br>Replace the CPU Card and reboot the system. If the problem persists, call the Response Center. Refer to the "Calling the Response Center" section for more information.<br>**NO.** Go to Step 5. |
| 5. Chassis code 9xxx displayed? | **YES.** Console initialization error. Refer to "Troubleshooting Console Initialization Failures" procedure.<br>**NO.** Go to Step 6. |
| 6. Chassis code Axxx displayed? | **YES.** Boot device initialization error. Refer to "Boot and System Initialization Failures" procedure.<br>**NO.** Go to Step 7. |
| 7. Chassis code Cxxx displayed? | **YES.** System initialization error. Refer to "Boot and System Initialization Failures" procedure.<br>**NO.** Go to Step 8. |

**Table 5-4. System Fault Troubleshooting Procedure (continued)**

| CAUSE/SYMPTOM | ACTION |
|---|---|
| 8a. Chassis codes BE00, xxxx, DEAD displayed ? | **YES.** MPE/iX Monitor Halt (Halt 0)<br>Determine cause of failure by decoding "Halt 0" code sequence using Table 5-5.<br>Also refer to the "Operating System Problems" section.<br>Note whether or not operating system halt was caused by HPMC. Go to Step 10.<br>**NO.** Go to Step 8b. |
| 8b. Chassis codes BE07, xxxx, DEAD displayed? | **YES.** MPE/iX System Abort (Halt 7)<br>Perform memory dump. Refer to the "Taking a Memory Dump" section for more information.<br>Also refer to the "Operating System Problems" section.<br>Call the Response Center. Refer to the "Calling the Response Center" section for more information.<br>**NO.** Go to Step 9. |
| 9. Chassis codes CBFF and xxxx looping? | **YES.** Nested HPMC. Go to Step 10.<br>**NO.** Go to Step 14. |
| 10. MPE/iX ? | **YES.** Perform a Transfer of Control (TOC). Go to Step 11.<br>**NO.** HP-UX. Go to Step 13. |
| 11. Transfer of Control (TOC) successful? | **YES.** Perform memory dump. Refer to the "Taking a Memory Dump" section for more information. Go to Step 12.<br>**NO. 11a.** Perform system reset. Stop at PDC by interrupting the automatic boot process.<br>**11b.** From the PDC menu, enter **SER** to access the Service Menu. Then execute PDC **PIM HPMC** command to report HPMC error log and HPMC PIM.<br>**11c.** Isolate failing FRU by analyzing error log and PIM. See "Troubleshooting HPMCs" procedure.<br>**11d.** Send data to Response Center for analysis. **END** |
| 12. OS failure caused by HPMC? | **YES.** Go to Step 11b.<br>**NO.** Send dump data to Response Center for analysis. **END** |
| 13. HP-UX | Perform system reset. Go to Step 11b. |

**Table 5-4. System Fault Troubleshooting Procedure (continued)**

| CAUSE/SYMPTOM | ACTION |
|---|---|
| **Determine true operating state.** | |
| 14. PDC prompt? | **YES** Reset system. Go to Step 16.<br>**NO.** Replace CPU card. **END** |
| 15. OS prompt? | **YES.** Perform orderly shutdown. Go to next step.<br>**NO.** Record chassis code and report it to Response Center. Refer to the "Calling the Response Center" section for more information. **END** |
| 16. Chassis codes change appropriately? | **YES.** Unknown problem. Report to Response Center. Refer to the "Calling the Response Center" section for more information. **END**<br>**NO** Replace CPU card. Go to next step. |
| 17. Chassis codes change appropriately? | **YES. END**<br>**NO** Unknown problem. Report to Response Center. Refer to the "Calling the Response Center" section for more information. **END** |

**Table 5-5. MPE/iX Halt 0 Operating System Error Codes**

| Code | Cause/Action |
|---|---|
| 0001 - 0099 | Take memory dump and call Response Center. |
| 00F1 - 00F3 | Take memory dump. Replace CPU Card. May be OS bug. |
| 00F8 - 00FB | Take memory dump. Replace CPU Card. May be OS bug. |
| 00F4 - 00F7, 03xx | HPMC may have occurred.<br>Perform a Transfer of Control (TOC). Perform a memory dump. Refer to the "Taking a Memory Dump" section for more information. Execute PDC **PIM HPMC** command from the PDC Service menu to report HPMC error log and HPMC PIM.<br>Examine requestor/responder information at the end of the log and replace the I/O card.<br>If this does not solve the problem, replace the CPU card.<br>If the problem persists, call the Response Center. Refer to the "Calling the Response Center" section for more information. |

## Troubleshooting Memory Failures

**Table 5-6. Memory Troubleshooting Procedure**

| CAUSE/SYMPTOM | ACTION |
|---|---|
| 1. Chassis code 707D displayed? | **YES.** No memory found.<br>a. Remove the CPU Card and check for the presence and correct installation of memory SIMMs.<br>b. If SIMMs are installed correctly, replace the CPU Card, and reboot the system.<br>c. If the error persists, call the Response Center. Refer to the "Calling the Response Center" section for more information.<br>**NO.** Go to Step 2. |
| 2. Chassis code 70xx displayed? | **YES.** HPMC due to memory error.<br>a. Replace the SIMM in the slot/module indicated ("xx" indicates the slot/module (A or B)). Reboot the system.<br>b. If the error remains, replace the CPU Card, and reboot.<br>c. If the error persists, call the Response Center. Refer to the "Calling the Response Center" section for more information.<br>**NO.** Unknown error. Call the Response Center. Refer to the "Calling the Response Center" section for more information. |

## Troubleshooting I/O Failures

**Table 5-7. I/O Failure Troubleshooting Procedure**

| CAUSE/SYMPTOM | ACTION |
|---|---|
| No communication over the network (HP-UX systems only)? | **YES.** LAN failure. Do the following steps until the problem is corrected.<br>a. Replace the cable between the CPU Card and the AUI or TP-MAU.<br>b. Replace the AUI or TP-MAU.<br>c. Replace the CPU Card.<br>d. Call the Response Center. Refer to the "Calling the Response Center" section for more information.<br>**NO.** Unknown problem. Call the Response Center. Refer to the "Calling the Response Center" section for more information. |

## Troubleshooting Console Initialization Failures

**Table 5-8. Console Initialization Troubleshooting Procedure**

| CAUSE/SYMPTOM | ACTION |
|---|---|
| Chassis code 9001 or A088 displayed? | **YES**. Unable to initialize system console.<br>If MPE system, go to Step 1.<br>If HP-UX system, go to Step 2.<br>**NO.** Call the Response Center. Refer to the "Calling the Response Center" section for more information. |
| 1. MPE System | a. Check the terminal configuration.<br>b. Check the cable connection between the Multifunction I/O card and the console. Replace the cable.<br>c. If the error remains, replace the Multifunction I/O card.<br>d. If the error persists, call the Response Center. Refer to the "Calling the Response Center" section for more information. |
| 2. HP-UX System | a. Check the terminal configuration.<br>b. Check the cable connections between the console and the MDP, and between the Multifunction I/O card and the MDP.<br>c. Replace the cable between the console and the MDP.<br>d. Replace the cable between the Multifunction I/O card and the MDP.<br>e. Replace the Multifunction I/O card.<br>f. Replace the MDP.<br>g. Call the Response Center. Refer to the "Calling the Response Center" section for more information. |

## Boot and System Initialization Failures

**Table 5-9. Boot and System Initialization Failures**

| CAUSE/SYMPTOM | ACTION |
|---|---|
| 1. Chassis code A008 displayed? | **YES.** IPL Boot Attempt. No bootable device found.<br>Attempt to boot from another device. If boot succeeds, replace the boot device. If boot still fails, replace the Multifunction I/O card. If boot still fails, replace the CPU Card.<br>**NO.** Go to Step 2. |
| 2. Chassis code 800x displayed and IODC Error Status message on console? | **YES.** ISL Boot Attempt. Do the following steps until the problem is solved.<br>Check that the internal SCSI cable is terminated at both ends.<br>Replace I/O card for the device you attempted to boot from. Replace boot device attached to I/O card.<br>Replace CPU Card.<br>Replace Multifunction I/O card.<br>Refer to "Check I/O Card and Device LEDs" procedure.<br>Call Response Center. Refer to the "Calling the Response Center" section for more information.<br>**NO.** Go to Step 3. |
| 3a. Chassis code C5Fx displayed? | **YES.** Primary path initialization failed. Reboot from alternate path. If boot succeeds, replace the primary path disk device.<br>**NO.** Continue to Step 4b. |
| 3b. Chassis code C7Fx displayed? | **YES.** Alternate or other path initialization failed. Reboot from primary path. If boot succeeds, replace the alternate path boot device.<br>If boot fails from both primary and alternate boot path, replace the Multifunction I/O card. If boot still fails, replace the CPU Card.<br>**NO.** Go to Step 4. |

**Table 5-9. Boot and System Initialization Failures (continued)**

| CAUSE/SYMPTOM | ACTION |
|---|---|
| 4. All front panel LEDs lit? | System failed to initialize properly. Perform the following procedures until the problem is solved.<br>a. Cycle Power (depress and release power switch two times).<br>b. Replace the CPU Card. Check for proper system operation.<br>c. Replace the Multifunction I/O Card. Check for proper system operation.<br>d. Back-out all system I/O boards from backplane.<br>If the system initializes, insert one I/O board at a time and check for proper initialization of the system. Do this until the problem reoccurs, then replace that I/O board.<br>e. Disconnect the power connectors of all internal peripherals.<br>Check for proper system initialization.<br>If the system initializes, connect one peripheral at a time and check for proper initialization of the system. Do this until the problem reoccurs, then replace that device.<br>f. Replace the power supply.<br>g. Replace the backplane.<br>h. Contact the Hewlett-Packard Response Center for further assistance. Refer to the "Calling the Response Center" section for more information. |

## Warnings

### Overtemperature Warning

**Table 5-10. Overtemperature Troubleshooting Procedure**

| CAUSE/SYMPTOM | ACTION |
|---|---|
| Is the room temperature too high? | **YES** Restore room to normal temperature. Check that room air conditioning is operating properly .<br>**NO**<br>a. Make sure there is sufficient air flow around the system.<br>b. Check the fan movement. If fan is not moving, replace the power supply unit.<br>c. Possible bad sensor on power supply. |

### PowerTrust UPS Online Error Messages

When you see online error messages concerning the PowerTrust UPS, do the following steps.

1. Ensure that the PowerTrust Unit configuration is correct.
2. Ensure that you are using a supported PowerTrust UPS.
3. Make sure the RS-232 cable is the one intended for the UPS connection to the system. The UPS cable has a special pin configuration, and is labelled "UPS" at one end. A regular RS-232 cable will not work with the UPS.
4. Make sure the cable is properly connected.

For more detailed information about PowerTrust UPS error messages displayed by HP-UX and MPEiX, refer to the appropriate PowerTrust documentation.

### Other Warning Messages

**Table 5-11. Other Warning Troubleshooting Procedure**

| CAUSE/SYMPTOM | ACTION |
|---|---|
| Chassis code 3001 displayed. | ERR_READING_EEPROM. Error occurred reading Stable Storage. Contents are invalid.<br>Replace CPU Card. |
| Chassis code 3002 displayed. | ERR_WRITING_EEPROM. Error occurred writing to EEPROM.<br>Replace CPU Card. |
| Warning displayed at Boot Console Handler that Floating Point not functional | Floating Point selftest failure.<br>Replace CPU Card at earliest convenience. The system is still usable, it just does not perform as well as it should. |
| Warning at Boot Console Handler that LAN selftest failed. | **YES.** LASI/LAN module test failure.<br>Check the LAN connector. If a MAU is connected without being connected to a LAN, it will cause the test to fail.<br>If the LAN connection is okay, replace the CPU Card. |

## Troubleshooting HPMCs

When an HPMC occurs, the fault light on the front panel comes on, and the console displays the status. An hpmc is handled initially by system firmware, which builds an error log. When finished, it transfers control back to the operating system.

In HP-UX, a panic dump is created. The operating system saves a memory dump to a special location on disk and attempts to reboot the system.

On MPE systems, further information is displayed on the console. When the system halts, you do a control B and type "TC". Then boot from the primary boot device and interact with ISL. At the ISL prompt, type "Dump" and save the memory dump to tape.

The HPMC error logs are the same in both operating systems. To access the error logs, reset the system. When you get the PDC menu, type **SER** to access the service menu. Then type "PIM" to list the contents of the PIM dump.

The most important information is in last sections of the pim dump. The important items to look at are the timestamp, HPMC type, and requester/responder information.

**Table 5-12. HPMC Codes**

| Code | Cause/Action |
|---|---|
| 2040 | Cache error. Replace CPU Card. |
| 2043 | Data Cache error. Replace CPU Card. |
| 2044 | Level 2 Instruction Cache error. Replace CPU Card. |
| 2045 | Level 1 Instruction Cache error. Replace CPU Card. |
| 503F | Replace I/O cards listed in HPMC error log. |
| 7000 | Double-bit memory parity error |
| 70xx | Replace memory SIMMs or replace CPU Card. |
| CBFF | Multiple HPMCs from above list. Act only on first recorded HPMC. |

### High Priority Machine Check (HPMC)

A third type of failure is the High Priority Machine Check (HPMC). An HPMC is an abnormal condition which has compromised the integrity of system processing. The CPU detects the HPMC and halts the system.

Use the recovery procedures in Table 5-13 to resolve the problem.

**Table 5-13. HPMC Symptoms and Solutions**

| Symptoms | Recovery Procedure |
|---|---|
| 1. System halts.<br>2. All user activity stops.<br>3. HPMC error message on console.<br>4. Orange Fault LED is lit. | 1. Record the sequence of 4-digit codes at bottom of console display. (Press Control-B first.)<br>2. Record information from the HPMC:<br>a. From the Main Menu, enter **SER** to access the Service Menu.<br>b. Enter the PDC command PIM.<br>c. Copy or print out the console display fields.<br>3. Take a memory dump. (If the computer did not respond to TC and you had to perform an RS hard boot, do not bother to take a memory dump.) |

# Soft Errors

Soft errors are intermittent failures or failures that occur while the operating system is running. Here are the basic steps in troubleshooting soft failures.

- Determine the environment.
- Check the error logs.
- Run diagnostics.
- Take appropriate action.

You must determine the environment. This means observing the front panel LEDs and any console messages. You should also check all error logs in the system and peripheral devices, if appropriate.

If needed, there are both offline and online diagnostics, as well as a system exerciser, that you can use to troubleshoot the failure. Once you determine the cause of the failure, you can act accordingly.

## Diagnostic Tools

### Online Diagnostics

The online diagnostics require a user license and have password protection against unauthorized use. When you purchase a support license, you will get a password.

To access the diagnostics, type SYSDIAG at the operating system prompt. At the DUI prompt, type *list* to display a list of the online diagnostics supported. If you type *list long* you will get a detailed listing of the available diagnostics with information about the specific devices tested by the diagnostic. Help is available for each one.

You can find detailed information about the online diagnostics in the Diagnostic Manual Set.

### System Log File Procedure

One of the online diagnostics available is LOGTOOL. You can use logtool to check the system logs. As with all the online diagnostics, only licensed users can use logtool.

Perform the following procedure to display the system logs. Enter the commands that are underlined.

| | | |
|---|---|---|
| # | SYSDIAG | |
| DUI> | LOGTOOL | |
| LOGTOOL> | STATUS | Lists the log files currently on the system. The most current log file is marked with an asterisk. |
| LOGTOOL> | SUMMARIZE log = n/n | Summarize one or more of the logs listed by the STATUS command. |
| LOGTOOL> | LIST LOG = `Log number` TYPE = `log type` | Lists detail of specified log of the specified type |
| | LIST LOG = `Range` TYPE = `log type` | Lists detail of specified range of logs of the specified type |

### System Exerciser

Another tool that you can use for troubleshooting is the System Exerciser, or SX.

The system exerciser is loaded into the TELESUP account as part of the fundamental operating system.

On systems with HP-UX, SX is not installed as part of the fundamental operating system. SX is available on standalone tape. Other exercisers are available in a collection of tools called the Support Tool Manager. You can find out more information by referring to the Support Tool Manager document that is part of the Diagnostic Manual set.

### Offline Diagnostics

There are some times when you will want to use offline diagnostics instead of online diagnostics:

- If the operating system will not run.
- You don't want to jeopardize the integrity of the operating system.
- You suspect some potential problem with the operating system.

The offline diagnostics for this family of systems and future systems are contained in a shell called ODE, which stands for Offline Diagnostic Environment. ODE is available on the Support Tape. One program, Mapper, is available on disk. To access ODE, you will need to boot to ISL and interact with IPL.

When you get the ISL prompt, type "ODE" to run the offline diagnostic environment. It will take a few minutes to load ODE from tape. To get a list of the tests available, type "ls" at the ODE prompt. ODE contains CPU, memory, and I/O tests, as well as a firmware update tool.

ODE is one of the modules available at ISL. You can find detailed information about other offline diagnostics in the Diagnostic Manual set.

# Operating System Problems

When an operating system problem occurs, the first step is to determine the type of problem.

The first symptom of a problem is that the system does not respond to user input. This lack of response indicates either a performance problem or a system interruption.

**Performance problem** The system responds to one or more programs/users, but the system response is very slow.

**System hang** There is a complete loss of CPU resources for all users/programs. There is no system response over a long period of time.

## Performance Problems

If the system seems to have a performance problem, use the recovery procedures in Table 5-14.

**Table 5-14. System Performance Symptoms and Solutions**

| Symptoms | Recovery Procedure |
|---|---|
| 1. System responds to one or more programs/users.<br>2. Other programs/users cannot seem to get a response.<br>3. System seems slow. | 1. See if any active processes are making heavy use of computer resources. (For example, a massive compilation or a real time process.)<br>2. Try sending an interrupt (Control-C) at a terminal.<br>3. Check another terminal to verify that the problem is not just a console hang. |

### MPE System Hang

Table 5-15 lists the symptoms and the recovery procedure.

**Table 5-15. System Hang Symptoms and Solutions**

| Symptoms | Recovery Procedure |
|---|---|
| 1. The machine is running (the green RUN light is lit), but no one can access the system.<br>2. The system console may or may not be hung.<br>3. The Control-A ("=" prompt) may or may not be functioning.<br>4. The hex display typically displays one of two possible states:<br>a. F0FF/FFFF (the hex display alternates between F0FF and FFFF),<br>b. FAFF/FFFF (the hex display alternates between FAFF and FFFF). | 1. Halt the machine by issuing a "TC" command. (Do NOT do a "=SHUTDOWN" command first. Do NOT use the "RS" command. Either of these commands may destroy important troubleshooting information.)<br>2. Take a memory dump.<br>3. Restart the system as soon as the dump is finished. |

**Note**

The four-digit chassis code is visible on the system console.

To see a line of status information on the console (including the four-digit chassis code):

1. Set the **Service/Normal** switch on the CPU card to the **Service** position.
2. At the system console, enter Control B to enter Access Port control mode.
3. Look on the bottom line of the display for status information.

### HP-UX System Hang

Use the recovery procedure in Table 5-16 to resolve the problem.

**Table 5-16. System Hang Symptoms and Solutions**

| Symptoms | Recovery Procedure |
|---|---|
| 1. The machine is running (the green Run light is lit), but no one can access the system.<br>2. The system console may or may not be hung. | 1. If possible, wait about 15 minutes to see if the computer is really hung or if it has performance problem. With some performance problems, a computer may not respond to user input for 15 min. or longer.<br>2. If the computer is really hung, perform a soft reboot on the machine by issuing a "TC" command. (Do NOT use the "RS" command if possible; "RS" may destroy important troubleshooting information.)<br>3. Save the memory dump file and call the HP Response Center to have it analyzed. |

### Monitor Halts

A monitor halt can be caused by either software or hardware.

The console may not show a message describing the condition.

The sequence of hex codes begins with a "Bx00" to distinguish it from the Bx07 "system halt 7" characteristic of system abort sequences.

Use the recovery procedure in Table 5-17 to resolve the problem.

**Table 5-17. Monitor Halt Symptoms and Solutions**

| Symptoms | Recovery Procedure |
|---|---|
| 1. System halts<br>2. All user activity stops.<br>3. No message on console (usually).<br>4. Orange Fault LED is lit.<br>5. Sequence of 4-digit codes at bottom of console display. (Press Control-B first.) One of the codes is Bx00. | 1. Record error message on console if one appears.<br>2. Record the sequence of 4-digit codes at bottom of console display. (Press Control-B first.)<br>3. Take a memory dump. Refer to the "Taking a Memory Dump" section for more information.<br>4. Restart the system when dump is finished. |

### System Abort

A system abort is a condition experienced by the MPE/iX operating system in which either system or data integrity may be compromised by continued operation. While the causes of system aborts are many, the result is always the same: the system immediately halts and displays system abort information on the physical console (Ldev 20). All user activity stops.

A system abort message typically has the following format:

```
SYSTEM ABORT xxxx FROM SUBSYSTEM xxxx
SECONDARY STATUS:  INFO = xxxx,  SUBSYS = xxx   {this line may not appear}
SYSTEM HALT 7, $xxxx
```

Use the recovery procedures in Table 5-18 to resolve the problem.

**Table 5-18. System Abort Symptoms and Solutions**

| Symptoms | Recovery Procedure |
|---|---|
| 1. System halts ("System Halt 7" message).<br>2. All user activity stops.<br>3. System abort message on console (usually).<br>4. Orange Fault LED is lit.<br>5. Sequence of 4-digit codes at bottom of console display. (Press Control-B first.) | 1. Record entire system abort message on console.<br>2. Record the sequence of 4-digit codes at bottom of console display. (Press Control-B first.)<br>3. Take a memory dump. Refer to the "Taking a Memory Dump" section for more information.<br>4. Restart the system when dump is finished. |

If you have a system abort message on the console, it is probably unnecessary to copy down the hex display pattern. However, if there was nothing printed on the console AND the hex display looks like that above (it includes a "Bx07" sequence) then you have probably experienced a system abort which did not identify itself on the console display. In this case, write the codes down. The Response Center can determine the system abort number from this information.

## Taking a Memory Dump

This section provides procedures for taking a memory dump for both MPE/iX and HP-UX systems.

### Summary

To perform a memory dump:

1. Do a Transfer of Control (TC):
   a. Type CTRL-B to get `CM >` prompt on console.
   b. Type "TC" and hit RETURN key.
   c. If Autoboot is enabled, hit any key to interrupt it.
2. Boot from Primary Boot Path:
   a. Type "yes" to the "Interact with IPL" prompt.

3. Perform a memory dump:
   a. Mount the appropriate media on the ALTPATH tape drive and put the drive online.
   b. At `ISL >` prompt, type "DUMP" command.
   c. Enter appropriate site and problem data at "Enter Dump Name" prompt.
4. Restart the operating system:
   a. At "ISL >" prompt, type "START" or "START NORECOVERY" as desired.
   b. Resume normal system processing.

   If you are reluctant to let users on the system until the Response Center engineer approves further processing, call the Response Center. Report your concern to the Response Center coordinator and request a Priority One code.
5. Process the memory dump:
   a. Mount the first dump tape on the tape drive.
   b. Log on as MGR.TELESUP,DAT.
   c. Type "DAT" to initiate the Dump Analysis Tool (DAT) program.
   d. Type "GETDUMP xxxxx" at the DAT program prompt, where xxxx is the 5 character dump identifier name.
   e. Reply to the tape I/O request at the system console.
   f. When all tapes are read in, EXIT the DAT utility.
6. Call the Response Center and report the problem.

## MPE/iX Memory Dump

To take a memory dump, perform the following procedure. Taking the wrong steps, or performing the steps out of order can result in an invalid dump, lost data, and a waste of system processing time.

### Step 1: Do a Transfer of Control (TC)

Initiate a "Transfer of Control" to change the CPU from its current state to the `ISL >` prompt. The aim is to preserve the current environment, so that data in the memory dump are valid.

1. Get into the "Control Mode" on the console. Type Control-B (hold the Control key [CRTL] down and simultaneously press the [B] key). The result should be the prompt for the Access Port (AP) Control Mode: `CM >` .
2. At the `CM >` prompt, enter `TC` and a single carriage return to execute a Transfer of Control (TOC).
3. To ensure that the TC took effect, watch the hex display located in the lower left hand corner of the console when in CM mode. The hex display should change from the code it displayed prior to the TC to a different series of codes (the series of codes displayed when the CPU undergoes selftest and the system boots ISL.)
4. If the hex code DOES NOT change, the TC did not take effect. Try the following tactics:
   a. Try typing a Control-M (no carriage return). If this produces no effect, do a hard reset of the terminal and attempt another Control-B TC key sequence.
   b. If the hex code still does not change, call the Response Center. The Response Center may be able to help.

c. If all efforts to do a TC fail, you probably will have to do a Hard Reset. Perform a hard reset by entering `RS` at the `CM >` prompt.

If you do a reset, do not waste your time taking a memory dump. Instead, just bring the machine up and report the problem to the Response Center.

---

**Caution**

Do not do a hard reset (RS) unless absolutely necessary. A hard reset invalidates the memory dump and destroys important troubleshooting information.

---

#### Step 2: Boot to ISL.

At this point, you have successfully initiated a TC and are watching the hex display change through all of its selftest codes.

1. After a TC, the console is automatically placed into console mode so you can monitor the boot process messages.
2. When the console displays a prompt for booting the computer, enter a response so that the computer boots from the PRIMARY PATH - as you would for any normal system start attempt.
3. If the autoboot flag is enabled, you see:

```
Processor is starting the autoboot process.

To discontinue, press any key within 10 seconds...
```

As soon as you see the above prompt, press a key.

---

**Caution**

Autoboot is a script of ISL commands that are automatically executed.

If your site uses the Autoboot feature, **make sure that you abort the autoboot sequence!** Otherwise the memory dump will be lost unless the autoboot file contains a DUMP command.

---

**Note**

If you find that you do not get this console prompt, but instead seem to be hanging at the xxxx, 9001, or C640 code, try typing `CO` at the `CM >` prompt. This should switch you into Console Mode and, if autoboot is not enabled or if the 10 second autoboot sequence has not expired, you should be able to boot to ISL.

---

#### Step 3: Dump the System.

At this point, you are at the `ISL >` prompt.

1. Install a tape on the tape drive configured as the "Alternate Path" device (the tape drive from which you normally UPDATE or INSTALL).
2. Put the drive online and ensure that the tape loaded properly.

**Note**

If you find that your inputs to the ISL > prompt are being rejected (or considered invalid), check the console configuration (MODES softkey). Ensure that AUTOLINEFEED and BLOCK MODE are not enabled (only REMOTE should be enabled). Also, the terminal should be set to the HP defaults: 9600 Baud, 8 bits/no parity, ENQ/ACK.

3. Type DUMP at the ISL > prompt to initiate the dump program.
4. The dump program prompts you with Enter Dump Name.

   The dump name is written to tape as an identifier which is useful if the tape is accidentally mislabeled or is mixed up with another dump tape. The dump name should begin with an alpha character. For naming conventions, the Response Center recommends that:

   a. System Aborts be named "Axxxx" where the xxxx is the system abort number.

   b. HPMCs be named "HPMC".

   c. System hangs can be labeled "HANG".

   Type in your name, reason for taking the dump, site name and timestamp of the system interruption.
5. If you do not respond to the prompt within a few seconds, the dump continues. If this happens the dump does not receive a name, but the contents of the dump are not harmed.
6. Monitor the progress of the dump, recording any error messages that occur. Report these error messages to the Response Center when you call.

### Step 4: Restart the System.

At this point, the dump has completed and you should be at the ISL > prompt.

1. You can now restart the system using a START RECOVERY (Warmstart) or a START NORECOVERY (Coolstart) at your option.
2. At this point, it is normally safe to perform your typical system/data base recovery procedures and resume system processing.

### Step 5: Process the Memory Dump.

At this point, your system is back up and running normally. You should also have a memory dump tape of the failure which completed without error.

The next step is to process the dump tape so that its contents can be remotely analyzed. Do this by running the Dump Analysis Tool (DAT), a utility residing in the DAT.TELESUP group/account.

1. Log on as MGR.TELESUP,DAT.
2. Type DAT at the colon prompt to initiate the Dump Analysis Tool.

   a. If you get the following error message:

   ```
   "Program requires more capabilities than group is allowed
   (LDERR 505)".
   ```

   the DAT group was not created with full capabilities. Enter:

   ```
   :ALTGROUP DAT;CAP=IA,BA,PH,MR,DS,PM
   ```

then retry the DAT command.

3. You should see a `$ nmdat>` prompt.
4. Enter a GETDUMP command in the format "GETDUMP xxxxx" where the xxxxx is the 5-character dump name you gave to the dump.
5. The console displays an I/O Request message for the dump tape. Reply as normal.
6. Monitor the subsequent process for unusual error messages.
   a. The DAT utility may abort because of insufficient disk space. The memory dump may require hundreds of thousands of sectors of permanent disk space on the system. If there is not enough space to accomplish this task, the DAT utility aborts. Report this event to the Response Center.
7. Once the dump is finished, type EXIT to leave the utility.

The memory dump now resides as file(s) in the DAT.TELESUP account.

#### Step 6: Call the Response Center.

In the last step, you gather information and call the Response Center to report the system interruption:

1. Gather the following information to give to the Response Center engineer who will be calling back:
   a. The modem telephone number and Baud rate.
   b. The passwords to MGR.TELESUP and any additional security provisions needed to access the system on which the memory dump resides.
   c. The operating system release (type :SHOWME to get current release number).
   d. All troubleshooting information gathered so far.
2. Call the Response Center. If you are certain the problem is hardware, ask for "Hardware Assistance." Report the full system abort message printed on the console and the contents of the hex display. Also report any unusual messages encountered during the subsequent system startup.
3. The Response Center recommends that you allow users to log back on, without waiting for the Response Center engineer to call back.

   If you choose to wait for the Response Center engineer to call back before allowing users back on, please note this fact to the Response Center Coordinator so that your call is appropriately prioritized.

## HP-UX Automatic Core Dump

As HP-UX reboots following a system panic, the computer may save a **core file** to disk. This core file is a snapshot of physical memory at the time of the panic. If it becomes necessary, this core file can be analyzed using special tools to determine more about what caused the panic.

Saving a core file is a two-part process:

1. After the panic occurs, the HP-UX kernel writes an image of its physical memory onto the dump device. This is the **core file** (**crash file**). By default, the dump device is the primary swap device.
2. Usually when the core dump is complete, the system will attempt to reboot the system. During reboot, HP-UX will attempt to save the previously created core file (on the dump device) into the `/tmp/syscore` directory on disk.

   Specifically, the */etc/rc* bootup script runs *savecore* (1M), the command for saving the core file and the `/hp-ux` file to disk. By default, the */etc/rc* script specifies the target directory as `/tmp/syscore`.

   The two files copied by *savecore* are named:

   - `hp-ux.n` (a copy of the original kernel, `/hp-ux`)
   - `hp-core.n` (a copy of the physical memory image).

   Together these two files make up a **core dump pair**. The `n` in the file names is a number assigned to a particular core dump pair.

### What To Do With Core Files

The core files created by *savecore* are very big (the same size as the system physical memory). If you know why the system panic occurred, you can delete the core files.

If you feel you need to save these files for future analysis, it is best to save them to tape and remove them from your file system in order to free up space.

Troubleshooting difficult problems (especially intermittent problems) often requires two or more core files.

### Problems With Automatic Memory Dump

The following conditions may prevent the automatic memory dump from succeeding:

- The *savecore* command line has been commented out or removed from the */etc/rc* script.
- The directory in which *savecore* has been told to put the crash file does not exist. By default this directory is `/tmp/syscore`.

---

**Note** This directory is not automatically created during install.

---

- There is not enough room in the dump device(s) or in the partition that *savecore* is told to use. If the dump device is too small to contain the image of physical memory, the dump will be only partially saved and will be invalid.

### Avoiding Problems with Automatic Memory Dump

The best way to avoid memory dump problems is to make sure your system is properly set up. For example, make sure that the target directory for *savecore* has already been created on your computer.

There are several ways to deal with the problem of the dump device or partition being too small to contain the core files:

- You can modify */etc/rc* to specify an appropriately sized target directory for *savecore*. The next time a core dump occurs, it will be saved to the new directory.
- Once a computer is down, you can specify a different target file system by booting the system in single user mode and running the *savecore* manually.
- If your system has a large physical memory, you might want to use the *-i* option to *savecore*. This option causes *savecore* to save as much important information as possible after a system panic.

  With the *-i* option, *savecore* saves the complete core file if there is enough space in the target directory. If there is insufficient space in the target directory, *savecore -i* saves the kernel pages and (if possible) user pages into a compressed core file. These compressed core files are easier to transport. However, the analysis tools cannot be used directly on compressed core files.

  For more information on *savecore* and its options, see the entry for *savecore* (1M) in the *HP-UX Reference* or the HP-UX man page. Also, see *HP-UX System Tasks*.

### Running savecore Manually

The *savecore* command can be run manually. Typically, you enter a series of commands like the following:

```
ISL> hpux -is              /* to boot single user after a crash */
                           /* (specify driver name and hardware address */
                           /* for the device you want to boot from) */

# /etc/fsck -p             /* to fix the file system */
# /etc/mount -a            /* to mount all disks (maybe "-a -t hfs") */
# /bin/df                  /* to find where there is enough space */
# mkdir /tmp/syscore       /* assuming /tmp has enough space */
# cd /tmp/syscore
# /etc/savecore .          /* to save the core file to the current directory */
```

If the system is configured with the primary swap device as the dump device (default configuration), a problem can occur if *savecore* is run after the system has been brought up multi-user. Once the system starts back up, it is free to start swapping over the swap device. This could corrupt a crash image written out to the swap device.

If the dump device is configured to use another logical volume or file system rather than the primary swap device, the system's physical memory image remains intact; you can *savecore* after the system has been brought up to multi-user mode. At this point, you can mount a magnetic tape and use the *-t* option to *savecore* to save the system's physical memory image to magnetic tape.

## Calling the Response Center

**If your problem is serious enough to call the HP Response Center:**

1. Gather the following information to give to the Response Center engineer who will be calling back:
   a. The modem telephone number and Baud rate.
   b. History and nature of the problem:
      i. When did the problem first occur?
      ii. What changes have occurred on the system?
      iii. Has the problem ever occurred before?
      iv. Can the problem be reproduced?
      v. Is the problem intermittent?
   c. All troubleshooting information gathered so far. For example:
      i. The system panic message displayed on the console.
      ii. If an HPMC is displayed, the console display fields.
      iii. If the system did not reboot, the sequence of 4-digit codes at bottom of console display. (Press Control-B first.)
2. Call the Response Center. If you are certain the problem is hardware, ask for "Hardware Assistance."
3. Use your judgment about whether to reboot at this point and allow users to log back on, without waiting for the Response Center engineer to call back. For example, if the computer does not execute *savecore*, you may want to talk with the Response Center before rebooting.

   If you choose to wait for the Response Center engineer to call back before allowing users back on, please note this fact to the Response Center Coordinator so that your call is appropriately prioritized.

## Error Codes and Messages

Error codes and messages come from the following sources:

- PDC
- ISL
- Operating Systems
- Access port
- Error logs

## PDC Codes

The PDC Selftest codes can be used to identify field replaceable units. Table 5-19 summarizes the major test sections of PDC selftest, and Table 5-20 summarizes the HPMC error codes.

**Table 5-19. PDC Selftest and Diagnostic Test Section Summary**

| Test Section | Description |
|---|---|
| 1xxx | CPU and TLB |
| 2xxx | Cache |
| 3xxx | Processor Dependent Hardware (PDH) |
| 4xxx | Floating Point Coprocessor |
| 5xxx | Bus Transactions |
| 6xxx | Stable Store, ROM, and EPROM |
| 7xxx | Memory subsystem: includes MIOC and RAM cards |
| 8xxx | I/O Device Errors |
| 9xxx | Console Initialization Errors |
| Axxx | Boot Device Initialization Errors |
| Bxxx | OS Panic |
| Cxxx | System Initialization |

**Table 5-20. HPMC Error Halt Codes**

| Code | Description |
|---|---|
| 2040 | HPMC due to cache error |
| 2043 | HPMC due to data cache error |
| 2044 | HPMC due to level 2 instruction cache error |
| 2045 | HPMC due to level 1instruction cache error |
| 503F | HPMC due to bus error |
| 7000 | HPMC due to memory error |
| CBFF | Nested HPMC occurred, hanging the machine. This error code is alternately displayed with one of the error codes above. |

Table 5-21 through Table 5-30 list all of the PDC selftest sections by major category.

**Table 5-21. CPU/TLB/MIOC Selftest Error Codes**

| Code | OSTAT Display | Test |
|---|---|---|
| 1080 | **TEST** | CPU_DIAG |
| 1081 | **TEST** | CPU_BASIC |
| 1082 | **TEST** | CPU_ALU_BR |
| 1083 | **TEST** | CPU_SHADOW |
| 1086 | **TEST** | CPU_BIT_OP |
| 1087 | **TEST** | CPU_ARITH_COND |
| 108A | **TEST** | CPU_AR_SIDE_EFF |
| 108B | **TEST** | CPU_CR |
| 108C | **TEST** | CPU_EXT_INT |
| 108D | **TEST** | CPU_SUPER |
| 1090 | **TEST** | TLB_INIT |
| 1091 | **TEST** | TLB_ADDRESS |
| 1092 | **TEST** | TLB_RAM |
| 1093 | **TEST** | TLB_REPLAC |
| 1094 | **TEST** | TLB_PROTECTION |
| 1095 | **TEST** | HWTLB_TEST |
| 1096 | **TEST** | DTLB_TRAP |
| 10D0 | **TEST** | MIOC_DIAG |
| 10D1 | **TEST** | MIOC_EIR |
| 10D2 | **TEST** | MIOC_HPMC |
| 10D4 | **TEST** | MIOC_MEM_INTERFACE |
| 10D7 | **TEST** | MIOC_EDC_SBE |
| 10D7 | **FLT** | |
| 10D8 | **TEST** | MIOC_EDC_DBE |
| 10D8 | **FLT** | |
| 10D9 | **TEST** | MIOC_PARITY |
| 10DA | **TEST** | QUICK_RAM |
| 10DB | **TEST** | DESTRUCTIVE_RAM |

**Table 5-22. Cache Selftest Error Codes**

| Code | OSTAT Display | Test | Multiplexed Error Displays |
|---|---|---|---|
| 2040 | **FLT** | CACHE_ERR_HPMC | |
| 2043 | **FLT** | DCACHE_ERR_HPMC | |
| 2044 | **FLT** | I2CACHE_ERR_HPMC | |
| 2045 | **FLT** | I1CACHE_ERR_HPMC | |
| 2090 | **TEST** | CACHE_DLINE | 000F, 000D (tag or data) 0111, 0ddd (I-cache or D-cache) Bit position (left to right) |
| 2091 | **TEST** | CACHE_ALINE | most significant 1/2 data word - expected least significant 1/2 data word - expected 2091 dispalyed again most significant 1/2 data word - actual least significant 1/2 data word - actual |
| 2092 | **FLT** | ICACHE_RAM | 0fff, 0ddd (tag, data) Bit number (in hex) |
| 2093 | **FLT** | DCACHE_RAM | 0fff, 0ddd (tag, data) Bit number (in hex) |
| 2094 | **TEST** | CACHE_TAG | |
| 2095 | **TEST** | CACHE_ERR | |
| 2096 | **TEST** | CACHE_CONFIG | |
| 2097 | **TEST** | CACHE_FLUSH | |
| 2098 | **TEST** | CACHE_BYTE | |
| 2099 | **TEST** | ICACHE_MISS | |
| 209A | **TEST** | DCACHE_MISS | |
| 209B | **TEST** | CACHE_DONE | |
| 209F | **TEST** | UCACHE_RAM | |

**Table 5-23. Stable Store, ROM, and EEPROM Error Code**

| Code | OSTAT Display | Test |
|---|---|---|
| 3000 | **TEST** | ROM_XSUM |
| 3001 | **WARN** | ERR_READING_EEPROM |
| 3001 | **FLT** | FATAL_ERR_READING_EEPROM |
| 3002 | **WARN** | ERR_WRITING_EEPROM |
| 3003 | **FLT** | FATAL_ERR_WRITING_EEPROM |
| 3004 | **FLT** | PROC_SPEED_SENSE_FLT |
| 3005 | **FLT** | GET_PROC_SPEED_FLT |
| 3009 | **FLT** | GET_CACHE_SIZE_FLT |
| 300A | **FLT** | WRITE_GBOA_FLT |
| 300B | **FLT** | READ_RTC_FLT |

**Table 5-24. PDC Floating Point Coprocessor Selftest Error Codes**

| Code | OSTAT Display | Test |
|---|---|---|
| 4080 | TEST | FLOATING_POINT_REG |
| 4081 | TEST | FLOATING_POINT_INSTR |
| 4082 | TEST | FLOATING_POINT_TRAPS |
| 4083 | TEST | FLOATING_POINT_RANDOM |

**Table 5-25. Bus Self-test Transactions**

| Code | OSTAT Display | Test |
|---|---|---|
| 503F | FLT | BUS_ERR_HPMC |

**Table 5-26. Memory Subsystem Self-test Error Codes and Slot Numbers**

| Code | OSTAT Display | Test | Slot Number |
|---|---|---|---|
| 700A | FLT | MEM_ERR_HPMC | 0A |
| 700B | FLT | MEM_ERR_HPMC | 0B |
| 701A | FLT | MEM_ERR_HPMC | 1A |
| 701B | FLT | MEM_ERR_HPMC | 1B |
| 702A | FLT | MEM_ERR_HPMC | 2A |
| 702B | FLT | MEM_ERR_HPMC | 2B |
| 703A | FLT | MEM_ERR_HPMC | 3A |
| 703B | FLT | MEM_ERR_HPMC | 3B |
| 707D | FLT | NO_RAM_FOUND | |
| 707E | TEST | NON_DEST_RAM | |

**Table 5-27. I/O Device Error Codes**

| Code | OSTAT Display | Test |
|---|---|---|
| 8003 | TEST | ERR_READING_IODC_BYTES |
| 8004 | TEST | ERR_READING_EINIT |
| 8005 | TEST | ERR_EXEC_EINIT |
| 8006 | TEST | ERR_READING_EIO |
| 8007 | INIT | ENTRY_IO_ERR |
| 8008 | INIT | INVALID_DEV_CLASS |
| 8009 | TEST | ERR_READING_ETEST |
| 800A | TEST | ERR_EXEC_ETEST |
| 8101 | TEST | LAN_MODULE |
| 8200 | TEST | GECKOBOA_REGISTER |

**Table 5-28. Console Initialization Error Codes**

| Code | OSTAT Display | Test |
|---|---|---|
| 9001 | **INIT** | NO_CONS_FOUND |

**Table 5-29. Boot Device Initialization Error Codes**

| Code | OSTAT Display | Test |
|---|---|---|
| A008 | **INIT** | NO_BOOT_SELECTION |
| A088 | **FLT** | NO_BOOT_NO_CONS |

**Table 5-30. System Initialization Error Codes**

| Code | OSTAT Display | Test |
|---|---|---|
| **Memory Initialization** | | |
| C200 | **INIT** | RAM_CONFIG |
| C201 | **INIT** | BEG_DESTR_MEM_INIT |
| C202 | **INIT** | BEG_NONDESTR_MEM_INIT |
| C20F | **INIT** | RAM_CONFIG_FP |
| **Console Initialization** | | |
| C600 | **INIT** | GET_DEFAULT_CONS |
| C640 | **INIT** | INIT_DEFAULT_CONS |

**Table 5-30. System Initialization Error Codes (continued)**

| Code | OSTAT Display | Test |
|---|---|---|
| **Boot Device Initialization and IPL Codes for Primary Path** | | |
| C500 | **INIT** | GET_PRI_PATH |
| C540 | **INIT** | INIT_PRI_PATH |
| C550 | **INIT** | TEST_PRI_PATH |
| C580 | **INIT** | LOAD_IPL_PRI_PATH |
| C5F0 | **INIT** | PRI_IPL_FAULT |
| C5F0 | **FLT** | PRI_IPL_FAULT_FATAL |
| C5F1 | **INIT** | BAD_IPL_ADDR_PRI |
| C5F2 | **INIT** | BAD_LIF_MAGIC_PRI |
| C5F3 | **INIT** | BAD_IPL_SIZE_PRI |
| C5F4 | **INIT** | BAD_IPL_ENTRY_PRI |
| C5F8 | **INIT** | BAD_IPL_CHECKSUM_PRI |
| C5FF | **INIT** | LAUNCH_IPL_PRI |
| **Boot Device Initialization and IPL Codes for All Other Paths** | | |
| C700 | **INIT** | GET_OTHR_PATH |
| C740 | **INIT** | INIT_OTHR_PATH |
| C750 | **INIT** | TEST_OTHR_PATH |
| C780 | **INIT** | LOAD_IPL_OTHR_PATH |
| C7F0 | **INIT** | OTHR_IPL_FAULT |
| C7F0 | **FLT** | OTHR_IPL_FAULT_FATAL |
| C7F1 | **INIT** | BAD_IPL_ADDR_OTHR |
| C7F2 | **INIT** | BAD_LIF_MAGIC_OTHR |
| C7F3 | **INIT** | BAD_IPL_SIZE_OTHR |
| C7F4 | **INIT** | BAD_IPL_ENTRY_OTHR |
| C7F8 | **INIT** | BAD_IPL_CHECKSUM_OTHR |
| C7FF | **INIT** | LAUNCH_IPL_OTHR |
| **TOC Codes** | | |
| CB00 | **INIT** | TOC_INITIATED |
| CB00 | **FLT** | TOC_FAULT |
| CB0B | **INIT** | BR_TO_OS_TOC |
| **HPMC Codes** | | |
| CBF0 | **FLT** | HPMC_INITIATED |
| CBFB | **FLT** | BR_TO_OS_HPMC |
| CBFF | **FLT** | MULTIPLE_HPMCS |
| **HP-PB Initialization** | | |
| CDx0 | **INIT** | INITIALIZE_NIO |

## ISL Boot Codes

**Table 5-31. ISL Boot Codes**

| Code | Description |
|---|---|
| 0x00 | No error currently detected. In process of initializing or using this device |
| 0x01 | Could not find ENTRY_INIT (IODC Driver) |
| 0x02 | Error while executing ENTRY_INIT (IODC Driver) |
| 0x03 | Could not find ENTRY_IO (IODC Driver) |
| 0x04 | Error while executing ENTRY_IO (IODC Driver) |
| 0x05 | Device class of device indicates it is not bootable |
| 0x06 | LIF Magic on boot media is not 0x8000 |
| 0x07 | IPL address on boot media is either 0 or not 2K aligned |
| 0x08 | IPL size on boot media is 0, greater than maximum, or not 2K aligned |
| 0x09 | IPL entry address on boot media is not within range of IPL addresses or is not word aligned |
| 0x0A | IPL on boot media does not checksum correctly |

### MPE/iX ISL Boot Codes

**Table 5-32. MPE/iX ISL Boot Codes**

| Display | Description |
|---|---|
| CE40 | MMSAVE Launched |
| CE41 | Establish first available free memory |
| CE42 | Align input buffers for DMA transfer |
| CE43 | Initialize I/O driver pointers |
| CE44 | Write welcome message to console |
| CE46 | Reading LIF volume label |
| CE47 | Getting values from volume label |
| CE48 | Reading LIF directory |
| CE49 | Find disk address and size of DUMPAREA LIF file |
| CE4A | DUMPAREA found. Start writing to disk |
| CE4B | Memory written to DUMPAREA. Proceeding to ISL |
| CE4C | Finding ISL disk address and size |
| CE4D | Reading ISL |
| CE4E | Launching ISL |
| CE4F | Writing error message |
| CE50 | Calling IODC to write message to console |
| CE51 | Configuring memory controllers |
| CE52 | Completed memory controller configuration |

### HP-UX ISL Boot Codes

**Table 5-33. HP-UX ISL Boot Codes**

| Display | Description |
|---|---|
| CB00 | Transfer-of control initiated by the firmware (also see the D*** codes) |
| CEC0 | Hpuxboot has been loaded and initialization begun (realmain() has been entered) |
| CED0 | Hpuxboot has entered main() |
| CED2 | Hpuxboot is about to configure the I/O system |
| CED4 | Hpuxboot is about to mount the root file system |
| CEDA | Hpuxboot is about to list the contents of a directory |
| CEDB | Hpuxboot is about to load the kernel into memory |
| CEDC | Hpuxboot is about to start a copy operation |
| CEDD | Hpuxboot is about to stop (return to rdb) |
| CEDE | Hpuxboot is about to return to ISL |
| CEDF | Hpuxboot is about to launch the kernel |

## System Initialization Codes

**Table 5-34. MPE/iX System Initialization Codes**

| Display | Description |
|---|---|
| CF00 | Entering launch |
| CF02 | Mapped system state |
| CF04 | Allocating memory |
| CF08 | Backing out into Genesis |
| CF0A | Entering Genesis |
| CF30 | Initializing Genesis completed |
| CF40 | Initializing resident kernel completed |
| CF50 | Initializing non-resident kernel completed |
| CF60 | CM SL binding completed |
| CF70 | Configuring system I/O completed |
| CF80 | System volume initialized and mounted |
| CF90 | Initializing CM OS completed |

**Table 5-35. HP-UX System Initialization Codes**

| Display | Description |
|---|---|
| CEE0 | Kernel was loaded and initialization has begun (realmain() was entered) |
| CEF0 | Kernel has entered main() |
| CEF2 | Kernel is about to configure the I/O system |
| CEF4 | Kernel is about to mount the root file system |
| CEF6 | Kernel is about to set up the page-out daemon |
| CEF8 | Kernel is about to start the init process |

## HP-UX OS Display Codes

### Table 5-36. HP-UX System Panic Codes

| Display | Description |
|---|---|
| B000 | Kernel panic |
| B009 | Panic dump completed (disks not fully synchronized) |
| B00A | Panic dump completed (disks fully synchronized) |

### Table 5-37. HP-UX System Shutdown Codes

| Display | Description |
|---|---|
| D000 | Shutdown begun (boot() has been entered) |
| D400 | Shutdown in progress (returned from update(), about to wait for buffers to be flushed |
| D600 | Shutdown in progress (busy-wait after update() has completed |
| D900 | Shutdown completed (disks not fully synchronized) |
| DA00 | Shutdown completed (disks fully synchronized) |
| D004 | Transfer-of-control core dump begun |
| D904 | TOC dump completed (disks not synchronized) |
| D010 | High-priority machine-check core dump begun |
| D910 | HPMC dump completed (disks not synchronized) |

### Table 5-38. HP-UX System Run Codes

| Display | Description |
|---|---|
| FX1F | System running. An F in the first and fourth digits indicates the system is running normally. The second digit (X) is updated every 5 seconds with the length of the run queue at that time (an instantaneous reading, NOT an average). It indicates the number of processes. Loads higher than 9 display as A. The third digit indicates the number of processors. In HP 9000 EX5 systems, it is always set to 1. |

# SCSI/Console/LAN PCA Access Port Error Codes.

This is a list of the error codes that can occur when the `TA` command is used on SCSI/Console/LAN PCA, P/N A1703-60003.

**Table 5-39. TA Command Tests and Power-on Selftests**

| Test Number | Test Description |
|---|---|
| 1 | OCTART tests ( Never runs because octart is always busy) |
| 2 | Flash ROM test |
| 3 | Firmware ROM test |
| 4 | IODC ROM test |
| 5 | EEPROM test |
| 6 | Local port ENQ/ACK test |
| 7 | Remote port ENQ/ACK test |
| 8 | LAN loopback test |

If a test fails, the following message is displayed:

```
Additional Failure Information  :  TTTTSSSS HHHHHHHH HHHHHHHH
```

`TTTT` is the first two bytes of the self test number in ASCII hex.

`SSSS` is the second two bytes of the self test number in ASCII hex.

`HHHHHHHH` is for internal use only.

The selftest failure test codes are shown in Table 5-40.

**Table 5-40. Selftest Failure Codes**

| Test | Word 0 |
|---|---|
| All-purpose Chip DTACK | 80010000 |
| OCTART DTACK | 80020000 |
| LAN Controller DTACK | 80030000 |
| ISR DTACK | 80040000 |
| DMA Controller DTACK | 80050000 |
| Key DTACK | 80060000 |
| SRAM | 80070000 |
| DRAM | 80080000 |
| DRAM parity | 81080000 |
| Power-on SRAM | 82070000 |
| Power-on DRAM | 82080000 |
| Power-on DRAM parity | 83080000 |
| OCTART tests | 80090000 |
| DMA Controller register | 800a0000 |
| Key Chip register | 800b0000 |
| fw ROM tests | 800c0000 |
| EEPROM tests | 800dnnnn[1] |
| IODC ROM tests | 800e0000 |
| Backplane DMA | 800fnnnn[1] |
| LAN Controller tests | 80100000 |
| FLASH tests | 80120000 |
| fw patch test | 80130000 |
| All-purpose Chip register test | 80140000 |
| front panel lb test | 8015nnnn[1] |
| fw fatal error | 80160000 |
| Spurious Interrupt occurred | 80170000 |
| parity test | 80180000 |

**Note**

[1] Subtests are indicated in this field. They are for internal use only.

## Integrated Access Port Selftest Failure Codes

The Integrated Access Port (IAP) selftest failure messages appear as:

```
AP failed selftest number xx(APERR 05)
```

where xx is defined in Table 5-41 .

```
SE     - Supervisor Element
OCTART - Chip containing 8 serial I/O ports
QANAT  - Bus interface chip
```

**Table 5-41. Integrated Access Port Selftest Failure Codes**

| Element Number | Part Under Test | Description | Destructive Test |
|---|---|---|---|
| 0 | | Reserved. | |
| 1 | 8-port MUX | 8-port MUX short test. | Yes |
| 2 | 8-port MUX | Complete test contains all tests that check the 8-port MUX board only. | Yes |
| 3 | 68000 | 68000 test. | Yes |
| 4 | ROM | ROM test (C.R.C). | Yes |
| 5 | RAM | RAM test. | Yes |
| 7 | OCTART | Test channel registers port x. | No |
| 8-14 | | Reserved. | |
| 15 | OCTART | Check various statuses ... port x. | No |
| 16-22 | | Reserved. | |
| 23 | OCTART | Check channel hardware (Mux) port x. | No |
| 24-30 | | Reserved. | |
| 31 | ADP | Test with quadriloop on ADP port x | No |
| 32-38 | | Reserved. | |
| 39 | OCTART | Check Xon/Xoff at global level. | Yes |
| 40 | OCTART | Test w/r OCTART global registers. | Yes |
| 41 | OCTART | Test all ports with global link at the OCTART's output. | Yes |
| 42 | OCTART | Check interrupt capabilities. | Yes |
| 43 | OCTART | Check modem features. | Yes |
| 44 | OCTART | Check global timer. | Yes |
| 45 | OCTART | Check vector generation. | Yes |
| 46 | QANAT | Check QANAT hard. related to port x. | No |
| 47-53 | | Reserved. | |
| 54 | QANAT | Check QANAT hardware related to SE. | Yes |
| 55-79 | | Available. | |
| 80 | 8-port MUX | Poweron selftest. | Yes |
| 81 | 8-port MUX | Non-destructive selftest for AP. | Yes |
| 82 | 8-port MUX | Test list called by AP's TA command. | No |
| 83 | EEPROM | CRC test for EEPROM. | No |
| 84 | OCTART | Front panel loopback test. | Yes |
| 85 | RAM | Harmless RAM test | No |
| 86 | EEPROM | Manufacturing NVM Test. | No |
| 87 | EEPROM | NVM Status check. Note: always fails. | No |
| 88-90 | | Available. | |
| 91 | ADP | Test ADP with loopback connector. | No |
| 92-99 | | Available. | |

**Table 5-41. Integrated Access Port Selftest Failure Codes (continued)**

| Element Number | Part Under Test | Description | Destructive Test |
|---|---|---|---|
| 100 | OCTART | Test interr. priority in channel x. | No |
| 101-107 | | Reserved. | |
| 108 | OCTART | Test break features in channel x. | No |
| 109-115 | | Reserved. | |
| 116 | OCTART | Test timer features in channel x. | No |
| 117-123 | | Reserved. | |
| 124 | OCTART | Test xon/xoff features in channel x | No |
| 125-131 | | Reserved. | |
| 132 | ADP | Check channel hardware (Adp) port x. | No |
| 133-139 | | Reserved. | |
| 140 | ADP | Check global link at CREM input on ADP. | Yes |
| 141 | | Complete test of 8-port MUX and RS232 ADP | Yes |
| 142 | | Complete test of ADP only | Yes |
| 143 | | Complete test of 8-port MUX and RS422 ADP | Yes |
| 144-251 | | Available. | |
| 252 | | Returns MUX id., plus added info. | No |
| 253 | | Returns ADP type (quadriloop or not). | Yes |
| 254 | | Backplane loopback (through QANAT). | Yes |
| 255 | | Get the rest of error data structure. | Yes |

## Multifunction I/O Card Status LEDs

The Multifunction I/O cards have LED status indicators on the bulkheads. Figure Figure 5-1 shows the name and location of LEDs on each version of the card. To determine the status of a particular function on a card, locate and identify the LED (e.g., LINK Status, SCSI Selftest, etc). Match the LED pattern with the descriptions in Table 5-42.

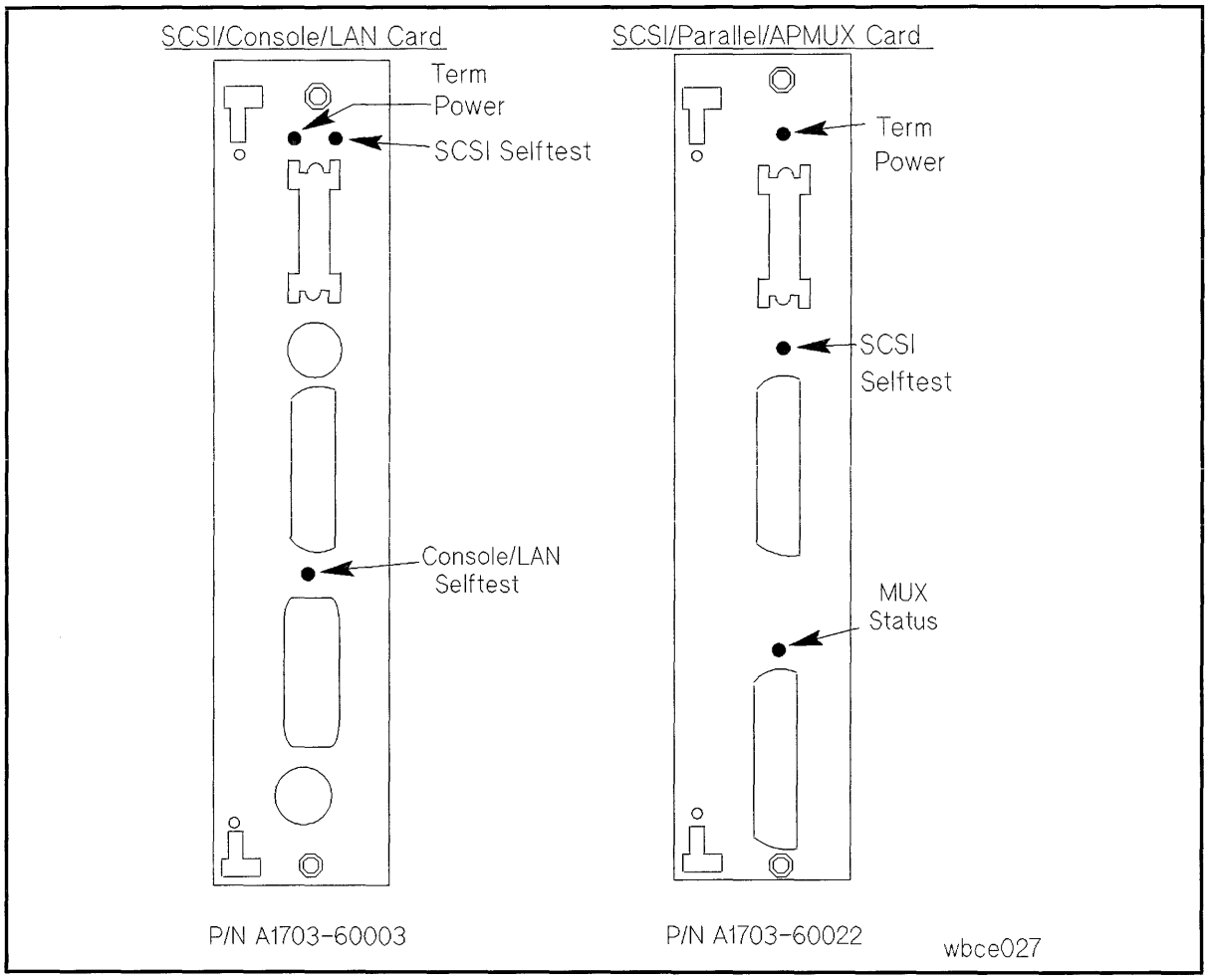



**Figure 5-1. Multifunction I/O Card Status LEDs**

**Table 5-42. Multifunction I/O Card Status LEDs**

| LED Name | LED Display | Description |
|---|---|---|
| Mux Status | Blinking | Testing |
| | ON | Test Failed |
| | OFF | Normal |
| SCSI Selftest | ON | Failed Selftest |
| | OFF | Normal |
| Termination Power | ON | Normal |
| | OFF | No power (check fuse) |
| Console/LAN Selftest | ON | Failed Selftest |
| | OFF | Normal |
| | Flashing | LAN network error external to card |
| | ON | Failed |

**Table 5-43. ADP Panel Status LEDs**

| LED Name | LED Display | Description |
|---|---|---|
| Link Status | ON Momentarily at Power-Up | ADP to Link not working |
| | ON Steadily | Mux to ADP not receiving data from Mux |
| | OFF | Normal |
| Power | ON | Power to ADP good |
| | OFF | No power from Mux |

## Troubleshooting SCSI Problems

There have been several cases reported to us, where the system log files were getting full with SCSI errors on HP9000 Model Ex5 systems. The log analysis has showed that the SCSI bus was being reset by system software.

A high level of signal noise in the SCSI bus can cause the SCSI controller chip to hang. When this occurs, the SCSI driver

1. times out,
2. sends a reset to the chip,
3. logs the event, and
4. retries the transaction.

This causes the system log files to fill with SCSI error messages.

If this occurs, check the following items. They can cause noise problems in the SCSI bus:

1. **External SCSI terminator:** If the configuration contains an external device, make sure that the last device in the chain contains an ACTIVE terminator. The active terminator is product number K2291 (part number: 1252-3920). The active terminator can be identified by its construction material (chrome-color plastic). Do not use terminators made of black or grey plastic, or chrome metal.
2. **High density terminator**: If there are no external devices, make sure that the high density terminator is installed on the Multifunction I/O card.
3. **Cable length:** Make sure that the total cable length does not exceed six meters. Count both internal and external cable lengths. The internal cable length for 2-slot standard chassis systems is 1.5 meters. The internal cable length for 6-slot and 12-slot expanded chassis is 3.0 meters.
4. **Old SCSI cables:** Old SCSI cables are known to generate noise in the SCSI bus. Do not use old SCSI cables. Old SCSI cables are grey color. New cables are parchment white.
5. **Excessive termination:** Ensure the ONLY device with termination SIP (Single In-line Package) resistor packs installed is the device at the end of the internal bus. No other internal or external devices should have termination resistor packs installed.
6. **Internal cable damage:** Ensure the internal SCSI ribbon cable has not been pinched by any of the sheetmetal causing wires to be cut or the insulation to be scraped off.
7. **Termination Power:** Ensure the option pin-sets on each device are selected such that the host supplies power to the termination resistors.

## 3.5-inch Hard Disk Drive Troubleshooting

**Note**

The following procedure does not apply to the A2444A, A2445A, and A2958A 3.5-inch drives. Each of these drives is replaced as a unit.

The hard disk drive includes two replaceable subassemblies: the disk mechanism and the SCSI controller PCA. The firmware ROM on the SCSI controller PCA is also replaceable.

1. Turn off system power.
2. Remove the SCSI controller PCA from the disk mechanism.
3. Install a known good SCSI controller PCA on the disk mechanism. Make sure the configuration jumpers on the good SCSI controller PCA assembly are set to the same positions as the jumpers on the suspect assembly.
4. Remove the firmware ROM from the faulty SCSI controller PCA, and install it on the replacement SCSI controller PCA.
5. Reinstall the disk drive.
6. Check to see if the problem is solved.
7. If the problem persists, change the ROM.
8. Check to see if the problem is solved.

If the problem persists, replace the disk mechanism.

## Drive Status Light

Table 5-44 shows drive status light indications during normal operation and fault conditions.

**Table 5-44. Status Light Indications**

| Status | Explanation |
|---|---|
| OFF | This is the normal indication when the hard disk drive is idle. This may also indicate that there is no power to the hard disk drive. |
| ON | If the status light remains on more than 20 seconds after the self-test begins, it indicates a self-test failure. |
| FLASHING (1 Hz) | If the status light continues flashing at a 1 Hz rate more than 20 seconds after the self-test begins, it indicates a self-test failure. |
| FLASHING (10 Hz) | This indicates that the hard disk drive is performing its internal self-test diagnostic. This pattern should only continue as long as the self-test is in progress. |
| RANDOM FLASHING | The status light flashes when the hard disk drive is accessed by the host. This indicates normal operation. |

## Diagnostic Information

The following paragraphs provide information on the hard disk drive internal status logs and the Extended Sense data returned by the hard disk drive in response to a REQUEST SENSE command.

The method of accessing this information depends on the diagnostic tool you are using. Refer to the appropriate diagnostic documentation for information on retrieving device information.

### Logs

There are three internal hard disk drive logs: the Usage Log, the Data Error Log, and the Hardware Error Log. These logs are maintained in two locations: on the disk media and is SCSI controller RAM. The controller RAM is initialized from the disk at power-on or following a reset. During disk drive operation, the controller RAM is continually updated. The contents of the controller RAM are only posted to the disk media when an error entry is added.

**Usage Log.** The Usage Log includes the following fields: Area, Access Count, Blocks Accessed, First Retry Count, Multiple Retry Count.

The Area field indicates which part of the hard disk media the Data Error Log is reporting on.

The Access Count field indicates the number of media accesses performed since the last hardware error occurred, or the log was cleared. When an entry is added to the Hardware Error Log, the contents of this field are included and this field is reset to zero. Thus, to determine the total number of media accesses, you must add the contents of this field to any Hardware Error Log Access Count entries. If there are no Hareware Error Log entries,

this value represents the total media accesses. Table 5-45 lists the access count ranges corrresponding to the values reported in this field.

The Blocks Accessed field indicates the number of blocks read from the hard disk drive.

The First Retry Count field indicates the number of times read retries were performed and data was recovered on the first retry.

The Multiple Retry Count field indicates the number of times data was not recovered on the first retry. This field is incremented only once per completed recovery.

**Table 5-45. Hard Disk Drive Access Count Range Values**

| VALUE (HEX) | MINIMUM OF ACCESS RANGE | MAXIMUM OF ACCESS RANGE |
|---|---|---|
| 0 | No Accesses | No Accesses |
| 1 | 1 | 1 |
| 2 | 2 | 10 |
| 3 | 11 | 100 |
| 4 | 101 | 1,000 |
| 5 | 1,001 | 10,000 |
| 6 | 10,001 | 100,000 |
| 7 | 100,001 | 500,000 |
| 8 | 500,001 | 1,000,000 |
| 9 | 1,000,001 | 5,000,000 |
| A | 5,000,001 | 10,000,000 |
| B | 10,000,001 | 50,000,000 |
| C | 50,000,001 | 100,000,000 |
| D | 100,000,001 | 500,000,000 |
| E | 500,000,001 | 1,000,000,000 |
| F | 1,000,000,001 | >1,000,000,001 |

**Data Error Log.** The Data Error Log includes the following fields: Logical Block Address, Error Type, Count, and Error.

The Logical Block Address field contains the logical block address of a data block that encountered multiple read retries during one or more data error recovery attempts.

The Error Type field indicates the type of data error the block encountered (refer to Table 5-46).

The Count field is incremented each time a block is uncorrectable or requires multiple retries during a transaction. This field is incremented only once for each data recovery attempt.

The Error field contains encoded data error byte information as listed in Table 5-46.

**Table 5-46. Hard Disk Drive Error Type and Error Byte**

| | |
|---|---|
| **Error type:** | |
| REC-E = | Recovered data with ECC |
| REC-R = | Recovered data with retrys |
| UNR = | Unrecoverable error |
| **Error byte:** | |
| 1XXXXXXX = | Unclassifiable error |
| X1XXXXXX = | Error occurred in header field |
| XX1XXXXX = | Error occurred in data field |
| XXX1XXXX = | Unrecoverable data |
| XXXX1XXX = | Data recovered with ECC |
| XXXXX1XX = | Data recovered with retries |
| XXXXXX1X = | Write fault |
| XXXXXXX1 = | Reserved |

**Hardware Error Log.** The Hardware Error Log includes the following fields: Logical Block Address, Internal Drive Status, and Access Count.

The Logical Block Address field contains the logical block address of a data block that was being accessed when the error occurred.

The Internal Device Status field contains an error code corresponding to the Additional Sense Code field returned by the REQUEST SENSE command.

The Access Count field indicates the number of media accesses that had been performed when the hardware fault occurred. To determine the total number of media accesses, add these values to the Access Count field of the Usage Log. Table 5-45 lists the access count ranges corresponding to the values in this field.

**REQUEST SENSE Data Fields.** Table 5-47 shows the data format for the data fields returned by the drive in response to a REQUEST SENSE command. Reserved fields always contain zeros. Only the extended sense data format is supported.

**Table 5-47. SCSI-2 Request Sense Extended Data Format**

| | Bit | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Byte** | **7** | **6** | **5** | **4** | **3** | **2** | **1** | **0** |
| **00** | Valid | Error Class = 7 | | | Reserved | | | Error Code |
| **01** | Segment Number = 0 | | | | | | | |
| **02** | FM = 0 | EOM = 0 | ILI = 0 | Reserved | Sense Key | | | |
| **03—06** | (MSB=03) Information Bytes (LSB=06) | | | | | | | |
| **07** | Additional Sense Length = 20 | | | | | | | |
| **08—11** | Command Specific Information | | | | | | | |
| **12** | Additional Sense Code | | | | | | | |
| **13** | Additional Sense Code Qualifier | | | | | | | |
| **14** | Field Replaceable Unit Code = 0 | | | | | | | |
| **15** | SKSV=0 | Sense Key Specific | | | | | | |
| **16—17** | Sense Key Specific | | | | | | | |
| **18** | Retry=0 | Reassign = 0 | HRDERR = 0 | Reserved | | | | |
| **19—23** | Reserved | | | | | | | |
| **Device Error Field Follows: (Bytes 24—27)** | | | | | | | | |
| **24** | Vendor Unique DERROR Status Code | | | | | | | |
| **25** | ESDI Status Byte | | | | | | | |
| **26—27** | SCSI Status Bytes | | | | | | | |

**SCSI-2 Error Code.** A bit value of 0 (zero) specifies current error; a bit value of 1 (one) specifies deferred error.

**Error Class.** This field is always equal to 7.

**Valid.** When set to 1, the VALID bit indicates that the Information Bytes field contains valid information. The exact significance of the Information Bytes depends on the status of the Sense Key field.

**Segment Number.** Set to zero (0). Used for Copy and Search commands; not supported in this product.

**FM (File Mark), EOM (End of Media), ILI (Incorrect Length Indicator).** All set to zero (0).

**Sense Key.** This field is used to indicate the type of error that has occurred, and the recovery action that should be taken by the initiator. It is the primary piece of information available to the Initiator for making decisions based on errors detected by the Target. The Sense Key codes shown in Table 5-48.

**Additional Sense Code.** This field is specific for each sense code and provides additional information about the cause of that particular Sense Key. Additional Sense Codes are listed in Table 5-49.

**Information Bytes.** Contain information relative to specific commands and specific devices.

**Additional Sense Length.** Specifies the number of additional Sense data bytes to follow. Set to 14 for SCSI (CCS) or 20 for SCSI-2.

**Command Specific Information.** Contains information dependent upon the command that was executed. Specific details are included in appropriate command explanations.

**Additional Sense Code Qualifier.** Not supported, reported as zeros.

**Failed Field Replaceable Unit (FRU).** Refers to the Field Replaceable Unit (FRU) that caused the current error reported in this Sense Key. This field will be set to 0 since FRU specific error detection is not supported.

**SKSV (Sense Key Specific Valid).** Not supported, reported as zeros.

**Device Error Field.** Indicates device unique error codes designed to aid service personnel in more detailed analysis of any drive faults. This field consists of four bytes.

| SCSI-2 Byte | Description |
|---|---|
| 24 | Vendor Unique DERROR Status Codes: listed in Table 5-50. |
| 25 | ESDI Status Byte: listed in Table 5-51. |
| 26-27 | SCSI Status Bytes: listed in Table 5-52. |

**Table 5-48. Sense Key Codes**

| Value (hex) | Description |
|---|---|
| 0 | **No Sense.** Indicates that there is no specific sense key information to be reported for the designated logical unit. |
| 1 | **Recovered Error.** Indicates that the last command completed successfully with some recovery action performed by the Target. Details may be determinable by examining the additional sense bytes and the information bytes. |
| 2 | **Not Ready.** Indicates that the logical unit addressed cannot be accessed. |
| 3 | **Media Error.** Indicates that the command terminated with a nonrecovered error condition that was probably caused by a flaw in the media or an error in the recorded data. |
| 4 | **Hardware Error.** Indicates that the Target detected a nonrecoverable hardware failure (for example, controller failure, device failure, parity error, etc.) while performing the command or during a self test. |
| 5 | **Illegal Request.** Indicates that there was an illegal parameter in the command descriptor block or in the additional parameters supplied as data for some commands. |
| 6 | **Unit Attention.** Indicates that the Target has been reset or there has been a power on. |
| 7 | **Data Protect.** Indicates that a command that reads or writes the media was attempted on a block that is protected from this operation. The read or write operation is not performed. |
| B | **Aborted Command.** Indicates that the Target aborted the command due to Initiator request/action. |
| C | **Equal.** Indicates a SEARCH DATA command has satisfied an equal comparison. |
| E | **Miscompare.** Indicates data in buffer may have been corrupted between READ BUFFER and WRITE BUFFER commands, or a MISCOMPARE occurred during a VERIFY (with BYTCK enabled). |

**Table 5-49. Additional Sense Codes**

| Value (hex) | Description |
|---|---|
| 00 | No Additional Sense Information |
| 01 | No Index/Sector signal |
| 02 | No Seek Complete |
| 03 | Write Fault |
| 04 | Drive Not Ready |
| 05 | Logical Unit Does Not Respond to Selection |
| 08 | Logical Unit Communication Failure |
| 09 | Servo lost while track following |
| 10 | ID CRC or ECC error |
| 11 | Unrecovered Read Error of Data Blocks |
| 14 | No Record Found |
| 15 | Seek Positioning Error |
| 17 | Recovered Read Data with Target's Read Retries (Not with ECC) |
| 18 | Recovered Read Data with Target's ECC Correction (Not with retries) |
| 19 | Defect List Error |
| 1A | Parameter Overrun |
| 1B | Synchronous Transfer Error |
| 1D | Compare Error |
| 20 | Invalid Command Operation Code |
| 21 | Illegal Logical Block Address. Address greater than the maximum LBA returned by the READ CAPACITY data with PMI not set. |

**Table 5-49. Additional Sense Codes (continued)**

| Value (hex) | Description |
|---|---|
| 24 | Illegal Field in CDB |
| 25 | Invalid LUN |
| 26 | Invalid Field in Parameter List |
| 27 | Write Protected |
| 29 | Power On or Reset or Bus Device Reset Occurred |
| 2A | Mode Select Parameters Changed. |
| 2C | Command Sequence Error |
| 2F | Commands Cleared by Another Initiator |
| 31 | Media Format Corrupted |
| 32 | No Defect Spare Location Available |
| 33 | Spare Operation Failed |
| 3D | Invalid Bits in Identify Message |
| 3F | Target Operating Conditions Have Changed |
| 40 | RAM Failure |
| 41 | Data Path Diagnostic Failure |
| 42 | Power-On Diagnostic Failure |
| 43 | Message Reject Error |
| 44 | Internal Controller Error |
| 45 | Select/Reselect Failed |
| 46 | Unsuccessful Soft Reset |
| 47 | SCSI Interface Parity Error |
| 48 | Initiator Detected Error |
| 49 | Inappropriate/Illegal Message |
| 4E | Overlapped Commands Attempted |

**Table 5-50. DERROR Status Codes**

| Error Code Hex(Dec) | Description |
|---|---|
| 00(0) | Not an error condition. |
| 01(1) | Reserved. |
| 02(2) | Reserved. |
| 03(3) | Timed out waiting for DSP to complete Power On Self-Test. |
| 04(4) | After power-on, DSP became Command Ready without Finished being asserted. |
| 05(5) | DSP reported a revision value incompatible with this firmware version. |
| 06(6) | Power-On DSP RAM test failed. |
| 07(7) | Parity error on command received. |
| 08(8) | Reserved. |
| 09(9) | Reserved. |
| 0A(10) | Received illegal command. |
| 0B(11) | Address of Seek command was outside legal address space. |
| 0C(12) | An attempt was made to set an illegal EEPROM address. |
| 0D(13) | Reserved. |
| 0E(14) | Timed out waiting for EEPROM write to complete. |
| 0F(15) | DSP did not spinup after a spinup command was executed. |
| 10(16) | Timed out waiting for DSP to become ready for a short term command. |
| 11(17) | Timed out waiting for DSP to become ready for a long term command. |
| 12(18) | A Seek was attempted when the spindle was not spun up and locked. |
| 13(19) | The DSP did not end up in tracking mode after a Recalibrate command was executed. |
| 14(20) | Bounds test of Track Offset command failed. |
| 15(21) | A fault is still set after clearing Gate Array fault latches. |
| 16(22) | Retries were exhausted while trying to verify position during a Recalibrate. |
| 17(23) | The DC bias adaptation failed to null NPES within the maximum iteration limit. |
| 18(24) | Maximum iteration limit reached during head alignment SPES null. |
| 19(25) | DSP sync lost during head alignment SPES measurement. |
| 1A(26) | The drive has entered the Head Alignment Needed state. |

**Table 5-50. DERROR Status Codes (continued)**

| Error Code Hex(Dec) | Description |
|---|---|
| 1B(27) | The drive has entered the Head Alignment Critical state. |
| 1C(28) | The maximum total (AC+DC) head alignment correction limit was exceeded. |
| 1D(29) | Reserved |
| 1E(30) | DSP failed to complete a Read Track Number command in allotted time. |
| 1F(31) | DSP failed to complete a Spin Down command in allotted time. |
| 20(32) | Reserved. |
| 21(33) | DSP failed to complete a Spin Up command in allotted time. |
| 22(34) | DSP failed to complete a Recalibrate command in allotted time. |
| 23(35) | DSP failed to complete an Introduce Tracking Offset command in allotted time. |
| 24(36) | DSP failed to complete a Seek command in allotted time. |
| 25(37) | DSP failed to complete a Measure Alignment Band command in allotted time. |
| 26(38) thru 29(41) | Reserved. |
| 2A(42) | HDA EEPROM test byte is not 55H. |
| 2B(43) | HDA EEPROM checksum result not equal to 00. |
| 2C(44) | PCA EEPROM test byte is not 55H. |
| 2D(45) | PCA EEPROM checksum result not equal to 00. |
| 2E(46) | Computed read/write setting is out of range. |
| 2F(47) thru 31(49) | Reserved. |
| 32(50) | The long term DSP command completed with Alert signal set in status register. |
| 33(51) | The DSP Alert signal was set when attempting to send a command to the DSP. |
| 34(52) | Request Status logged a Servo Fault from the fault register. |
| 35(53) | DSP failure code indicates other than Reset at power-on. |
| 36(54) | Reserved. |
| 37(55) | Reserved. |
| 38(56) | Maximum DC head alignment correction capability was exceeded. |
| 39(57) | Maximum AC head alignment correction capability was exceeded. |
| 3A(58) | Maximum iteration limit was exceeded in calibrating the NPES gain. |

**Table 5-50. DERROR Status Codes (continued)**

| Error Code Hex(Dec) | Description |
|---|---|
| 3B(59) | SPES gain not within acceptable level. |
| 3C(60) | Reserved. |
| 3D(61) | Reserved. |
| 3E(62) | Write current unsafe. |
| 3F(63) | That command requires a special test enable to be executed. |
| 40(64) | Unknown write fault. |
| 41(65) | Write during loss of servo timing sync. |
| 42(66) | Write during momentary spindle off-speed indication. |
| 43(67) | Write during momentary actuator off-track indication. |
| 44(68) | Write during a seek operation. |
| 45(69) | Write after settle or tracking failure. |
| 46(70) | Write following aggressive settle. |
| 47(71) | Write following inhibit DSP code 7 is not defined. |
| 48(72) | Write was attempted while ESDI attention was asserted. |
| 49(73) | Write was attempted while an illegal head was selected. |
| 4A(74) | Write was attempted while a recalibrate was in process. |
| 4B(75) | Write was attempted on a head that was in the head alignment critical state. |
| 4C(76) | Write was attempted while a head alignment was in process. |
| 4D(77) | Write was attempted after a fatal head alignment occurred. |
| 4E(78) | Write was attempted while spun down or after a recalibrate failure. |
| 4F(79) thru 7F(127) | Reserved. |
| 80(128) | No failure detected. |
| 81(129) | Unsupported command. |
| 82(130) | Illegal command sequence. |
| 83(131) | Servo heartbeat time out. |
| 84(132) | Spindle stuck. |
| 85(133) | Spindle couldn't reach full speed. |
| 86(134) | Servo PLL didn't lock. |
| 87(135) | Index pattern fault. |
| 88(136) | TMR2 Alignment failure. |
| 89(137) | Servo PLL came unlocked. |
| 8A(138) | Bad hard track number. |
| 8B(139) | Settle failure. |
| 8C(140) | Alignment Band AGC voltage not within legal range. |
| 8D(141) | Heroics invoked during spin up. |

**Table 5-50. DERROR Status Codes (continued)**

| Error Code Hex(Dec) | Description |
|---|---|
| 8E(142) | DSP reset detected. |
| 8F(143) | Minimum spindle speed could not be maintained. |
| 90(144) | Tracking failure after a successful settle to a new setpoint. |
| 91(145) thru C0(192) | Reserved. |
| C1(193) | PLL came unlocked in Slow Acceleration Phase. |
| C2(194) | Seek timed out in Slow Acceleration Phase. |
| C3(195) | Velocity too high in Slow Acceleration Phase. |
| C4(196) thru C8(200) | Unassigned seek fault in Slow Acceleration Phase. |
| C9(201) | PLL came unlocked in Fast Acceleration Phase. |
| CA(202) | Seek timed out in Fast Acceleration Phase. |
| CB(203) | Velocity too high in Fast Acceleration Phase. |
| CC(204) thru D0(208) | Unassigned seek fault in Fast Acceleration Phase. |
| D1(209) | PLL came unlocked in the Coasting Phase. |
| D2(210) | Seek timed out in the Coasting Phase. |
| D3(211) | Velocity too high in the Coasting Phase. |
| D4(212) thru D8(216) | Unassigned seek fault in the Coasting Phase. |

**Table 5-50. DERROR Status Codes (continued)**

| Error Code Hex(Dec) | Description |
|---|---|
| D9(217) | PLL came unlocked in Fast Deceleration Phase. |
| DA(218) | Seek timed out in Fast Deceleration Phase. |
| DB(219) | Velocity too high in Fast Deceleration Phase. |
| DC(220) thru E0(224) | Unassigned seek fault in Fast Deceleration Phase. |
| E1(225) | PLL came unlocked in Slow Deceleration Phase |
| E2(226) | Seek timed out in Slow Deceleration Phase |
| E3(227) | Velocity too high in Slow Deceleration Phase |
| E4(228) thru E8(232) | Unassigned seek fault in Slow Deceleration Phase. |
| E9(233) thru F0(240) | Unassigned seek fault. |
| F1(241) | PLL came unlocked in the Gross Settle Phase. |
| F2(242) | Seek timed out in the Gross Settle Phase. |
| F3(243) | Velocity too high in the Gross Settle Phase. |
| F4(244) thru F9(249) | Unassigned seek fault in the Gross Settle Phase. |
| FA(250) | Seek timed out in the Fine Settle Phase. |
| FB(251) | Velocity too high in the Fine Settle Phase. |
| FC(252) thru FF(255) | Unassigned seek fault in the Fine Settle Phase. |

**Table 5-51. Byte 25 ESDI Status Byte Contents**

| Bit | Description |
|---|---|
| 7 | Spindle Motor Stopped |
| 6 | Command Data Parity Fault |
| 5 | Interface Fault |
| 4 | Invalid Command Fault |
| 3 | Seek Fault |
| 2 | Write Gate with Track Offset Fault |
| 1 | DERROR Status Available; SCSI-2=byte 24 |
| 0 | Write Fault |

**Table 5-52. Bytes 26, 27 SCSI Status Bytes Contents**

| Bit | Description |
|---|---|
| **Byte 26: SCSI-2** | |
| 7 | BPF: Buffer parity fault |
| 6 | UOF: PHLEA FIFO underflow/overflow |
| 5 | SNR: Status not read |
| 4 | DNC: Data not complete |
| 3 | ATN: ESDI/device attention |
| 2 | SNC: Status not complete |
| 1 | CTO: Command Timeout |
| 0 | EOS: End of sector |
| **Byte 27: SCSI-2** | |
| 7 | SIL: Error would have been silent |
| 6 | DE3: Data ECC3 error |
| 5 | DE1: Data ECC1 error |
| 4 | HE1: Header ECC1 error |
| 3 | DSF: Data sync fault |
| 2 | HSF: Header sync fault |
| 1 | HTC: Header track miscompare |
| 0 | HSC: Header sector miscompare |

## DDS-Format DAT Drive Troubleshooting

The DDS drive is replaced as an entire assembly, but before replacing it you must make sure the problem is caused by a hardware failure. This means you must rule out problems caused by the environment or the tape media.

Use the following sequence to isolate DDS drive problems (see Figure 5-2).

1. Check the DDS drive status lights.
   - If the lights indicate a high humidity fault, refer to Solving High Humidity Problems.
   - If the lights indicate a media warning fault, refer to Solving Media Warning Problems.
2. Try cleaning the tape heads and see if the problem is solved.
3. Determine if the problem is media-related by installing a new DDS cassette and retrying the failed operation. If a cassette is jammed in the DDS drive tape mechanism, refer to Removing Jammed Cassettes.
4. If the preceding steps have not solved the problem, replace the entire DDS drive.
5. Check system operation to make sure the problem is solved.

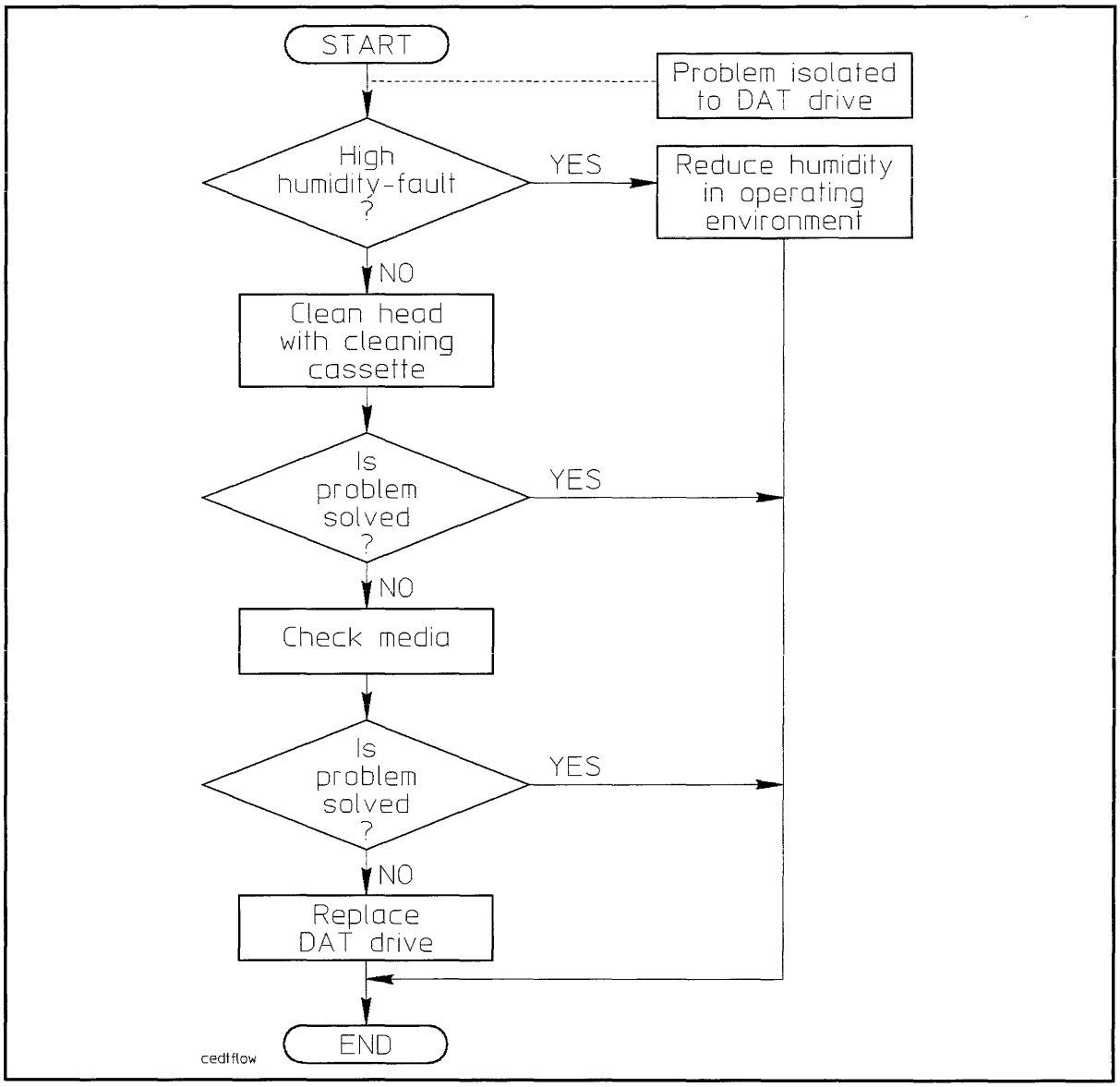



**Figure 5-2. DDS Drive Troubleshooting Flowchart**

## Status Lights

The status of the DDS drives is indicated by the cassette status light and the drive status light.

### DDS-Format DAT Drive Status Lights

See Figure 5-3 for the location of the lights on the drive. Refer to Table 1-8 for the states of the lights during normal operation and when fault conditions occur.

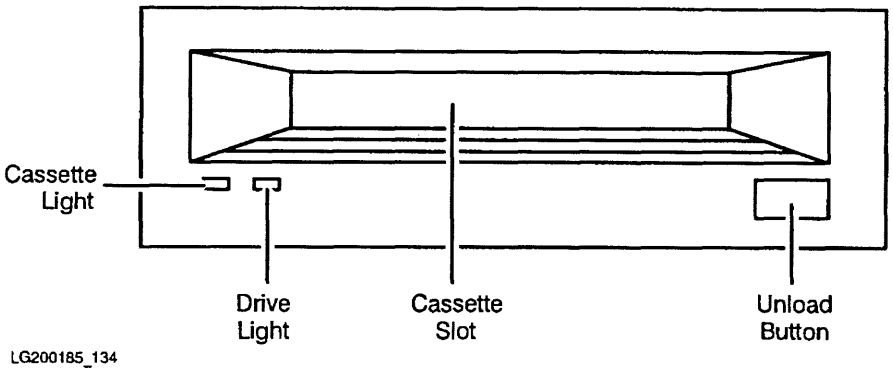



**Figure 5-3. HP C1503B and C1504B DDS-Format DAT Drive Front Panel**

## Solving Media Warning Problems

A media warning fault usually indicates that either the tape head is dirty, or the tape cassette is nearing the end of its useful life.

To correct a media warning problem,

1. Eject the suspect cassette from the DDS drive.
2. Clean the tape head using a cleaning cassette.
3. Insert the suspect cassette and repeat the operation that was being performed when the media warning occurred.

If the media warning does not recur, the tape head was simply dirty. The cassette can continue to be used; however, you should remind the customer to clean the tape head regularly.

If cleaning the tape head did not the fix the media warning fault, it may indicate a problem with the cassette itself. In this case, continue with the following steps:

1. Copy the data from the suspect cassette onto a hard disk drive.
2. Eject the suspect cassette and install a new cassette.
3. Copy the data from the hard disk drive to the new cassette.
4. Retry the operation that was being performed when the media warning occurred.

In the unlikely event that the problem still occurs, it may indicate a problem with the DDS drive hardware, in which case the entire drive must be replaced.

## Solving High Humidity Problems

If a sensor in the DDS drive detects that the humidity has risen above a safe operating level, the drive stops whatever it is doing, unthreads the tape, and waits for the humidity to drop. The DDS drive will not respond to any commands until the sensor detects an acceptable level of humidity. This protects the drive and the tape media from damage.

Once the humidity has dropped to an acceptable level, the DDS drive must be power cycled before it can be used again.

**Note**

A high humidity fault indicates that the customer needs to exercise tighter control on the operating environment. Subjecting the DDS drive (and the other computer equipment as well) to environmental extremes may shorten the life of the drive. The operating environment should be maintained within the range recommended in the system specifications.

## Removing a Jammed Cassette From a DDS-Format Drive

If a DDS cassette becomes jammed in the DDS drive, try either power-cycling the drive or a hard reset. If this fails to release the cassette, the cassette can be manually extracted from the drive as follows (see Figure 5-4):

1. Rewind the tape to the Beginning of Media (BOM).
2. Switch off power to the DDS drive and remove the DDS drive from the cabinet.
3. Remove the cabinet mounting bracket from the drive.
4. Remove the two adapter brackets from the drive.
5. Insert a flat-blade screwdriver between the drive chassis and the side of the top cover. Pry up the top cover at two points on each side of the top cover and remove the top cover.
6. Insert a size 00 flat-blade screwdriver through the emergency eject access hole (1).
7. View the tip of the screwdriver from the left-hand side of the drive, and angle the screwdriver down into the slotted head of the worm gear (2).
8. Rotate the screwdriver counter-clockwise and watch the worm gear to make sure it is rotating. You must rotate the worm gear several hundred times because of its small diameter.

**Caution**

- When the tape is unthreaded, a loop of tape will be hanging out of the cassette. Be careful not to let any grease in the threading slots contaminate the tape.
- As the cassette is ejected, the cassette door will close on the loop of tape and may crease the tape. If the tape was at BOM before starting this procedure, the crease will occur where no data is written. However, if the tape was not at BOM, damage to the tape may occur and data may be lost.

9. Continue rotating the screwdriver counter-clockwise for several hundred revolutions until the cassette (4) moves forward from the read/write station (5) and is ejected. At times, it may seem that the tape is not moving, such as when the reel spindles drop. This is normal.
10. Remove the cassette from the cassette slot (6).

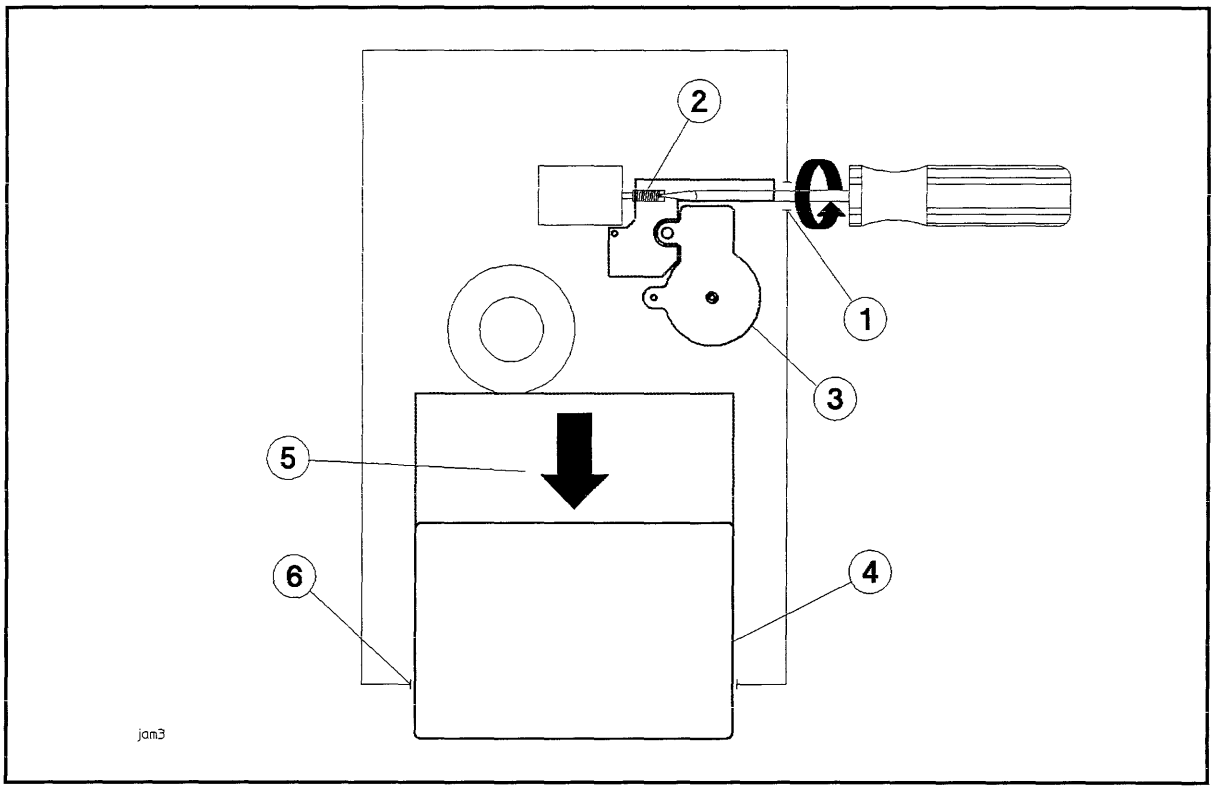



**Figure 5-4. Manually Ejecting a DDS Tape**

1. Emergency Eject Access Hole
2. Worm Gear
3. Cam Gear
4. Cassette
5. Read/Write Station
6. Cassette Slot

## Diagnostic Information

The following paragraphs provide information on the DDS drive internal status logs and the Extended Sense data returned by the DDS drive in response to a REQUEST SENSE command.

The method of accessing this information depends on the diagnostic tool you are using. Refer to the appropriate diagnostic documentation for information on retrieving device information.

### Logs

The DDS drive maintains three internal logs: the fault log, the error rate log, and tape log.

**Fault Log.** The Fault Log contains information about hardware faults that have occurred since the log was last cleared. The Fault Log is located in DDS drive controller RAM and is *not* transferred to the tape. The Fault Log is cleared when the DDS drive power is cycled or reset, or when the CLEAR LOGS command is executed. The Fault Log has a maximum limit of 30 entries and operates on a first-in-first-out (FIFO) basis. The Fault Log entries are organized by event and time of occurrence.

**Error Rate Log.** The Error Rate Log contains information about the types and counts of errors that have occurred on the tape during the current tape load or since the Error Rate Log was last cleared. The Error Rate Log is cleared when the DDS drive power is cycled or reset, when the CLEAR LOGS command is executed, or as an option when initiating an error rate test. The log is not saved on the tape when the tape is unloaded.

**Tape Log.** The Tape Log contains information about the number of groups read, written, and retried for the current tape load and the last (previous) tape load. The Tape Log also contains the totals since the tape was initialized, including the current load. The Tape Log cannot be cleared. It is copied to RAM when the tape is loaded, updated in RAM during the load, then copied back to the tape during the unload sequence. This means that if the drive is power-cycled with the tape loaded, the current information is lost.

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**Note**

If a DDS cassette is write-protected, the drive cannot update the Tape Log when the cassette is unloaded. Consequently, the Tape Log on a write-protected tape will not reflect the true usage of the tape.

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### REQUEST SENSE Data Fields

Table 5-53 shows the data format for the following data fields returned by the drive in response to a REQUEST SENSE command. Reserved fields always contain zeros.

**Table 5-53. DDS-Format DAT Drive REQUEST SENSE Extended Data Format**

| | BIT | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **BYTE** | **7** | **6** | **5** | **4** | **3** | **2** | **1** | **0** |
| **00** | Valid | Error Class | | | Error Code | | | |
| **01** | Segment Number | | | | | | | |
| **02** | FM | EOM | ILI | Reserved | Sense Key | | | |
| **03—06** | (MSB=03) | Information Bytes | | | | | (LSB=06) | |
| **07** | Additional Sense Length | | | | | | | |
| **08—11** | Command Specific Information = 00 | | | | | | | |
| **12** | Additional Sense Code | | | | | | | |
| **13** | Additional Sense Code Qualifier | | | | | | | |
| **14** | Field Replaceable Unit Code | | | | | | | |
| **15** | SKSV | C/D | Reserved = 0 | | BPV | Bit Pointer | | |
| **16—17** | (MSB=16) | Field Pointer/Drive Error Code | | | | | (LSB=17) | |
| **18** | Reserved = 0 | | | | | | | |
| **19** | Copy Target Status | | | | | | | |
| **20—51** | Copy Target Sense | | | | | | | |

**Valid.** A value of 1 indicates that the Information bytes contain valid information. The exact significance of the Information bytes depends on the status of the Sense Key field.

**Error Class.** Always set to 7.

**Error Code.** A value of 0 specifies current error; a value of 1 specifies deferred error.

**Segment Number.** Contains the number of the current segment descriptor when the REQUEST SENSE command is in response to a COPY command. Otherwise, this field is set to 0.

**FM (File Mark).** A value of 1 indicates the logical position is at a filemark or setmark.

**EOM (End of Media).** Indicates the physical position is at End Of Media. Sense Key is set to No Sense. The Additional Sense Code is set to 04 for Beginning Of Partition or 02 for End Of Partition. Beginning Of Partition is reported after a Space command encounters BOP. End Of Partition is reported when a Write or Write File Marks command leaves the tape positioned in the Early Warning region near the End Of Partition.

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**Note**

On a DDS-formatted tape, there are two indicators toward the physical end of the partition. EOT occurs 500 mm before the EOM mark. EOM indicate the end of usable tape. The drive will never write data to the tape after encountering EOM. The drive uses EOT to generate Early Warning EOP on writes. The host may write approximately 10 megabytes of data to the tape following the Early Warning EOP before encountering the physical EOM.

---

**ILI (Incorrect Length Indicator).** Indicates the requested block length did not match the actual block length. Only Read and Verify may cause this bit to be set.

**Sense Key.** Indicates the type of error that has occurred, and the recovery action that should be taken by the initiator. Refer to Table 5-54.

**Information.** These bytes are valid only if the Valid field is set to 1. They contain residue information following the failure of a Read, Write, Write Filemarks, or Space command.

**Additional Sense Length.** Specifies the number of Additional Sense bytes to follow. Always set to 0B.

**Command Specific Information.** Normally set to 0. If, however, the Sense data is for a check conditioned Copy command, and the Additional Sense is Copy Aborted, then the first two bytes are set to 19 and the last two are set to 0.

**Additional Sense Code and Additional Sense Code Qualifier.** Provide additional information about the cause of the Check Condition or the current tape position. Refer to Table 5-55.

**Field Replaceable Unit (FRU) Code.** The value of this field indicates the FRU that failed, as follows:

| Value | Assembly |
|---|---|
| 0 | No failing FRU |
| 1 | Controller PCA |
| 2 | Mechanism |

**SKSV (Sense Key Specific Valid).** Set to 1 if the Sense Key specific bytes (bytes 15 through 17) are valid. These bytes are valid only when they assume the role of Field Pointer bytes. This will occur when an Illegal Field Check detects an error in a command parameter list. If this bit is not set, the CD, BPV, and Bit Pointer fields will be set to 0, the top byte of the Field Pointer field will be 0, and the bottom byte of the Field Pointer field will contain a product-specific error code.

**C/D.** If set, the Field Pointer information applies to the command descriptor block. If not set, the Field Pointer information applies to the parameter list for the command (Only valid if SKSV is set.)

**BPV.** Indicates the Bit Pointer field is valid. Set if SKSV is set.

**Bit Pointer.** Identifies the bit position of the field in error. (Only valid if SKSV is set.)

**Field Pointer/Drive Error Code.** This field is dependent on the SKSV field as follows:

If SKSV is set to 1, this field identifies which byte of the command descriptor/parameter list an error was detected in. If SKSV is set to 0, the top byte of this field contains the drive error code associated with the failure of the previous command, or it contains zero in the case of no failure/no appropriate error code ( refer to Table 5-56 for a list of drive error codes).

**Copy Target Status.** Returned only if the Sense Key is Copy Aborted. Set to the value of the status byte returned to the drive from a Copy Target which resulted in the failure of the last Copy operation.

**Copy Target Sense.** Returned only if the Sense Key is Copy Aborted. Contains the Sense data returned to the drive by the last copy target the drive communicated with. The drive would have requested this data by issuing a REQUEST SENSE command to the copy target in response to receiving a non-good status from the copy target.

**Table 5-54. Sense Key Codes**

| VALUE (HEX) | DESCRIPTION |
|---|---|
| 0 | NO SENSE. No specific Sense Key information to be reported, or the command executed prior to the REQUEST SENSE command completed successf |
| 1 | RECOVERED ERROR. Last command completed successfully with some recovery action performed by the logical unit. |
| 2 | NOT READY. Logical unit cannot be accessed. |
| 3 | MEDIA ERROR. READ or WRITE command terminated with an error condition, or drive encountered problems loading or unloading tape. |
| 4 | HARDWARE ERROR. Controller detected a hardware failure while executing a command or performing a self-test. |
| 5 | ILLEGAL REQUEST. Illegal parameter in the command descriptor block or in additional parameters supplied as data for a command. |
| 6 | UNIT ATTENTION. Media has been exchanged, logical unit has been reset, or MODE SELECT parameters have been changed. |
| 7 | WRITE-PROTECTED. Logical unit attempted to write on a write-protected tape. |
| 8 | BLANK CHECK. Logical unit encountered End Of Data (EOD). |
| A | COPY ABORTED. COPY or COPY AND VERIFY command aborted due to an error condition on the source device, destination device, or both. |
| B | ABORT COMMAND. Command was aborted. |

**Table 5-55. Additional Sense Codes/Additional Sense Code Qualifiers**

| VALUE (HEX) | DESCRIPTION |
|---|---|
| 00 00 | No Additional Sense Information |
| 00 01 | Filemark Detected |
| 00 02 | End Of Partition/Medium Detected |
| 00 03 | Setmark Detected |
| 00 04 | Beginning Of Partition Detected |
| 00 05 | End Of Data Detected |
| 04 00 | LUN Not Ready, cause not reportable |
| 04 01 | LUN Becoming Ready |
| 04 02 | LUN Not Ready, initializing command required |
| 09 00 | Track Following Error |
| 0C 00 | Write Error |
| 11 00 | Unrecovered Read Error |
| 14 03 | End Of Data Not Found |
| 15 00 | Mechanical Positioning Error |
| 17 00 | Recovered Data With No Error Correction |
| 17 01 | Recovered Data With Retries |
| 18 00 | Recovered Data With Error Correction |
| 1A 00 | Parameter List Length Error |
| 20 00 | Invalid Command Operation Code |
| 24 00 | Invalid Field in Command Descriptor Block |
| 25 00 | LUN Not Supported |
| 26 00 | Invalid Field in Parameter List |
| 27 00 | Operator Selected Write Protect |
| 28 00 | Not Ready to Transition |
| 29 00 | Power-On, Reset, Bus Device Reset |
| 2A 01 | Mode Parameters Changed |
| 2B 00 | Copy Cannot Execute |
| 30 02 | Cannot Read Media, Incompatible Format |

**Table 5-55.**
**Additional Sense Codes/Additional Sense Code Qualifiers (continued)**

| VALUE (HEX) | DESCRIPTION |
|---|---|
| 30 03 | Cleaning Cartridge Installed |
| 31 00 | Medium Format Corrupted |
| 33 00 | Tape Length Error |
| 37 00 | Rounded Parameter |
| 3A 00 | Medium Not Present |
| 3B 00 | Sequential Positioning Error |
| 3B 01 | Tape Position Error at BOM |
| 3D 00 | Invalid Bits in Identify Message |
| 3E 00 | LUN Not Self-Configured |
| 40 XX | Diagnostic Failure On Component |
| 43 00 | Message Error |
| 44 00 | Internal Target Failure |
| 45 00 | Select/Reselect Failure |
| 47 00 | SCSI Parity Error |
| 48 00 | Initiator Detected Error Message |
| 49 00 | Invalid Message Error |
| 4A 00 | Command Phase Error |
| 4B 00 | Data Phase Error |
| 4E 00 | Overlapped Commands Attempted |
| 50 00 | Write Append Error |
| 51 00 | Erase Failure |
| 52 00 | Cartridge Fault |
| 53 00 | Media Load/Eject Failed |
| 53 02 | Medium Removal Prevented |
| 82 80 | Humidity Too High |
| 82 81 | Dryness |

**Table 5-56. Drive Error Codes**

| VALUE (HEX) | DESCRIPTION |
|---|---|
| 01 | Faulty 12V |
| 02 | High Humidity |
| 03 | Mode Sensor Fault |
| 04 | Tension Fault |
| 05 | Bad Reel Diameter |
| 06 | Capstan Not Moving |
| 07 | Drum Phase Lock Lost |
| 08 | Drum Not Moving |
| 09 | Drum DREF Lost |
| 0A | Drum PG Lost |
| 10 | Supply reel stuck while threading |
| 11 | Supply reel stuck while in Capstan mode |
| 12 | Cleaning tape slipped on capstan |
| 13 | Take-up reel stuck while in Capstan mode |
| 14 | Reels stuck in Reel mode |
| 18 | RAM Test Failure |
| 19 | ROM Check Failure |
| 1A | Supply Reel Brake Failure |
| 1B | Take-up Reel Brake Failure |
| 1C | Duncan Test Failure |
| | |
| 20 | File Mark Encountered |
| 21 | Save Set Mark Encountered |
| 22 | Illegal Length Record |
| 23 | Bad Group Blocking |
| 24 | Position Lost |
| 25 | Buffer Parity Error |
| 26 | Transfer Complete |

**Table 5-56. Drive Error Codes (continued)**

| VALUE (HEX) | DESCRIPTION |
|---|---|
| 27 | Buffer Firmware Defect |
| 28 | Invalid Buffer Command |
| 29 | Invalid Buffer Parameters |
| 2A | Entity Encountered |
| 2B | Count Overflow |
| 40 | Unknown Algorithm |
| 80 | Bad Write Command Received |
| 81 | Getting Write Command Problems |
| 82 | Write Command Queue Problems |
| 83 | Report Problems During Write |
| 84 | Group Read-After-Write Retry Limit Exceeded |
| 85 | Write Frames Command Retry for Read-After-Write |
| 86 | No SUSHI Message Within Timeout |
| 87 | Bad Read Command Received |
| 88 | Getting Read Command Problems |
| 89 | Read Command Queue Problems |
| 8A | Report Problems During Read |
| 8B | RAM Parity Error Detected |
| 8C | C3 Row Calculation Failure |
| 8D | Streamfail During Map Command |
| 8E | Too Many Bad Subdata Frames |
| 8F | Too Many Guessed Logical Frame IDs |
| 90 | Group not complete when expected |
| 91 | Positive track bad, 22-frame group |
| 92 | Negative track bad, 22-frame group |

**Table 5-56. Drive Error Codes (continued)**

| VALUE (HEX) | DESCRIPTION |
|---|---|
| 93 | Track conflict, 22-frame group |
| 94 | Timeout exceeded for C3 syndromes |
| 95 | Positive track checksum bad after C3 |
| 96 | Negative track checksum bad after C3 |
| 97 | Not enough good tracks after C3 |
| 98 | Mini data bad, 23-frame group |
| 99 | C3 correction calculations failed |
| 9A | C3 syndromes calculation failed |
| 9B | Message window missed |
| 9C | Checksum bad after recalculation, positive track |
| 9D | Checksum bad after recalculation, negative track |
| 9E | Track conflict after checksum recalculation |
| | |
| A0 | SUSHI register test failed |
| A1 | Internal error on message loopback test |
| A2 | Data miscompare on message loopback test |
| A3 | Illegal AFC search requested |
| A4 | Timed out waiting for BOM or EOM |
| A5 | Unexpected BOM or EOM |
| A6 | Internal error on data loopback test |
| A7 | Data miscompare on data loopback test |
| A8 | Unexpected ISR value on data loopback test |
| A9 | Wrong header on data loopback test |
| AA | Wrong checksum on data loopback test |
| AB | Drum ramp too slow |
| AC | Capstan ramp too slow |
| AD | Supply reel ramp too slow |
| AE | Take-up reel ramp too slow |

**Table 5-56. Drive Error Codes (continued)**

| VALUE (HEX) | DESCRIPTION |
|---|---|
| AF | Mode change too slow |
| B0 | Unable to clean up after test |
| B1 | Utility data not valid |
| B2 | Diagnostic command aborted by host |
| B3 | Illegal diagnostic requested |
| B4 | Illegal loopcount specified |
| B5 | Diagnostic required tape |
| B6 | Diagnostic required no tape |
| B7 | Diagnostic test not supported |
| B8 | Error on calibration, reel did not start |
| B9 | Error on calibration, reel did not stop |
| BA | Timed out, waiting for Done state |
| BB | No ATF lock |
| BC | ATF edge not found |
| BD | Bad ATF window |
| BE | Invalid Malcolm firware revision |
| C0 | Invalid DDS Group |
| C1 | Invalid DDS End Of Data |
| C2 | Invalid DDS System |
| C3 | No Group Subdata |
| C4 | Append Point Unreadable |
| C5 | Unreadable Subdata |
| C6 | Position Lost |
| C7 | Drive Timeout |
| C8 | Tape Snapped |
| C9 | Write Velocity Fault |

**Table 5-56. Drive Error Codes (continued)**

| VALUE (HEX) | DESCRIPTION |
|---|---|
| CA | EOD Encountered |
| CB | BOM Encountered |
| CC | EOM Encountered |
| CD | Overshot Target |
| CE | ATF Locking Timeout |
| CF | Pre Stream Timeout |
| | |
| D0 | Pretry Proximity |
| D1 | Positioning Timeout |
| D2 | SUSHI Command Timeout |
| D3 | Drum Speed Timeout |
| D4 | Outside Message Window |
| D5 | Message Period Timeout |
| D6 | Unexpected Position Counter |
| D7 | Unexpected Reel Diameter |
| D8 | Tape Unavailable |
| D9 | Invalid When Threaded |
| DA | No Cassette Present |
| DB | Unexpected Cassette Present |
| DC | Finding AFC Timeout |
| DD | Initialization Error |
| DE | SUSHI Data Underflow |
| DF | SUSHI Data Overflow |
| | |
| E0 | Bad SUSHI Parity |
| E1 | SUSHI Message Overflow |
| E2 | Failed To Read Log |
| E3 | Blank Tape |

**Table 5-56. Drive Error Codes (continued)**

| VALUE (HEX) | DESCRIPTION |
|---|---|
| E4 | Non-DDS Tape |
| E5 | Bad Checksum Buffer Parity |
| E6 | Unexplained Positioning Failure |
| E7 | Unable To Locate Target |
| | |
| F0 | Previous Error |
| F1 | Invalid Command Sequence |
| F2 | Tape Length |
| F3 | Unsupported Tape |
| F4 | Cleaning Tape |
| F5 | Invalid Device Command |
| F6 | Invalid Device Parameter |
| F7 | Device Firmware Defect |
| F8 | Invalid Tape Format |
| F9 | No Tape Loaded |

# CD-ROM Drive Troubleshooting

If the drive status light indicates a problem with the drive, first replace the media. If the problem persists, replace the CD-ROM drive. There are no replaceable PCAs within the drive.

## Drive Status Light

Table 5-57 shows drive status light indications during normal operation and fault conditions.

**Table 5-57. Drive Status Light Indications**

| Status | Explanation |
|---|---|
| ON | No CD-ROM detected, CD-ROM insertion error detected, or no CD-ROM is in the caddy. |
| OFF | Drive power is off, self-test passed, or no activity with the host. |
| FLASHING | Activity with the host. |

## Diagnostic Information

The following paragraphs provide information about the data returned by the drive in response to a REQUEST SENSE command.

The method of accessing this information depends on the diagnostic tool you are using. Refer to the appropriate diagnostic documentation for information on retrieving device information.

### REQUEST SENSE Data Fields

Table 5-58 shows the data format for the following data fields returned by the drive in response to a REQUEST SENSE command. Reserved fields always contain zeros.

**Valid.** A value of one for the Valid bit indicates the Information bytes contain valid information. The significance of the Information bytes depends on the status of the Sense Key field.

**Error Class.** Always returns a value of 7.

**Error Code.** Always returns a value of 7.

**Sense Key.** Indicates the type of error which has occurred, and the recovery action which should be taken by the Initiator. Sense Key codes are listed in Table 5-59.

**Information.** Contains the logical block address associated with the Sense Key field.

**Additional Sense Length.** Specifies the number of Additional Sense bytes that follow.

**Additional Sense Code.** Provides additional information about the error condition reported in the Sense Key field (refer to Table 5-60). If the disk drive does not have further information, this field contains zeros.

**Table 5-58. REQUEST SENSE Data Format**

| | BIT | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **BYTE** | **7** | **6** | **5** | **4** | **3** | **2** | **1** | **0** |
| **00** | Valid | Error Class = 7 | | | Error Code = 0 | | | |
| **01** | Segment Number = 0 | | | | | | | |
| **02** | FM = 0 | EOM = 0 | ILI | Reserved | Sense Key | | | |
| **03—06** | (MSB=03) Information Bytes (LSB=06) | | | | | | | |
| **07** | Additional Sense Length = 0A | | | | | | | |
| **08—11** | Command Specific Information = 00 | | | | | | | |
| **12** | Additional Sense Code | | | | | | | |
| **13** | Additional Sense Code Qualifier = 00 | | | | | | | |
| **14** | Field Replaceable Unit Code = 00 | | | | | | | |
| **15** | FPV = 0 | C/D = 0 | Reserved | | BPV = 0 | Bit Pointer = 0 | | |
| **16—17** | (MSB=00) Field Pointer (LSB=00) | | | | | | | |

**Table 5-59. Sense Key Codes**

| VALUE (HEX) | DESCRIPTION |
|---|---|
| 0 | NO SENSE. No specific sense data to return; successful completion of command executed prior to the REQUEST SENSE command. |
| 1 | RECOVERED ERROR. Last command completed successfully with an error recovery operation, retries or error correction. |
| 2 | NOT READY. Drive cannot be accessed. |
| 3 | MEDIA ERROR. Command execution terminated with a nonrecoverable error condition caused by a media defect. |
| 4 | HARDWARE ERROR. Drive detected a nonrecoverable hardware failure while executing a command or performing a self-test. |
| 5 | ILLEGAL REQUEST. Illegal parameter in the command descriptor block (CDB) or in additional parameters. |
| 6 | UNIT ATTENTION. Media has been changed, the drive has been reset by a power-on or reset condition, or a BUS DEVICE RESET message. |
| 8 | BLANK CHECK. Drive encountered format-defined end-of-data block; attempted to read audio track. |
| B | ABORTED COMMAND. Drive aborted command execution. |

**Table 5-60. Additional Sense Codes**

| VALUE (HEX) | DESCRIPTION |
|---|---|
| 00 | No additional sense information (NO SENSE). |
| 04 | Drive not ready (NOT READY). |
| 11 | Unrecoverable read error (MEDIA ERROR). Unable to recover data with retries or ECC. |
| 12 | Unable to read header of target block (MEDIA ERROR). |
| 15 | Seek operation did not complete within specified time limit (HARDWARE ERROR or MEDIA ERROR). |
| 17 | Recovered data with read retries, not with ECC (RECOVERED ERROR). |
| 18 | Recovered data with ECC correction, not with retries (RECOVERED ERROR). |
| 20 | Invalid command operation code (ILLEGAL REQUEST). |
| 21 | Illegal logical block address (ILLEGAL REQUEST). Maximum logical block address exceeded. |
| 24 | Illegal field in CDB (ILLEGAL REQUEST). |
| 25 | Invalid LUN (ILLEGAL REQUEST). |
| 26 | Invalid field in parameter list (ILLEGAL REQUEST). |
| 28 | Media exchanged (UNIT ATTENTION). Tray OPEN/CLOSE operation was executed. |
| 29 | Power-on reset, reset condition, or BUS DEVICE RESET occurred (UNIT ATTENTION). |
| 2A | Block length or error recovery parameter of MODE SELECT command changed (UNIT ATTENTION). |
| 30 | Incompatible disk in disk tray (MEDIA ERROR). |
| 44 | Internal controller error (HARDWARE ERROR or ABORTED COMMAND). |
| 45 | Select/Reselect failed (HARDWARE ERROR or ABORTED COMMAND). |
| 47 | SCSI Interface parity error (HARDWARE ERROR or ABORTED COMMAND). |
| 49 | Inappropriate/illegal message (HARDWARE ERROR or ABORTED COMMAND). |
| 88 | Object address of an AUDIO TRACK SEARCH command is a data track address (ILLEGAL REQUEST). |
| 89 | Object address of a READ, SEEK, READ EXTENDED, or SEEK EXTENDED command is an audio track address (ILLEGAL REQUEST). |
| 8A | The CD-ROM drive is not in continuous audio mode while on an audio track (ILLEGAL REQUEST). |

# Quarter-inch Cartridge (QIC) Tape Drive Troubleshooting

The QIC drive is replaced as an entire assembly, but before replacing it you must make sure the problem is caused by a QIC hardware failure. This means you must rule out problems caused by the tape media or dirty heads.

Use the following sequence to isolate QIC drive problems.

1. Try cleaning the tape heads and see if the problem is solved.
2. Determine if the problem is media-related by installing a new QIC cassette and retrying the failed operation.
3. If the preceding steps have not solved the problem, replace the entire QIC drive.
4. Check system operation to make sure the problem is solved.

## QIC Troubleshooting Tools

1. Power-on Selftest - tests drive only
2. QIC diagnostic - SCSIQIC
   - Default Section (10)
   - Interactive Section (50)
3. Support tape

   MAPPER in ODE or IOMAP.
4. Operating System
   - System support logs

## Troubleshooting Sequence

1. Clean heads according to the schedule in Table 5-61.

**Table 5-61. Recommended Preventive Manintenance Schedule**

| Item | Interval (hours) |
|---|---|
| Head Cleaning | 8 (or as required)<br>(2 hours with new tapes) |
| Capstan Cleaning | 20 (or as required) with used tapes |

2. For read/write errors, run the Read/Write Error test.
3. Test with new media.
   - If errors do not recur, replace media.
   - If errors recur, replace drive.
4. Format compatibility.

   This may occur if the media is from a non-HP source.
   - Verify data format
   - Clean heads and retest

- If possible, test with new media
- Retest media on another system

5. If all else fails, replace the drive.

# 8mm Tape Drive Troubleshooting

## Clearing a Tape Jam

If a cartridge is stuck (jammed) in the tape drive, follow this procedure to remove the cartridge.

Before attempting to remove the cartridge, try the following:

1. Power the tape drive off and on again to clear a possible hang condition.
2. If the bottom LED (green) is lit, indicating **READY** status, press the **UNLOAD** button to unload the cartridge.
3. If the cartridge does not unload, go to the "Remove the Top Panel" procedure.

**Caution** Observe electrostatic protection procedures.

Use these tools to remove the cartridge:

- Magnetic torque limiting #0 Phillips screwdriver
- Small tweezers
- Scissors

### Remove the Top Panel

See Figure 5-5.

1. Use a magnetic torque limiting #0 Phillips screwdriver to remove the five screws from the top panel.
2. Lift the top panel off the tape drive.

**Caution** Make sure none of the screws fall into the mechanism.

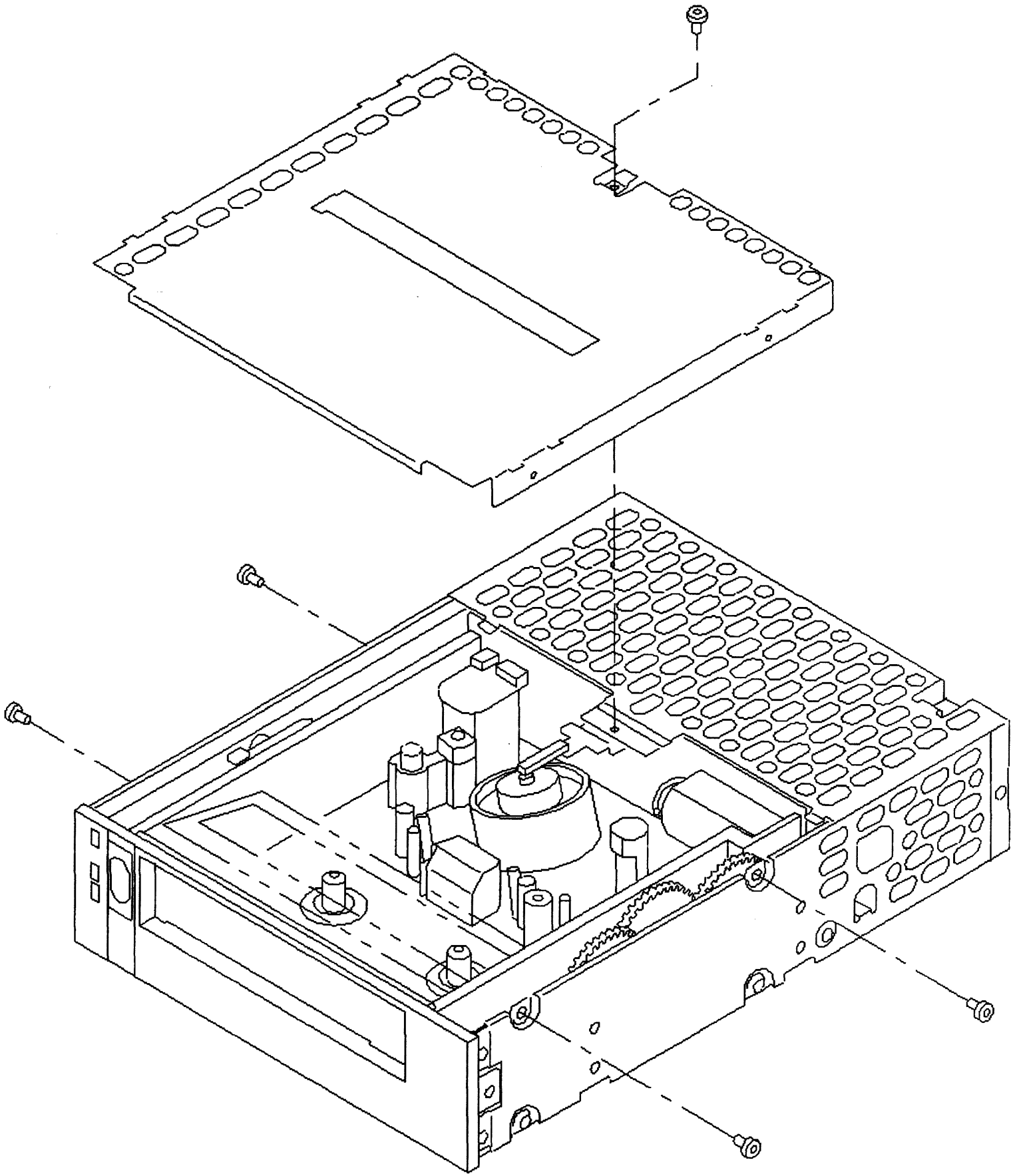

Figure 5-5. Removing the Top Panel

### Remove Tape from the Tape Path

If the tape is threaded in the tape path, follow these steps to remove the tape.

If the tape is not threaded in the tape path, go to the "Remove the Cartridge" procedure.

See Figure 5-6.

**Caution** 

If tape is loaded in the tape path, you must cut the tape to remove the cartridge.

1. Locate the pinch roller, capstan, and spring clip.

**Caution** 

Do not touch the drum mechanism. Skin oils and acids damage the drum.

2. Use your finger to push the spring clip toward the pinch roller until there is a gap between the pinch roller and capstan.
3. While pushing on the spring clip, use the tweezers to grasp the section of tape between the pinch roller and spring clip. Make a 1/2-inch loop in the tape by pulling it toward the front of the tape drive.
4. Once you have made a loop in the tape, release the spring clip.

**Note** 

If the tape is cut, data may be lost. Be sure it is necessary to cut the tape to remove it.

5. Use the scissors to cut the tape at the loop.
6. Remove the cartridge as described in the "Remove the Cartridge" procedure.

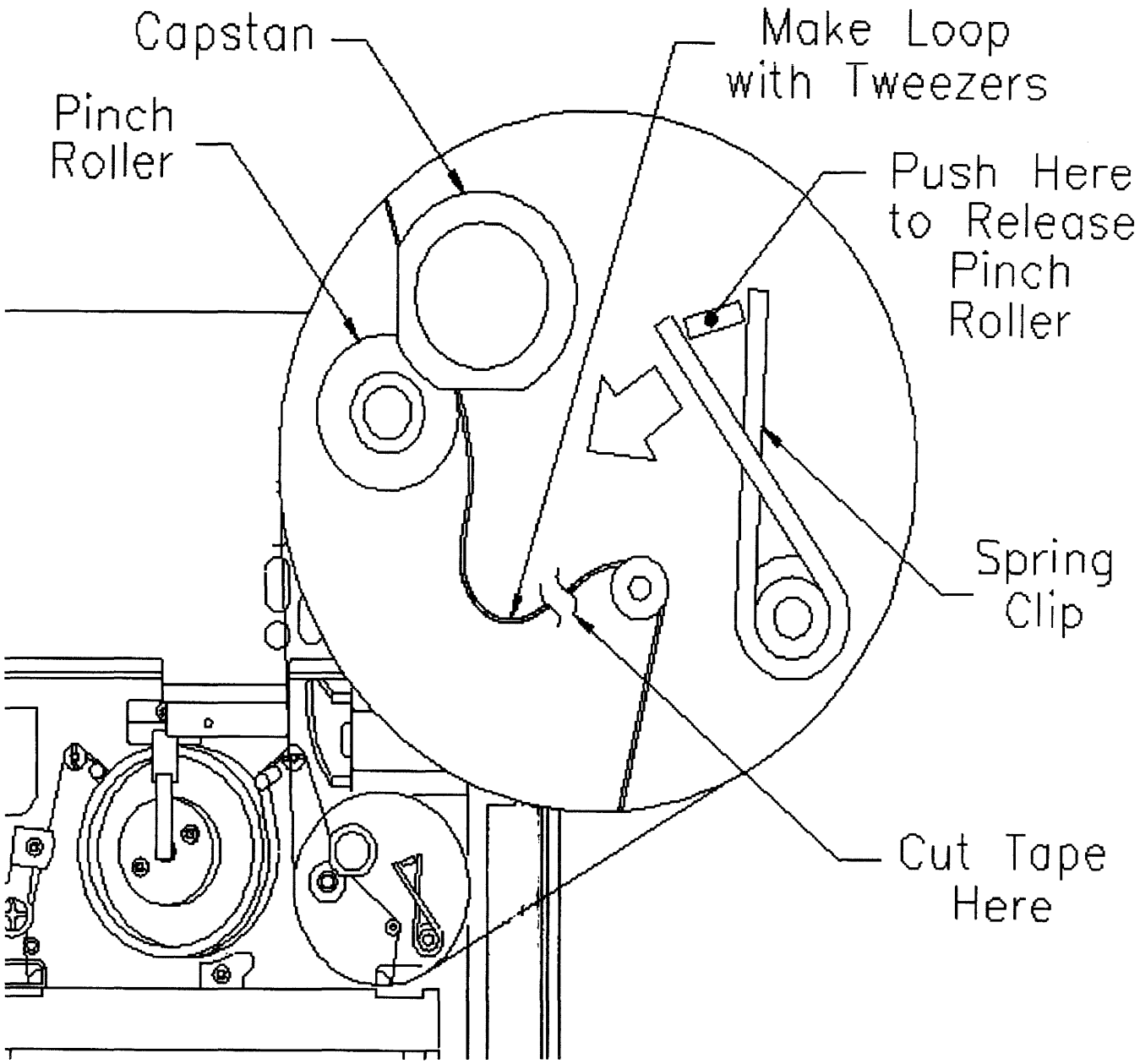


**Figure 5-6. Removing the Tape from the Tape Path**

### Remove the Cartridge

Once the tape has been removed from the tape path, remove the cartridge from the tape drive.

See Figure 5-7.

1. Locate the lock release tab and the cassette loading gear. The lock release tab is white.
2. Use your finger to gently press down and release the lock release tab.
3. Use your thumb to gently roll the cassette loading gear toward the front of the tape drive until the rear of the cartridge slides out of the tape drive.
4. Pull the cartridge all the way out of the tape drive.
5. Visually inspect the tape heads for moisture or foreign matter. The tape heads are on the rotating drum.

6. Replace the top panel.

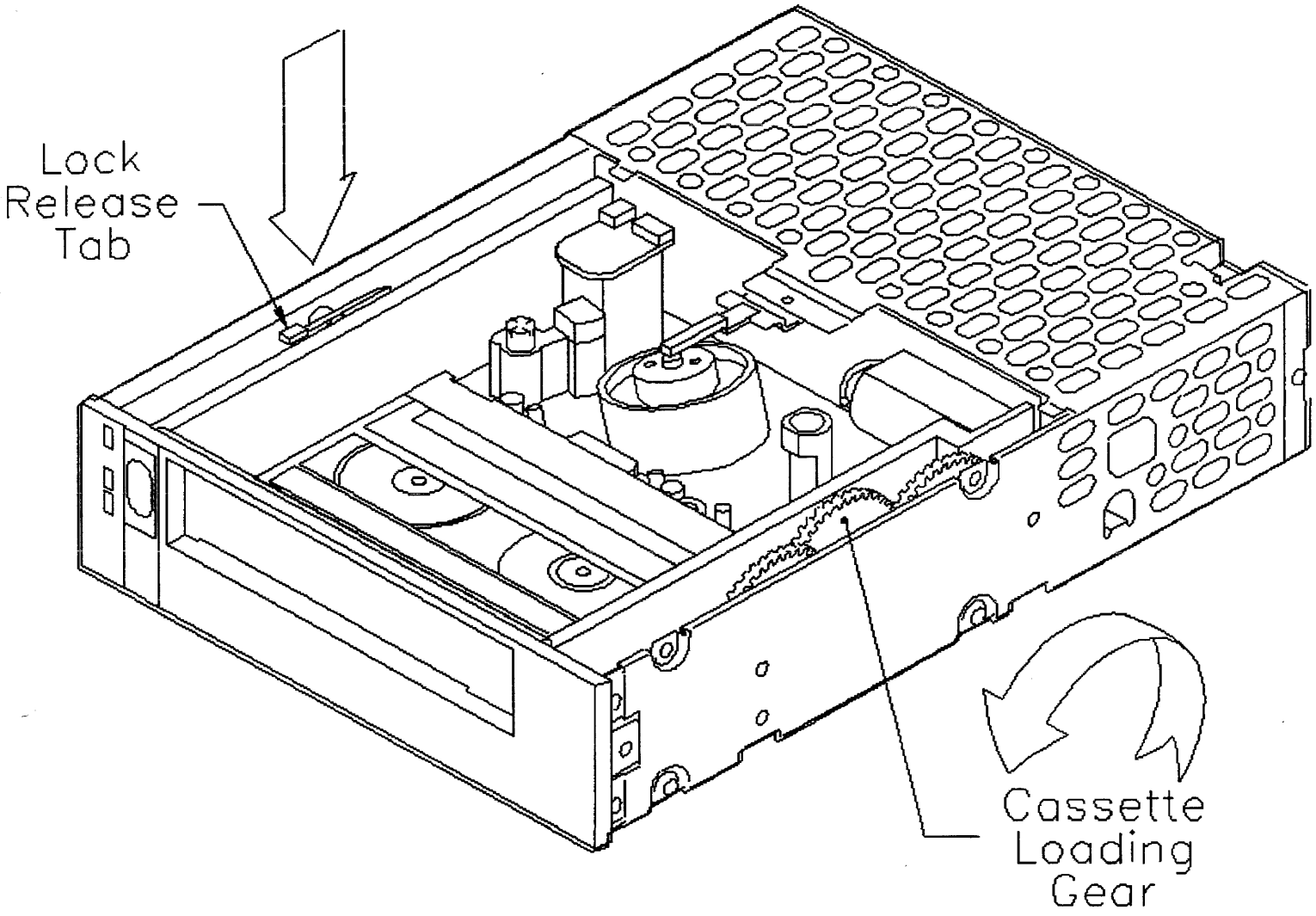


**Figure 5-7. Removing the Cartridge**

## Floppy Disk Drive Troubleshooting

### Floppy Disk Drive Troubleshooting Tools

- Device Selftest

  A Read/Write operation is performed on the buffer RAM and I/O port at power-on. An error in selftest will result in a HARDWARE ERROR response to the first SCSI command issued to the device. Do not proceed under these conditions; proper operation is not guaranteed.
- SCSIDSK2 diagnostic
  1. Read/Write tests (destructive to data)
  2. Error rate test
- Support tape

- Operating system

  System support logs

## Troubleshooting Procedure

The floppy drive is replaced as a unit. Before replacing it, make sure that the problem is caused by a hardware failure. Make sure that the problem is not due to faulty media by using the following troubleshooting procedure.

1. Upon encountering Read or Write errors, the unit automatically attempts up to 16 retries of the failing operation. Observe the unit to determine if retries are in progress. If so, the media is probably at fault. If the mechanism is clearly not performing retries, the drive mechanism MAY be at fault. Go to step two.
2. If the problem occurs on a Write operation, remove the media and format the new media. Perform a Write operation on the new media. If this is successful, the drive is good and the media is faulty.

   If the problem occurs on a Read operation, attempt to read the media on another drive, if one is available. If the media can be read on another drive, the original drive may be at fault - run the floppy diagnostic. If another drive is not available, attempt to read other sectors on the media. If this is successful, the drive is good and the media is probably faulty.
3. If the above steps have not isolated the fault to the media, replace the entire floppy mechanism.
4. Check system operation to make sure the problem is solved.

## Other Considerations

Media formatted on another drive may not be readable in this mechanism if the formatting mechanism is out of alignment. If you find that many operations are failing on multiple devices, attempt to determine if a single drive is used for formatting and troubleshoot that device.

# 6

# Diagnostics and Utilities

This chapter provides information about the following diagnostic aids:

- Online diagnostics and utilities
- Offline diagnostics and utilities
- Procedure for booting up the system from the HP-UX Support Tape

For detailed information on diagnostic subsystems and utilities, refer to the most current editions of the following manuals:

- *PA-RISC Support Tools, Volume 1: SPU*
  (HP part number 5960-3149)
- *PA-RISC Support Tools, Volume 2: Device Adapters/Muxes*
  (HP part number 5960-3151)
- *PA-RISC Support Tools, Volume 3: LAN*
  (HP part number 5960-3153)
- *PA-RISC Support Tools, Volume 4: SCSI*
  (HP part number 5960-3155)
- *PA-RISC Support Tools, Volume 5: Disks*
  (HP part number 5960-3157)
- *PA-RISC Support Tools, Volume 6: Tapes/Printers*
  (HP part number 5960-3159)
- *PA-RISC Support Tools, Volume 7: Utilities*
  (HP part number 5960-3161)
- *PA-RISC Support Tools, Volume 8: ISL Support Tools*
  (HP part number 5960-3163)
- *Support Tools Manager User's Manual (SupportWave) (HP Only)*
  (HP part number 5961-1612)
- *Support Tools Manual*
  (HP part number 5960-3165)

## Online Diagnostics and Utilities

The alphabetical list below shows the available disk-resident online diagnostics.

AFIDAD
CARTDIAG
CENTPBA
CIPERLPD
CONSOLAN
CS80DIAG
DASSDIAG
DIAG7478
DTDUTIL
FDDIPBA
FLEXDIAG
FWSCIPB
GPIODAD
HPFLDIAG
HPIBDAD
HPIBDDS
HPIBDIAG
LAN3PBB
LAN5PBB
LANDAD
LOGTOOL
MEMDIAG
MUXDIAG
OPDIAG
OSI4DAD
PMUXDIAG
PRNT5000
PSIDAD
REELDIAG
SARRAY
SCSI8MM
SCSICD
SCSICIO
SCSIDDS
SCSIDSK2
SCSIPBA
SCSIQIC
SCSIREEL
SS80DIAG
SYSMAP

### Using the Online Diagnostics

To start the online diagnostics, do the following:

Log on the system

Type `SYSDIAG`

SYSDIAG loads the Diagnostic user Interface (DUI)

Type `HELP` to list the commands.

Type `HELP command_name` to display information about any command.

Type `HELP diagnostic_name` to display information about any diagnostic.

Type `HELP diagnostic_name SECTIONS` to display the test sections for a specific diagnostic.

Type `HELP diagnostic_name SECTIONS=nn` to display the commands that apply to specific test sections of a specific diagnostic.

## Offline Utilities

Offline utilities are available under the ISL environment. ISL-based offline utilities are implemented on the the support tape. Some utilities are also implemented on the boot disk.

Note that MPE/iX and HP-UX have different support tapes.

Once you are at the `ISL>` prompt, type `HELP` to list the commands.

## Support Tape

The support tape allows you to diagnose problems when the HP-UX operating system cannot be booted from the system disk. For additional information on use of the support tape, refer to the most current *Support Tape Users Manual*.

To use the support tape, you need this minimum hardware configuration:

- 16 Mbyte memory
- Console
- Magnetic tape drive

### Booting Up

If the system has halted and cannot be booted from the system disk, you need to boot from the support tape. The procedure is as follows:

1. Select a tape drive to boot from and determine the drive's physical address.
2. Load support tape on tape drive and put drive online.
3. Press system reset button and wait about 30 seconds.
4. If autoboot is enabled, the following appears on the console:

```
Processor is starting autoboot process.

To discontinue, press any key within 10 seconds.
```

When a console key is pressed, the PDC Main menu is displayed.

```
---- Main Menu -------------------------------------------------------------

     Command                          Description
     -------                          -----------
     BOot [PRI|ALT|<path>]            Boot from specified path
     PAth [PRI|ALT|CON] [<path>]      Display or modify a path
     SEArch [DIsplay|IPL] [<path>]    Search for boot devices

     COnfiguration menu               Displays or sets boot values
     FIrmware menu                    Displays firmware information
     INformation menu                 Displays hardware information
     SERvice menu                     Displays service commands

     DIsplay                          Redisplay the current menu
     HElp [<menu>|<command>]          Display help for a menu or command
     REset                            Restart the system

----
Main Menu: Enter command or menu >
```

**Figure 6-1. Main Menu**

At this point, you can enter the **BOot PRI** or **BOot ALT** command. When the boot process is complete, the following prompt is displayed:

```
ISL>
```

At this point, type `HELP` to see which ISL utilities are available.

If you want to run the mini-kernel, type `support`. The kernel will load, taking several minutes. The following menu is displayed.

```
ISL> support
```

---

**Note**

If autoboot is not enabled, the sequence of prompts and responses shown above occurs, with one exception. The first prompt, which allows the primary boot path to be overridden, does not appear.

---

5. After a successful boot, the tape is positioned at the beginning of section 1. The login prompt appears on the System Console. Log in as "root." The password is "support." After you log in, the support tape Main Menu is displayed on the console.

## Support Tape Main/Utilities Menus

To select from the support tape Main Menu, type the name of the alphabet character preceding the command description. Type `d` to display the *On Line Diagnostics Menu* .

The support tape *Main Menu* is:

```
s. Search for file
b. Reboot
l. Load a file
d. On-line diagnostics
m. Display Manual page for specific command
r. Recover an unbootable HP-UX system
u. Utilities
x. Exit to shell
```

# 7

# Supported Peripherals

Refer to the most recent editions of the HP 3000 and HP 9000 Configuration Guides to determine which peripherals are supported on the systems. Note that the type and number of supported peripherals varied with the operating system and the release of that operating system.

# 8

# Replaceable Parts

## Introduction

This section provides names and part numbers of Field Replaceable Units (FRUs). Exchange and non-exchange parts are listed in Table 8-1.

It contains a list of replaceable parts for the HP A1883A/84A and HP A1896A/97A rack-mount cabinet.

It contains procedures for removing and replacing the field-replaceable components of the systems.

It also contains removal and replacement procedures for the HP A1883A/84A and HP A1896A/97A rack-mount cabinet.

# Parts List

**Table 8-1. Replaceable Parts**

| Description | New Part No. | Exchange Part No. |
|---|---|---|
| Active Distribution Panel II (ADP II) | 5062-3054 | |
| Adapter, Two-board | 5062-9367 | |
| AUI Retainer Clip | 5062-3351 | |
| Backplane, 2-slot | A2051-66504 | A2051-69004 |
| Backplane, 4-slot | A2051-66505 | A2051-69003 |
| Backplane Clip, Right | A1703-40006 | |
| Backplane Clip, Left | A1703-40007 | |
| Bezel, Front | A2051-60023 | |
| Bezel, Rear | A2051-40002 | |
| Bezel, Rack Assembly | A2051-60040 | |
| Bracket, Support | A2051-00006 | |
| Bulkhead, double-high | A2051-00010 | |
| Bulkhead, single-high | 5062-3343 | |
| Cable, console, for A1703-60003 Multifunction I/O PCA | A1703-63003 | |
| Cable, Mux, 16-port to ADP and DDP | A1703-63005 | A1703-69305 |
| Cable, Mux, 8-port to ADP II | 5060-3074 | |
| Cable, Mux, 8-port to ADP I | 40299-60003 | |
| Cable, Mux, Y to DDP | 5062-3052 | |
| Cable, Mux, Y to DDP, 19-inch | 5062-3100 | |
| Cable, Mux, Y to MDP | J2094-60004 | |
| Cable, Mux, four-branch, J2096A to DDP, 19-inch | 8120-6162 | |
| Cable, Power | 8120-1751 | |
| Cable, SCSI, I/O, Internal, to disks | A2051-63007 | |
| Cable, SCSI, I/O, Single-ended, internal, to removable media devices | A2051-63003 | |
| Cable, SCSI, Internal (1 meter) | A1703-63001 | |
| Cable, SCSI, Internal (1.5 meter) | A1703-63007 | |
| Cable, SCSI External (high-to-low density) 1.0 M | 5062-3383 | |
| Cable, SCSI External (high-to-low density) 1.5 M | 5062-3388 | |
| CD-ROM Drive, 3401A | A1658-60001 | A1658-69001 |
| CD-ROM Caddy | C2293-80001 | |
| Chassis | A2051-60072 | |
| Cover Plate, Mechanism, Metal | A1703-60075 | |
| CPU, 48 MHz | A2051-66501 | A2051-69001 |
| CPU, 64 MHz | A2051-66521 | A2051-69002 |
| CPU, 80 MHz | A2051-66531 | A2051-69005 |
| Direct Distribution Panel (DDP) | 5062-3066 | |
| Disk Drive, 535 MB | A2958-60001 | A2958-69001 |
| Disk Drive, 1 GB | C2247-60365 | C2247-69365 |
| Disk Drive, 2 GB | C2490-60365 | C2490-69365 |
| Disk Drive, Floppy, 1.44 MB | A2942-60001 | A2942-69001 |

**Table 8-1. Replaceable Parts (continued)**

| Description | New Part No. | Exchange Part No. |
|---|---|---|
| Distribution Panel, (DDP) | 5062-3066 | |
| Distribution Panel, Modem | 5062-3054 | |
| Distribution Panel, 16-channel, (DDP) | 0950-2431 | |
| Filler Panel, Plastic | A1027-40007 ????? | |
| Firmware Removal Tool | 8710-1982 | |
| Harness, Wire | A2051-63001 | |
| LAN | 28640-60001 | 28640-69001 |
| Light Pipe | A2051-40004 | |
| Memory Board, 8MB SIMM | A2578-60001 | A2578-69001 |
| Memory Board, 32MB SIMM | A2575-60001 | A2575-69001 |
| Multifunction I/O PCA (SCSI/Console/LAN) | A1703-60003 | A1703-69003 |
| Multifunction I/O PCA 8/16 port | A1703-60022 | A1703-69042 |
| Nameplate, HP 3000/928LX | A2960-82001 | |
| Nameplate, HP 3000/928RX | A2935-82001 | |
| Nameplate, HP 3000/968LX | A2961-82001 | |
| Nameplate, HP 3000/968RX | A2936-82001 | |
| Nameplate, HP 9000/E25 | A2937-82001 | |
| Nameplate, HP 9000/E35 | A2938-82001 | |
| On/Off Switch | A1703-60015 | |
| Panel, Rear, HP 9000 | A2051-80008 | |
| Panel, Rear, HP 3000 | A2051-80009 | |
| Peripheral Housing | A2051-60071 | |
| Precision Bus Adapter | A1700-60005 | |
| Precision Bus Adapter Interface | A1700-60001 | |
| CIO Bulkhead | A1027-60017 | |
| CIO/HP-IB Cable | 27113-63003 | |
| HP-IB PCA | 27113-60301 | |
| HP-IB Firmware | 27113-67801 | |
| Power Switch Cover Door | A1703-40018 | |
| Power Supply | A1703-60041 | |
| Power System, Uninterruptible, 600 VA | 0950-2444 | 0957-0063 |
| SCSI Terminator, High Density | 1252-3932 | |
| SCSI Terminator (DMK part number) | K2289 | |
| SCSI Terminator Fuse | 2110-0517 | |
| Screw, Chassis, No. 10 TORX, Thread Forming | 0624-0740 | |
| Screw, CD-ROM, QIC Drive, and Internal Disk Mounting | 2360-0515 | |
| Screw, DDS Mounting | 0515-0430 | |
| Side Panel, Left | A1703-00012 | |
| Side Panel | A1703-00013 | |

**Table 8-1. Replaceable Parts (continued)**

| Description | New Part No. | Exchange Part No. |
|---|---|---|
| Tape Drive, Quarter-inch Cartridge (QIC) 1 GB | A2944-60001 | A2944-69001 |
| Tape Drive, Quarter-inch Cartridge (QIC) 525 MB | A2034-60004 | A2034-69004 |
| Tape Drive, C1503B, 3.5-inch DDS-format, 2 GB | C1503-67201 | C1503-69201 |
| Tape Drive, C1504A, 3.5-inch DDS-format, 4-8 GB | C1504-67201 | C1504-69201 |
| Tape Drive, 8mm DDS-format, 5 GB | A3024-60001 | A3024-69001 |
| Terminator, Cable | 1252-4414 | |
| Termination Resistor, Disk [1] | 1810-1176 | |
| Termination Resistor, C1502A DDS Tape Drive[1] | 1810-1176 | |
| HP-PB SCSI/Parallel PCA | 28655-60001 | 28655-69001 |
| HP-PB HP-IB PCA | 28650-60101 | 28650-69101 |
| CIO HP-IB PCA | 27113-60301 | 27113-69301 |
| CIO HP-FL (MPE/iX and HP-UX) PCA | 27115-60001 | 5062-3308 |

**Note** [1] Three termination resistors required.

## 8 mm Tape Drive Terminating Resistor Ordering Information

Use the following information to order terminating resistors for the 8 mm Tape Drive.

**Description:**

Resistor Pack 22/330, 10%, 8-pin SIP
Quantity = 3
Part Number CSC 08A-05-221/331J

**Supplier:**

Dale Electronics
42211 West Eisenhower
Suite 2
Loveland, CO

Phone: (303) 667-7500

## Major System Components

Table 8-2 and Table 8-3 list the processors, backplanes, and multifunction I/O cards for the HP 3000 9x8 Family and HP 9000 Model 800 Ex5 Class systems.

**Table 8-2. HP 3000 Series 9x8 Boards**

| Model | Backplane | Processor | Multifunction I/O Card |
|---|---|---|---|
| 908LX | A2051-66504 | A2051-66501 | A1703-60003 |
| 918LX | A2051-66504 | A2051-66501 | A1703-60003 |
| 918RX | A2051-66505 | A2051-66501 | A1703-60003 |
| 928LX | A2051-66504 | A2051-66501 | A1703-60003 |
| 928RX | A2051-66505 | A2051-66501 | A1703-60003 |
| 968LX | A2051-66504 | A2051-66521 | A1703-60003 |
| 968RX | A2051-66505 | A2051-66521 | A1703-60003 |
| 978RX | A2051-66505 | A2051-66531 | A1703-60003 |

**Table 8-3. HP 9000 Model Exx Boards**

| Model | Backplane | Processor | Multifunction I/O Card |
|---|---|---|---|
| E25 2-slot | A2051-66504 | A2051-66501 | A1703-60022 |
| E25 4-slot | A2051-66505 | A2051-66501 | A1703-60022 |
| E35 2-slot | A2051-66504 | A2051-66521 | A1703-60022 |
| E35 4-slot | A2051-66505 | A2051-66521 | A1703-60022 |
| E45 2-slot | A2051-66504 | A2051-66531 | A1703-60022 |
| E45 4-slot | A2051-66505 | A2051-66531 | A1703-60022 |

# Rack-Mount Cabinet Replaceable Parts

**Table 8-4. Rack-mount Cabinet Replaceable Parts**

| Description | Part Number |
|---|---|
| Rear door, 1.6 meter | C2786-60009 |
| Rear door, 1.1 meter | C2785-60008 |
| Rear hinge | C2786-00012 |
| Vented top cap | C2786-60015 |
| Non-vented top cap | C2785-60007 |
| Side cover, 1.6 meter | C2786-60014 |
| Side cover, 1.1 meter | C2785-60006 |
| Forehead assembly (with on/off switch) | C2786-60004 |
| Base cover, 1.6 meter | C2786-00014 |
| Base cover, 1.1 meter | C2785-00004 |
| Rail assembly | C2786-60018 |
| 230V Fan assembly | C2786-60024 |
| 115V Fan assembly | C2786-60005 |
| 230V Fan | 3160-0378 |
| 115V Fan | 3160-0228 |
| US 208-240V PDU, 1.6 meter | C2786-63006 |
| EURO 230V PDU, 1.6 meter | C2786-63007 |
| US 120V PDU, 1.1 meter | C2785-63000 |
| EURO 230V PDU, 1.1 meter | C2785-63003 |
| PDU Support Bracket | C2786-00021 |
| Caster | 1492-0159 |
| Nut- Wiz, M8 x 1.25 (caster) | 0535-0096 |
| Leveler | 0403-0778 |
| Ballast assembly | C2786-60017 |
| Nut- Tinnerman 10/32 | 0590-0804 |
| Screw, T15 10/32 w/washer | 2680-0278 |
| Screw, T25 10/32 | 2680-0281 |
| Strike Plate | 1390-0489 |
| Magnetic Door Catch | 1390-0265 |
| Door Bumper | 0403-0780 |
| 1U Filler assembly | C2786-60001 |
| Rack device power cord, 20 inches | 8120-5470 |
| Rack device power cord, 30 inches | 8120-1396 |
| Rack device power cord, 5 feet | 8120-1860 |
| ADP mounting bracket | C2786-00036 |

# Removal and Replacement

This chapter provides removal and replacement procedures of the

- Chassis
- Cabinet

Quick reference removal procedures are also provided for the major components of the chassis.

It also provides assembly and disassembly procedures for the

- 3.5-inch Hard Disk
- 3.5-inch DDS-Format DAT Drive
- CD-ROM
- Quarter-inch Cartridge Tape Drive (QIC)
- 8mm Tape Drive
- Floppy Disk Drive

## Before You Begin Removal Procedures

**Warning**

**Hazardous voltages are present inside the cabinet. To prevent shock, turn off DC power using the front panel DC On/Off switch AND disconnect the AC power cord from the outlet before opening the unit.**

**Wait one minute before disassembling the system.**

**Caution**

Handle all FRUs carefully. Dropping or otherwise jarring the FRUs will damage them.

Follow ESD procedures. Always use an ESD grounding wrist strap during service.

**Caution**

Do not mix thread-forming TORX chassis screws (Figure 8-1) and peripheral mounting TORX screws when you disassemble the system. They are not interchangeable. If thread-forming TORX chassis screws are inserted where peripheral mounting TORX screws should be used, they will damage the internal peripherals.

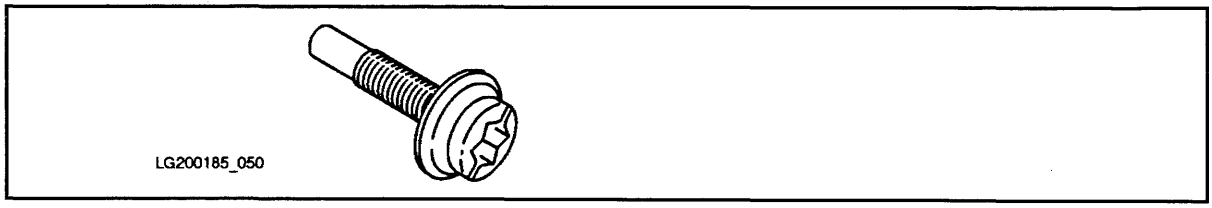


**Figure 8-1. Thread-forming TORX Chassis Screw**

### Required Tools

- No. 10 TORX head driver
- No. 15 TORX head driver
- Small flat blade screw driver
- Small needle-nose pliers
- Anti-static protective containers
- Grounding wrist strap

### System Identification

Figure 8-2 shows the system.

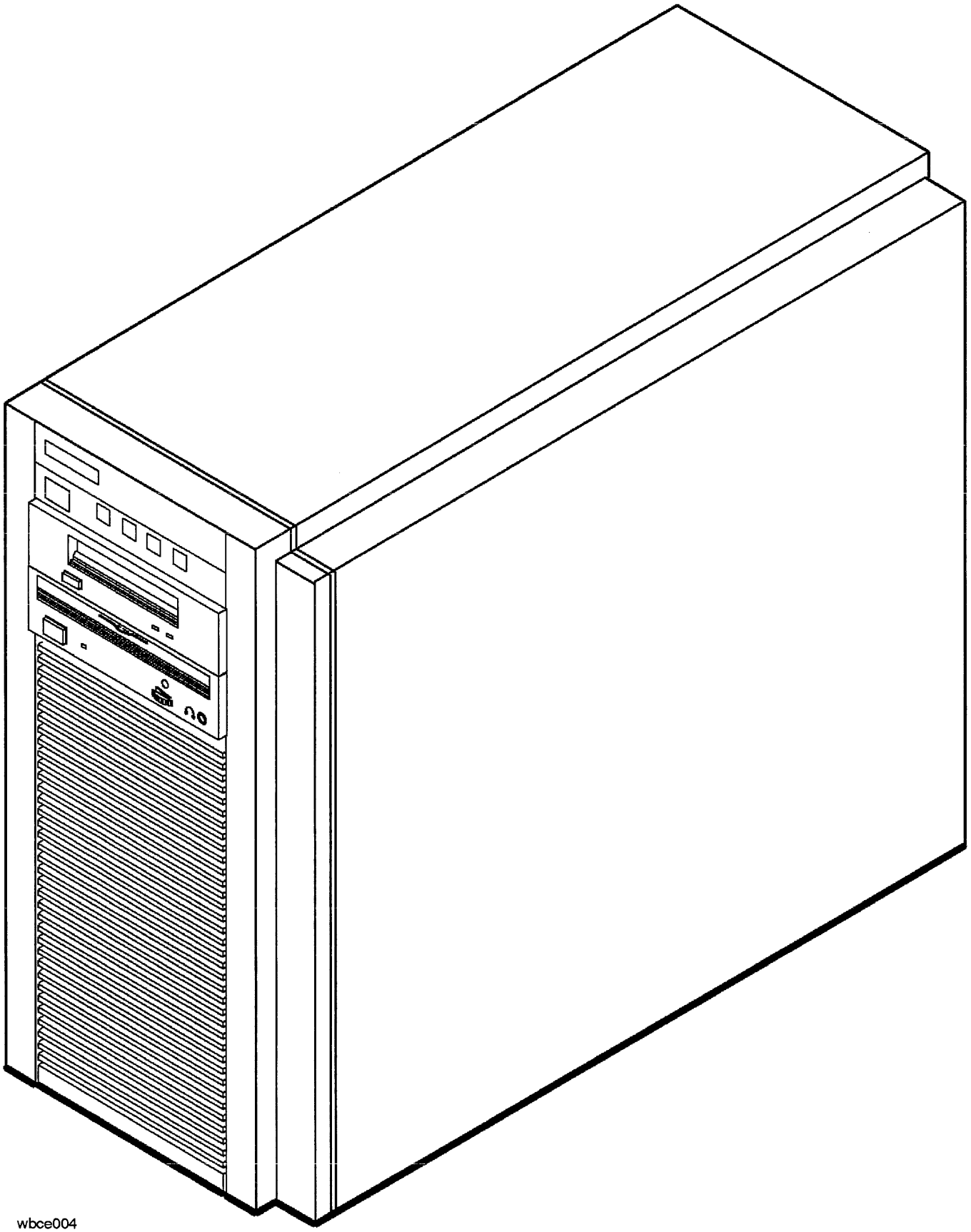


Figure 8-2. HP 3000 Series 9x8 and HP 9000 Model 800 Ex5 Class System

### Turn Off System

1. Press the On/Off switch to remove DC power from the system.
2. Disconnect the power cord from the wall socket to remove AC power from the system.

## Chassis Removal Procedures

The removal procedures are in the order they should be performed. In general, each procedure assumes that you have performed all of the procedures before it.

### Remove Front Bezel

1. See Figure 8-3.
2. Remove two screws from the bottom of the front bezel.
3. Slide the bezel straight up about 0.25 inches.
4. Pull the bottom of the front bezel about one inch away from the system.
5. Lift the bezel away from the system.

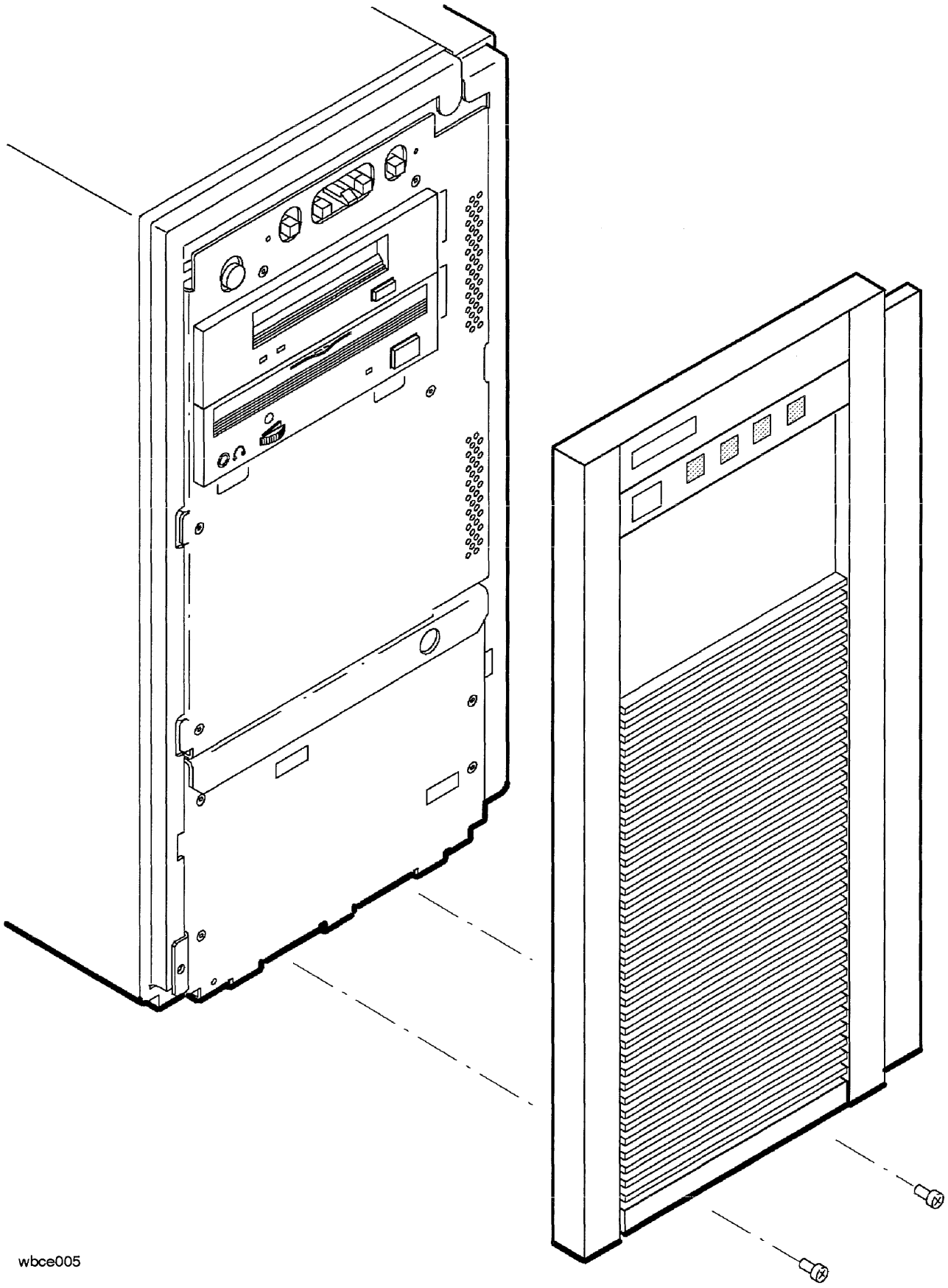


Figure 8-3. Chassis Front Bezel Removal

## Remove Peripherals

1. Remove bezel.

### Remove Peripheral Drawer

1. See Figure 8-4.
2. Remove two TORX screws.
3. Lift the peripheral drawer to clear the locks on the system cabinet and pull it out of the system cabinet. Be careful not to strain the power and SCSI cables.
4. Set the peripheral drawer on a supporting surface.
5. See Figure 8-14.
6. Disconnect the SCSI flat ribbon cable from the DDS and the disk.
7. Disconnect the power connectors from the DDS and the disk.

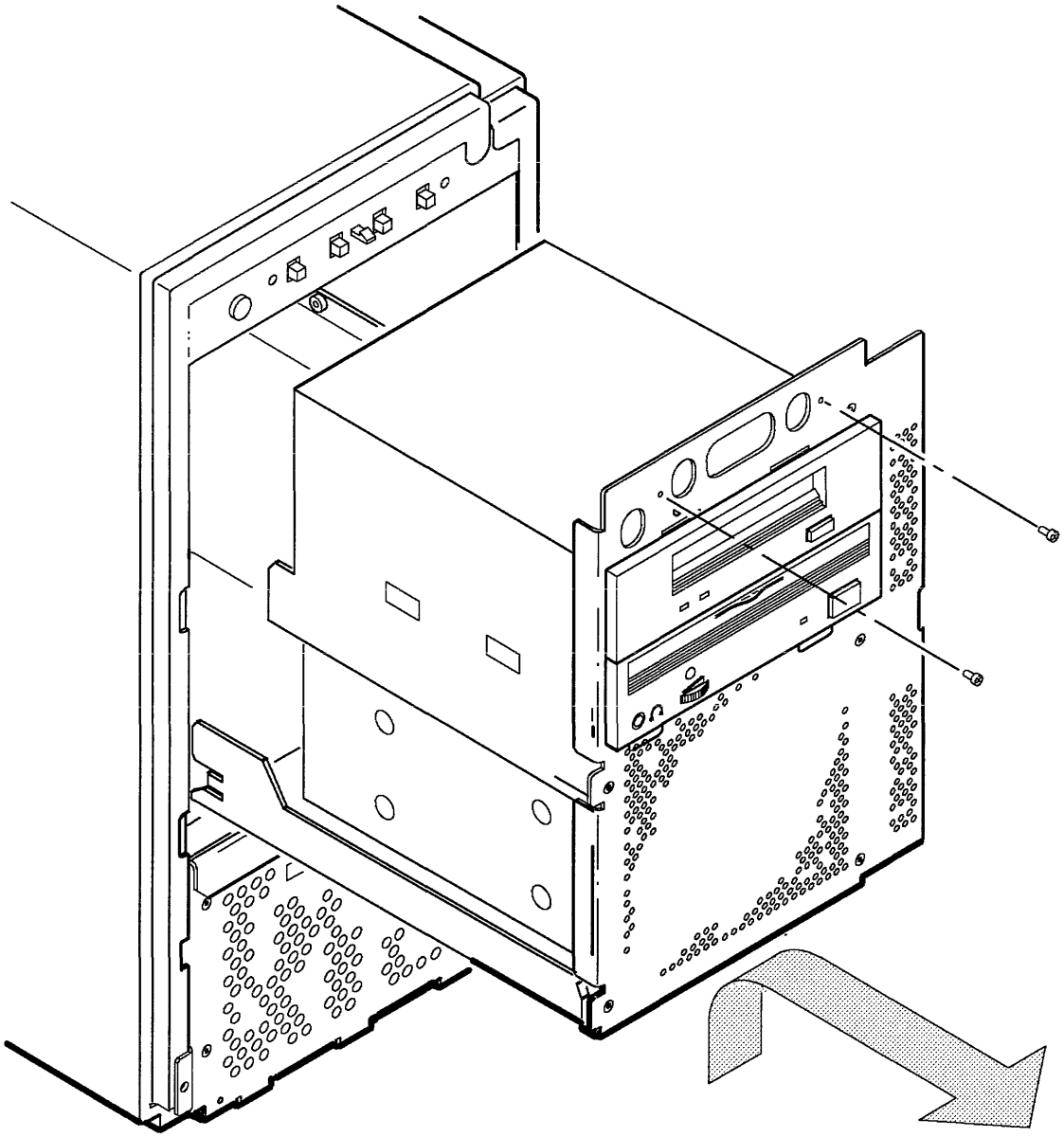

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**Figure 8-4. Peripheral Drawer Removal**

### Remove 3.5-inch Digital Data Storage (DDS) Device

1. See Figure 8-5.
2. Disconnect the SCSI flat ribbon cable from the DDS.
3. Disconnect the power cable from the DDS.
4. See Figure 8-6.
5. Remove four TORX screws and remove the DDS from the front of the peripheral drawer.

**Warning**

**Do not mix these screws with the system chassis screws or the disk support screws. You will damage the DDS if you attempt to mount it with the system chassis screws or the disk support screws.**

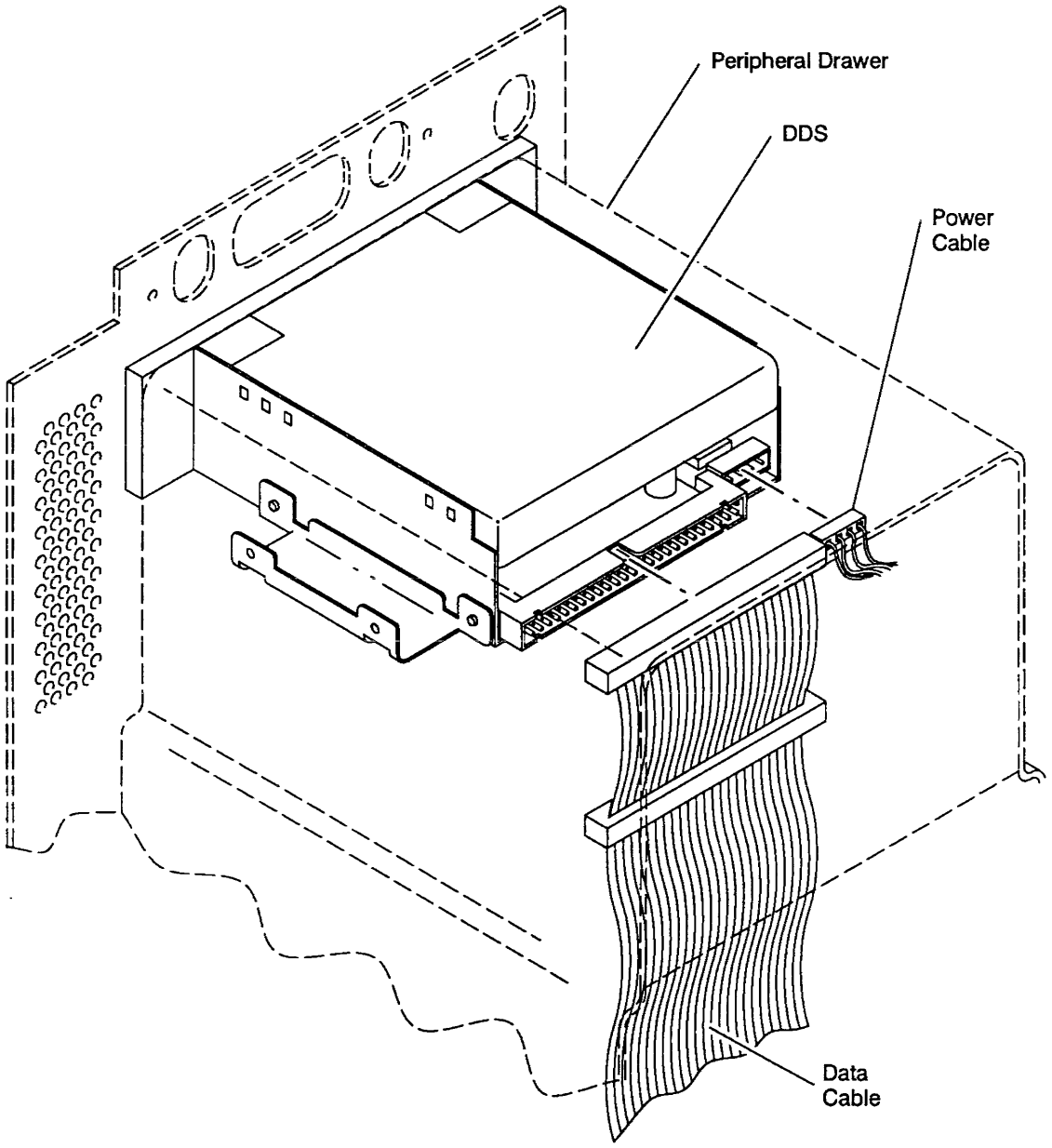



**Figure 8-5. 3.5-inch Digital Data Storage (DDS) Device Cabling**

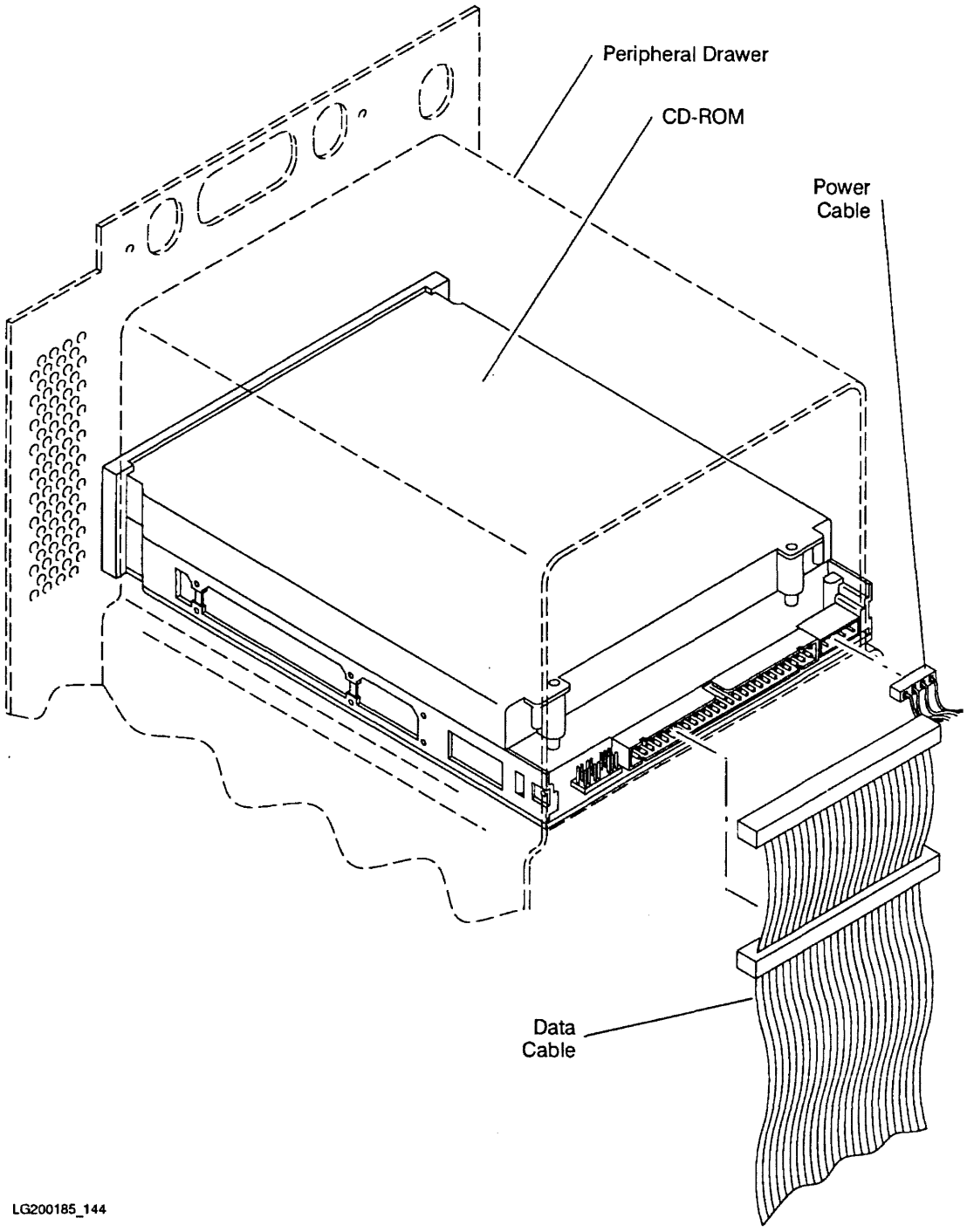



**Figure 8-7. CD-ROM Cabling**

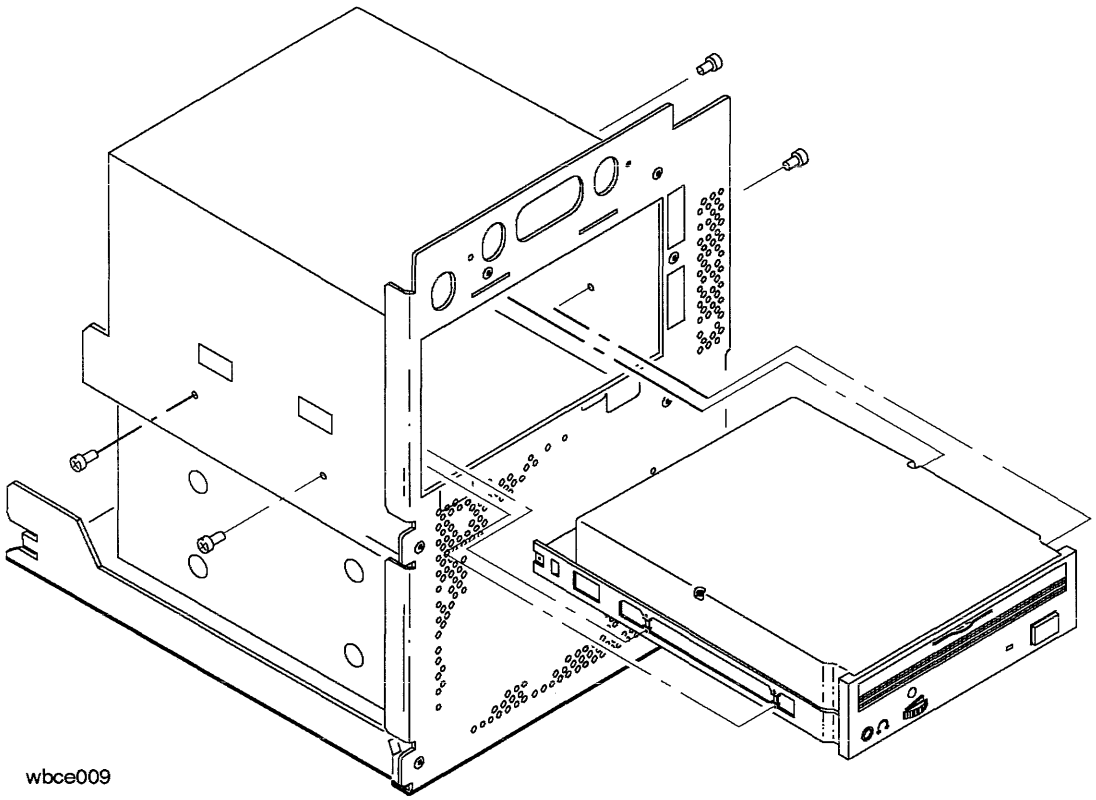



**Figure 8-8. CD-ROM Removal**

### Remove Quarter-inch Cartridge Tape Driver (QIC)

1. See Figure 8-9.
2. Disconnect the SCSI flat ribbon cable from the QIC drive.
3. Disconnect the power connector from the QIC drive.
4. See Figure 8-10.
5. Remove four TORX screws and remove the QIC drive from the front of the peripheral drawer.

---

**Warning**

**Do not mix these screws with the system chassis screws. You will damage the QIC tape drive if you attempt to mount it with the system chassis screws.**

---

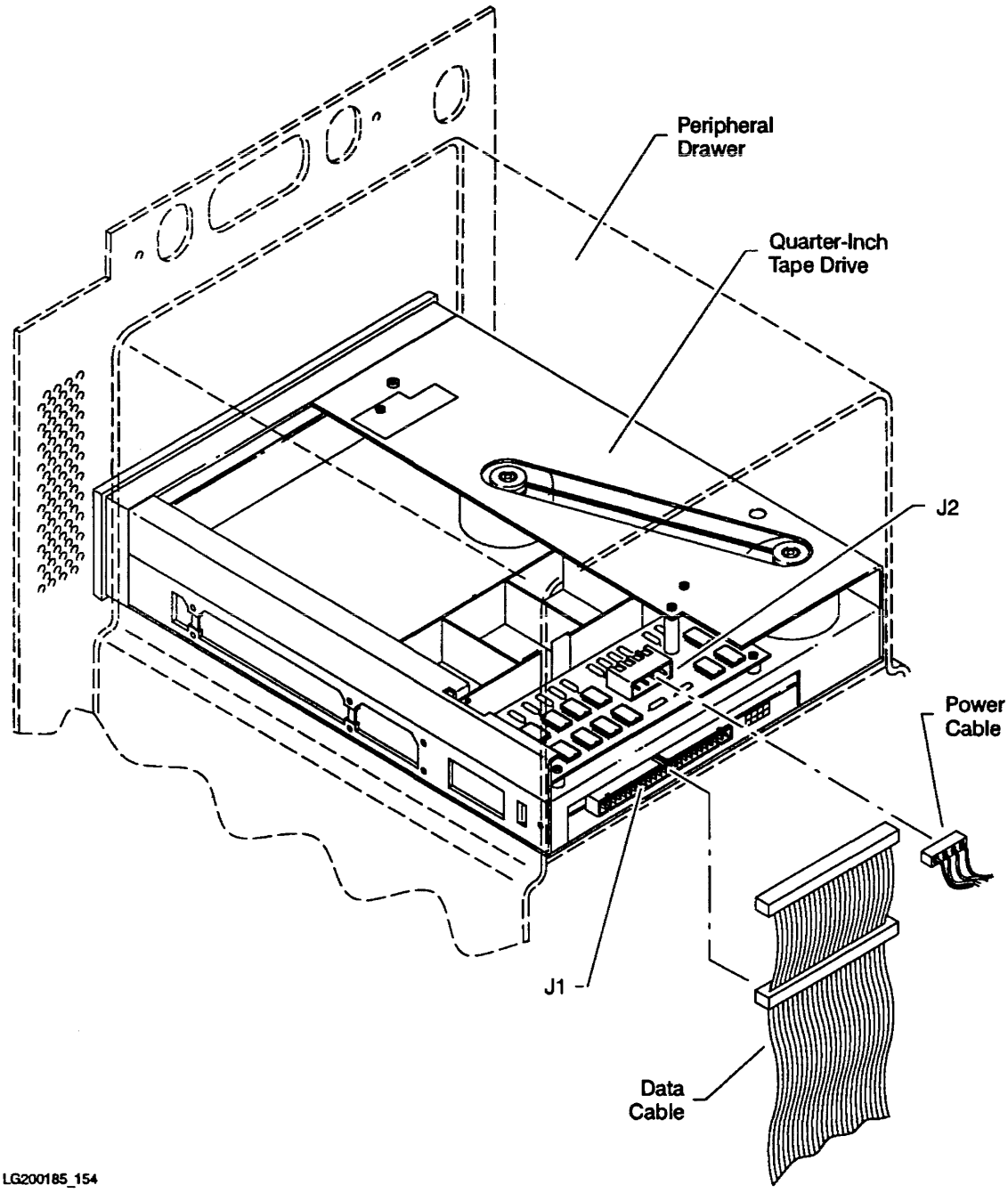



Figure 8-9. QIC Cabling

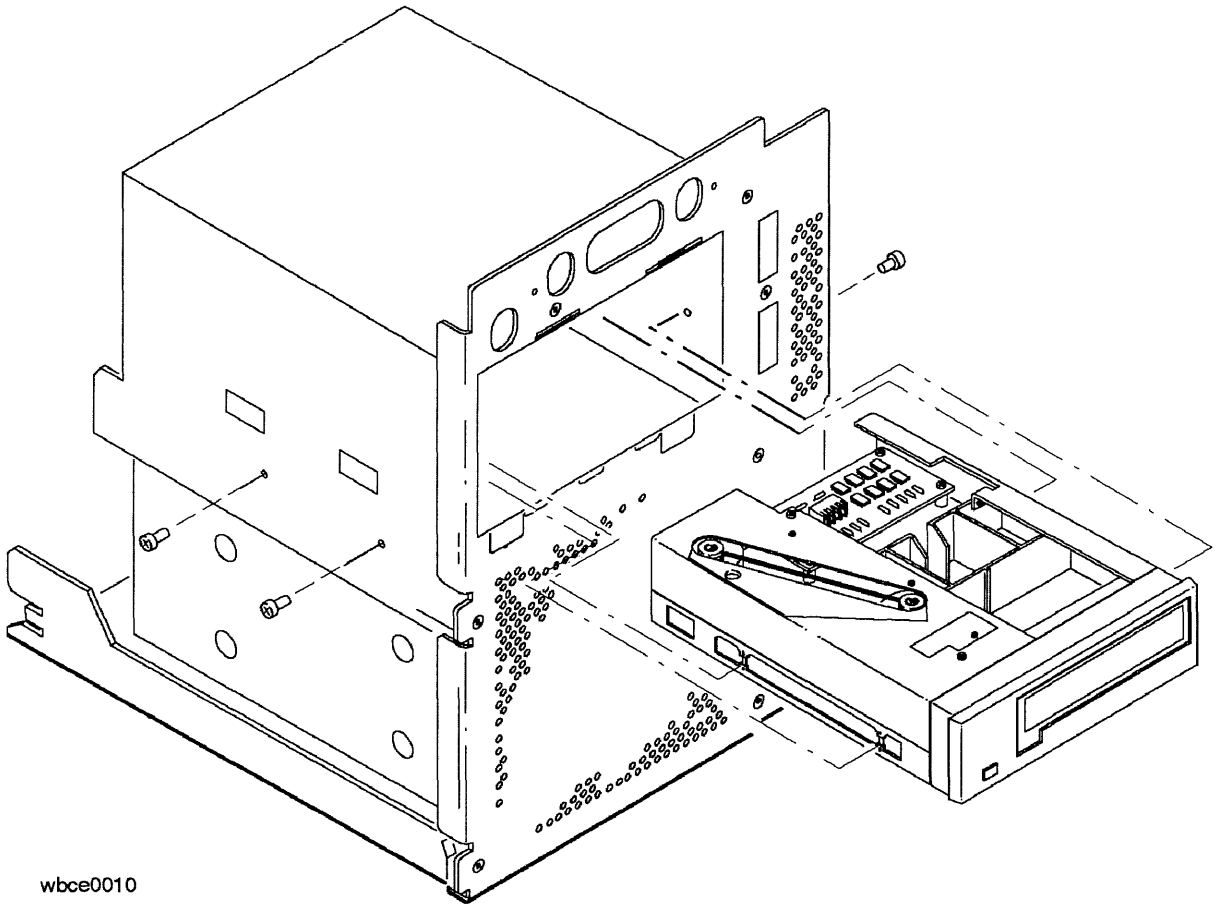



**Figure 8-10. QIC Removal**

### Remove 8mm Tape Drive

1. See Figure 8-11.
2. Disconnect the SCSI flat ribbon cable from the 8mm tape drive.
3. Disconnect the power connector from the 8mm tape drive.
4. See Figure 8-12.
5. Remove four TORX screws and remove the 8mm tape drive from the front of the peripheral drawer.

**Warning**

**Do not mix these screws with the system chassis screws. You will damage the 8mm tape drive if you attempt to mount it with the system chassis screws.**

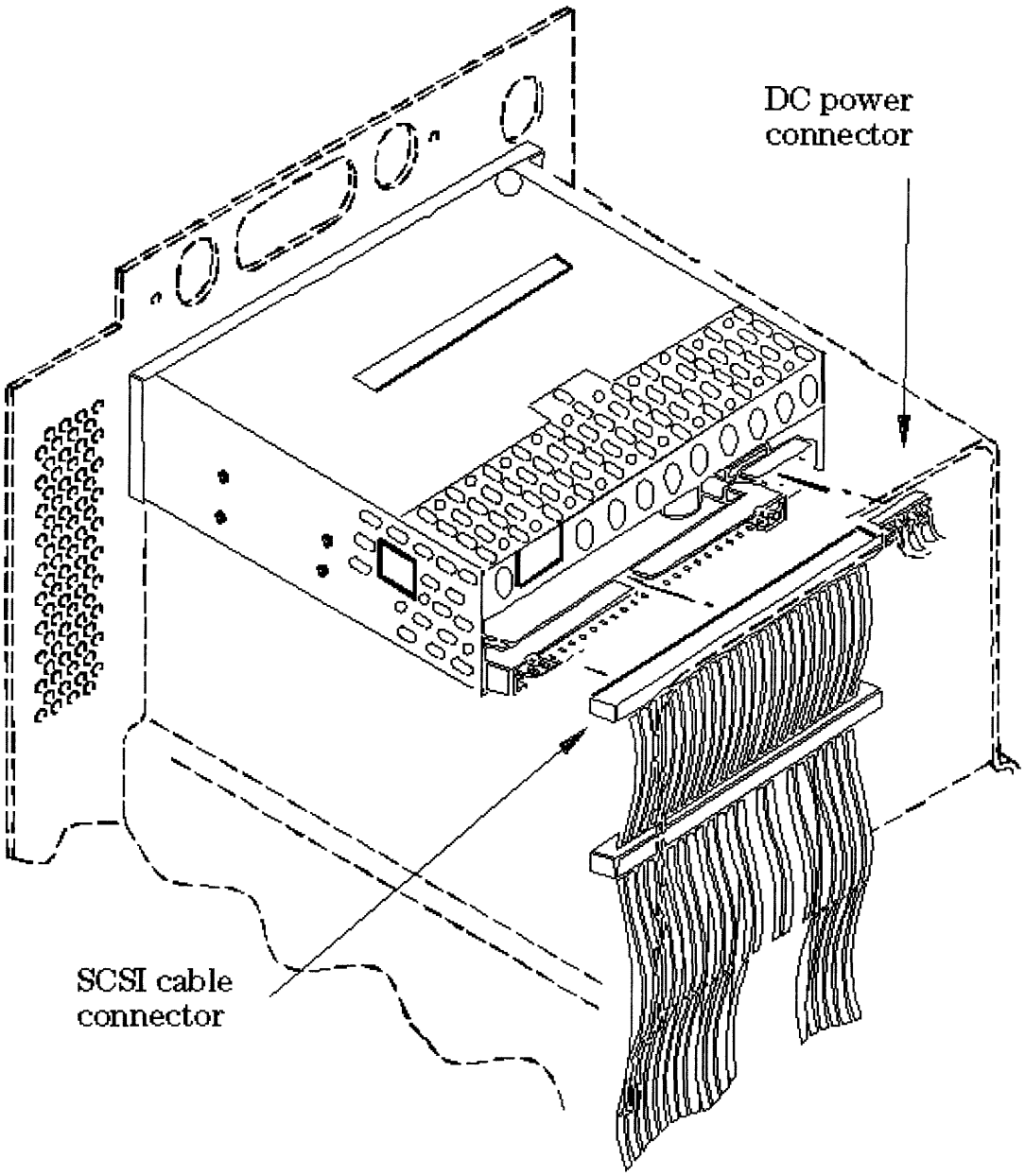



**Figure 8-11. 8mm Tape Drive Cabling**

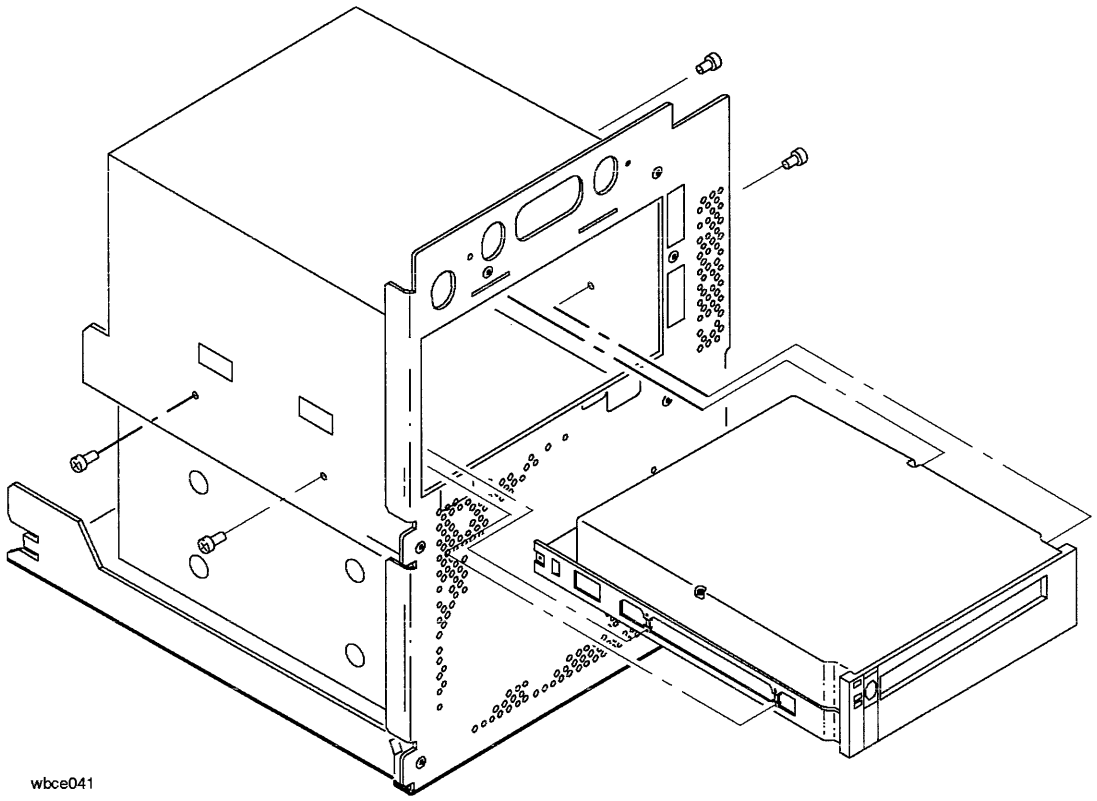



**Figure 8-12. 8mm Tape Drive Removal**

### Remove Floppy Disk Drive

1. Disconnect the SCSI flat ribbon cable from the floppy disk drive.
2. Disconnect the power connector from the floppy disk drive.
3. See Figure 8-13.
4. Remove four TORX screws and remove the floppy disk drive from the front of the peripheral drawer.

**Warning** **Do not mix these screws with the system chassis screws. You will damage the floppy disk drive if you attempt to mount it with the system chassis screws.**

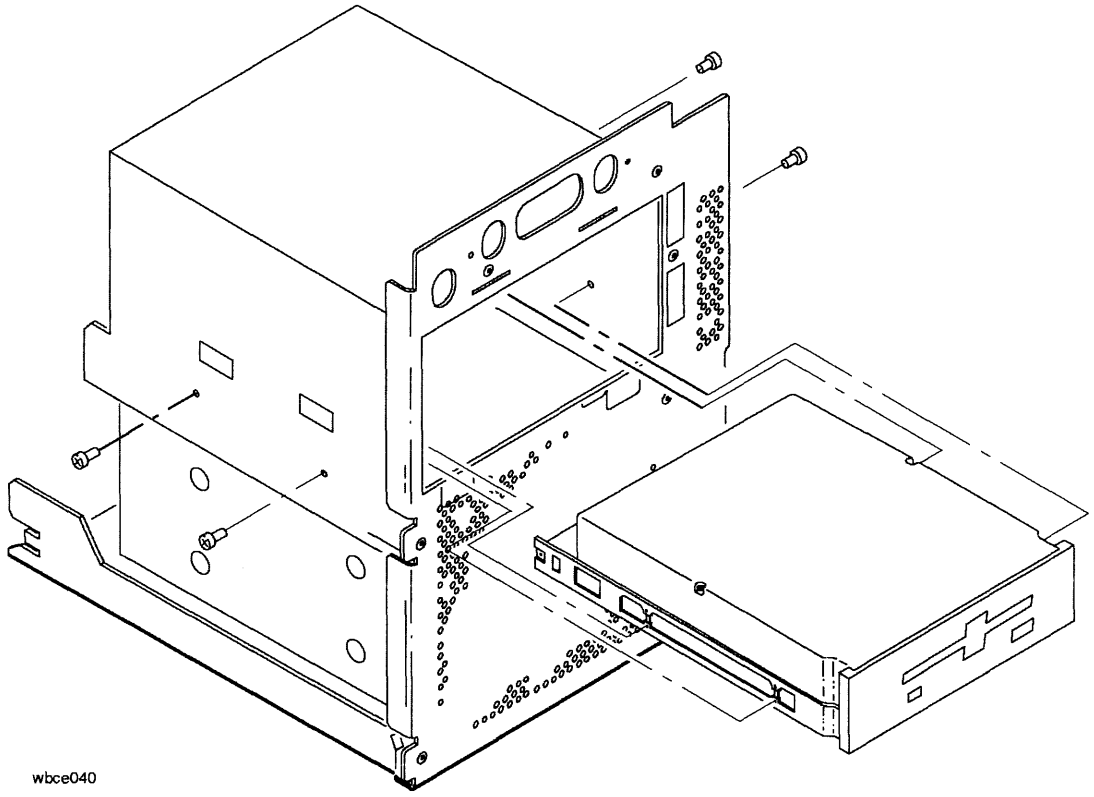



**Figure 8-13. Floppy Disk Drive Removal**

### Remove Internal 3.5-inch Disks

1. See Figure 8-14.
2. Disconnect the SCSI flat ribbon cable from each disk
3. Disconnect the power connectors from each disk.
4. Remove eight TORX screws and remove the two disks from the disk carrier.

**Warning**

**Do not mix these screws with the system chassis screws or the DDS support screws. You will damage the disk if you attempt to mount it with the system chassis screws or the DDS support screws.**

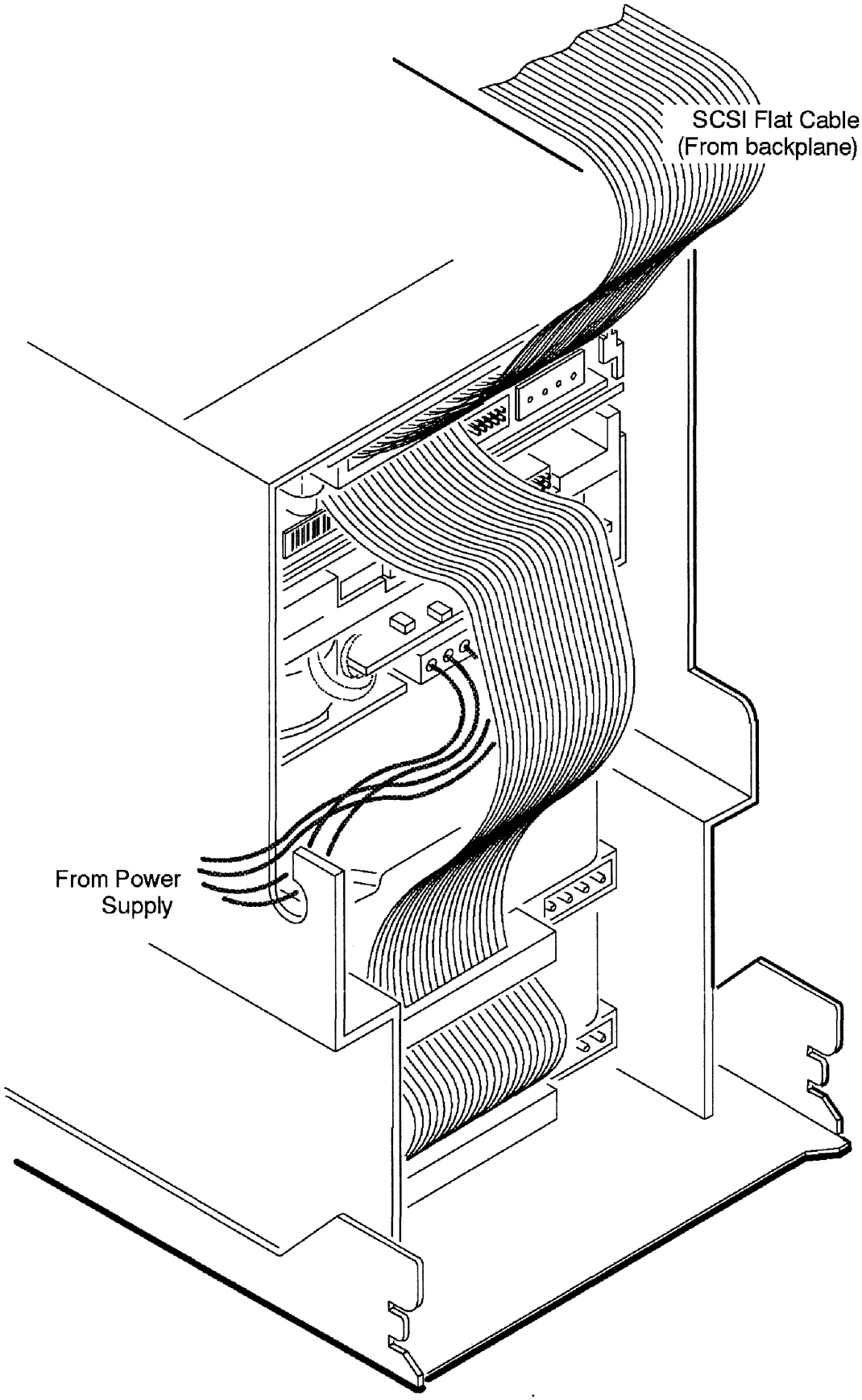



Figure 8-14. Internal Disk Cabling

## Remove Power Supply

**Warning** 

**Shock Hazard. Do not attempt to power-up the power system outside the system chassis. The power system requires a load and a VON_L enabling signal to operate.**

**Caution** 

The rear connector on the power supply plugs into the backplane. Be careful that you do not twist the power supply and damage the backplane power connector.

**Note** 

You must remove the peripheral drawer before you perform this step.

1. Disconnect the power cord from the rear of the cabinet.
2. See Figure 8-15.
3. Remove two TORX screws and gently pull the power supply one quarter of the way out of the cabinet.
4. Disengage the DC On/Off power cable from the cable clamps on the side of the peripheral drawer.
5. Disconnect the DC On/Off power cable.
6. Pull the power supply out. This may require force.

### Power Supply Control PCA Connectors

Refer to Figure 8-16 to identify the connectors on the power supply control PCA.

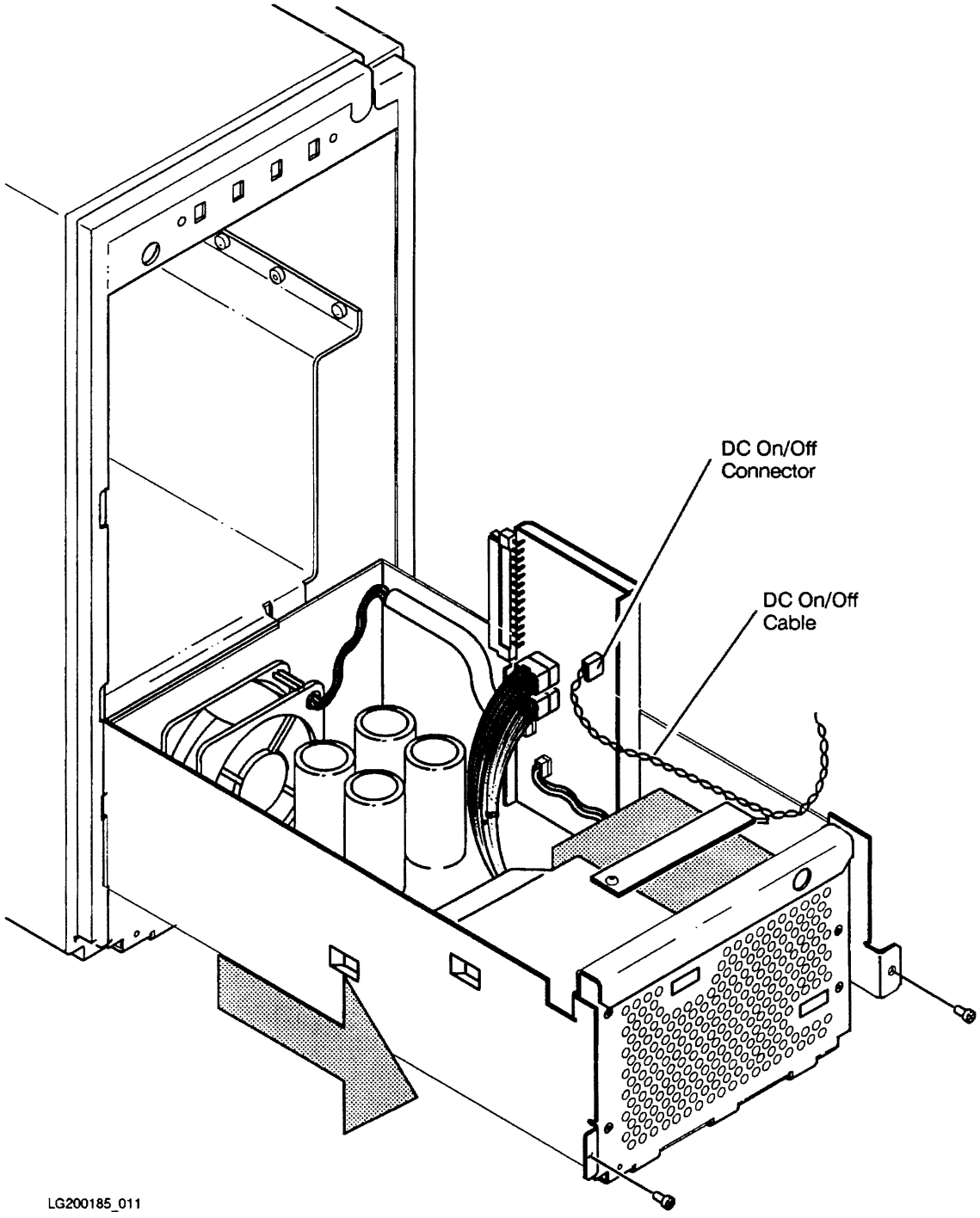



**Figure 8-15. Power Supply Removal**

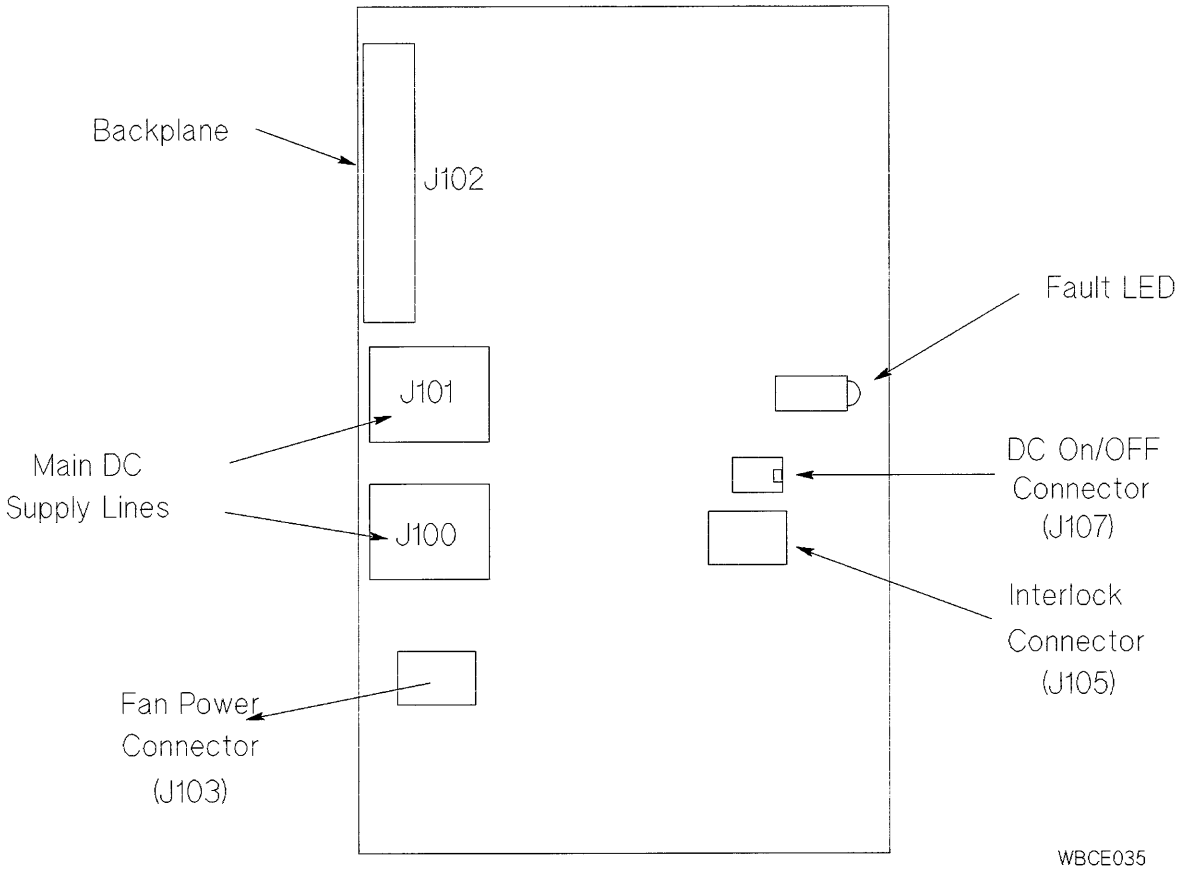
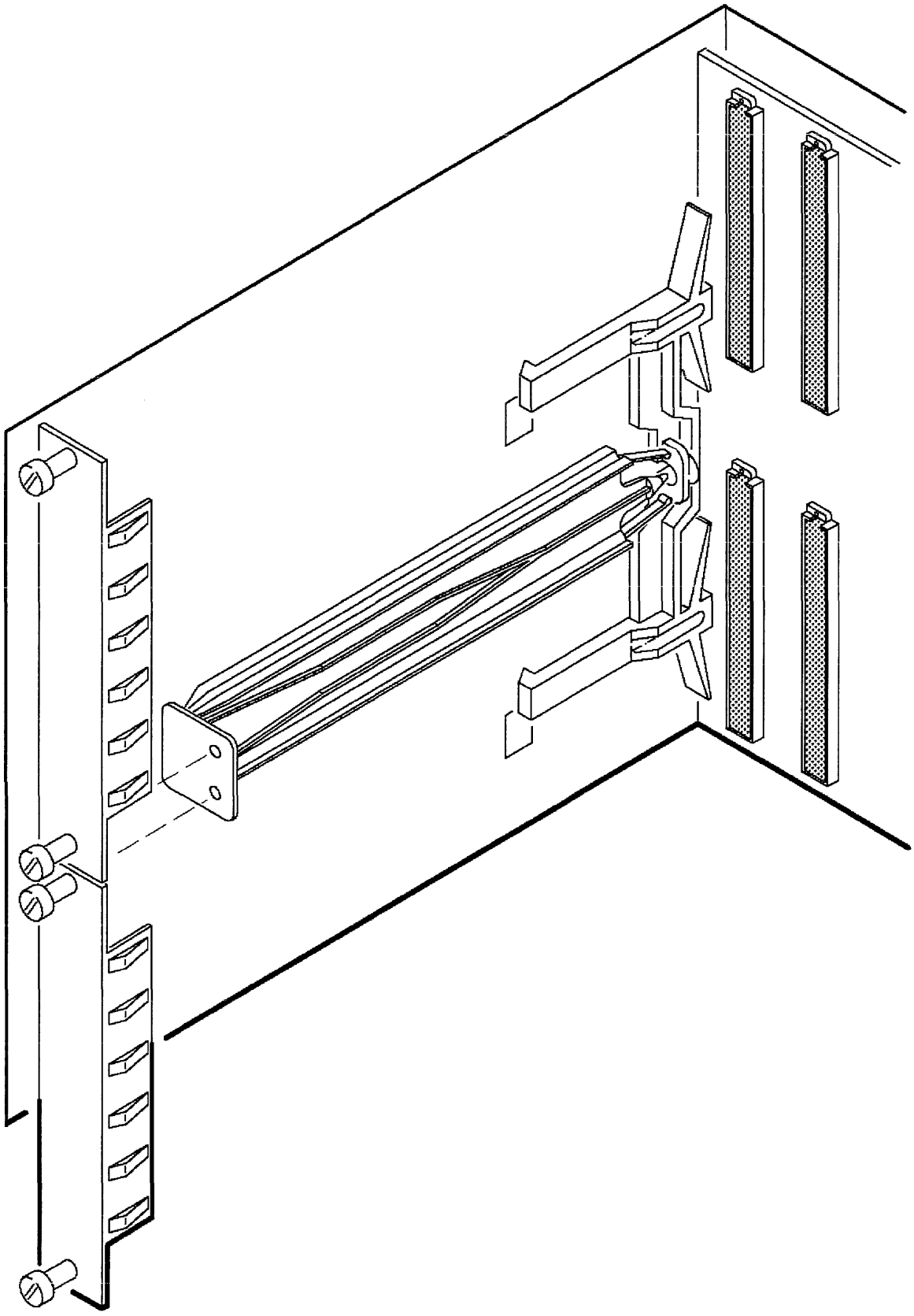



**Figure 8-16. Power Supply Control PCA Connectors**

## Remove Filler Panels

See Figure 8-17. Loosen the upper and lower captive TORX screws and remove the filler panels.



wbce013

Figure 8-17. Filler Panel Removal

## Remove I/O PCAs

1. See Figure 8-18.
2. Loosen two captive TORX screws on each I/O PCA bulkhead, lift two extractor levers, and remove each I/O PCA.
3. Remove the two-board adapter by firmly pulling straight back.

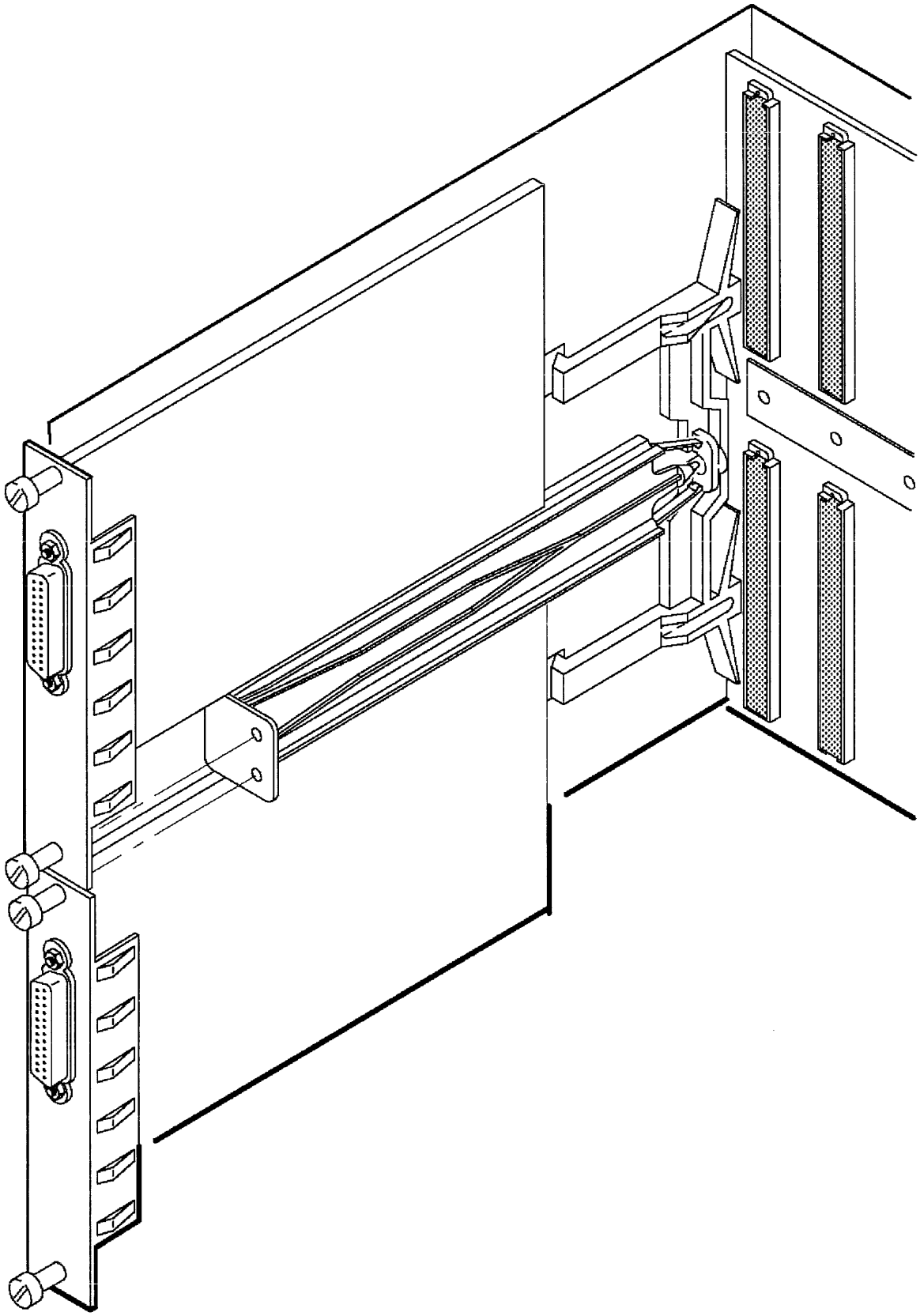


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Figure 8-18. I/O PCA Removal

## Remove Multifunction I/O PCA

1. See Figure 8-19.
2. Loosen two captive TORX screws, lift two extractor levers, and remove the Multifunction I/O PCA.

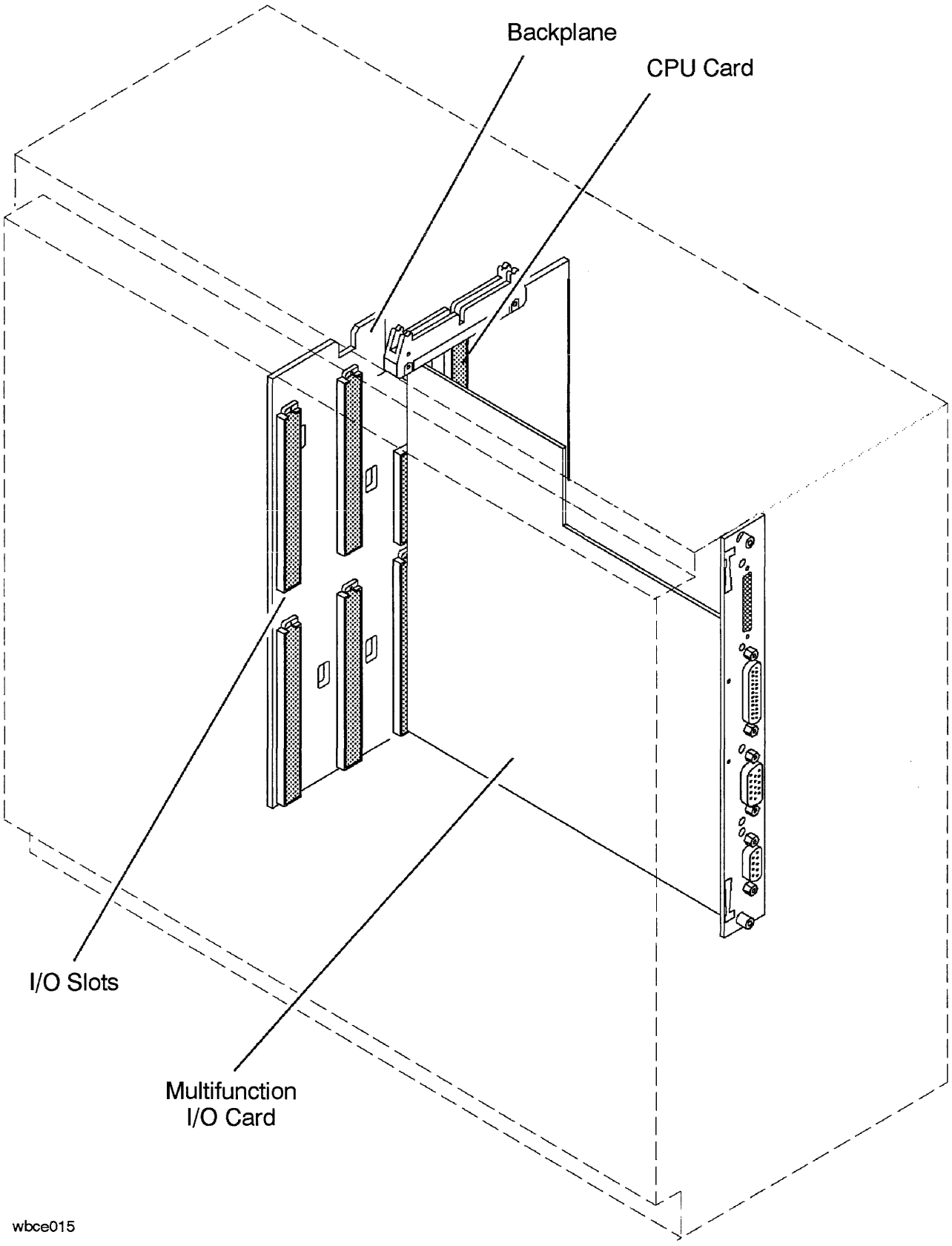


**Figure 8-19. Multifunction I/O PCA Removal**

## Remove Rear Bezel

1. See Figure 8-20.
2. Remove six TORX screws and remove the rear bezel from the cabinet.

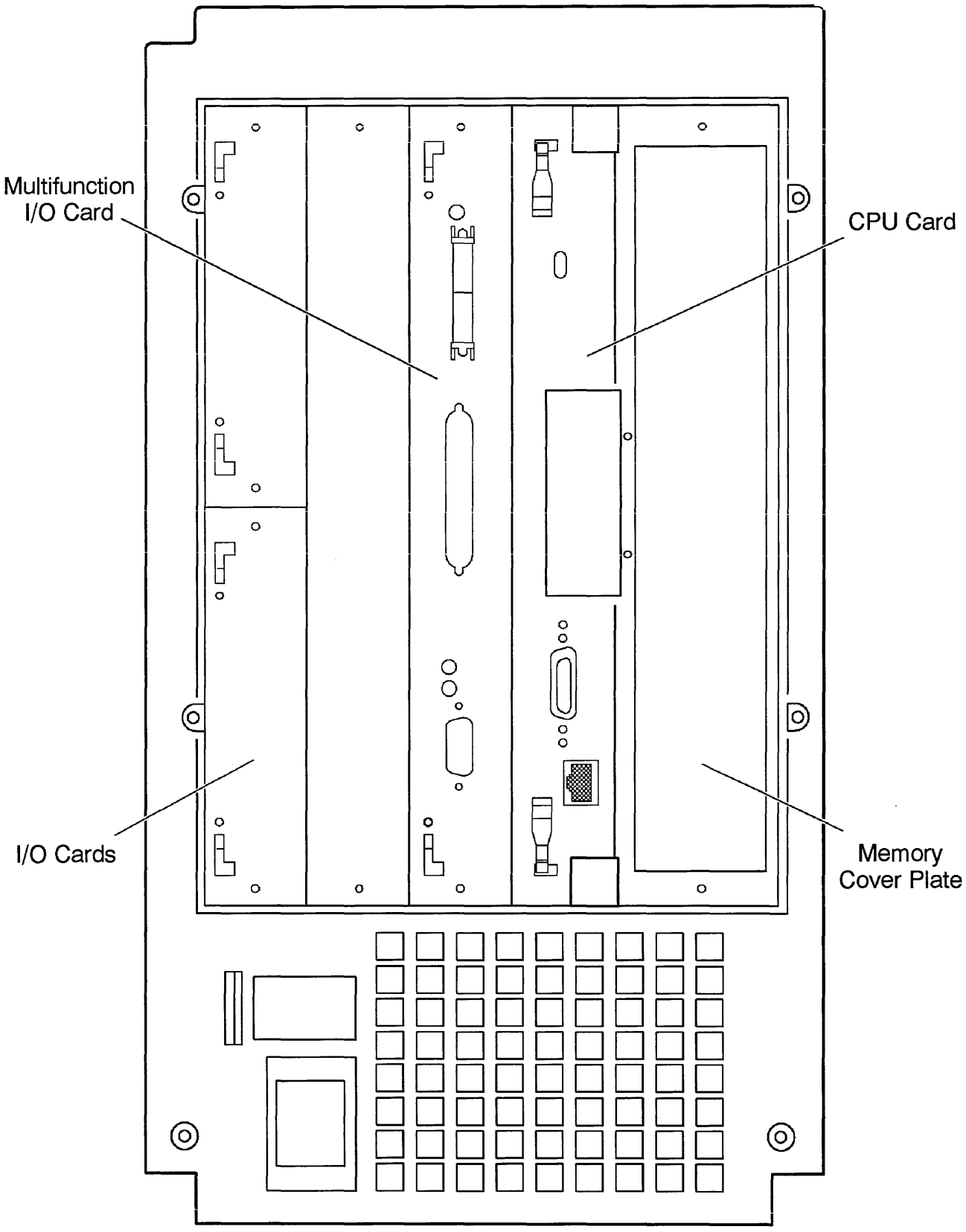


Figure 8-20. Rear Bezel Removal

## Remove CPU Card

1. See Figure 8-21.
2. Lift the two board extractor levers and remove the CPU card.
3. Place PCAs in anti-static containers and set aside.

---

**Caution** Do not stack PCAs on top of each other. Severe damage can occur to components.

---

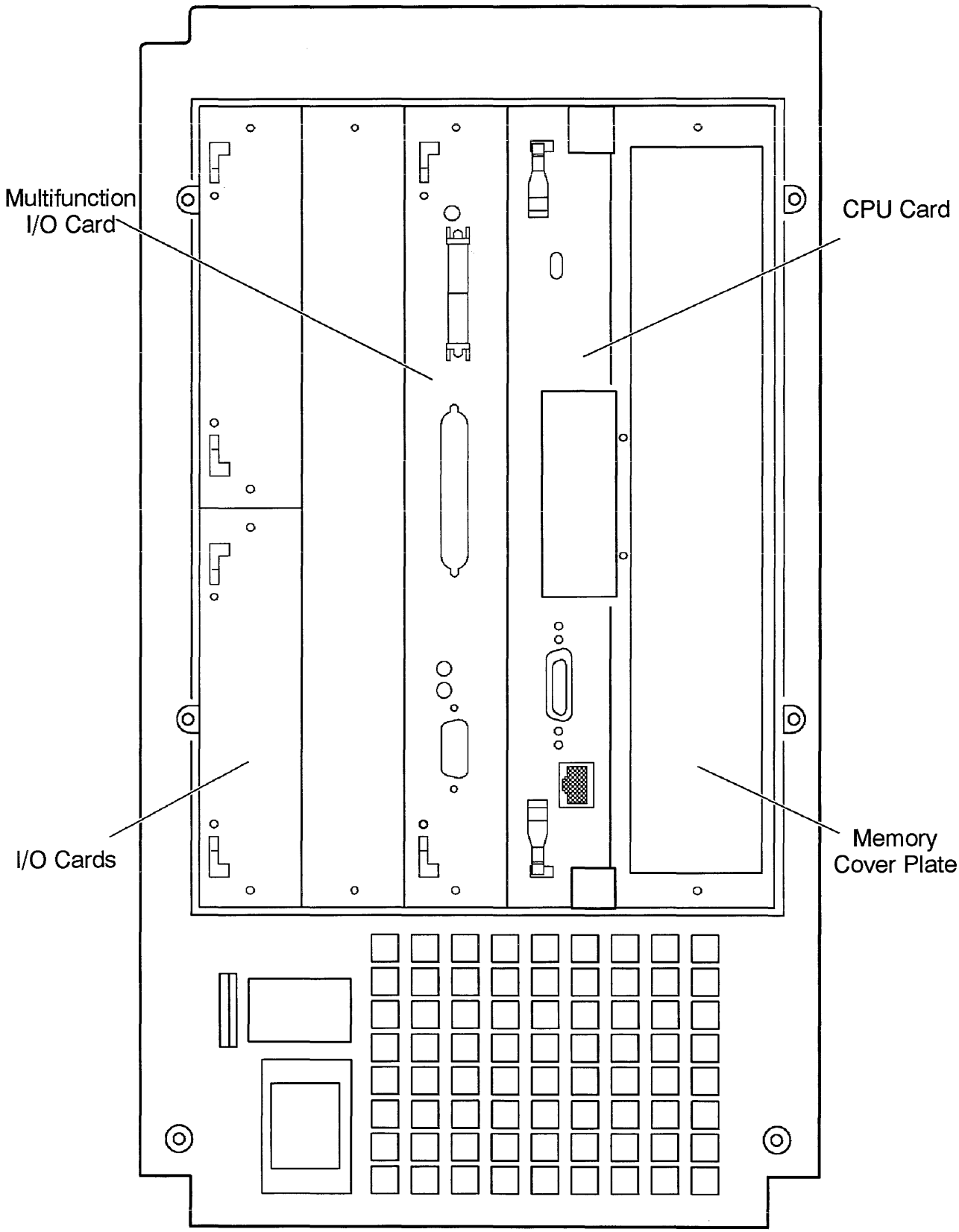


**Figure 8-21. CPU Card Removal**

## Remove Memory PCAs

1. Figure 4-8 shows Memory PCAs on the backplane.
2. Tilt the Memory PCA and lift it from the backplane.

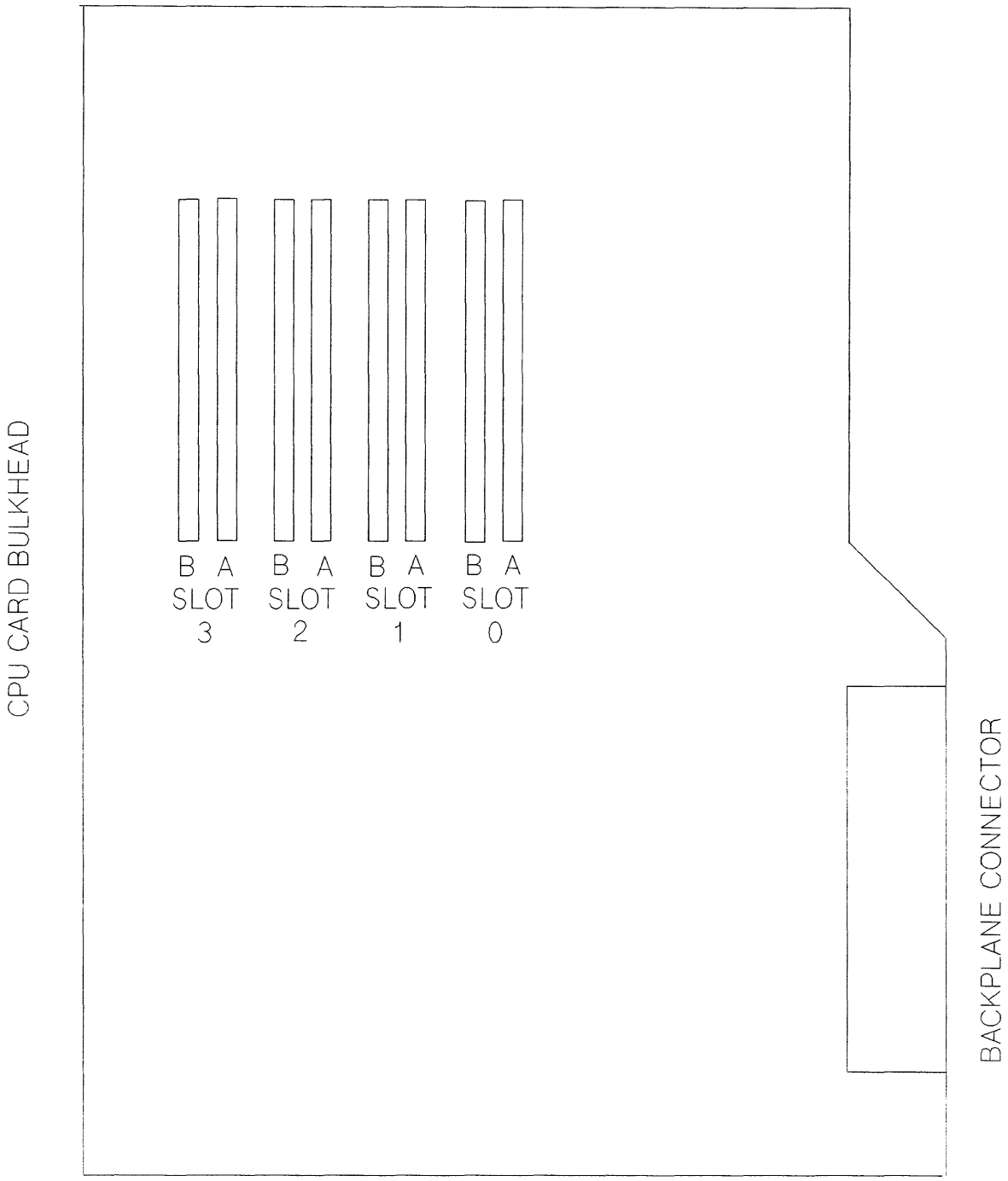


**Figure 8-22. Memory PCA Removal**

## Remove Backplane

**Note**

You must disconnect the power supply from the backplane before you perform this step. Pull the power supply out about one inch.

1. Remove the I/O PCAs, CPU card, and Multifunction I/O card from the backplane.
2. Disconnect the internal SCSI flat ribbon cable from the backplane.
3. See Figure 8-23.
4. Use a flat-blade screwdriver, lift each leg of the left backplane retaining clip, and remove the clip. The clip is labeled **LEFT**. The hole in the left clip is used to align the adapter.
5. Use a flat-blade screwdriver, lift each leg of the right backplane retaining clip, and remove the clip. The clip is labeled **RIGHT**.
6. See Figure 8-24.
7. Lift the backplane from the alignment tabs and remove it from the system cabinet.

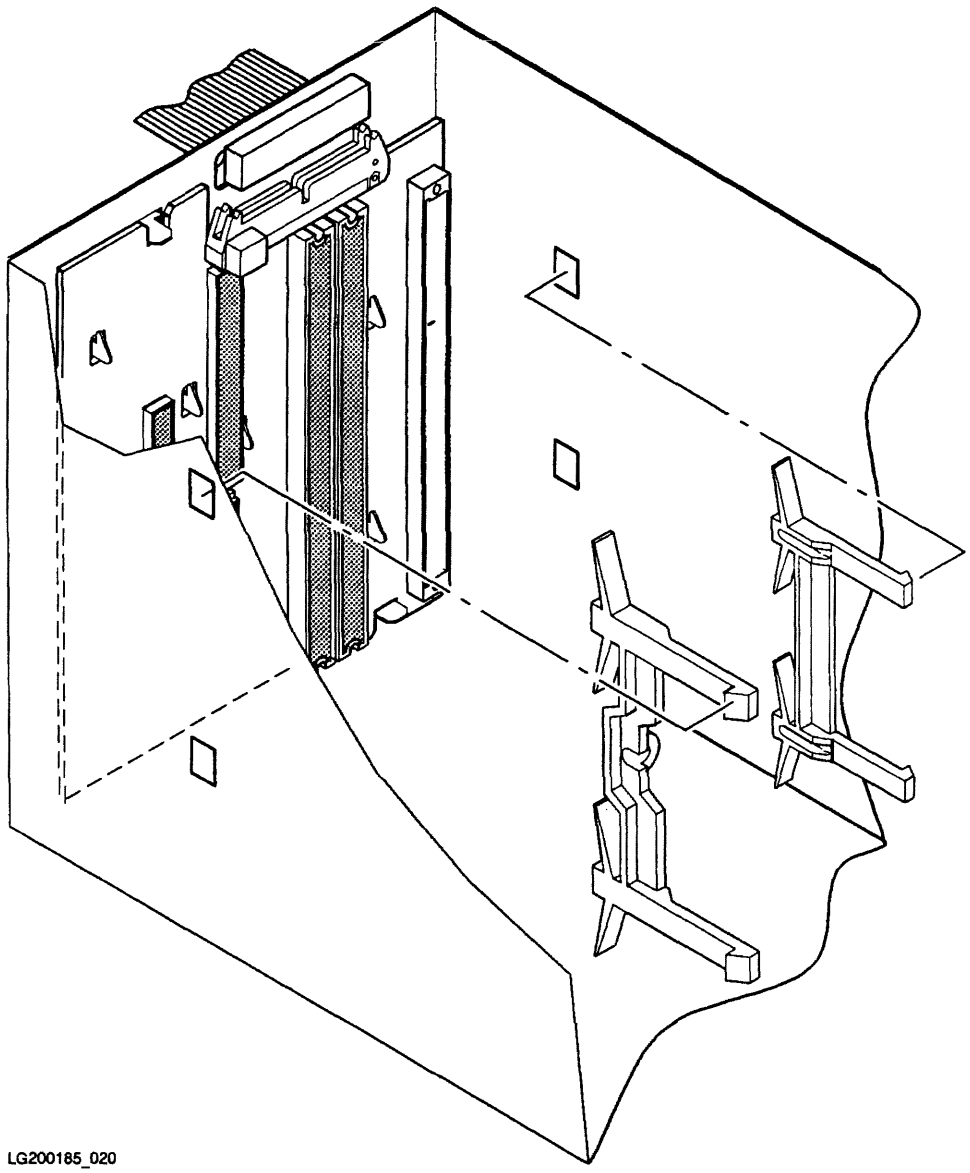


**Figure 8-23. Backplane Retaining Clip Removal**

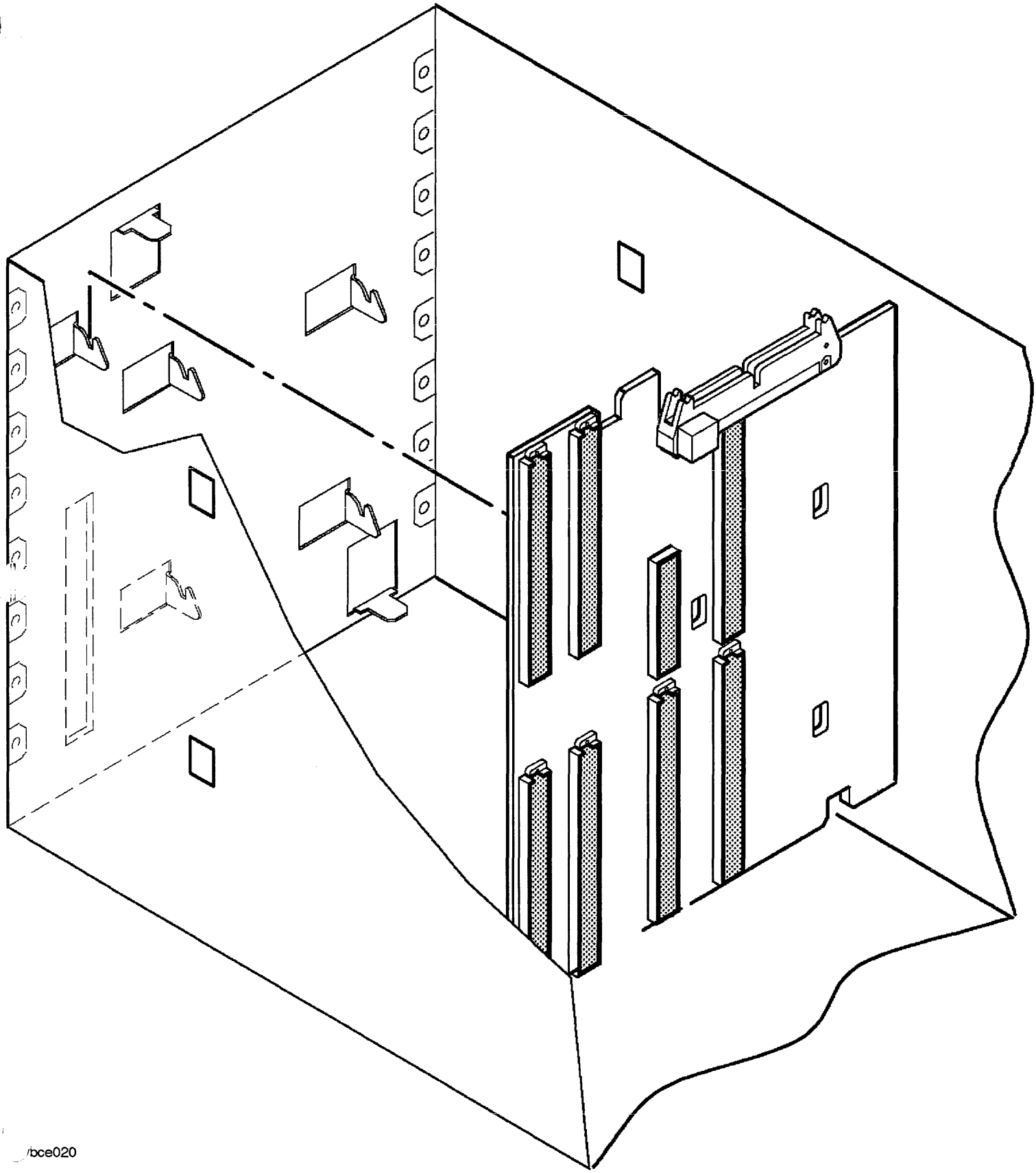


Figure 8-24. Backplane Removal

## Remove Left and Right Side Panels

1. See Figure 8-25.
2. Remove two chassis screws from the front of the right panel.
3. Remove two chassis screws from the rear of the right panel.
4. Lift the panel up and then lift away from the chassis.
5. Remove two chassis screws from the front of the left panel.
6. Remove two chassis screws from the rear of the left panel.
7. Lift the panel up and then lift away from the chassis.

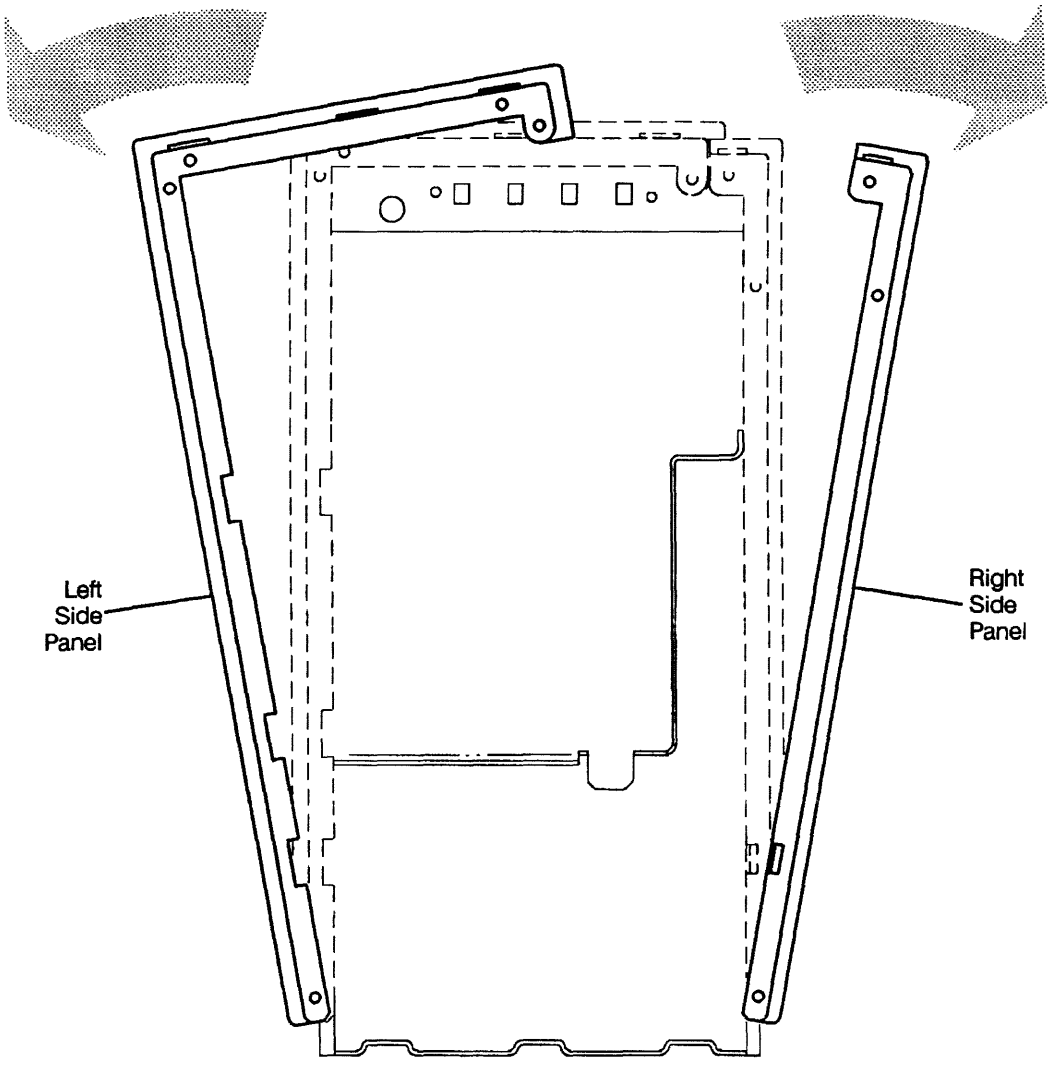


**Figure 8-25. Left and Right Side Panel Removal**

## Remove Light Pipes

1. See Figure 8-26.
2. Gently press down on the locator tab at the front of the light pipe to release the light pipe from the chassis.
3. Slide the light pipe to the rear and then lift out of the chassis.

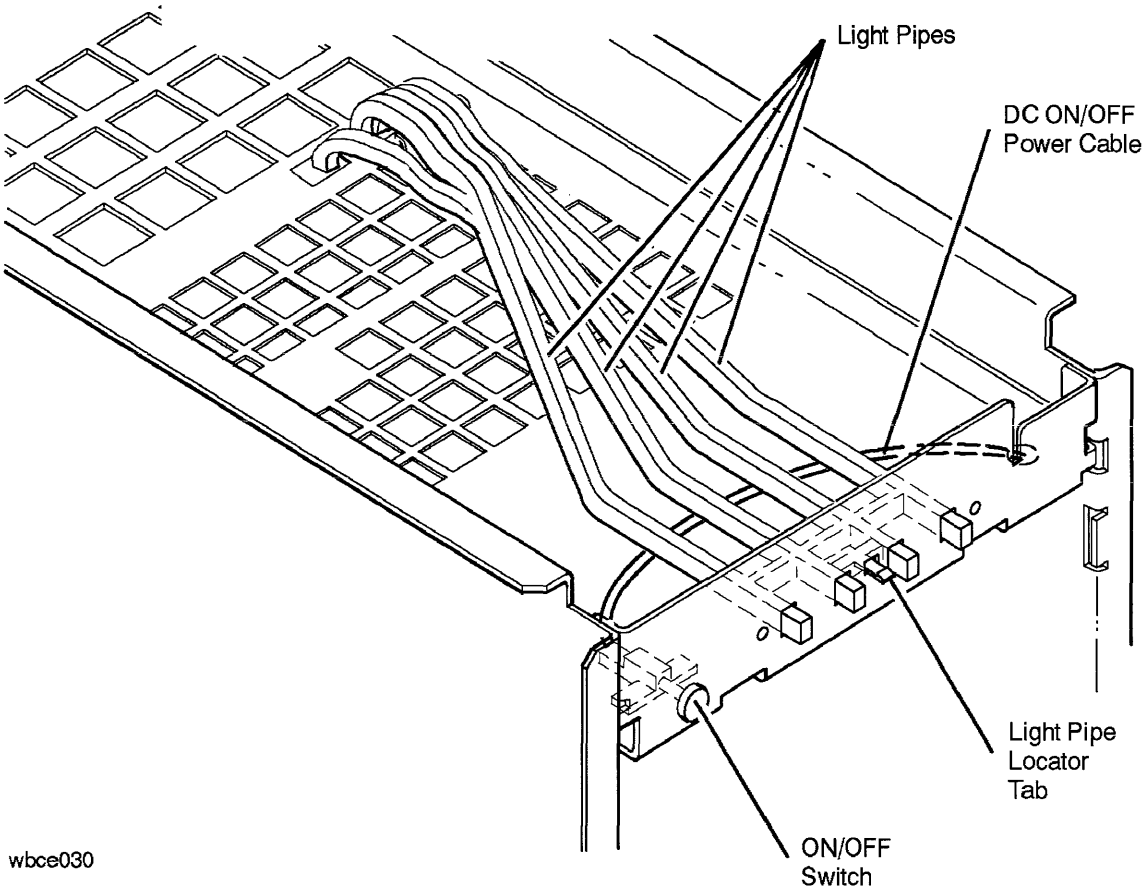


**Figure 8-26. Light Pipe Removal**

## Remove DC On/Off Switch

1. See Figure 8-27.
2. Using a pair of small needle-nose pliers, bend the four tabs on the switch retainer bracket to a vertical position.
3. Lift the switch out of the bracket.
4. Disengage the cable from the cable retaining tabs on the right side of the cabinet.
5. Disconnect the DC On/Off cable from the power control module in the power supply.

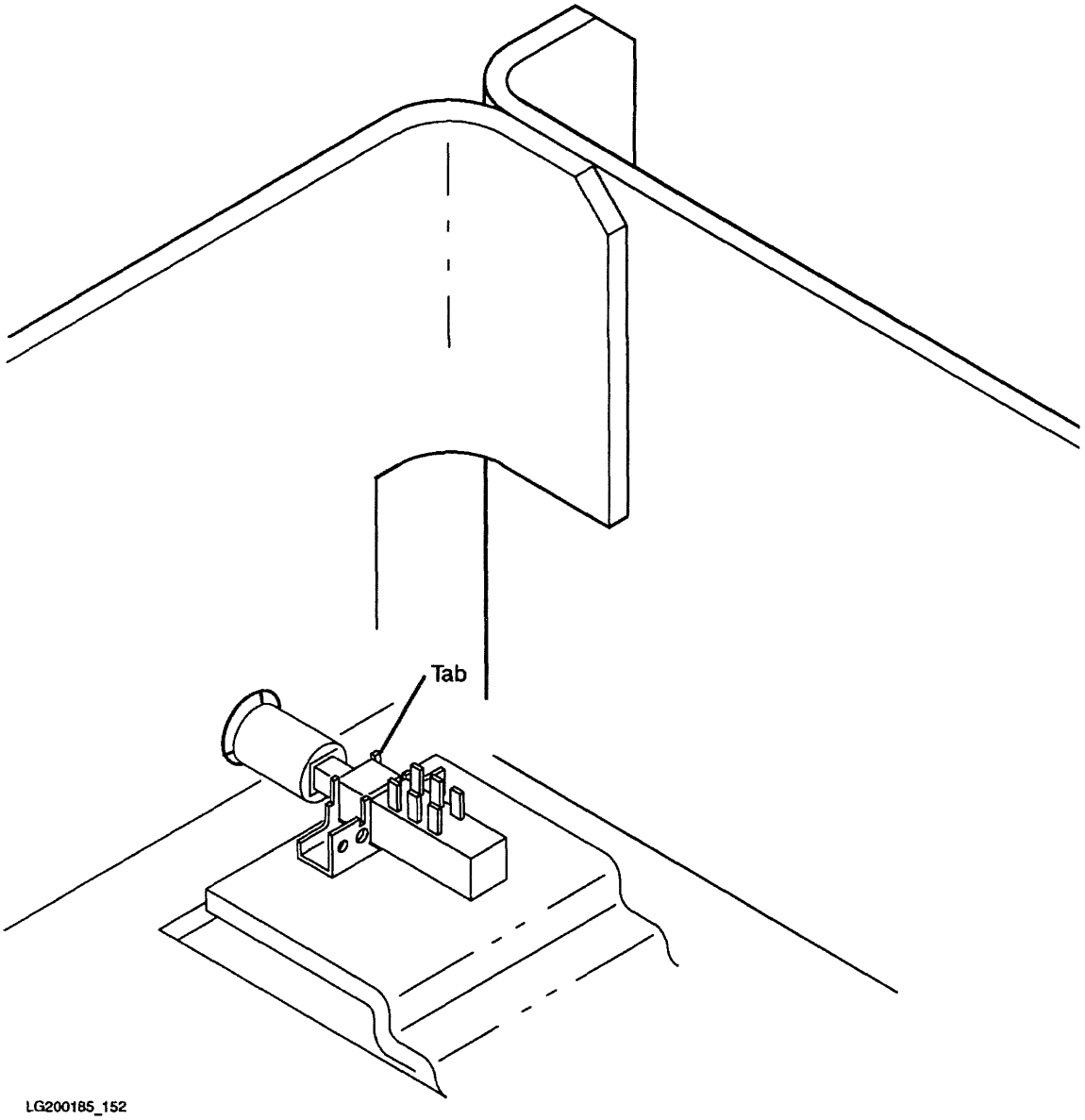


**Figure 8-27. DC On/Off Switch Removal**

## Chassis Replacement Procedures

Replacement procedures are performed in the reverse order of the removal procedures. Refer to the appropriate removal procedure for replacement instructions.

**Note**

Before you insert the power supply in the cabinet, dress any unused peripheral power cables in the cable retaining clip on the side of the peripheral drawer.

# Quick Reference Removal Procedures.

These procedures are checklists of the steps required to perform specific tasks. They are intended to be used as a quick guide by CEs who are familiar with all of the steps in each task.

## Backplane Removal

1. Remove front bezel
2. Pull power supply one inch out of the cabinet
3. Remove rear bezel
4. Remove all I/O cards
5. Remove Multifunction I/O card
6. Remove Processor card
7. Remove Memory extender
8. Remove SCSI cable
9. Remove backplane retaining clips
10. Remove backplane

## Digital Data Storage (DDS) Removal

1. Remove front bezel
2. Remove peripheral drawer
3. Disconnect cables
4. Remove DDS

## Internal Disk Removal

1. Remove front bezel
2. Remove peripheral drawer
3. Disconnect cables
4. Remove disk

## CD-ROM Removal

1. Remove front bezel
2. Remove peripheral drawer
3. Disconnect cables
4. Remove CD-ROM

## QIC Removal

1. Remove front bezel
2. Remove peripheral drawer
3. Disconnect cables
4. Remove QIC drive

## 8 mm Tape Drive Removal

1. Remove front bezel
2. Remove peripheral drawer
3. Disconnect cables
4. Remove 8 mm Tape Drive

## Floppy Disk Drive Removal

1. Remove front bezel
2. Remove peripheral drawer
3. Disconnect cables
4. Remove Floppy Disk Drive

## Light Pipe Removal

1. Remove front bezel
2. Remove left and right side panels
3. Remove top panel
4. Remove light pipes

## Memory PCA Removal

1. Remove rear bezel
2. Remove cover plate
3. Remove Memory extender
4. Remove memory on backplane

## Power Supply Removal

1. Remove front bezel
2. Remove peripheral drawer above the power supply
3. Pull power supply partially out.
4. Disconnect DC On/Off power cable
5. Remove power supply

## Processor PCA Removal

1. Remove rear bezel
2. Remove cover plate
3. Remove Processor PCA

# Internal Peripheral Assembly and Disassembly

The following sections describe the removal and replacement of the replaceable assemblies of each of the internal peripherals.

## DDS-Format DAT Drive Assembly and Disassembly

This section describes the removal and replacement of the drive replaceable assemblies.

**Note**

- New drives do not include mounting hardware. You must remove the mounting hardware from the old drive and install it on the new drive.
- Make sure the configuration of the new drive is the same as the old drive (see Figure 4-12).

### Replaceable Assemblies

The DDS drive is normally replaced as an entire assembly. However, the front panel may be replaced as a subassembly.

**Front Panel. To remove the front panel (see Figure 8-28):**

1. Press in the locking tab (2) on the right-hand side with a small screwdriver and pull the right corner of the front panel (1) away from the mechanism chassis.
2. Repeat step 1 for the locking tab on the left-hand side.
3. Press in the front panel door and rotate the front panel up until the locator tabs (3) can be lifted out of the chassis.

**To replace the front panel:**

1. Lower the front panel locator tabs into the chassis.
2. Rotate the front panel down and press the front panel locking tabs into place.

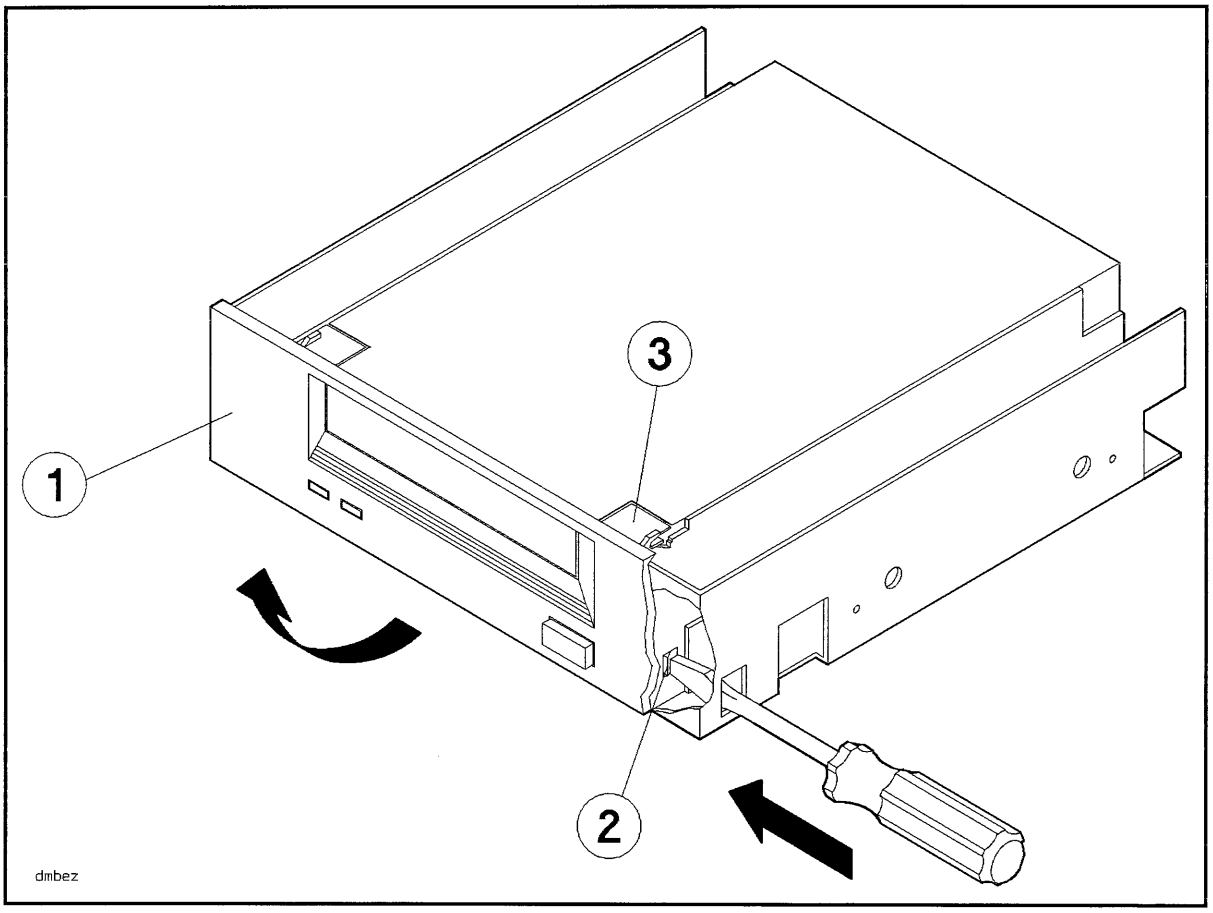


**Figure 8-28. Removing the Front Panel**

1. Front Panel
2. Locking Tab
3. Locator Tab

## CD-ROM Drive Assembly and Disassembly

This section describes the removal and replacement of the drive replaceable assemblies.

### Laser Safety

**Warning**

- **Use of controls, adjustments, or performing procedures other than those specified in this manual may result in hazardous invisible laser radiation exposure.**
- **Do NOT disassemble the CD-ROM drive for any reason. The CD-ROM drive becomes a Class 1 laser mechanism when disassembled. If the CD-ROM disk drive is disassembled, exposure to the invisible laser beam and hazardous invisible laser radiation could result in blindness.**

### Handling Precautions

**Caution**

- Make sure you eject the media from the drive before removing the drive from the cabinet. Damage to the drive may occur if media is in the drive and the drive is moved while the power is off.
- Make sure you observe the proper ESD precautions when servicing the drive.

**Note**

- New drives do not include mounting hardware. You must remove the mounting hardware from the old drive and install it on the new drive.
- Make sure the configuration of the new drive is the same as the old drive (see Figure 4-14).

### Replaceable Assemblies

The CD-ROM drive is normally replaced as an entire assembly. However, the front panel and door may be replaced as subassemblies.

**Front Panel. To remove the front panel (see Figure 8-29):**

1. Gently pry out the two locking tabs (2) on the right-hand side of the front panel.
2. Repeat step 1 for the locking tabs on the left-hand side of the front panel.
3. Gently pry out the locking tab from the bottom center of the front panel and pull the front panel away from the front of the drive.

**To replace the front panel:**

Gently push the front panel onto the drive chassis until the locking tabs lock into place.

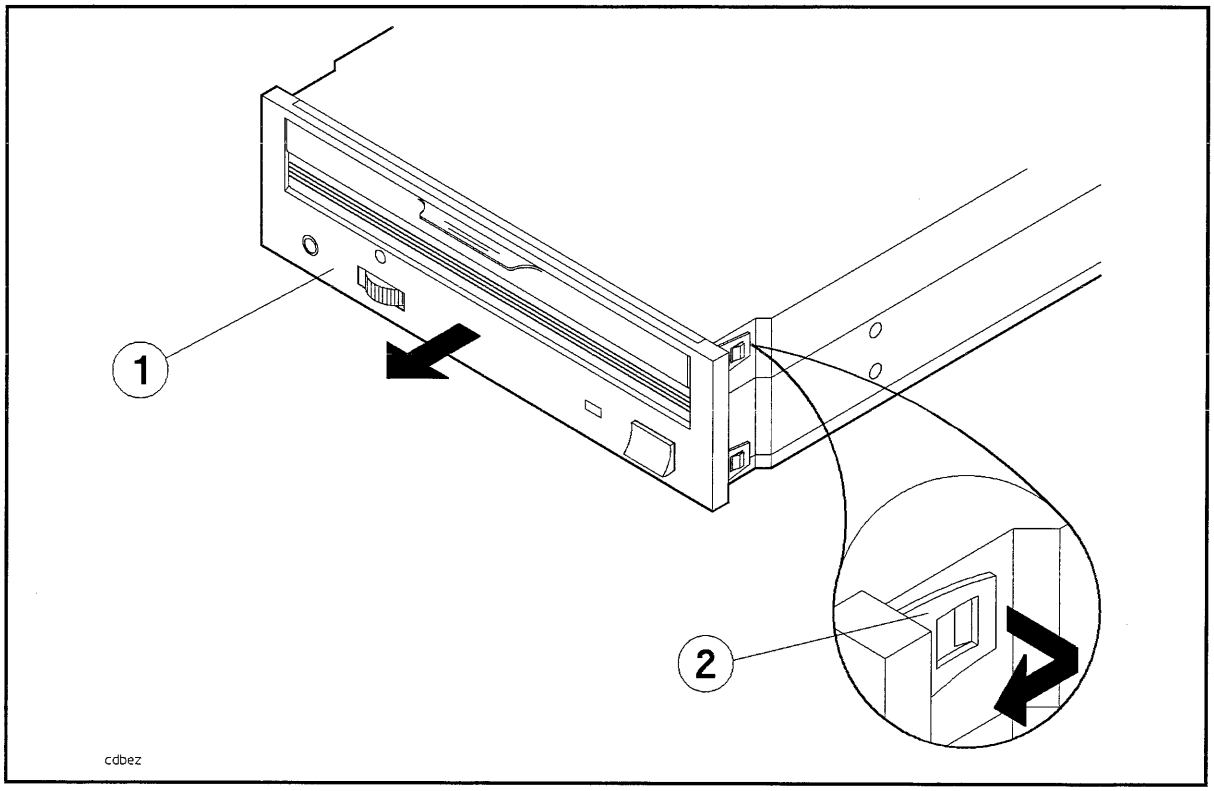


**Figure 8-29. Removing the Front Panel**

1. Front Panel
2. Locking Tab (5)

**Door. To remove the door (see Figure 8-30):**

**Note** A coil spring is used to keep the door closed. Make sure the spring is reinstalled when the door is replaced.

1. Slide the door cam off of the door.
2. Pull the hinge pin out of the door.
3. Detatch the door spring from the drive chassis and pull the door away from the front of the drive.

**To replace the door:**

1. Insert the free end of the door spring into the hole below the CD-ROM slot.
2. Position the door over CD-ROM slot.
3. Insert the hinge pin.
4. Orient the door cam as shown and slide it onto the door.

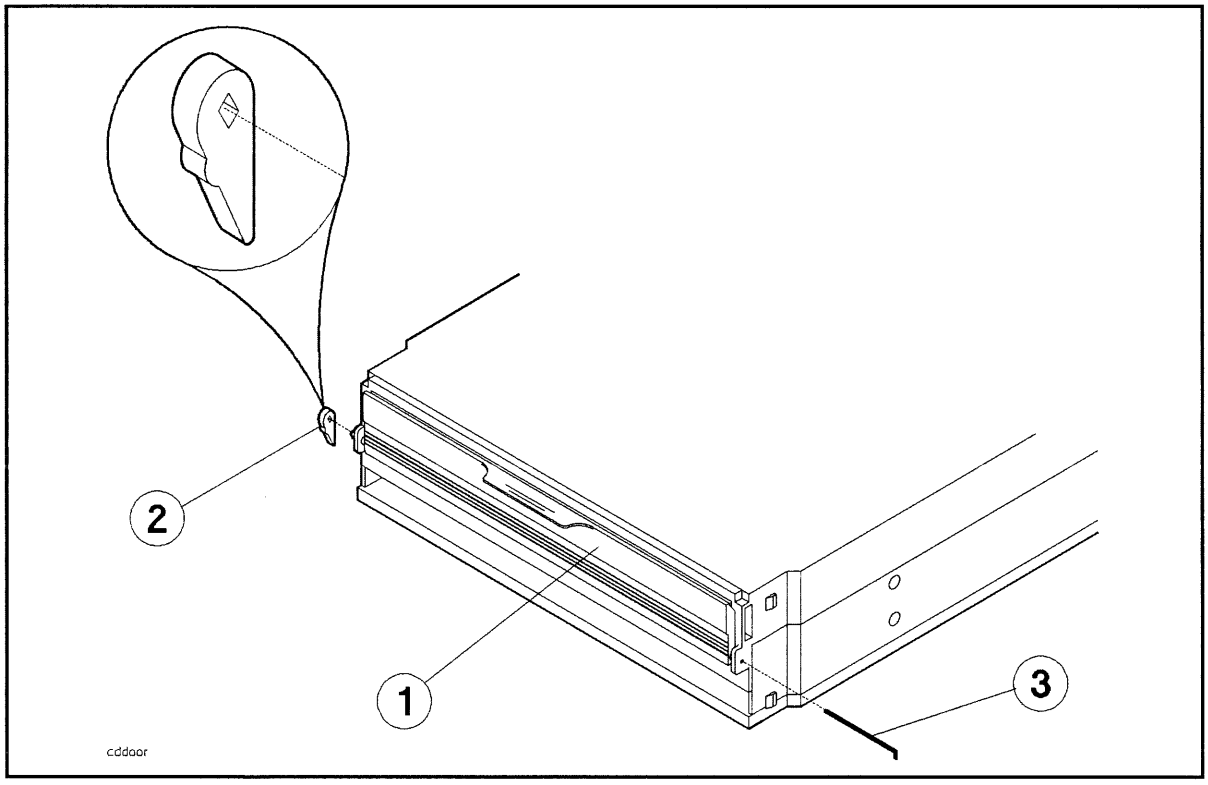


**Figure 8-30. Removing the CD-ROM Door**

1. Door
2. Door Cam
3. Hinge Pin

## Cabinet Removal and Replacement

This section describes the procedure for replacing a damaged part. Refer to Table 8-4 for a list of the cabinet parts that can be replaced if damaged.

The 1.1 meter and 1.6 meter cabinet are identical except for vertical height. All parts are removed and replaced the same. For this reason, only the 1.6 meter cabinet is shown. The only parts that are different between the 1.1 meter cabinet and 1.6 meter cabinet are the rear door, top cap, base cover, and side covers.

Refer to Figure 8-31 and Figure 8-32 while performing the procedures outlined in this section.

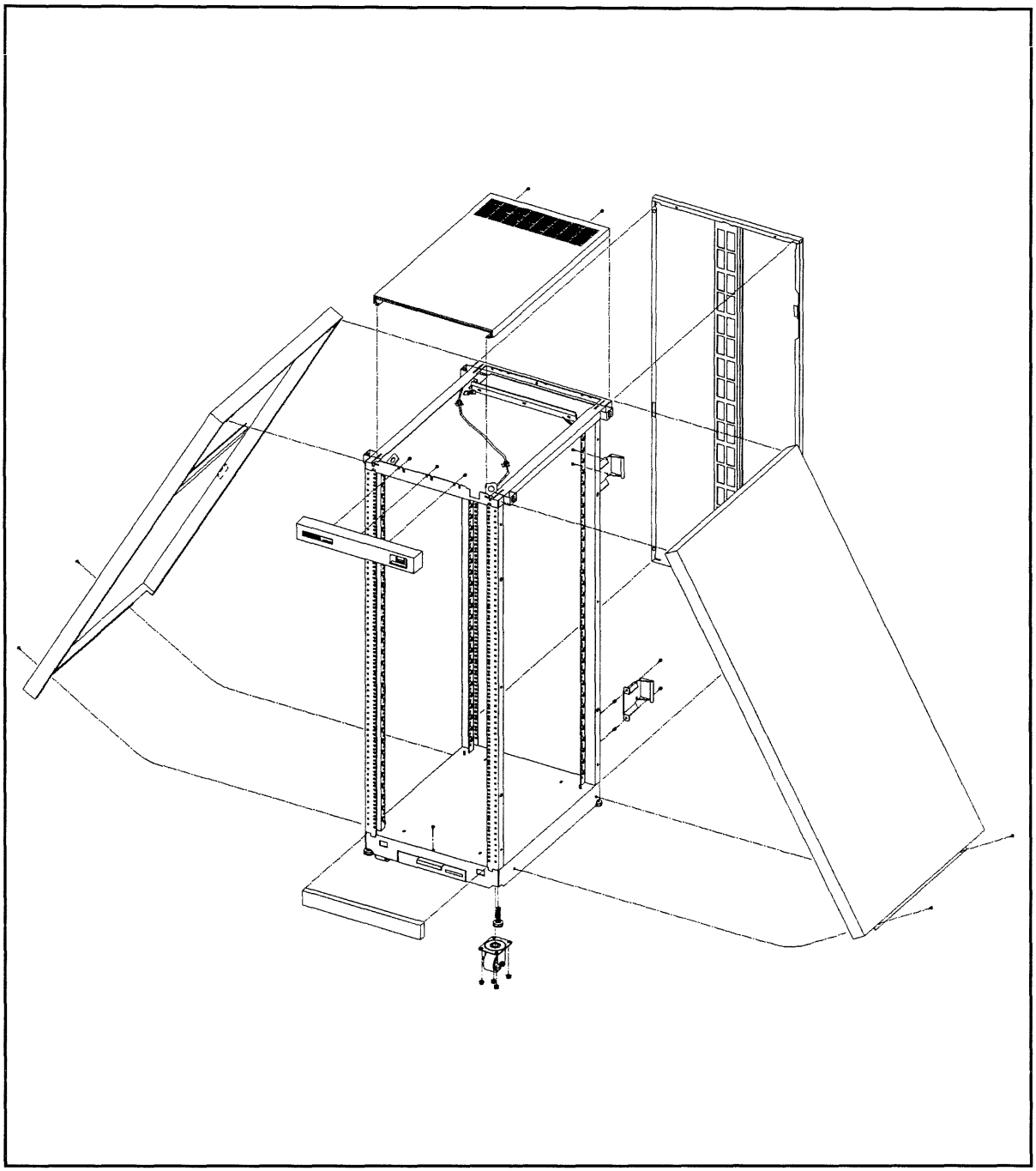

Figure 8-31. Cabinet Exploded View Front

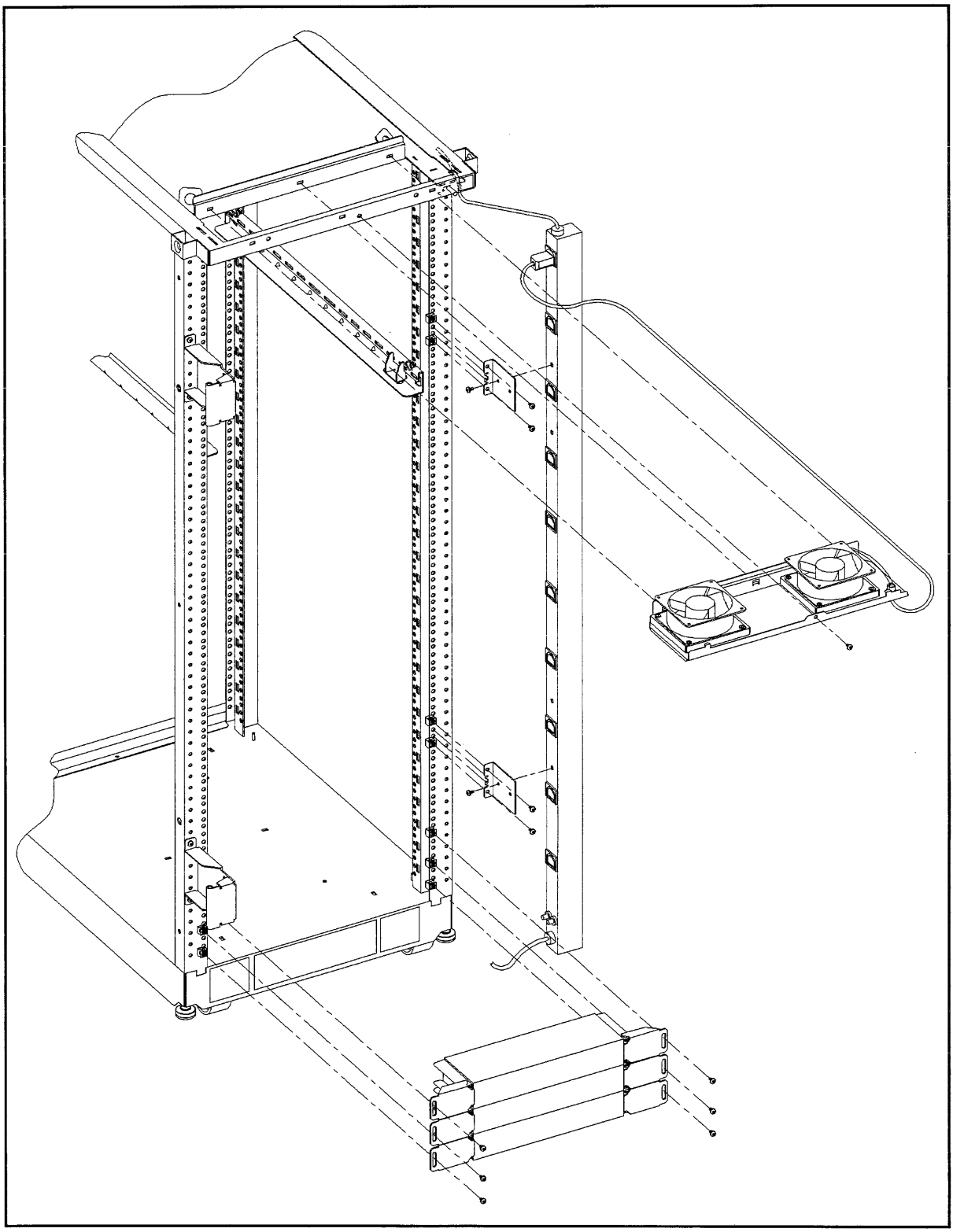

Figure 8-32. Cabinet Exploded View Rear

## Removal and Replacement Procedures

The following procedures are for the HP Field Replaceable Units (FRUs) contained in the HP A1883A/84A or HP A1896A/97A rack-mount cabinets.

### Rear Door

Refer to Figure 8-31 while performing these procedures.

**Rear Door Removal:**

1. Remove the rear door of the cabinet by opening the door.
2. Disconnect the bonding wire from the door.
3. Grasp the rear door support and lift the door straight up and away from the cabinet.

**Rear Door Replacement:**

1. Hold the rear door by the support column, in an open position.
2. Align the door hinge pins over the cabinet hinge holes.
3. lower the door onto the cabinet hinge.
4. Reconnect the bonding wire to the door.

### Top Cap

Refer to Figure 8-31 while performing these procedures.

**Top Cap Removal:**

1. Turn the cabinet power switch off and unplug the cabinet power cord.
2. Open the rear door all the way.
3. Remove the two outside mounting screws at the top rear of the cabinet.
4. Then, from the rear of the cabinet, pull the top cap toward the back, a few inches.
5. Lift the top cap off the cabinet.

**Top Cap Replacement:**

1. From the rear of the cabinet, place the top cap between the side covers and slide it forward until it stops.
2. Insert the two mounting screws at the top rear. Tighten the screws.
3. Close the rear door. Plug the cabinet power cord into the wall outlet and power up the computer system.

### Side Cover

Refer to Figure 8-31 while performing these procedures.

**Side Cover Removal:**

1. Remove the two mounting screws at the bottom of the cabinet.
2. On the right side cover, open the rear door and remove the two mounting screws on the upper door hinge (that secure the hinge to the side panel).

3. Grasp the sides of the side cover (pulling the bottom of the panel away from the cabinet offers a better grip), then lift up and away.

**Side Cover Replacement:**

1. Grasp the side cover on the sides and align it with the cabinet at a vertical angle with the bottom out and the top toward the top of the cabinet.
2. Lower the side onto the top edge of the cabinet side so the top of the side cover hooks onto the top of the cabinet.
3. With the side cover flush with the cabinet frame and insert the two mounting screws in the bottom. Tighten the screws.
4. On the right side cover, insert the mounting screws through the upper door hinge into the side panel and tighten screws.

### Forehead Assembly

To remove the forehead assembly, the power has to be turned off and the top cap has to be removed first. Refer to Figure 8-31 while performing these procedures.

**Forehead Assembly Removal:**

1. Turn the power off (refer to Chapter 4 for power off procedures).
2. Unplug the cabinet power cord.
3. Remove the top cap (refer to top cap removal).
4. Unplug the PDU harness from the back of the ON/OFF switch.
5. Remove the three mounting screws behind the forehead assembly.
6. Pull the forehead assembly away from the cabinet frame.

**Forehead Assembly Replacement:**

1. Align the forehead assembly at the top of the cabinet frame, so the three mounting holes match the frame holes, and the mounting hooks on each side engage the mounting slots.
2. Insert the three mounting screws through the frame into the forehead assembly. Tighten the screws.
3. Attach the PDU harness to the ON/OFF switch lugs as indicated:

| | |
|---|---|
| Red: | switch terminal 1 |
| Black: | switch terminal 2 |
| White: | switch terminal 6 |

4. Replace the top cap (refer to top cap replacement).
5. Plug the cabinet power cord into the wall outlet.

### Base Cover

Refer to Figure 8-31 while performing these procedures.

**Base Cover Removal:**

1. Remove the mounting screw located on the top edge, center, of the base cover.
2. Pull the base cover away from the bottom of the cabinet.

**Base Cover Replacement:**

1. Align the base cover hooks on the bottom of the cabinet frame and roll the base cover until the mounting holes in the cabinet and base cover align.
2. Insert the mounting screw. Tighten the screw.

### Rear Door Hinge

Refer to Figure 8-31 while performing these procedures.

**Rear Door Hinge Removal:**

1. Remove the rear door (refer to rear door removal).
2. Remove the two mounting screws from the cabinet column (on the upper hinge, also remove the two mounting screws in the side panel), and lift the door hinge away.

**Rear Door Hinge Replacement:**

1. Align door hinge with the pressed nuts in the rear cabinet column.
2. Insert the two mounting screws through the hinge into the column (on the upper hinge insert the two mounting screws into the side panel). Tighten the screws.

### Rail Assembly

This procedure is also used to remove or replace a rail clamp. Refer to Figure 8-31 while performing these procedures.

**Rail Removal:**

1. Remove the component mounted on the rail to be replaced. Removing the component could involve a lot of cable handling. Be sure to tag the removed cables for replacement later.
2. Remove the two rail mounting screws.
3. Lift the rail out of the rail support notch in the cabinet column.
4. If the rail clamp needs to be removed, remove the clamp screw, and slide the clamp out of the rail grove.

**Rail Replacement:**

1. Slide the rail clamp into the rail.
2. Insert the rail tab into the appropriate inside cabinet column support notch.
3. Insert the two mounting screws through the rail into the slip nuts on the column. Tighten the screws.
4. Re-install the component that was previously removed.
5. Slide the rail clamp up to the rear of the component and insert the clamp screw. Tighten the screw.

### Fan Assembly

Refer to Figure 8-33 and Figure 8-32 while performing these procedures.

**Fan Assembly Removal:**

1. Turn off the cabinet power. Refer to the power off procedures in Chapter 5.
2. Open the rear door.
3. disconnect the fan power cord from the PDU.
4. Remove the one mounting screw at the top rear cabinet frame bar.
5. Grasp the fan assembly from the bottom and pull toward the rear of the cabinet.
6. The fan assembly should release from the cabinet, and can be lowered out of the cabinet.

**Fan Assembly Replacement:**

1. Raise the fan assembly into the rear cabinet frame opening.
2. Slide the fan assembly forward engaging the tabs on the fan assembly into the slots in the cabinet frame.
3. Insert the mounting screw. Tighten the screw.
4. Connect the fan power cord from the fan assembly to the PDU.
5. The rear door can now be closed and the system powered up.

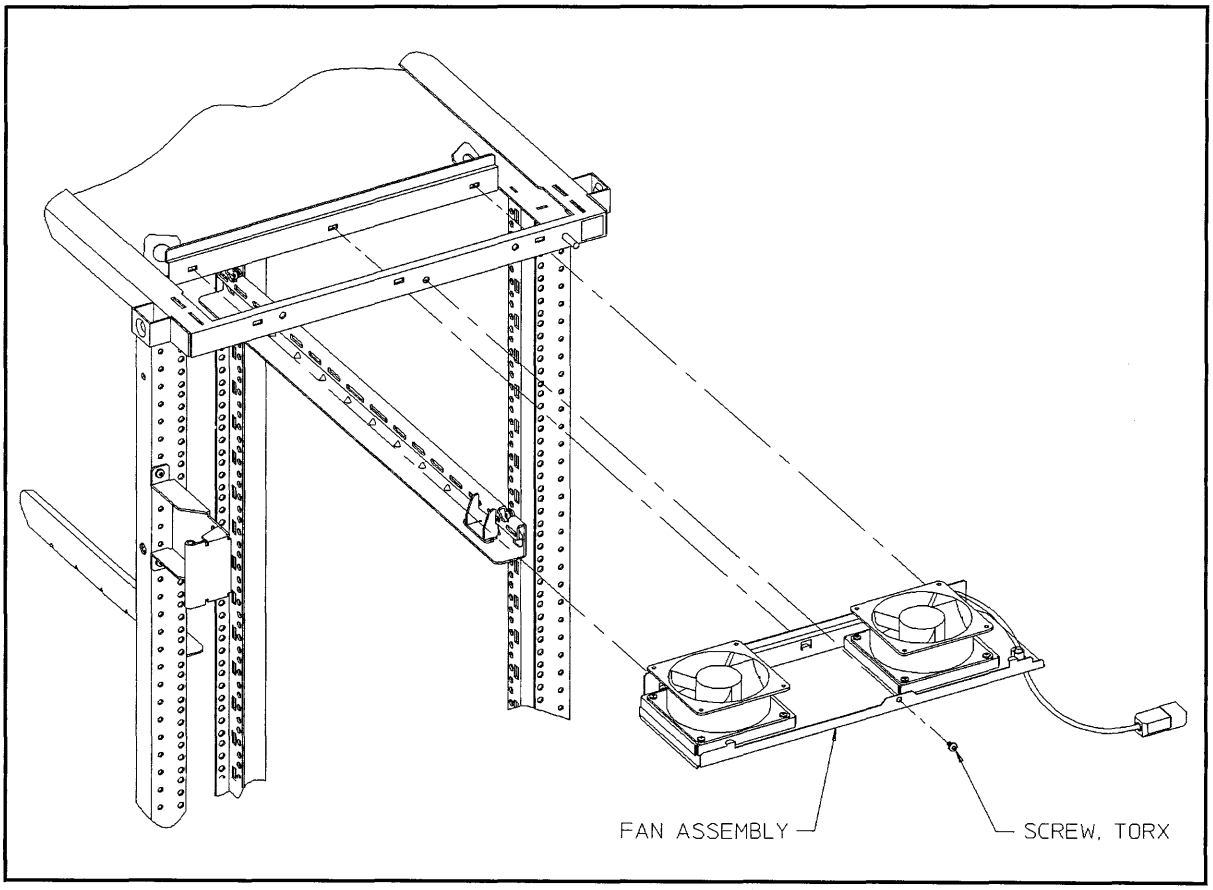


**Figure 8-33. Fan Assembly**

## Fan

Refer to Figure 8-34 while performing these procedures.

**Fan Removal:**

1. Remove the fan assembly (refer to fan assembly removal).
2. Remove the power cable connectors from the fan.
3. Remove the two mounting screws and nuts holding the fan to the fan tray.
4. The fan bracket stays with the fan tray.

**Fan Replacement:**

1. Position the fan over the fan bracket/tray mounting holes so that the power lugs are at the rear of the fan tray, and on the right side of the fan (as viewed from the back of the assembly). Also verify the air flow arrow points up.
2. Insert the mounting screws up through the bottom of the fan tray/bracket and fan.
3. Attach mounting nuts/washers on the mounting screw. Tighten screws and nuts.
4. Attach power cord lugs to spades on the fan (polarity does not matter).
5. Replace fan assembly (refer to fan assembly replacement).

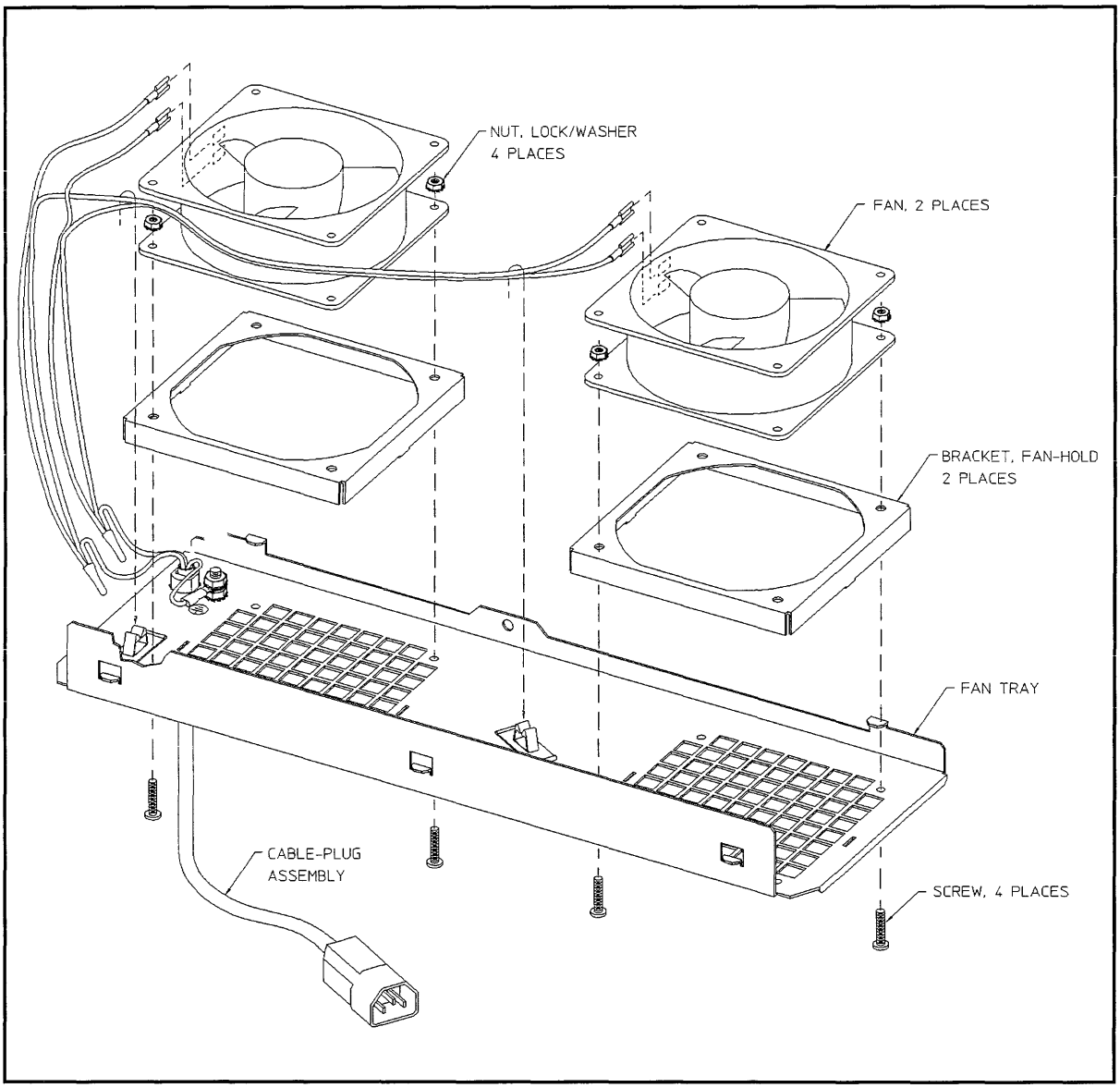


**Figure 8-34. Fan Diagram**

### PDU

Refer to Figure 8-32 while performing these procedures.

**PDU Removal:**

1. Turn OFF the power switch on the front of the cabinet.
2. Unplug the cabinet power cord from the wall outlet.
3. Remove the top cap (refer to top cap removal).
4. Unplug the PDU harness from the back of the ON/OFF switch.
5. Unclip the PDU harness from the cable clamps on the cabinet frame top and pull the PDU harness down through the top frame.
6. Remove all component power cords from the PDU.

7. Remove the four (two on each bracket) mounting screws from the PDU mounting brackets that attach to the frame columns.
8. Lift the PDU up to disengage, the PDU mounting bracket hooks from the frame column.
9. Pull the PDU out of the cabinet.

---

**Note** The PDU mounting brackets could be removed at this point if necessary.

---

**PDU Replacement:**

1. Align the PDU (with the brackets attached) on the right rear column of the cabinet frame.
2. Insert the PDU bracket hooks into the column holes and lower the PDU until it rests on the column.
3. Insert the PDU mounting screws through the brackets into the column with slip nuts attached.
4. Route the PDU harness up through the top of the cabinet and through the cable clamps.
5. Plug the PDU harness onto the ON/OFF switch.
6. Replace the top cap (refer to top cap replacement).
7. Reconnect all the cabinet components to the PDU.
8. Plug the power cord into the wall outlet.
9. The cabinet and computer are ready to be powered up.

### Cabinet Leveler or Caster

Refer to Figure 8-31 while performing these procedures.

**Leveler or Caster Removal:**

1. Turn Off the cabinet power switch.
2. Unplug the cabinet power cord from the wall outlet.
3. Carefully move the cabinet to an area with enough room to allow the cabinet to be laid on its side.
4. Remove all computer components mounted in the cabinet.
5. Carefully lay the cabinet over on one of its sides.
6. unscrew the desired leveler. Or, remove the desired caster by removing four mounting nuts and pulling the caster off.

**Leveler or Caster Replacement:**

1. With the cabinet still on its side, screw in the leveler. Or, place the caster over the four mounting studs, and attach the four mounting nuts. Tighten the nuts.
2. Carefully lift the cabinet back up to an upright position.
3. Install all computer components that were removed previously.
4. Carefully move the cabinet to its install site.

5. Plug the cabinet power cord into the wall outlet.
6. The cabinet is now ready for operation.

### Magnetic Door Catch

The magnetic door catch is located in the rear door, with catch plate on the left side cover.

**Magnetic Door Catch Removal:**

1. Open the rear door.
2. Grasp the magnetic door catch on the top and bottom. It is inside the rear door fold.
3. Simultaneously press the top and bottom mounting tabs of the door catch, while pushing the door catch out of the rear door.
4. When the door catch mounting tabs are clear of the rear door opening, pull the door catch out.
5. If the door catch plate needs to be removed, pry it off with a flat blade screwdriver. It is stuck on the side cover.

**Magnetic Door Catch Replacement:**

1. Align the magnetic door catch back to the mounting hole in the rear door.
2. Firmly press the door catch into the rear door mounting hole.
3. Press the door catch until the mounting tabs snap into place and the door catch is firmly locked into place.
4. If the door catch plate needs to be replaced, peel the adhesive cover off the back of the catch plate. Then align it with the magnetic door catch and press it against the side cover until firmly stuck.

### Door Bumper

The rear door bumpers (one top and one bottom) are self-adhesive rubber bumpers stuck to the rear door. To remove, pry it off with a flat blade screwdriver. To put a bumper on, peel off the adhesive cover, and press the bumper on the appropriate corner of the rear door.

# 9

# Functional Description

## Introduction

This chapter describes the major hardware components of the system and the Access Port and its associated commands.

### CPU

Refer to Figure 9-1. The PCX-L Central Processing Unit (CPU) is a single-chip Precision Architecture - Reduced Instruction Set Computer (PA-RISC) processor. The CPU conforms to PA-RISC architecture, Edition 3. An additional feature is two-way superscalar operation. It provides the ability to execute integer-integer and integer-floating point instruction bundles in parallel. The CPU also contains an on-chip Floating Point Co-processor (FP), on- chip Memory and Input/Output Controller (MIOC), on-chip Translation Lookaside Buffer (TLB), and a first-level on-chip instruction cache.

### Memory and Input/Output Controller (MIOC)

The MIOC handles the interface to memory via a private set of 72 data lines (64 data + 8 ECC), and 24 address and control lines. The balance of the memory subsystem consists of up to eight 72-bit ECC memory SIMMs, added in pairs of 8, 32, or 64 Megabytes. The memory SIMMs are industry standard, except for the 64MB version, which is a double-high, HP-proprietary version of the 32 MB SIMM. All memory shipped with, and supported in these system is made by HP. Note that memory must be added in like-pairs of 8/8 32/32, or 64/64MB.

### Translation Lookaside Buffer (TLB)

The on-chip TLB contains space for 64 unified instruction/data translation entries, eight block translation entries, and an additional single instruction translation. The added single instruction translation buffer contains the translation for the instruction page most recently accessed. A hit on this buffer frees the balance of the TLB to perform a data translation without any time penalty.

### Cache

The CPU contains an on-chip one-kilobyte instruction cache in addition to the interface for an off-chip instruction/data cache. The on-chip, level one I-cache serves to pre-fetch instructions from the external. level two cache. The off-chip cache on the system board is made up of standard SRAMs combined for a total of 64KB or 256KB of unified instruction/data cache.

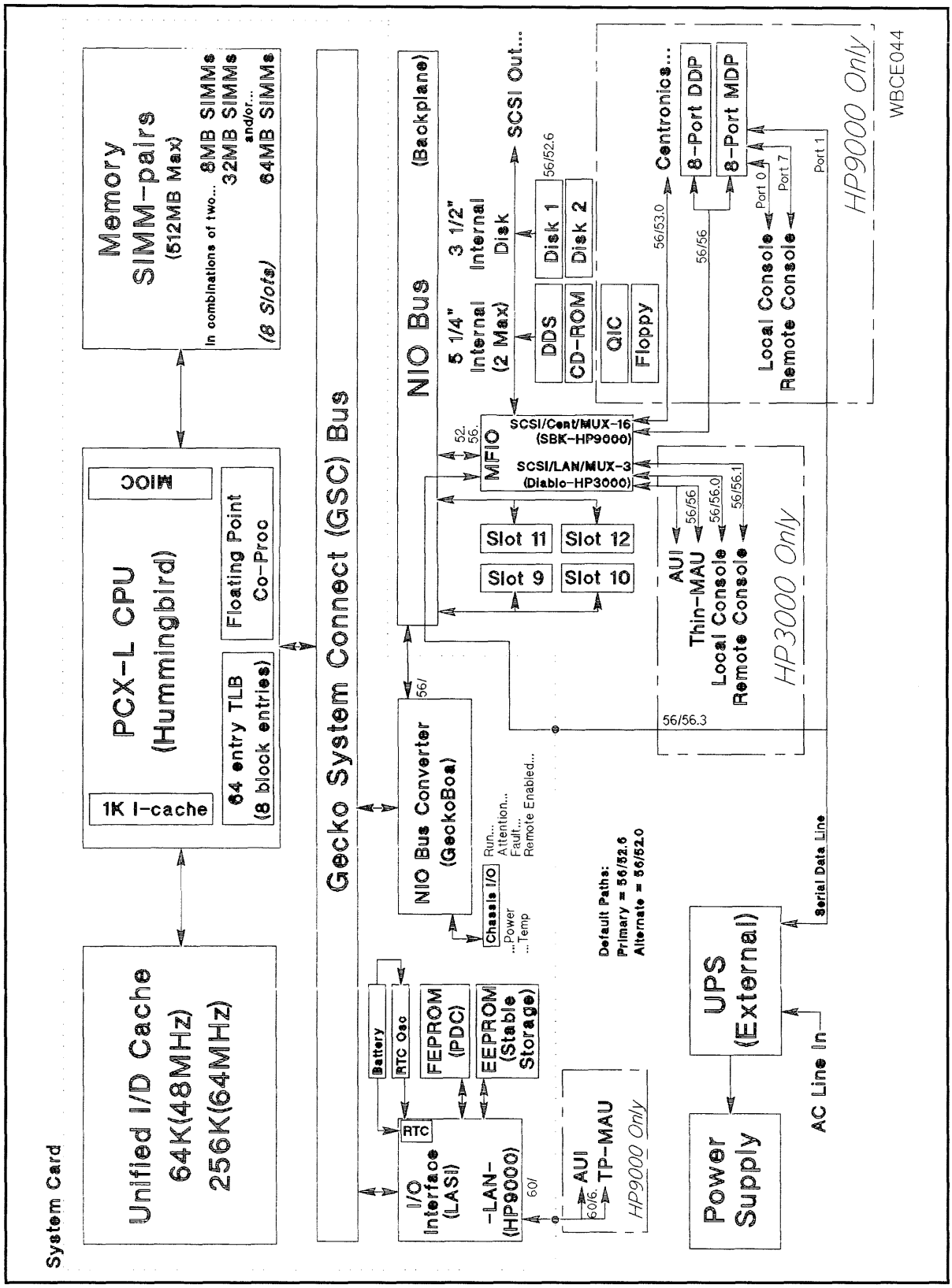


**Figure 9-1. HP 3000 and HP 9000 System Block Diagram**

## Gecko System Connect (GSC)

The MIOC provides the interface to the system main bus, which is the Gecko System Connect (GSC). Gecko was the system for which this bus was originally designed. MIOC handles a speed reduction of 2:1 from the CPU to GSC. In other words, the GSC runs at half the speed of the CPU. The GSC provides the communication medium for the CPU, the GSC-to-NIO Bus Converter, and the I/O Interface (LAN, Stable Storage, etc). The GSC is made up of 32 address/data lines and associated control/handshake lines. The I/O interface chip (LASI) handles arbitration of the bus.

## I/O Interface

The I/O Interface chip provides the LAN connection on HP 9000 systems. It contains the Real Time Clock (RTC) and the interface to the Processor Dependent Code (PDC) and Stable Storage firmware devices. This chip also handles the arbitration of the GSC bus between itself, the Bus Converter, and the CPU. The LAN connection is via either a direct AUI port or a 10-base-T MAU connection on the rear of the system card. The chip automatically selects the port that has been connected to an active LAN medium. The real time clock (RTC) circuit is made up of an internal counting register, an external oscillator, and an external battery. The battery powers all three of these components when the system is powered down.

## Processor Dependent Code (PDC) and Stable Storage

The Processor Dependent Code (PDC) is stored in a downloadable flash EPROM on the CPU card. PDC contains the system self-test routines, offline user interface, and numerous low level routines that can be called from the operating system to return system information and to handle certain error conditions (HPMCs). This firmware can be updated to a new version with an update program and an image of the new code, all supplied on tape or CD-ROM media if an update is needed. The Stable Storage area is provided on a EEPROM and also on the CPU card. Stable Storage contains certain system configuration parameters, such at the primary and alternate boot paths, and other information such as a log of any previous HPMC. Both parts are addressed and controlled through the I/O Interface chip on the System card.

## NIO Bus Converter

The NIO Bus Converter provides bus translation from the high speed GSC bus to the HP-PB I/O bus. Bus transactions are converted from the GSC protocol to the HP-PB protocol and vice versa. In addition, the Bus Converter provides the interface to the Access Port, Front Panel Status Display, and Chassis Status Display.

## Hewlett-Packard Precision Bus (HP-PB)

The Hewlett-Packard Precision Bus (HP-PB) provides the interconnection and communication mechanism for I/O modules. Note that no memory modules are supported on the HP-PB in these systems. The HP-PB is a 32-bit address/data bus with synchronous operation at 8 MHz. In these systems, slots 9 and 10 (2-slot systems), and 11 and 12 (4-slot systems) are available for added I/O interface cards. The Multifunction I/O interface card resides in slots 13 and 14 and the HP-PB Bus Converter, for control purposes, occupies logical slot 15. Refer to the block diagram for appropriate path addressing.

## Multifunction I/O

The Multifunction Input/Output (MFIO) card provides most of the core I/O functionality. Different MFIO cards are used in the HP 3000 and HP 9000 system configurations. With the HP 3000, the SCSI, LAN (ThinLan and AUI ports), Local Console, Remote Console, and UPS connection (through the CPU card) functions are provided. With the HP 9000, the SCSI, Centronics, Local Console, Remote Console, UPS connection, and up to 13 other MUX port functions are provided. Refer to the block diagram for appropriate path addressing.

## Embedded Peripherals

Several devices are supported in the SPU enclosure. There is room for two half-height removable-media devices and two 3.5 inch fixed disk drives. Refer to the appropriate HP 3000 or HP 9000 system configuration guide for a list of currently supported devices. The internal devices are interconnected via an internal SCSI I/O bus that is driven by the MFIO card. The last device on the internal bus (usually the primary disk if present, at address six) must terminate that end of the bus. This is usually provided by the installation of termination resistor packs or the setting of a jumper to enable termination. The SCSI bus also extends outside the SPU via a connector on the MFIO card. This connector should also have a terminator installed unless external devices are connected providing termination at the LAST device in the chain.

## Power Subsystem

The power supply internal to the SPU provides DC power to all circuit boards and peripherals installed in the SPU. It accepts AC input (autoranging to 110 or 230 V.A.C. levels) and provides the +5, +12, and -12 DC voltages needed within the system. There are no test points or adjustments on the power supply. A System Power Control Module (SPCM) board located within the supply provides control and monitoring of the supply. The SPCM informs the CPU that power is in or out of spec and signals temperature or impending power-loss problems.

## Uninterruptible Power System

These computers can use an optional Uninterruptible Power System (UPS) to supply power in the event of a power outage. The UPS is a standalone product that is connected to the AC input line source. The SPU is then connected to the UPS with an AC convenience cord and a serial data cable. If an AC power loss occurs, the UPS will continue to supply AC to the SPU for a minimum of 15 minutes. In addition, an audible alarm tone sounds, a LED lights on the UPS front panel, and notification of the power loss will be sent to the SPU. The SPU can then continue to run and monitor the UPS for the return of main AC input power. The SPU Operating System software can be configured to gracefully shutdown the system within a predetermined time if the UPS has not signaled the return of power. Refer to the appropriate Operating System administration manuals for details on how to control this feature.

# Access Port

## General Description

The Access Port is located on the Multifunction I/O card. The Integrated Access Port is designed for use with PA-RISC HP-PB I/O base systems to provide a minimal level of remote supportability for the systems. The Access Port gives the console operator the ability to read system status and to generate system resets through the console terminal instead of through the system's front panel display and switches. It also provides the ability to connect a second console in parallel with the local console terminal. This "mirrored" console port is connected to a modem through which the second or remote console is attached. This provides the same system support functionality to a remote terminal as is available to a console operator sitting next to the system.

## Access Port Operation

### Local/Remote Console

The I/O card provides an interface for the host based PDC and card based IODC or the operating system's I/O driver to communicate with the console terminal and the support modem. When the support modem is not being used for remote console operation, it is available for use by the host system. When it is being used for remote console operation, the modem port is connected in parallel with the system's console port, making it unavailable for use as an independent terminal connection.

### Access Port Functions

The Access Port may be considered as a type of support server. It acts as an agent to pass characters between the frontplane (terminal input and output) and the backplane (the host system interface). At certain times, the Access Port may be given commands to suspend character transfer between host and terminals to allow the console operator to interact directly with the Access Port. This gives the operator the ability to check the operating status of the host, enable or disable remote operator accesses, lock the remote support modem for increased system security, force a system reset, or to initiate a Transfer of Control (TOC). After the operator completes Access Port related tasks, communication with the host may be resumed without loss of data.

### Access Port Modes

Terminal ports connected to the Access Port may be in one of three modes:

**Session Mode.** Session mode is defined as a direct connection from the terminal to the host system with the Access Port monitoring but not acting on any characters transmitted between the terminal and the host.

**Console Mode.** Console mode is defined as a connection in which the Access Port monitors the data being transferred and will take special action on some characters.

**Control Mode.** Control mode is defined as a mode in which the terminal is in communication with the Access Port only.

## Integrated Access Port Commands

When the Integrated Access Port is in control mode, there are several commands that are available to the local and remote console operators. These commands allow the operator to configure the Access Port functions of the I/O interface card, enable or disable remote console access as well as modify remote access security features, view the system's status display, and initiate a system reset or transfer of control.

Unless otherwise specified, all commands may be performed by both the local and remote consoles. Also, all commands may be entered in upper or lower case characters.

### Access Port Commands Overview

**Table 9-1. Access Port Command Summary**

| CONTROL MODE COMMANDS | | Valid At | |
|---|---|---|---|
| Command | Description | LC | RC |
| CA | Configure Remote Support Modem Port | Y | Y |
| CO | Return to Console Mode | Y | Y |
| CS* | Copy Screen | Y | Y |
| DI | Disconnect Remote Console | N | Y |
| DR | Disable Remote Operator Access | Y | Y |
| DS | Disable SPU Status Display | Y | Y |
| ER | Enable Remote Operator Access | Y | N |
| ES* | Enable SPU Status Display | Y | Y |
| HE | Print Help Menu | Y | Y |
| LR | Lock Remote Support Modem Access | Y | Y |
| RS | Reset SPU | Y | Y |
| SE | Enter Session Mode on Remote Port | N | Y |
| SO | Security Options | Y | Y |
| TC | Initiate SPU Transfer of Control | Y | Y |
| TA | Initiate Self Test | Y | Y |
| TE | Tell | Y | Y |
| UR | Unlock Remote Support Modem Access | Y | N |

* Not available if non-HP consoles are used

LC = Local Console
RC = Remote Console

## Access Port Command Description

### CA: Configure Remote Support Modem Port

**Definition:**

This command allows the local console operator to set the modem protocol, bit rate, CCITT Rate Select, and the optional system identification.

- Modem Protocol: Bell or CCITT
- Bit Rate: 300, 1200, 2400, 4800, 9600 bits/sec
- CCITT Rate Select (Circuit 111): HIGH (ON) or LOW (OFF)
- System Identification: 0 to 23 ROMAN-8 characters (non control)

**Valid From:** Local Console Port, Remote Modem Port

This new configuration is written to Nonvolatile memory at the end of command processing. The new configuration will not be used by the IAP for configuring the remote support modem port until the next incoming call is answered after the current operator session has been disconnected. If an incorrect entry was made resulting in an incorrect configuration, the CA command should be re-executed.

### CO: Return to Console Mode

**Definition:**

Switches the console terminal from control mode to console mode. If the Close Console Path was last active, characters that are inbound from the master port will be placed in the CCP transmit buffer and characters received from the CCP will be transmitted to the console terminal (or terminals). If the Close Console Path was not active, characters that are inbound from the master port will be placed in the inbound console backplane buffer, and characters that are in the outbound console backplane buffer will be transmitted to the connected console terminals.

If background command processing for busy ports is not supported on the I/O card, returning to console mode also requires that the any buffered commands be completed and the Estat field of the IO_STATUS register be cleared if no errors need to be reported.

**Valid From:** Local Console Port, Remote Modem Port

### CS: Copy Local Console Screen

**Definition:**

The local console operator can copy the contents of the local console screen memory to the remote console by entering the Copy Screen (CS) command. If the local operator enabled remote copy screen when remote operator access was enabled (ER command), the remote operator can copy the contents of the local console screen to the remote console.

This feature is quaranteed to work only if the local console is a 700/92 or later terminal.

**Valid From:** Local Console Port, Remote Modem Port

### DI: Disconnect Remote Console

**Definition:**

This command causes the IAP to initiate a modem disconnect sequence on the remote support modem if it is being used as a remote console. After executing this command the IAP de-asserts the modem control lines, thus forcing the modem to "hang up" the telephone line. The remote support modem port is then no longer connected as a mirrored console, and the local console port becomes master.

If the remote access mode (see ER command) was set to be single, remote operator access is disabled and must be re-enabled by using the ER command to once again allow remote operator access. If the remote access mode was set to be multiple, the IAP will connect the next incoming call on the remote support modem port to the IAP as a remote operator connection.

**Valid From:** Remote Modem Port

### DR: Disable Remote Operator Access

**Definition:**

This command disables remote operator access on the support modem port. If an operator is connected as a parallel console at the time this command is executed, the remote console is disconnected. Any future incoming calls to the remote support modem will be handled by the system as a user session. If remote operator access was already disabled when this command is executed, this command has no effect.

If background command processing for busy ports is not supported on the I/O card, the following applies: When switching from Remote Operator Enabled to Remote Operator Disabled, any buffered commands posted to the host's remote modem port should be completed and the Estat field of that port's IO_STATUS register set appropriately. This indicates to the driver that the port is no longer busy. A "ready to connect" connection status will be sent to the driver.

**Valid From:** Local Console Port, Remote Modem Port

### DS: Disable SPU Status Display

**Definition:**

Disable display of the system's OSTAT and hex display to the console terminals when in console mode. See ES: Enable SPU Status Display command.

**Valid From:** Local Console Port, Remote Modem Port

### ER: Enable Remote Operator Access

**Definition:**

This command, available only on the local console, enables remote console access to a user on the modem port and configures the connection security parameters. The mode parameter establishes how many times the remote user may connect, disconnect, and reconnect the remote console before remote console access is automatically disabled. The password parameter is set by the local console operator and stored in nonvolatile memory. The password fault parameter sets the number of password faults allowable (3 password attempts per fault) before remote console access is automatically disabled.

If background processing of I/O commands received in the remote port's IO_COMMAND register is not supported, the port must be placed in a busy state. This means that any commands received at that time must not be executed. Instead, the driver that issued the command should be notified that the command was not executed because the port was busy, but that it will be executed as soon as the port is available to the driver again. Only one command will be buffered in this manner. If a second command is written over a command that was not completed due to the port being busy, undefined things may occur.

On initial power up the remote configuration defaults to:

- Remote Operator Access Disabled (see DR command)
- Mode = Multiple
- Password = None
- Password Faults = 3
- Remote Copy Screen = Disabled

The following two paragraphs describe how the mode and password fault parameters are used to enhance console security.

**Access Mode: Single—**

The remote user only has three attempts to enter the correct password. If the user succeeds, the remote console session is begun and remains until the user disconnects or until the user is disconnected by the local console operator. If the user fails, the line is disconnected. In either case, after the disconnection, the line is dropped, the remote console is disabled, and the port becomes a normal session port. To use the remote port as a remote console once again, the remote console capability must be re-enabled by the local console.

**Access Mode: Multiple—**

The remote user has three attempts to enter the correct password. If the user succeeds, the remote console session is begun and remains until the user disconnects or until the user is disconnected by the local console operator. If the user fails, the line is disconnected. After disconnection, the line is dropped and becomes available for future calls through the modem. If the user does not succeed in providing the correct password, a password fault count is increased, the caller is disconnected, and the line is dropped. When the password fault count exceeds an operator set limit, the remote operator access capability is disabled. The modem port may only be used as a normal session port until the local console operator re-enables the remote capability by using the ER command.

**Valid From:** Local Console Port

### ES: Enable SPU Status Display

**Definition:**

This command enables display of the system's status line (system OSTAT and hex code) on the console terminals in place of the softkey labels when the console has returned to console mode. (The console status line is always enabled when in control mode.)

**Valid From:** Local Console Port, Remote Modem Port

### HE: Print Help Menu

**Definition:**

Execution of this command (either HE or HELP are acceptable) displays the following information to the console terminal:

```
nnnnnn Access Port Revision xxxx - dddd

 CA:    Configure remote support modem
 CO:    Return to console mode
 CS:    Copy local console screen
 DI:    Disconnect remote console
 DR:    Disable remote operator access
 DS:    Disable SPU hex status display
 ER:    Enable remote operator access
 ES:    Enable SPU hex status display
 HE:    Help
 LR:    Lock Remote Support Modem Access
 RS:    Reset SPU
 SE:    Enter session mode on remote port
 SP:    Enter support processor mode
 TA:    Initiate self-test
 TC:    Initiate transfer of control
 TE:    Tell
 UR:    Unlock Remote Support Modem Access
```

nnnnnn is the product number of the I/O card the Integrated Access Port is implemented on.

xxxx is the Integrated Access Port firmware revision number. dddd is a date code indicating the year and week that the code revision was last updated.

**Valid From:** Local Console Port, Remote Modem Port

#### LR: Lock Remote Support Modem Access

**Definition:**

This command allows the local console operator to prohibit usage of the remote support modem by the system or by a remote operator. Once this command is issued from the console terminal, the remote support modem is disabled. Active sessions will be disconnected (either a user session or a remote operator). Incoming calls will be ignored. Requests by the system for establishing a modem connection will also be ignored. This command may be issued by the local or remote console operators, although a remote operator issuing this command will cause a loss of connection to the system. If the modem was already in the locked state, this command will have no additional effect.

This command does not affect the state of remote operator access (either enabled or disabled), although after executing this command, no remote operator connection can be established. After unlocking the remote support modem access, if remote operator access was enabled before locking, it will continue to be enabled. If it was disabled, it will continue to be disabled.

The local console operator must use the UR (Unlock Remote support modem access) command to re-enable usage of the remote support modem.

The state of the lock (either locked or unlocked) is saved in nonvolatile memory so that if power fails, the same state as existed before the power failure will exist after power is restored. Initially, the lock is set to the unlocked state.

**Valid From:** Local Console Port, Remote Modem Port

### RS: Reset SPU

**Definition:**

This command resets the system, IAP I/O card excluded, by deasserting the backplane POW_ON and SEC_ON signals. For multiple bus systems, a reset signal is provided on the support cable. The IAP firmware controls the length of time that POW_ON and SEC_ON are forced to the off state and the support cable RSTSYS_L signal is asserted. The reset condition should be held for a minimum of 5 milliseconds.

In order to ensure proper functioning of this command, the processor must mask off the reset from the backplane.

The proper SPU reset sequence is as follows:

- Determine that the Operator really wants to reset the system by requiring that the operator confirm that a system reset is desired.
- Firmware notifies the operator that the system reset has been successful.
- Reset the I/O functions on the IAP I/O card.
- The AP is placed in Console Mode to prepare for rebooting the system.

**Valid From:** Local Console Port, Remote Modem Port

### SE: Enter Session Mode On Remote Port

**Definition:**

This command may only be entered from the remote port and allows the user to leave control mode and enter session mode. To re-enter control mode, the user need only exit the user session. The IAP will reconnect the operator as a parallel console after the driver releases the connection.

After entering the SE command, the Access Port should send a "ready to connect" connection status to the driver through the IO_DATA_IN_IOE7 FIFO. Assuming that no other error precludes clearing error information in the IO_STATUS register, the Se bit should be cleared and 0 placed in the Estat field of the IO_STATUS register for port 7.

**Valid From:** Remote Modem Port

### SO: Security Options

**Definition:**

This command enables three features that can be independently enabled. The features are:

- Non-Activity Timer
- CMD_RESET Monitor
- Restricted Command Set

You must enter a configuration password to enable any of these features.

**Non-Activity Timer.** When the Access Port firmware is in the CONTROL mode and the Non-Activity Timer is enabled (ON), the Access Port firmware monitors the console terminal for input. If no input is received in three minutes, the Access Port firmware exits the CONTROL mode and returns to the CONSOLE mode.

If the Non-Activity Timer is disabled (OFF), the Access Port firmware does not monitor the console input for non-activity.

The default setting for this feature is disabled (OFF).

**CMD_RESET Monitor.** When the CMD_RESET Monitor is enabled (ON) and the Access Port firmware is in the CONTROL mode, the Access Port monitors the bus for RESET. If it is detected, the Access Port firmware exits the CONTROL mode and goes into the MONITOR mode.

If the CMD_RESET Monitor is disabled (OFF), the Access Port firmware ignores RESETs on the bus.

The default setting for this feature is disabled (OFF).

**Restricted Command Set.** When the Restricted Command Set is enabled (ON), only the **HE, CO,** and **SO** commands can be executed. Use of any other command results in the error message **Unknown Command.**

All commands are available when the Restricted Command Set is disabled (OFF).

The default setting for this feature is disabled (OFF).

#### TC: Initiate Transfer Of Control

**Definition:**

This command initiates a system Transfer Of Control by asserting the TOC line connected to the host's SPU through the support cable. After completion of this command, the AP is placed in console mode in preparation for rebooting the system.

**Valid From:** Local Console Port, Remote Modem Port

#### TA: Initiate IAP Self-Test

**Definition:**

This command causes the IAP card to execute its self-test. Execution of the self-test does not alter the configuration or disconnect the modem port if on line. However, any data sent to the I/O card during self-test will be lost.

**Valid From:** Local Console Port, Remote Modem Port

#### TE: Tell

**Definition:**

This command treats all displayable characters following the TE command as a comment. Since characters are echoed to the local console terminal and to the remote console terminal if it is connected, this has the effect of sending a message to the other terminal. The comment string, including the command mnemonic, is limited to a maximum of 80 characters.

**Valid From:** Local Console Port, Remote Modem Port

#### UR: Unlock Remote Support Modem Access

**Definition:**

This command allows the local console operator to allow usage of the remote support modem by the system or by a remote operator. Once this command is issued from the console terminal, the remote support modem is enabled.

If remote operator access had been enabled previously, the card will return to the remote operator enabled state, allowing incoming calls to be connected as a mirrored console.

If remote operator access had been disabled previously, the card will return to the remote operator disabled state, allowing system usage of this port for user sessions.

If the modem was already in the unlocked state, this command will have no additional effect.

This command does not affect the state of remote operator access (either enabled or disabled). After unlocking the remote support modem access, if remote operator access was enabled before locking, it will continue to be enabled. If it was disabled, it will continue to be disabled.

The state of the lock (either locked or unlocked) is saved in nonvolatile memory so that if power fails, the same state as existed before the power failure will exist after power is restored. Initially, the lock is set to the unlocked state.

A remote operator may only enter this command when the remote support modem port is in the unlocked state. In this situation, the UR command does nothing, so the remote operator effectively cannot issue this command, but the IAP will not complain if it is typed.

**Valid From:** Local Console Port, Remote Modem Port

## Access Port Special Characters

**Table 9-2. Access Port Special Character Summary**

| Character | Description |
|---|---|
| BREAK | Change Console Master |
| ^B | Switch From Console to Control Mode |
| ^V | Special Character Escape |
| ^S | XOFF |
| ^Q | XON |

## Special Characters Description

### ^B: Enter Control Mode

**Definition:**

Entering this character when in console mode causes a change to control mode. Some special consideration needs to be added for flow control lock ups. Upon entering control mode, the Se bit should be set and SERR_PORTBUSY should be placed in the IO_STATUS register of port 0.

### ^Q: XON Pacing Character

**Definition:**

This character causes the IAP to resume passing characters to the console terminal (or terminals) if all connected console terminals are not in the XOFF state. This character is flagged as a special character and passed on to the host system. See the section on Console Flow Control for more details.

### ^S: XOFF Pacing Character

**Definition:**

This character causes the IAP to stop passing characters to the console terminals. This flow control character may be sent by either the master or the slave console terminal, and the IAP must respond to either terminal sending the XOFF by stopping the flow of characters to the terminal. The IAP will not send characters to either console terminal if one of them has sent an XOFF. To prevent both terminals from being locked up, each time an XOFF is received, a two second timer is initiated for the port at which the XOFF was received. After two seconds elapse with no XON character from that port, the transmitter will be re-enabled and character transmission will resume. See the section on Console Flow Control for more details.

### ^V: Escape Character

**Definition:**

Entering this character on the active console terminal nullifies any special character processing of the following character (with the exception of the XON and XOFF character) and the ^V character is ignored. Thus, for example: vi users will need to enter ^B preceded by a ^V to page backwards while in console mode.

### BREAK: Change Console Keyboard Master

**Definition:**

Entering this character from the slave console immediately switches the slave console to console master and the break character is put in the bit bucket. When this character is entered from the console master however, it is sent on to the host system.

## IAP Initiated Self Tests

The Integrated Access Port also has the ability to initiate a card self test (using the TA command). While parts of the I/O card with the Integrated Access Port must be completely functional in order to have the IAP start the self test, there may be some critical function that is required to boot the system that is not used by the IAP to communicate with the console terminal. The self test that the IAP initiates should provide a sufficient test to verify the card is functional, as far as it is capable of testing itself. Since this card is the first line of defense for supporting the SPU hardware, this test must be complete.

# 10

# Reference

This section contains a list of HP system acronyms to aid the Customer Engineer (CE) in recognizing the terminology used when correcting or solving an SPU problem in HP 3000 Series 9x7 Family and HP 9000 Model 8x7S Family Computer Systems.

## HP System Acronyms

**Table 10-1. HP System Acronyms**

| Acronym | Description |
|---|---|
| AP | Access Port |
| ACD | Architecture Control Document |
| CA | Channel Adapter |
| CCU | Cache Control Unit |
| CIO | Channel I/O |
| CPU | Central Processor Unit |
| DA | Device Adapter |
| DIO | Direct I/O |
| DMA | Direct Memory Access |
| DUI | Diagnostic User Interface |
| ECC | Error Correction Circuitry |
| FRU | Field Replaceable Unit |
| HP-IB | Hewlett-Packard Interface Bus |
| HPMC | High Priority Machine Check |

| Acronym | Description |
|---|---|
| HP-PA | Hewlett-Packard Precision Architecture |
| HP-PB | Hewlett-Packard Precision Bus |
| HP-UX | Hewlett-Packard UNIX |
| I/O | Input/Output |
| IODC | I/O Dependent Code |
| IPL | Initial Program Loader |
| ISL | Initial System Loader |
| LANIC | Local Area Network Interface Controller |
| LED | Light Emitting Diode |
| LPMC | Low Priority Machine Check |
| MAU | Media Attachment Unit |
| MUX | Multiplexer |

**Table 10-1. HP System Acronyms (continued)**

| Acronym | Description |
|---|---|
| OS | Operating System |
| PDC | Processor Dependent Code |
| PDH | Processor Dependent Hardware |
| PFR | Powerfail Recovery |
| PON | Power On |
| RAM | Random Access Memory |
| RISC | Reduced Instruction Set Computer |
| ROM | Read Only Memory |
| RS-232C | Standard for Serial Communication Interface |

| Acronym | Description |
|---|---|
| RTC | Real Time Clock |
| SPU | System Processor Unit |
| TC | Transfer of Control |
| TCU | Translation lookaside Control Unit |
| TLB | Translation Lookaside Buffer |
| TOC | Transfer of Control |
| VLSI | Very Large Scale Integration |

# 11

# Service Notes