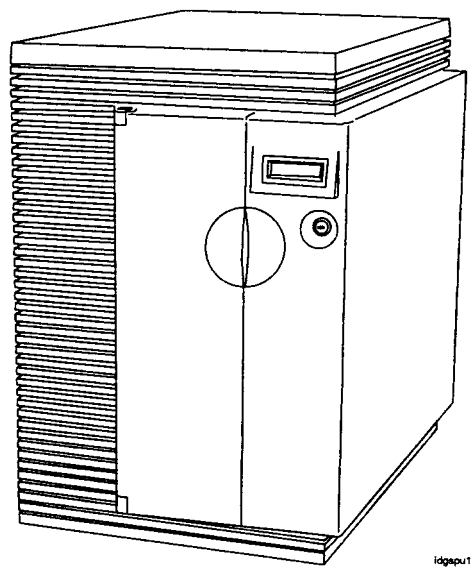
HP PA-RISC Computer Systems
Service Manual

HP 3000 Model 9x9KS
and HP 9000 K-Class Enterprise Servers



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Notice

Hewlett-Packard Company
Systems Technology Division
System Supportability Lab Documentation
19483 Pruneridge Ave.
Cupertino, CA 95014

Important — New In This Edition

Edition 5 provides the following new information:

- Product and service information pertaining to the newly-released HP9000/Kx80 Enterprise Servers is added throughout the service manual.
- Chapter 6, *Replaceable Parts*, has been restructured and expanded to included parts for the External HP-PB I/O Card Cage. **The power cord information tables have been enhanced to provide illustrations of typical plug and connector types.**
- Chapter 7, Removal and Replacement, now includes instructions for the removal and replacement of the External HP-PB I/O Card Cage and its assemblies.
- Appendix D, New Features, has been expanded to incorporate system configuration issues
- Appendix E has been added, listing information resources on the Internet
- Errors and omissions from previous editions have been corrected.

Printing History

New editions of this manual incorporate all material updated since the previous edition. The manual printing date and part number indicate its current edition. The printing date changes when a new edition is printed. (Minor corrections and updates which are incorporated at reprint do not cause the date to change.) The manual part number changes when extensive technical changes are incorporated.

This edition incorporates change bars to indicate changes from the preceding edition.

February 1995 .... Edition 1
January 1996 .... Edition 2
September 1996 .... Edition 3
December 1997 .... Edition 4
June 1998 .... Edition 5

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- Your company's name.

SERIOUS ERRORS, such as technical inaccuracies that may render a program or a hardware device inoperative, should be reported to your HP Response Center or directly to a Support Engineer.

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7 — Removal and Replacement Procedures

E — Sources of Information on the Web

1

Introduction

Introduction

This chapter provides information about the System Processor Unit (SPU) for the HP 3000/9x9KS and HP9000 K-Class servers, and the HP VISUALIZE K260/K450/K460 EG and XP Workstations. It shows and identifies the switches, displays, bulkhead connectors, and major SPU functional areas.

Figure 1-1 shows the front view of an SPU. The same physical cabinet is used for both the HP 3000 and HP 9000 SPU.

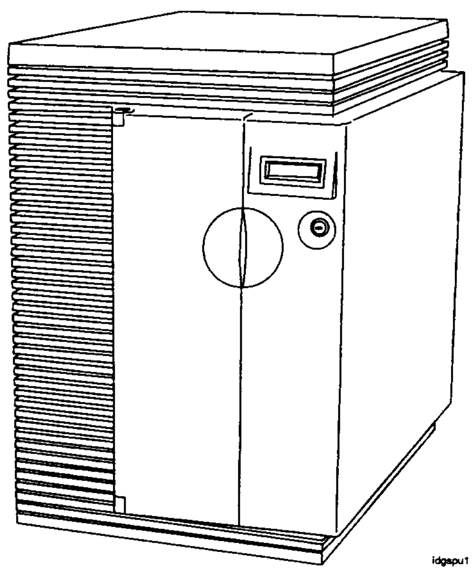


Figure 1-1. System Processor Unit, Front view

HP 3000 Systems

Table 1-1 lists the major components for the HP 3000 Systems.

Table 1-1. HP 3000 System Description

Models	**939KS**	**959KS**	**969KS/x00**	**969KS/x20**	**979KS**
CPU	PA7200				PA8000
Clock speed	80MHz[1]	100MHz	120MHz	120MHz	180MHz
Number of Processors Supported	1	1 to 4			
Floating Point Coprocessor	Integrated				
I-Cache	256K			1 MB	
D-Cache	256K			1 MB	
HP-PB I/O slots	4[2] to 8[3]				
Main Memory (minimum)	64MB	128MB			
Main Memory (Maximum)	3.75GB[4]				
O.S. Release	5.0[5]				5.5
Internal SCSI devices (Single-ended)	2				
Internal SCSI devices (Fast-wide)	4				
Internal Modem	1				
Internal Audio Card	0				

1. Clock speed reduced with software.
2. 2 single high slots and 2 double high slots, or 4 single high slots.
3. Upgradeable to 4 single high slots and 4 double high slots, or 8 single high slots.
4. 3.75GB maximum memory beginning with MPI/iX Release C.55.01.
5. With patches.

HP 9000 Systems

Table 1-2 lists the major components for the HP 9000 Systems.

Table 1-2. HP 9000 System Description

Models	**K100**	**K200**	**K400**	**K210**	**K410**	**K220**	**K420**
CPU	PA7200						
Clock Speed	100MHz			120MHz		120MHz	
Number of Processors Supported	1	1 to 4					
Floating Point Coprocessor	Integrated						
I-Cache	256K					1MB	
D-Cache	256K					1MB	
HP-PB I/O slots	4[1]	4[1]	8[2]	4[1]	8[2]	4[1]	8[2]
HP-HSC I/O slots	1		1[3]	1	1[3]	1	1[3]
HP-HSC Bus 1 clock speed	N/A	N/A	32MHz	N/A	40MHz	N/A	40MHz
HP-HSC Bus 2 clock speed (on Core I/O Card)	32MHz						
Main Memory (Minimum)	32 MB	64 MB	128MB	64 MB	128MB	64 MB	128MB
Main memory (Maximum)	512MB	2GB	3.75GB[4]	2GB	3.75GB[4]	2GB	3.75GB[4]
Internal SCSI devices (single-ended)	2						
Internal SCSI devices (fast-wide)	4						
Internal Modem	1						
O.S. Release	10.0						

1. 2 single high slots and 2 double high slots, or 4 single high slots.
2. 4 single high and 4 double high, or 8 single high.
3. Add 2 HP-HSC slots or add 4 HP-HSC slots (the Add 2 and Add 4 cannot be combined).
4. 3.75GB maximum memory for 32-bit OS, 4GB maximum memory with 64-bit OS.

Table 1-2. HP 9000 System Description (continued)

Models	K250	K260	K450	K460
CPU	PA8000			
Clock Speed	160MHz	180MHz	160MHz	180 MHz
Number of Processors Supported	1 to 4			
Floating Point Coprocessor	Integrated			
I-Cache	1MB			
D-Cache	1MB			
HP-PB I/O slots	4[1]		8[2]	
HP-HSC I/O slots	1		1[3]	
HP-HSC Bus 1 clock speed	40 MHz			
HP-HSC Bus 2 clock speed (on Core I/O Card)	32 MHz			
Main Memory (Minimum)	128 MB			
Main memory (Maximum)	4 GB		8.0 GB	
Internal SCSI devices (single-ended)	2			
Internal SCSI devices (fast-wide)	4			
Internal Modem	1			
Internal Audio Card	0			
O.S. Release	10.2			

1. 2 single high slots and 2 double high slots, or 4 single high slots.
2. 4 single high and 4 double high, or 8 single high.
3. Add 2 HP-HSC slots or add 4 HP-HSC slots (the Add 2 and Add 4 cannot be combined).

Table 1-2. HP 9000 System Description (continued)

Models	K260-EG	K460-EG	K460-XP
CPU	PA8000		
Clock Speed	180MHz		
Number of Processors Supported	1 to 4		
Floating Point Coprocessor	Integrated		
I-Cache	1MB		
D-Cache	1MB		
HP-PB I/O slots	4[1]	8[2]	
HP-HSC I/O slots	1	1[3]	2[4]
HP-HSC Bus 1 clock speed	40 MHz		
HP-HSC Bus 2 clock speed (on Core I/O Card)	32 MHz		
Main Memory (Minimum)	128 MB		
Main memory (Maximum)	4 GB	8.0 GB[5]	
Internal SCSI devices (single-ended)	2		
Internal SCSI devices (fast-wide)	4		
Internal Modem	0[6]		
Internal Audio Card	1[6]		
O.S. Release	10.2		

1. 2 single high slots and 2 double high slots, or 4 single high slots.
2. 4 single high and 4 double high, or 8 single high.
3. Add 2 HP-HSC slots or add 4 HP-HSC slots (the Add 2 and Add 4 cannot be combined).
4. One additional HSC I/O slot is available on the HP Visualize 48XP graphics accelerator card bulkhead.
5. 3.75GB maximum memory for a 32-bit OS.
6. Audio Card on Core I/O replaces the Internal Modem. If Remote Support is required, use an external modem and connect it to the Core I/O card.

Table 1-2. HP 9000 System Description (continued)

Models	K370	K570	K380	K580
CPU	PA8200			
Clock Speed	200 MHz		240 MHz	
Number of Processors Supported	1 to 6			
Floating Point Coprocessor	Integrated			
I-Cache	2MB			
D-Cache	2MB			
HP-PB I/O slots	4			
HP-HSC I/O slots	1 to 3	1 to 9	1 to 3	1 to 9
HP-HSC Bus 1 clock speed	40 MHz			
HP-HSC Bus 2 clock speed (on Core I/O Card)	32 MHz			
HP-HSC Bus 3/4 clock speed (on Dual Bus 4-Slot HSC Card)[1]	40 MHz			
Main Memory (Minimum)	128 MB	256 MB	128 MB	256 MB
Main memory (Maximum)	4.0 GB	8.0 GB	4.0GB	8.0GB
Internal SCSI devices (single-ended)	2			
Internal SCSI devices (fast-wide)	4			
Internal Modem	1			
Internal Audio Card	0			
O.S. Release	10.20 with HW extensions			

1. HP9000/K5x0 only

2

Hardware Installation and Configuration

This chapter contains information on installing the computer system as well as hardware configuration rules. The first part of this chapter provides installation summaries for both the HP 3000 and HP 9000 computer systems.

The Install summaries are in a pictorial format to provide a brief overview of the installation process. For more detailed information, refer to the Installation Guides that come with the computer itself.

The Configuration portion of this chapter refers to the hardware that comprises the computer system. This includes the configuration rules, a locator diagram, and the hardware address path information necessary to configure the Operating System software.

To obtain specific configuration information for the Operating System, refer to the HP 3000 or HP 9000 Software configuration Guide, or Administrators Guide for instructions.

Installation

HP 3000/9x9KS Install Summary

Figure 2-1 shows the connect location for the various components involved in a system installation. For specific instructions on installation, refer to the Installation Guide (HP part number A2375-90005).

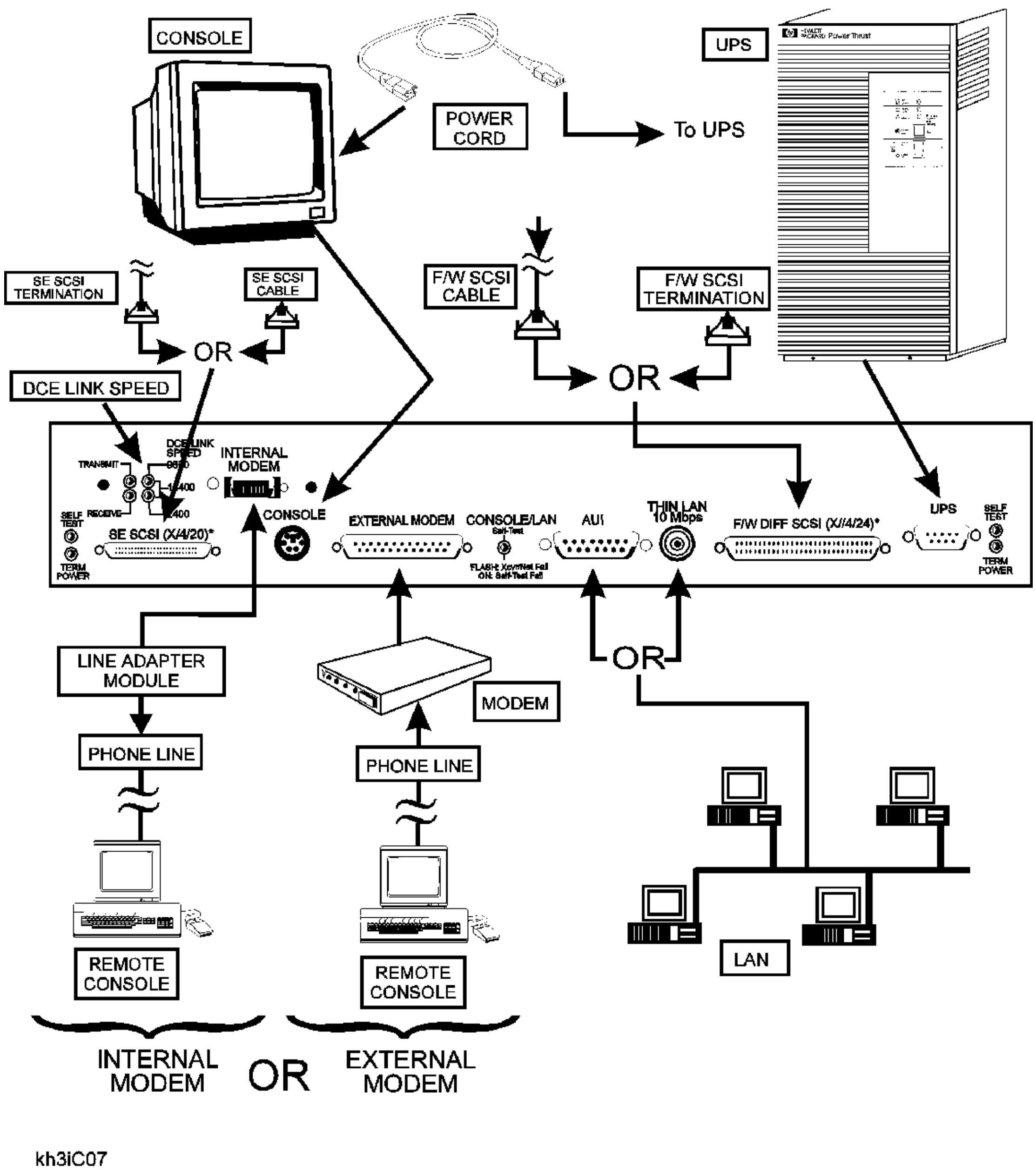


Figure 2-1 HP 3000/9x9KS Installation Diagram

HP 9000/Kxx0 Install Summary

Figure 2-2 shows the connect location for the various components involved in a system installation. For specific instructions on installation, refer to the Installation Guide (HP part number A2375-90006).

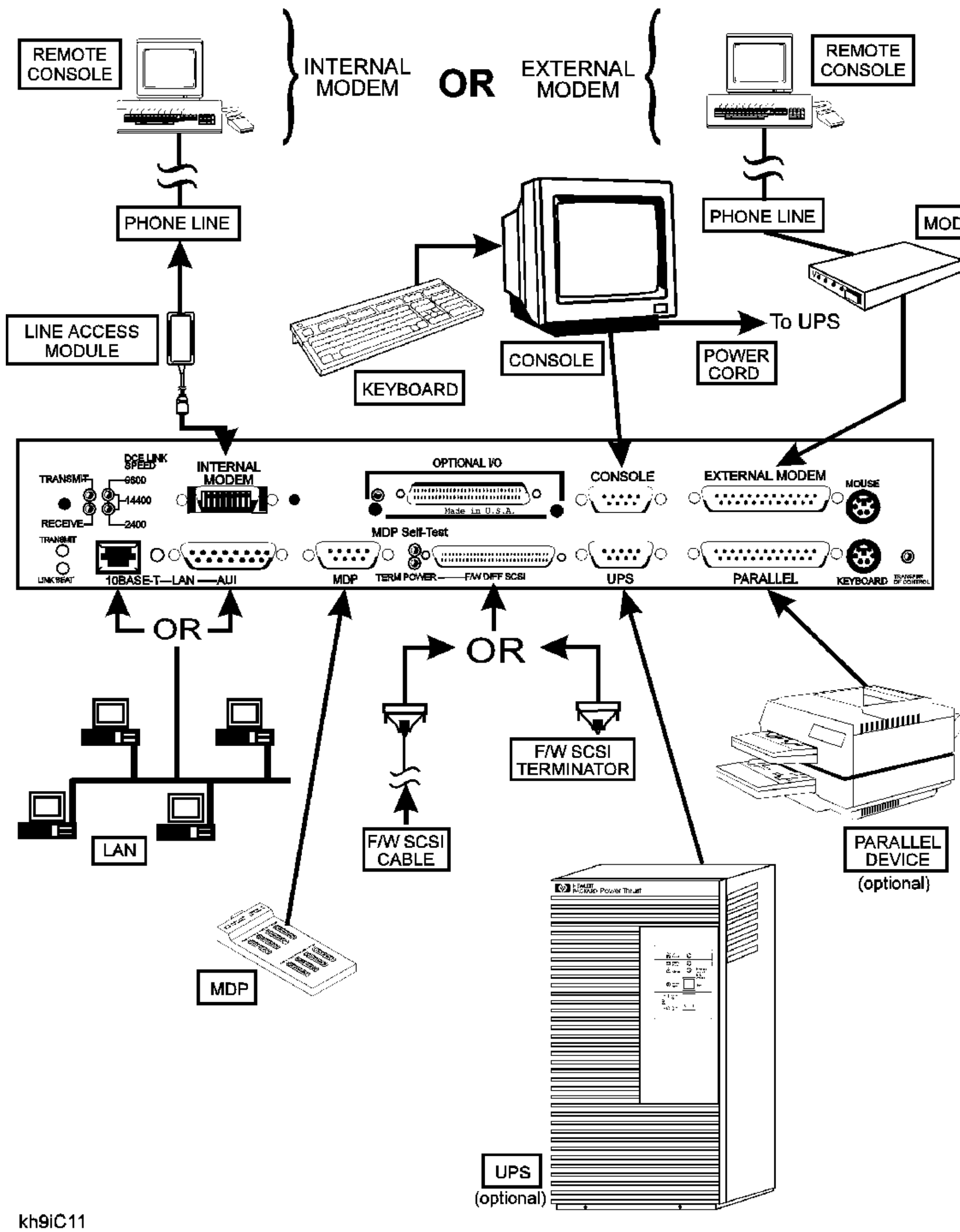
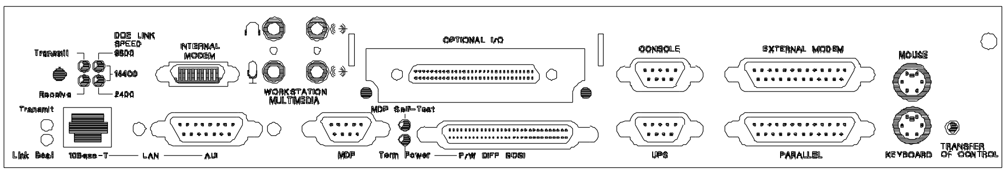


Figure 2-2 HP 9000/Kx00 Installation Diagram

Note
The Core I/O card for the HP9000/K460 workstation features additional jacks for microphone and headset as shown in the figure below.



System Start-up Process

Once the installation is complete (this includes all system peripherals), perform the following steps to turn on the computer system:

NOTE
Before performing the System Start-up Process, be sure all additional I/O cards and system upgrades are installed. Refer to the appropriate configuration rules in this Chapter for the component being added.

1. Turn on all externally connected peripherals. Make sure the peripherals are up with no errors.
2. Turn the computer key switch from STANDBY to ON (or SERVICE if needed).

When the key switch is placed in the ON (or SERVICE) position, the following sequence of displays are present on the front panel display:

Display Panel	Environment	Observations
	Key switch in Standby. No power cord.	Blank Display.
SWITCH OFF	Key switch in Standby. Power cord installed.	AC power installed, back light is off. Front panel displays SWITCH OFF
PROCEEDING TO TURN DC ON	Key switch is On.	Display panel shows message, back light is on 1 to 2 seconds after display starts.
OSTAT XXXX	Key switch is On. PDC is loading.	Ostats and chassis codes are displayed at the panel and console banner. Chassis codes range from 0000 to CDFF. Refer to Chapter 4.
OSTAT XXXX CPU XXXX	Key switch is On. ISL is running.	System initialization codes are being displayed. OS or Diag loading can be started. Codes range from CE00 to CEDF. Refer to Chapter 4.
OSTAT XXXX CPU XXXXX	Key switch is On. OS load in process.	OS is loading from disk or tape. Codes may range from CEE0 to CFFF. Refer to Chapter 4. CPU XXX shows processors installed (0-5).
RUN FXYF CPU XXXXXX	Key switch is On. OS load complete. OS is running.	The OS is finished loading. The X after RUN = CPU utilization, The Y= number of processors. CPU XXX shows processors installed (0-5).

OSTAT in the above sequence can equal one of the following states:

- OFF
- FLT (fault)
- TEST
- INIT (initialize)
- SHUT (shutdown)
- WARN (warning)
- RUN
- ALL

This sequence is followed by the system prompt. Refer to the ***System Administrators Manuals*** for the appropriate operating system instructions to proceed with the system configuration.

Configuration Rules

This section contains the configuration rules for the SPU. It includes CPU, Memory, Graphics, HP-HSC, and HP-PB I/O.

CPU Card Rules

CPU cards must be installed in numerical order, starting with CPU slot 0, then 1, 2, 3, 4, and 5. The HP 9000/K100 does not have CPU slots. The CPU chip is mounted directly on the system board (inside the cabinet).

The result of improper installation configuration of the CPU cards will be:

- Console displays a warning message.
- The boot process stops at the PDC prompt.
- Boot command is disabled.

Memory SIMM Rules

Memory for the HP 3000 and HP 9000 system are offered in five sizes: 16 MB, 32MB, 64MB, 128MB and 256MB SIMM pairs (32MB, 64MB, 128MB, 256MB, and 512MB increments). The memory configuration rules are described in detail in Appendix C of this manual.

Graphics Module Rules

If the HP-HSC Expansion card is installed, then all graphic modules must be installed on the HP-HSC Expansion I/O card.

If the graphics modules are mixed between the core I/O and the expansion I/O, an I/O address overlap will occur and the following violations will be seen:

- Log warning and hex code displays.
- System selftest will halt, stopping the boot process.

If a graphics terminal is used as the system console, refer to the *Graphics Terminal Configuration* section for rules and configuration parameters.

HP-PB Rules

The HP-PB I/O card top row (slots 1 and 3 of HP-PB bus 0 and 1) are setup in two rows of single high card slots. These slots can accommodate one single high or one double high (but no full high) HP-PB I/O cards. The single high cards can be installed in the bottom row (slots 2 and 4 of HP-PB bus 0 or 1) and the middle row (slots 1 and 3 of HP-PB bus 0 or 1). Refer to Figure 2-3 for the K2xx/K4xx I/O slot layout. Refer to Figure 2-4 for the Kx70/Kx80 layout. The HP 3000/939KS/959KS and HP 9000/K100 only have HP-PB bus 0. Double high I/O cards can only be installed in slots 1 and 3 of HP-PB bus 0 or HP-PB bus 1.

Note

HPPB paths 10/4/12, 10/4/16, 10/16/12, and 10/16/16 do not exist on Kx70/Kx80 servers. This information must be considered before upgrading to a Kx70/Kx80 server.

Kx70/Kx80 systems have half the slots of K4xx systems, but follow the same HP-PB rules.

The configuration rules for HP-PB cards are:

- HP-PB cards are installed in alternating busses
- Double high cards first, followed by the single high cards
- If HP-PB bus 0 and HP-PB bus 1 are used, alternate installation between the busses in the order of, Bus 1/slot 1 for the first double high card, then Bus 0/slot 1, continuing until all double high cards are installed. Then Bus 1/slot 2 for the first single high card, then Bus 0/slot 2, until all single high cards are installed.

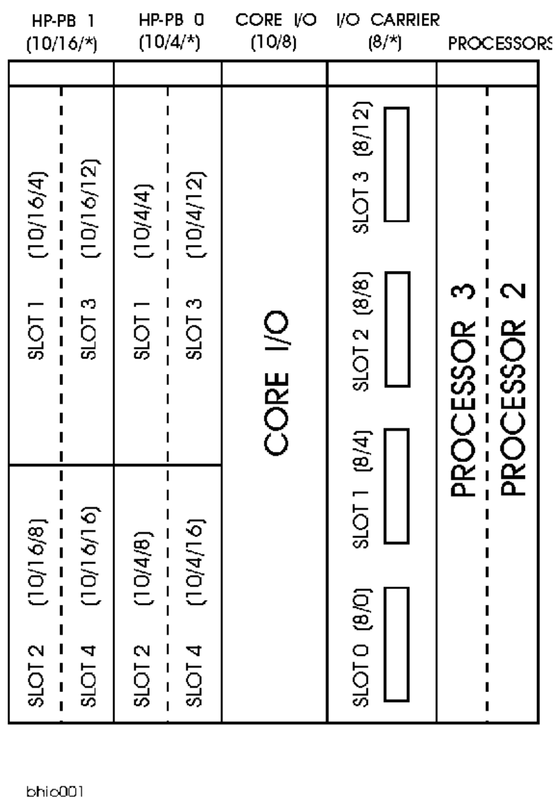


Figure 2-3 HP-PB I/O Slot Location Diagram (K2xx/K4xx)

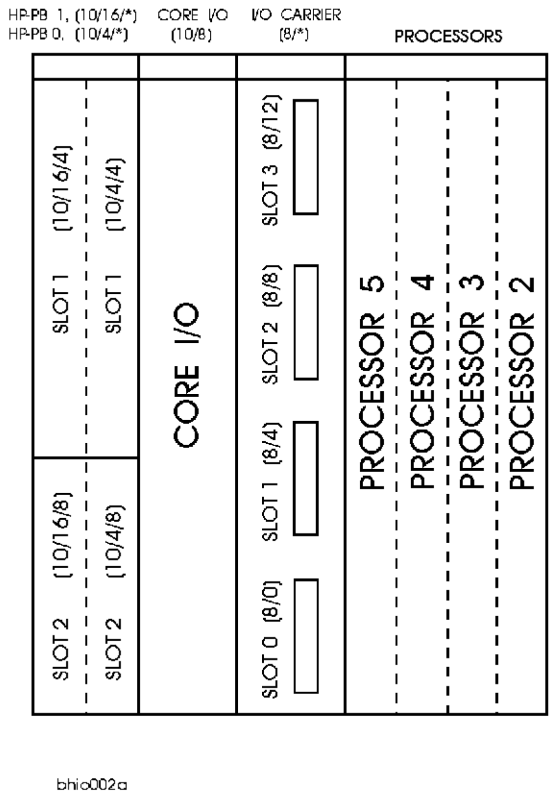


Figure 2-4 HP-PB I/O Slot Location Diagram (Kx70/Kx80)

Hardware Configuration

This section provides the System Processor Unit (SPU) hardware configuration information. This includes the address paths, power loading and configuration limits for both HP 9000 and HP 3000 SPUs. The address path information is needed to perform system configuration within the operating system software.

> **NOTE**
>
> There are no power loading considerations between the two I/O busses. The power supply in the SPU is sufficient to accommodate the distribution across all I/O slot locations. The HP-PB Configuration rules are for performance only.

Address Paths

Tables 2-1, 2-2, and 2-3 list the internal address paths for the HP computers.

Table 2-1. HP 9000/K100 Path Addressing

Location/Description	Device Type	Address Path (Dec)
Core I/O card FW DIFF SCSI connector	FW DIFF SCSI devices	8/0. (device addr)
Internal Peripheral Bay, slot C (boot disk)	FW SCSI disk drive	8/0.6
Internal Peripheral Bay, slot D	FW SCSI disk drive	8/0.5
Internal Peripheral Bay, slot E	FW SCSI disk drive	8/0.4
Internal Peripheral Bay, slot F	FW SCSI disk drive	8/0.3
Core I/O card console connector (MDP port 0)	HP 700/96 system console	8/4/0.0
Core I/O card UPS connector (MDP port 1)	1300VA PowerTrust (UPS)	8/4/0.1
Core I/O card Internal or external modem connector (MDP port 7)	HP LAM for Internal modem or an external modem	8/4/0.7
Core I/O card MDP connector: ports 2 3 4 5 6	A Modem Distribution Panel (MDP) is connected to the Core I/O connector. Supported devices are then connected to the MDP.	8/4/0.2 8/4/0.3 8/4/0.4 8/4/0.5 8/4/0.6
HP-PB 0, slot 1	HP-PB I/O card	8/4/4. (device addr)
HP-PB 0, slot 2	HP-PB I/O card	8/4/8. (device addr)
HP-PB 0, slot 3	HP-PB I/O card	8/4/12. (device addr)
HP-PB 0, slot 4	HP-PB I/O card	8/4/16. (device addr)
Core I/O card, Optional I/O (HSC) connector	Graphics console	8/8.0
Core I/O card, Parallel connector	Supported parallel device	8/12/0
Internal Peripheral Bay, slot A	SE SCSI CD-ROM	8/12/5.2
Internal Peripheral Bay, slot B	SE SCSI DDS Drive	8/12/5.0
Core I/O card, 10 base or AUI connector	Appropriate LAN cable	8/12/6
Core I/O card, Keyboard connector	graphics option keyboard	8/12/7
Core I/O card, Mouse connector	graphics option mouse	8/12/8

Table 2-2. HP 9000/K2x0/K4x0 Path Addressing

Location/Description	Device Type	Address Path
Core I/O card FW DIFF SCSI connector	FW DIFF SCSI devices	10/0. (device addr)
Internal Peripheral Bay, slot C (boot disk)	FW SCSI disk drive	10/0.6
Internal Peripheral Bay, slot D	FW SCSI disk drive	10/0.5
Internal Peripheral Bay, slot E	FW SCSI disk drive	10/0.4
Internal Peripheral Bay, slot F	FW SCSI disk drive	10/0.3
Core I/O card console connector (MDP port 0)	HP 700/96 system console	10/4/0.0
Core I/O card UPS connector (MDP port 1)	1300VA PowerTrust (UPS)	10/4/0.1
Core I/O card MDP connector: ports 2 3 4 5 6	A Modem Distribution Panel (MDP) is connected to the Core I/O connector. Supported devices are then connected to the MDP.	10/4/0.2 10/4/0.3 10/4/0.4 10/4/0.5 10/4/0.6
Core I/O card Internal or external modem connector (MDP port 7)	HP LAM for Internal modem or an external modem	10/4/0.7
HP-PB 0, slot 1	HP-PB I/O card	10/4/4. (device addr)
HP-PB 0, slot 2	HP-PB I/O card	10/4/8. (device addr)
HP-PB 0, slot 3	HP-PB I/O card	10/4/12. (device addr)
HP-PB 0, slot 4	HP-PB I/O card	10/4/16. (device addr)
HP-PB 1, slot 1[1]	HP-PB I/O card	10/16/4. (device addr)
HP-PB 1, slot 2[1]	HP-PB I/O card	10/16/8. (device addr)
HP-PB 1, slot 3[1]	HP-PB I/O card	10/16/12. (device addr)
HP-PB 1, slot 4[1]	HP-PB I/O card	10/16/16. (device addr)
Core I/O card, Optional I/O (HSC) connector	Graphics console	10/8
Core I/O card, Parallel connector	Supported parallel device	10/12/0
Internal Peripheral Bay, slot A	SE SCSI CD-ROM	10/12/5.2
Internal Peripheral Bay, slot B	SE SCSI DDS Drive	10/12/5.0
Core I/O card, 10 base or AUI connector	Appropriate LAN cable	10/12/6
Core I/O card, Keyboard connector	graphics option keyboard	10/12/7.0
Core I/O card, Mouse connector	graphics option mouse	10/12/8.0
HSC I/O Expansion card, slot 0[2]	HSC I/O card	8/0. (device addr)
HSC I/O Expansion card, slot 1[2]	HSC I/O card	8/4. (device addr)
HSC I/O Expansion card, slot 2[2]	HSC I/O card	8/8. (device addr)
HSC I/O Expansion card, slot 3[2]	HSC I/O card	8/12. (device addr)

1. HP-PB1 slots not available on K2x0.
2. HSC I/O Expansion slot not available on K2x0.

Table 2-3. HP9000 Kx70/Kx80 Path Addressing

Location/Description	Device Type	Address Path
Core I/O card FW DIFF SCSI connector	FW DIFF SCSI devices	10/0. (device addr)
Internal Peripheral Bay, slot C (boot disk)	FW SCSI disk drive	10/0.6
Internal Peripheral Bay, slot D	FW SCSI disk drive	10/0.5
Internal Peripheral Bay, slot E	FW SCSI disk drive	10/0.4
Internal Peripheral Bay, slot F	FW SCSI disk drive	10/0.3
Core I/O card console connector (MDP port 0)	HP 700/96 system console	10/4/0.0
Core I/O card UPS connector (MDP port 1)	1300VA PowerTrust (UPS)	10/4/0.1
Core I/O card MDP connector: ports 2 3 4 5 6	A Modem Distribution Panel (MDP) is connected to the Core I/O connector. Supported devices are then connected to the MDP.	10/4/0.2 10/4/0.3 10/4/0.4 10/4/0.5 10/4/0.6
Core I/O card Internal or external modem connector (MDP port 7)	HP LAM for Internal modem or an external modem	10/4/0.7
HP-PB 0, slot 1	HP-PB I/O card	10/4/4. (device addr)
HP-PB 0, slot 2	HP-PB I/O card	10/4/8. (device addr)
HP-PB 1, slot 1	HP-PB I/O card	10/16/4. (device addr)
HP-PB 1, slot 2	HP-PB I/O card	10/16/8. (device addr)
Core I/O card, Optional I/O (HSC) connector	Graphics console	10/8
Core I/O card, Parallel connector	Supported parallel device	10/12/0
Internal Peripheral Bay, slot A	SE SCSI CD-ROM	10/12/5.2
Internal Peripheral Bay, slot B	SE SCSI DDS Drive	10/12/5.0
Core I/O card, 10 base or AUI connector	Appropriate LAN cable	10/12/6
Core I/O card, Keyboard connector	graphics option keyboard	10/12/7.0
Core I/O card, Mouse connector	graphics option mouse	10/12/8.0
HSC I/O Expansion card, slot 0	HSC I/O card	8/0. (device addr)
HSC I/O Expansion card, slot 1	HSC I/O card	8/4. (device addr)
HSC I/O Expansion card, slot 2[1]	HSC I/O card	8/8. (device addr)
HSC I/O Expansion card, slot 3[1.]	HSC I/O card	8/12. (device addr)
HSC Dual Bus 4-slot I/O card, slot 0[1.]	HSC I/O card	12/0. (device addr)
HSC Dual Bus 4-slot I/O card, slot 3[1.]	HSC I/O card	12/12. (device addr)
HSC Dual Bus 4-slot I/O card, slot 2[1.]	HSC I/O card	14/8. (device addr)
HSC Dual Bus 4-slot I/O card, slot 3[1.]	HSC I/O card	14/12. (device addr)

1. HP9000/K5x0 only

Table 2-4. HP 3000/9x9KS Path Addressing

Location/Description	Device Type	Address Path
Core I/O card console connector	HP 700/96 system console	10/4/0.0
Core I/O card UPS connector	1300VA PowerTrust (UPS)	10/4/0.3
Core I/O card Internal or External modem connector	HP LAM for Internal modem or an External modem	10/4/0.1
HP-PB 0, slot 1	HP-PB I/O card	10/4/4. (device addr)
HP-PB 0, slot 2	HP-PB I/O card	10/4/8. (device addr)
HP-PB 0, slot 3	HP-PB I/O card	10/4/12. (device addr)
HP-PB 0, slot 4	HP-PB I/O card	10/4/16. (device addr)
Core I/O SCSI connector	SE SCSI Interface	10/4/20. (device addr)
Internal Peripheral Bay, slot A	SE SCSI CD-ROM	10/4/20.2
Internal Peripheral Bay, slot B	SE SCSI DDS Drive	10/4/20.0
Core I/O card FW DIFF SCSI connector	FW DIFF SCSI Interface	10/4/24
Internal Peripheral Bay, slot C (boot disk)	FW SCSI disk drive	10/4/24.6
Internal Peripheral Bay, slot D	FW SCSI disk drive	10/4/24.5
Internal Peripheral Bay, slot E	FW SCSI disk drive	10/4/25.4
Internal Peripheral Bay, slot F	FW SCSI disk drive	10/4/25.3
Core I/O card, ALS or THINLAN connector	Appropriate LAN cable	10/4/0
HP-PB 1, slot 1	HP-PB I/O card	10/16/4. (device addr)
HP-PB 1, slot 2	HP-PB I/O card	10/16/8. (device addr)
HP-PB 1, slot 3	HP-PB I/O card	10/16/12. (device addr)
HP-PB 1, slot 4	HP-PB I/O card	10/16/16. (device addr)

Graphics Terminal Configuration

If a graphics terminal is to be used as the system console you must be aware of the following rules and path address requirements.

Caution

If you are installing a graphics terminal in a system that currently uses a standard RS-232 terminal for its console, you must reconfigure the PDC path address for the graphics console before removing the standard RS-232 console from the system.

Supported Graphics Device: The HP A4330A 17" Monitor, the A4331A 20" Monitor, and the A4331B 20" Monitor are the only supported graphics devices at this time. The Monitors will automatically set themselves to match the graphics device adaptor (A2999A or A3519A). The graphics device adaptor has the following characteristics:

Resolution = 1280 x 1024
Scan Rate = 75Hz

Installation:

1. The graphics device adaptor (A2999A or A3519A) card should be installed in the Core I/O card, *Optional I/O* slot, when no HP-HSC Expansion I/O card is present. If the 2 or 4-slot HP-HSC Expansion I/O card is present, then the graphics device adaptor must be installed in the Expansion I/O card . This is to avoid address overlap problems when graphics device adaptors are installed in both the Core I/O and Expansion I/O cards.

Note

The Dual Bus 4-Slot HSC Expansion I/O card does not support graphics cards.

The HP VISUALIZE 48 3D Graphics will occupy the slot normally used by the HSC I/O card.

2. Use the graphics monitor cable that comes with the graphics monitor to connect between the graphics card and graphics monitor.

3. Connect the graphics keyboard to the Core I/O card connector marked **KEYBOARD**.

4. Connect the graphics mouse to the Core I/O connector marked **MOUSE**.

The Keyboard path address is *10/12/7.0* and the Mouse path address is *10/12/8.0*. These address paths are set and cannot be changed, they correspond to the connectors on the core I/O card.

Since the graphics monitor connects to a graphics device adaptor card that can be in different slots, its address path must be configured in PDC to reflect its slot location. You must change the *Console Path Address* in PDC to either *10/8.0* (for the core I/O Optional I/O slot), or one of the following path addresses for the HP-HSC Expansion I/O card slots:

Core I/O, Optional I/O slot	10/8.0
HP-HSC I/O Expansion card, slot 0	8/0.0
HP-HSC I/O Expansion card, slot 1	8/4.0
HP-HSC I/O Expansion card, slot 2	8/8.0
HP-HSC I/O Expansion card, slot 3	8/12.0

Internal Modem Configuration

The internal modem is configured with the on-line diagnostic utility *modutil*. Modutil can only be run from the Diagnostic Users Interface (DUI). Modutil provides three functions:

1. Modem Terminal Interface
2. Modem Diagnostics
3. Modem Configuration Information

Note that the internal modem is not present in HP VISUALIZE workstation models.

Modem Terminal Interface provides the terminal interface between the modem and the user. It takes **AT** commands from the keyboard and sends them to the modem. Refer to Table 2-4 for the list and description of the HP AT commands. It also receives data from the modem and displays it on the terminal.

The **Modem Diagnostics** provide the following diagnostics:

- Port Configuration Diags - Communicate with the modem by auto-selected combinations of port configurations (baud rates, character bits, etc.)
- Modem Selftest I - Performs the modem automatic selftest.
- Modem Selftest II - Performs the modem local analog loopback test.
- Modem Selftest III - Performs the modem local digital loopback test.
- Modem Selftest IV - Performs the modem remote digital loopback test.
- Combined Modem Selftest - Performs modem selftests I, II and III.

The **Modem Configuration Information** mode gives displays of the operating parameters, configuration parameters, and S register values.

To configure the internal modem perform the following steps:

> **Note**
>
> ONLINE diagnostics need to be loaded prior to performing the following steps and configuring the internal modem.

1. At the system prompt enter the sysdiag command. The DUI prompt should appear.
2. At the DUI prompt enter modutil command.
3. At the modutil prompt (MU>) enter terminal to go into the terminal command mode. The following terminal start message should be displayed:

```
The modem is on port 7 of the Core I/O board
Baud rate is 19200 bps, character size is 8 bits
Do you want to make any changes? Yes/No __
```

Baud rate (19200 bps) refers to the serial baud rate, not the modem bps on-line rate. If Y (yes) is entered you can change the baud rate and character size. The program then repeats the terminal mode start message with the new setup parameters.

If N (no) is entered, to accept the displayed parameters, the program displays the following message:

```
You can now enter modem commands or use Ctrl+X to return to the MU prompt
```

The AT commands can now be entered to further configure the internal modem.
In the HP AT command set descriptions, *** (three asterisks) indicate *Default Setting*.

Table 2-5. HP AT Command Set

Command	Values	Description
AT		Attention code that precedes most command lines.
RETURN		Pressing Return executes most commands.
A		Answer call, even if no ring present.
A/		Repeat last command. Do not precede this command with AT. Do not press Return to execute.
A:		Continuous redial (10 redials in DOC units) of last number until answered. (Used only in the U.S.A.)
$An	n = 0 or 1	*** $A0 discards data during auto-reliable time period. $A1 buffers data during auto-reliable time period.
#An	n = 0 to 3	*** #A0 means 14,400 to 12,000 to 9600 to 4800 to 2400 to 1200 to 300 bps, on-line. #A1 means 14,400 bps, on-line, only. #A2 means 14,400 to 9600 to 4800 bps, on-line, only. #A3 means 2400 to 1200 to 300 bps, on-line, only.
&Bn	n = 0 or 1	*** &B0 means normal transmit buffer size. &B1 means reduced transmit buffer size.
&BSn	n = 0 or 1	&BS0 means maximum transmit block size of 64 characters. ***&BS1 means maximum transmit block size of 256 characters.
$BAn	n = 0 or 1	***$BA0 means Baud Adjust is off, speed conversion is on. $BA1 means Baud Adjust is on, speed conversion is off.
&Cn	n = 0 to 2	&C0 forces Carrier Detect on. ***&C1 lets Carrier Detect act normally. &C2 lets Carrier Detect drop S24 time on disconnect.
Ds	s = phone#	Dial a telephone number (s), where **s** may include up to 60 digits or T, P, R, comma and; characters.
&Dn	n = 0 to 3	&D0 DTR is ignored. &D1 means modem returns to command state. &D2 lets modem react to DTR normally. ***&D3 causes modem to reset to modem default parameters.
En	n = 0 or 1	E0 means do not echo Command Mode characters. ***E1 means do echo Command Mode characters.

Table 2-5. HP AT Command Set

Command	Values	Description
&En	n = 0 to 15	&E0 means V.42 normal mode. ***&E1 means V.42 auto-redial mode. &E2 means V.42 reliable mode. &E3 means no modem-initiated flow control. &E4 means CTS modem-initiated flow control. ***&E5 means Xon/Xoff modem-initiated flow control. ***&E6 means Xon/Xoff not passed through. &E7 means Xon/Xoff passed through. ***&E8 means Enq/Ack pacing off. &E9 means Enq/Ack pacing on. &E10 means normal mode flow control off. ***&E11 means normal mode flow control on. &E12 means pacing off. ***&E13 means pacing on. &E14 not used. &E15 not used.
$EBn	n = 0 or 1	***$EB0 enables 10 bit mode. $EB1 enables 11 bit mode.
%En	n = 0 to 3	%E0 means modem will not escape. ***%E1 means +++ method. %E2 means break method. %E3 means either +++ or break methods.
#Fn	n = 0 to 2	#F0 means no fallback when on-line. #F1 means fallback from 14400 to 4800 bps when on-line. ***#F2 means fallback to 4800 bps from 14400 bps/fall forward if line improves.
&F		&F loads factory default values from ROM.
$Fn	n = 0 or 1	$F0 means do not fallback to normal connect if CR received. ***$F1 means fallback to normal connect if CR received.
&Gn (Not applicable in the U.K)	n = 0 to 2	***&G0 turns off CCITT guard tones. (except for Italy and New Zealand) &G1 turns on CCITT 550 Hz guard tone. &G2 turns on CCITT 1800 Hz guard tone. (default for Italy and New Zealand)
Hn (Not applicable in France)	n = 0 or 1	H0 means hang up (go on hook). H1 means go off hook.
In	n = 0 to 2	I0 requests modem ID#. I1 requests firmware revision #. I2 for MTS internal use.
L5		L5 lists all current operating parameters.
L6		L6 lists all current S-registers values.
L7		L7 lists additional parameters.
#Ln	n = 0 to 3	***#L0 means modems negotiate V.42 mode. #L1 means MNP on and LAP-M off. #L2 means LAP-M on and MNP off. #L3 means no detection phase but go directly to LAP-M.

Table 2-5. HP AT Command Set

Command	Values	Description
Mn	n = 0 to 3	M0 means monitor speaker always off. ***M1 means monitor on until carrier detected. M2 means monitor always on. M3 means monitor on during dialing, off during handshaking.
$MBn	n = speeds	$MB75 selects CCITT V.23 mode. $MB300 selects 300 bps on-line. $MB1200 selects 1200 bps on-line. $MB2400 selects 2400 bps on-line. $MB4800 selects 4800 bps on-line. $MB9600 selects 9600 bps on-line. ***$MB14400 selects 14400 bps on-line.
O		Exit command mode and go into on-line mode.
P (not applicable in Denmark)		***Modem will pulse dial numbers following the P.
&Pn (Not applicable in the U.K.)	n = 0 or 1	***&P0 means 60-40 pulse ratio. &P1 means 67-33 pulse ratio.
Qn	n = 0 to 2	***Q0 means result codes sent. Q1 means result codes will be suppressed (quiet). Q2 means dumb answer mode.
&Qn	n = 0 or 1	***&Q0 selects Multi-Tech command set. &Q1 selects AT command set.
Rn	n = 0 to 2	***R0 means modem will not reverse modes. R1 means modem will reverse modes.
&Rn	n = 0 to 2	***&R0 lets clear to send act normally. &R1 forces clear to send on. &R2 drops 2 seconds on disconnect
$Rn	n = 0 or 1	$R0 means disconnect after 12 retransmits. $R1 means do not disconnect after 12 retransmits.
&RFn	n = 0 or 1	&RF0 selects CTS follows RTS ***&RF1 selects CTS to act independently.
Sr=n	r = 0 to 16, 18, 24, and 25	Sets value of register **r** to value **n**. **n** is entered in decimal format (n varies).
Sr?	r = 0 to 16, 18, 24, and 25	Reads value of register **r** and displays value in 3-digit decimal form.
$SBn	n = speeds	$SB300 selects 300 bps at serial port. $SB1200 selects 1200 bps at serial port. $SB2400 selects 2400 bps at serial port. $SB4800 selects 4800 bps at serial port. $SB9600 selects 9600 bps at serial port. ***$SB19200 selects 19200 bps at serial port.
&SFn	n = 0 or 1	***&SF0 selects DSR follows CD. &SF1 selects DSR independent.

Table 2-5. HP AT Command Set

Command	Values	Description
&Sn	n = 0 to 2	&S0 forces data set ready on. ***&S1 lets data set ready act normally. &S2 data set ready drop is regulated by S24 on disconnect.
T		Modem will tone-dial numbers following the T.
&Tn	n = 4 or 5	&T4 means enable response to request for remote digital loopback. ***&T5 means disable response to request for remote digital loopback.
#Tn	n = 0 or 1	#T0 turns off trellis coded modulation. ***#T1 turns on trellis coded modulation.
Un	n = 0 to 3	U0 places modem in analog loop originate mode. U1 places modem in analog loop answer mode. U2 means remote digital loopback. U3 means local digital loopback.
Vn	n = 0 or 1	V0 means result codes sent as digits (terse mode). ***V1 means result codes sent as words (verbose mode).
W		Wait for new dial tone.
Xn (Default varies by country.)	n = 0 to 4	X0 selects basic Result codes (w/o connect 1200, connect 2400). X1 selects extend result codes (w/connect 1200, connect 2400). X2 selects standard AT command set with no dial tone. X3 selects standard AT command set with busy. X4 selects standard AT command set with no dial tone and busy.
Yn	n = 0 or 1	***Y0 disables sending or responding to long space break. Y1 enables sending or responding to long space breaks.
Z		All configurations are reset to default values.
,	in dial command	Causes pause during dialing. (In Sweden, not to be used in place of **W** command.)
;	in dial command	Causes return to command mode after dialing.
!	in dial command	Causes modem to flash on-hook. (Not applicable with pulse dial in Austria and Germany. Not applicable in the U.K.)
@	in dial command	Causes modem to wait for ringback, then 5 seconds of silence before processing next part of command.
+++AT<CR>		Escape code. Brings modem into command mode while still remaining on-line. Enter +++ followed by the letters A and T, up to ten command characters, and a Return.

Table 2-6. S-Register Definitions

Register	Unit	Range	Description
S0	1 ring	0-255	Sets number of rings until modem answers.
S1	1 ring	0-255	Counts rings which have occurred.
S2	ASCII	0-127	Sets escape code character.
S3	ASCII	0-127	Sets character recognized as RETURN.
S4	ASCII	0-127	Sets character recognized as LINE FEED.
S5	ASCII	0-127	Sets character recognized as BACKSPACE.
S6	1 second	2-255	Determines wait time for dial tone.
S7	1 second	1-255	Determines how long modem will wait for carrier before aborting the call.
S8	1 second	0-255	2 sets pause time caused by a comma character in a dial command.
S9	100 mSec	1-255	Sets carrier detect response time.
S10	100 mSec	1-255	Sets delay time between when carrier is lost and when modem disconnects.
S11	1 mSec	1-255	Sets time duration of and spacing between tones in tone-dialing.
S13	ASCII	0-127	Determines remote configuration escape character.
S17	10 mSec	0-2.5	Determines length of break time in seconds (space) to PC.
S24	50 mSec	0-255	Sets DSR/CTS/CD dropout time.
S25	100 mSec	0-255	Sets DTR dropout time.
S26	1	0-255	Specifies allowed failed attempts.
S30	minutes	0-255	Inactivity timer used to disconnect modem.
S32	100 mSec	0-255	Set duration in which modem will wait for a <RETURN> to be entered during escape sequence execution.
S34	ASCII	0-60	Buffer length of command mode after on-line escape sequence.

Table 2-7. Modem Result Codes

Digit	Words	Effect
0	OK	Command was executed without error, ready for next command.
1	CONNECT	Modem has detected carrier and gone on-line.
2	RING	Modem has detected ring caused by incoming call.
3	NO CARRIER	No carrier signal has been detected within the allowed time.
4	EEROR	Error in command line (too many, or invalid characters).
5	CONNECT 1200	Modem has detected carrier at 1200 bps and gone on-line.
6	NO DIAL TONE	No dial tone has been detected.
7	BUSY	A busy signal has been detected.
8	NO ANSWER	Remote system did not answer.
9	CONNECT 2400	Modem has detected carrier at 2400 bps and gone on-line.
11	CONNECT 4800	Modem has detected carrier at 4800 bps and gone on-line.
12	CONNECT 9600	Modem has detected carrier at 9600 bps and gone on-line.
13	CONNECT 14400	Modem has detected carrier at 14400 bps and gone on-line.

Internal Modem Remote Access

This section provides the information on enabling or disabling the remote access through the internal modem. The process to allow or not allow remote access is different between the HP 9000 systems and the HP 3000 systems.

> **NOTE**
>
> The following procedures are only applicable if HP Predictive has not been installed. If HP predictive is installed, use Predictive to configure the internal modem for remote access. Refer to the Predictive Support User's Guide (part number 50779-90018).
>
> The HP 50759A/B modem can not be used for dialin purposes due to an incompatibility of flow control parameters.

HP-UX Remote Access

The process for the HP-UX HP 9000 systems is provided through a script called ***dialin***. The syntax for running the *dialin* script is:

>**dialin** **[-bbaud]** **action**

Where:

dialin - is the HP-UX script.
[-baud] - can be used to specify a baudrate **(do not change the default baud rate)**.
action - is one of three choices: enable, disable, or status.

Example of enable remote access:

>**dialin enable** (this enables remote access and uses the default baudrate)
or
>**dialin status** (this displays the current status, either disabled or enabled)

> **CAUTION**
> Do not use a baud rate other than the default of 19200 KBS. Other baud rates could cause the dialin process to malfunction

The system then displays messages similar to the following:

Created device: /dev/cul0p7
Created device: /dev/ttyd0p7
Created device: /dev/cua0p7

Dialin enabled

To disable remote access, use the **disable** action with the ***dialin*** command. The **status** action will display the current state of either enabled or disabled for remote access.

MPE/iX Remote Access

> **NOTE**
>
> The following procedures are only applicable if HP Predictive **has not been** installed. If HP predictive is installed, use Predictive to configure the internal modem for remote access. Refer to the Predictive Support User's Guide (part number 50779-90018).

To have remote access for the HP 3000 computer you must configure Logical Device 21 in the operating system and on the core I/O card.

Logical Device 21 System Configuration

To establish a dial-in session for remote access through the internal modem, logical device 21 has to be configured in the operating system. To check the logical device 21, perform the following steps:

1. At the MPE/iX prompt, type *SYSGEN*.
2. At the SYSGEN> prompt, type *IO*. This puts you into the I/O submenu of SYSGEN.
3. AT the IO> prompt, type *lpath 10/4/0.1*. The lpath (list path) command will display the configured parameters for path address 10/4/0.1, as shown:

PATH:	**10/4/0.1**	**LDEV:**	**21**
ID:	**A2372-60003-CONSOLE-TERMINAL**	**TYPE:**	**TERM**
PMGR:	**CDM_CONSOLE_DM**	**PMGRPRI:**	**9**
LMGR:	**TIO_TLDM**	**MAXIOS:**	**0**

4. If the information is incorrect, delete device 21 by typing *io> DD 21*, before adding the correct information.
5. If there is no information displayed for the path 10/4/0.1 (logical device 21), then add the necessary configuration information with the AD 21 command, as shown:

```
io> AD 21 ID=A2372-60003-CONSOLE-TERMINAL; PATH=10/4/0.1
```

6. In the I/O submenu of SYSGEN, do a list device 21 (LD 21) and ensure that the following information is shown:

LDEV:	**21 DEVNAME:**	**OUTDEV:**	**21**	**MODE: JAID**
ID:	**A2372-60003-CONSOLE-TERMINAL**	**RSIZE:**	**40**	**DEVTYPE: TERM**
PATH:	**10/4/0.1**	**MPETYPE:**	**16**	**MPESUBTYPE: 0**
CLASS:	**TERM**			

Core I/O Remote Console Port Configuration

The internal modem port on the core I/O card must also be configured as Logical Device 21. This is done in NMMGR from MANAGER.SYS. The following procedure needs to be done one time.

1. Run NMMGR from MANGER.SYS.
2. The first screen is the Open Configuration/Directory File Screen.
3. Press the [F1] (open config) key to reach the main screen.
4. Press the [F1] (DTS) key to reach the Host Configuration screen.
5. Press [F4] (Go To UserPort) key to reach the HP Support Modem Port screen.
6. Modify the screen fields as shown below:

   Logical Device: 21

   Line Speed: 9600

   Modem: 1 [US Modem]

   Parity: None
7. Press [F6] (Save Data) to save the configuration data.
8. Press the [Home] key to position the cursor on the command line at the top of the screen.
9. Type *VALIDATE* and press [Enter]
10. Press [F2] (Validate DTS/LINK). Validating the DTS/LINK also cross validates NMCONFIG with SYSGEN.
11. Exit NMMGR by returning through the previous screens, or type EXIT at the command line.

Anytime a change is made to the system configuration in SYSGEN, it is necessary to reboot the system in order for the changes to take effect.

Enabling or Disabling Remote Access Hardware

Once the internal modem is configured for remote access, the computer needs to be enabled, or disabled. Also at this point, you can select either the internal or external mode. An internal or external modem can be used for dialout/dialin on an HP computer system. However, only one of these modems can be used at a time. The line speed between the internal modem and the system defaults to 19,200 bits/sec and is not configurable. The line speed for the external modem can be configured at 19200, 9600, 2400, or 1200 bits/sec. To enable, disable, or select which modem to use for the remote access, perform the following steps:

1. Put the key switch in the SERVICE mode.
2. At the system console, press [CTRL]+B. This puts you into the command mode.

3. Check to see if the remote console is locked, if so, unlock it with the Unlock Remote (**UR**) command, before configuring access or enabling remote console.

4. When dialing in for remote console access, there is no speed sensing, so it is necessary to verify that the remote console port is configured for the same speed as the originating modem. To configure the remote console port for the appropriate speed, use the Configure Access (**CA**) command mode. The following information is displayed:

```
CM> CA
Current remote support modem port configuration:

   Modem:                          Internal modem
   Internal modem autoanswer:      On
   Bit Rate:                       2400 (bits/sec)
   Protocol:                       Bell
   System identification:

Do you wish to change the configuration? (Y/N):
```

5. If the port configuration needs to be changed, type **Y** and enter the appropriate information.

6. To enable the remote console enter the Enable Remote (**ER**) command at the **CM>** prompt.

7. To disable the remote console enter the Disable Remote (**DR**) command at the **CM>** prompt.

8. When finished, exit the PDC command mode and put the key switch back into the ON position.

3

Troubleshooting

Introduction

This chapter presents the overall strategy for troubleshooting failures on the HP 3000/9x9KS, HP 9000/ Kxx0 Class systems and HP VISUALIZE Kx50-EG, Kx60-EG, and Kx60-XP workstations, and provides some procedures you can follow that will help you isolate most system problems.

The chapter is organized so that you can diagnose failures in a logical manner 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 problem 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. Care should be taken before taking any steps to remedy a failure. Always collect as much information as possible about the failure.

Never swap out a Field Replaceable Unit (FRU) until you have ascertained the following:

- The failure symptoms
- All status indicators
- All console and front panel messages
- System configuration
- Number of users logged on
- Application or tasks running at the time of the failure
- All other information that may help describe the failure

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

Calling the Response Center

If your problem is serious enough to call the HP Response Center, gather the following information to give to the Response Center engineer who will be calling back:

1. The modem telephone number and Baud rate.
2. History and nature of the problem:
   A. When did the problem first occur?
   B. What changes have occurred on the system?
   C. Has the problem ever occurred before?
   D. Can the problem be reproduced?
   E. Is the problem intermittent?
3. All troubleshooting information gathered so far. For example:
   A. Record the system panic message displayed on the console.
   B. If an HPMC is displayed, record the console hex display code.
   C. If the system did not reboot, record the sequence of 4-digit codes at bottom of console display. (Press Control-B first.)
4. Call the Response Center. If you are certain the problem is hardware, ask for "Hardware Assistance."
5. 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 an HP-UX 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.

Safety Considerations

Follow the procedures listed below to ensure safe handling of components and to prevent harm to both you and the server:

- Use an anti-static wrist strap and a grounding mat, such as those included in the Electrically Conductive Field Service Kit.
- Handle PCAs and components by the edges only. Do not touch any metal-edge connectors or any electrical components.

The keyswitch does NOT have an OFF position. There is a STANDBY position in which all but Three FRUs are turned off. The three FRUs which are still ON and should not be removed or installed with power applied are the POWER SUPPLY, POWER MONITOR, AND THE LC DISPLAY. Install and deinstall the Power Supply, Power Monitor, and the LC Display as follows:

1. Unplug the system.
2. Wait 10 seconds.
3. Proceed To Deinstall/install FRU.

Hard Failures

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

1. Obtain front panel display status. Also note any system console messages.
2. Find the chassis code in Table 3-7., hardware troubleshooting. Note the cause and follow the steps listed in the action column.

In some cases, failure messages related to the power system are displayed. Refer to the Power System messages Tables 3-1 through 3-5 for cause and action for each message.

Power System Troubleshooting

Table 3-1 provides some initial power-on type troubleshooting suggestions. For other power system problems, refer to the more detailed descriptions and procedures in this section.

Table 3-1. Power-On Troubleshooting

SYMPTOM	ACTION
No front panel message displayed and no system operation.	1. If PowerTrust is installed **a.** Check that the power output cable is connected from the PowerTrust (UPS) output receptacle to the system AC input receptacle. **b.** Check that the AC power cord from the UPS is plugged into the AC power source receptacle. **c.** Check that the UPS output switch is in the ON position. **d.** The UPS AC Output indicator should be green (AC power is being supplied). **e.** Disconnect the power cable from the system AC input receptacle. Disconnect the AC power cord from the UPS, connect it to the system AC input receptacle, and then plug it into the AC power source. **f.** If there is a display on the panel, replace the UPS. Otherwise, continue to Step 2. 2. Check for AC power at the power source. Plug another device into the receptacle. Check the circuit breaker or breaker panel. Reset the circuit breaker if necessary. 3. If AC power is present and no display **a.** Replace Power Monitor PCA. **b.** Replace Power Supply. **c.** Check internal cables, Power Monitor to front Panel. **d.** Replace the system board
No front panel display and the system is operating	1. If the operating system is running with no problems. **a.** Shutdown the operating system. **b.** Check internal cables, power monitor to front panel. **c.** Replace the front panel. **d.** Replace the power monitor card. **e.** Replace the system system board.

The power system consists of a Power Supply and a Power Monitor card. The following is a basic block diagram of the power system:

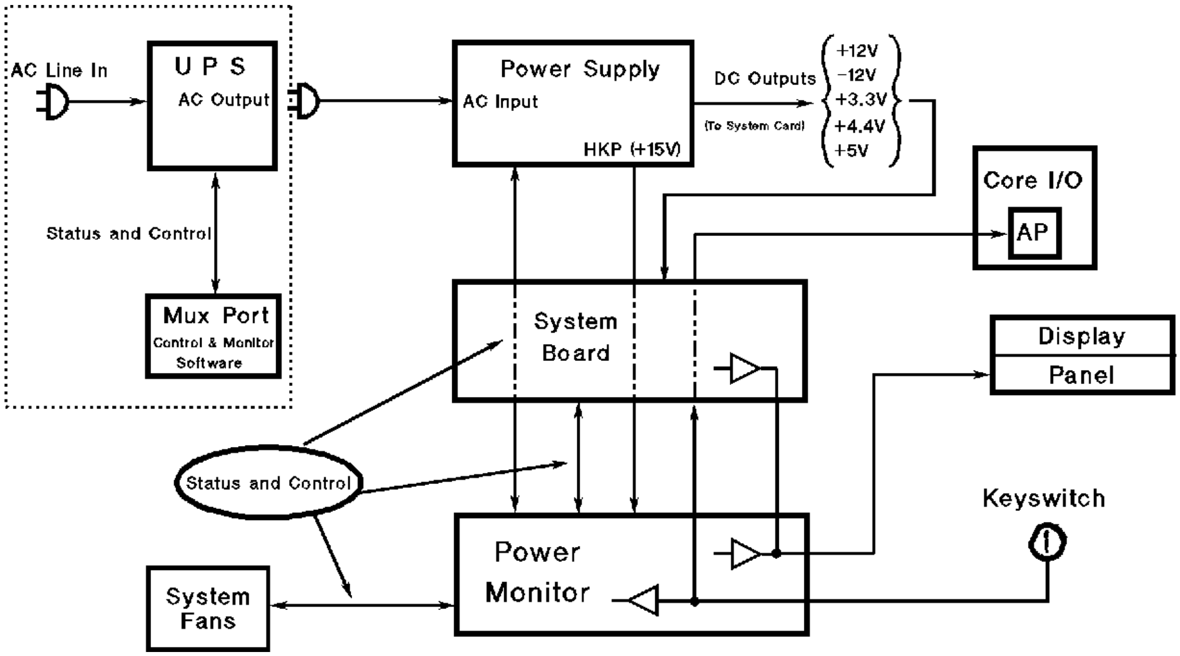


Figure 3-1. Power System Diagram

As shown on the block diagram, the Power Monitor card interfaces to the System Board, Core I/O card, Display Panel, key switch, and the system fans. The Power Supply and the Power Monitor cards connect to the System Board. The System Board acts as a backplane for distributing DC voltages to all PCAs that are installed in the system.

Power Supply

The Power Supply is a 1250VA auto-ranging supply (1700VA for HP9000 models Kx50/K260/K460/Kx70/Kx80, HP VISUALIZE workstations, and the HP3000 979KS). There are no test points or adjustments on the Power Supply. To fully remove power from the system, AC power must be removed. The Power Supply does not have a circuit breaker. Whenever AC is connected, the Power Supply continuously provides +15V House Keeping Power (HKP) to the Power Monitor card. The Power Monitor card is active even when the Key switch is in the *Standby* position.

Table 3-2 shows the DC voltage requirements for the individual components of the computer.

Table 3-2. DC Voltage Requirements

	Computer component										
DC Voltage	Power Monitor	Display Panel	CPU	System Board	Memory	HP3000 Core I/O	HP9000 Core I/O	HSC Exp. I/O	HPPB	Peripheral Bay	Fans
+15V (HKP)	X	*									
+12V				X		X	X	X	X	X	X
-12V				X		X	X	X	X		
+3.3V			X	X	X		X	X			
+4.4V			X	**							
+5V			X	X	X	X	X	X	X	X	

* = +5V is provided by the Power Monitor via the ribbon cable.
** = K100 only.

Power Monitor Card

The Power Monitor card is responsible for monitoring ambient (room) temperature, internal temperature, all DC voltages, system fan speed, and the key switch. The Power Monitor is responsible for controlling fan speed, DC outputs (except +15V), the Display Panel, and system resets. The Power Monitor card sends messages to the Display Panel ONLY when DC outputs are disabled.

Tables 3-3 and 3-4 detail all the messages that can be sent to the Display Panel by the Power Monitor card. Table 3-3 is for Non-error messages, and table 3-4 is for Error messages. Use these tables to determine the *cause* of the message and the *action* suggested to resolve the problem. Some messages may require further explanation. These messages will have notation numbers that correspond to further details following the table.

Table 3-3. Non-error Messages

Display Panel Message		**Cause**	**Action**
SWITCH OFF		Key switch is in the STANDBY position	None
SWITCH ON		Key switch is in ON or SERVICE position	None
PROCEEDING TO TURN DC ON	1	Power Monitor is about to enable DC outputs.	None

1. This message should be present for only a few seconds. If this message stays on the Display Panel, either PDC did not launch self test, or the communication path between the System Board (PDH) and the Display Panel is defective.

Table 3-4. Error Messages

Display Panel Message		Cause	Action
PM POWER ERROR +15V OUT OF SPEC	1	+15V is not within specifications	1. Replace Power Supply 2. Replace PM card
CPU MISMATCH CPUs=XXXX PS=Y	3	Installed CPUs are not of the same type	1. See Note 3
PS MISMATCH CPUs=XXXX PS=Y	3	Power Supply is not the correct type for the installed CPUs	1. See Note 3
FRONT FAN POWER SHUTDOWN	2	Front fan is dead or running too slow	1. Replace front fan 2. Replace PM card 3. Replace fan cables
REAR FAN POWER SHUTDOWN	2	Rear fan is dead or running too slow	1. Replace rear fan 2. Replace PM card 3. Replace fan cables
DC OVERVOLTAGE SHUTDOWN +X.Y V	2	An overvoltage condition has been detected on the specified D.C. voltage (+X.Y)	1. Replace Power Supply 2. Replace PM card
DC UNDERVOLTAGE SHUTDOWN +X.Y V	2 4	An undervoltage condition has been detected on the specified D.C. voltage (+X.Y)	1. Replace Power Supply 2. Replace PM card 3. Refer to note 4
DC OVERVOLTAGE POWER SHUTDOWN	2	An emergency overvoltage condition has been detected	1. Replace Power Supply 2. Replace PM card
AMBIENT TEMP POWER SHUTDOWN	2	The ambient temp sensor has detected temperature in excess of 43° C (109° F)	1. Check room temp. 2. Replace PM card
INTERNAL TEMP POWER SHUTDOWN	2	The internal temp sensor has detected temperature in excess of 70° C (158° F)	1. Correct cause of heat 2. Replace PM card 3. Replace System Board

Table 3-4. Error Messages

Display Panel Message		Cause	Action
POWER FAIL POWER SHUTDOWN	5	AC is not available or is out of specification	1. Check power source 2. Replace PM card 3. Replace Power Supply
SWITCH ON	6	1. Bad power supply fan 2. Failed power supply	1. Replace power supply fan. 2. Replace power supply.
PROCEEDING TO TURN DC ON			
POWER FAIL POWER SHUTDOWN			
blank with no backlight		AC is not available or is out of specification	1. Check power source 2. Check for defective key switch
OS message with no backlight	1 7	Power monitor microprocessor is not functioning	1. Replace Power Monitor card

1. AC must be removed to reset this error, the key switch has no affect.

2. The key switch must be switched to STANDBY, then ON to reset this error.

3. The following diagram explains how to decode this error:

Rules:

* All installed CPU's must be of the same type
* CPU Type 1 requires Power Supply Type 1
* CPU Type 2 Requires Power Supply Type 2

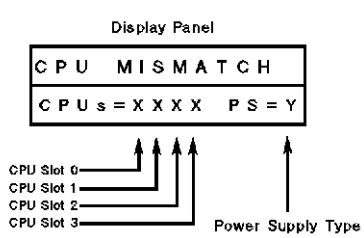
CPU Types:

0 = No CPU Installed
1 = 4.4V CPU
2 = Reserved
3 = Reserved

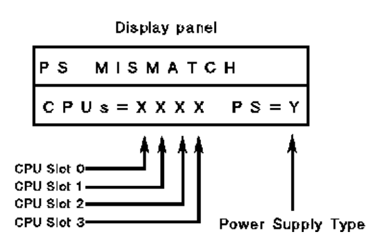
Power Supply Types:

1 = 4.4V Power Supply
2 = Reserved

CPU Mismatch



CPU / Power Supply Mismatch



4. Any card in the system could cause a DC undervoltage. It may be necessary to remove cards until a minimum configuration is achieved. Replace the defective assembly that is causing the undervoltage.

5. This message will be displayed for approximately 10 seconds after AC power is lost. Once AC power is restored, the system will power up provided the key switch is either ON or in the "SERVICE" position. This condition does NOT require cycling of the key switch.

6. These three messages will cycle as the system retries to access the power supply.

7. This fault indicates a watchdog timer error has occurred. The watchdog timer is the Power Monitor card microprocessor fault detector. If this fault occurs, the Display panel will contain the last message written to the Panel by PDC or the O/S. The fans will not be running and the Display Panel backlight will be out.

Display Panel Troubleshooting

The Display Panel is connected to the Power Monitor card via a ribbon cable. Use Table 3-5 to determine the error condition and suggested action:

Table 3-5. Display Panel Troubleshooting

Symptom	Cause	Action
Backlight is on but Display Panel is blank	No contrast control from Power Monitor card	1. Replace PM card 2. Replace Display Panel 3. Replace ribbon cable
Display Panel data is dim	Defective contrast control circuitry	1. Replace PM card 2. Replace Display Panel
Display Panel Data is garbled or unreadable	Data not being correctly decoded by Display panel	1. Replace Display Panel
Display Panel displays power monitor messages, but does not display O/S data	PDH not issuing messages to the display panel	1. Replace System Board

Key Switch Troubleshooting

The key switch is connected to the Power Monitor card via a ribbon cable. Use Table 3-6 to determine the error condition and suggested action:

Table 3-6. Key Switch Troubleshooting

Symptom	Cause	Action
System does not power up when key switch is on (no error messages on Display Panel)	Key switch position not being detected by the PM card, or the Key switch is defective	1. Replace PM card 2. Replace Key switch 3. Replace Ribbon cable
Service position does not allow Control B functionality	"SERVICE" position signal not being detected by the Access Port (AP)	1. Replace Core I/O Card 2. Replace System Board 3. Replace PM card

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 MPE/iX, refer to the appropriate PowerTrust documentation.

Troubleshooting System Hardware Faults

The Faults listed in Table 3-7 occur before the operating system is launched. This is during the power-up selftests and system initialization processes. For a detailed description of the Chassis display codes, refer to Chapter 4.

Table 3-7. System Hardware Troubleshooting

symptom	Cause	Action
Chassis code 1xyy (x=Processor Memory bus slot number)	CPU, TLB, Cache, or Coprocessor	a. Replace Processor Card indicated by x. b. Replace System Card. c. If the problem persists, call the Response Center.
Chassis code 2xyy (x=Processor Memory bus slot number)	Cache errors.	a. Replace Processor Card indicated by x. b. Replace System Card. c. If the problem persists, call the Response Center.
Chassis code 3xyy (x=Processor Memory bus slot number)	Processor Dependent Hardware (PDH) errors.	a. Replace System Card. b. If the problem persists, call the Response Center.
Chassis code 4xyy (x=Processor Memory bus slot number)	Late Selftests errors	a. Replace Processor Card indicated by x. b. Replace System Card. c. If the problem persists, call the Response Center.
Chassis code 5xyz (x=Processor Memory bus slot number y=System Bus Number)	Bus Transactions errors	a. Replace PCA indicated by x and y. b. Replace System Card. c. If the problem persists, call the Response Center.
Chassis code 7xxx	Memory Subsystem Fault	a. Refer to Table 3-9 for fault definition and action. b. Reference Chapter 4 (Error codes) for more detail. c. If the problem persists, call the Response Center.
Chassis code 8xxx	I/O Device Fault	a. Check graphics configuration. b. Replace Core I/O PCA. c. Replace System board. d. If the problem persists, call the Response Center.

Table 3-7. System Hardware Troubleshooting (Continued)

symptom	Cause	Action
Chassis code 9xxx	Console Initialization errors	a. Check console path and actual configured path. b. Check console cable and connections. c. Check core I/O PCA. d. Replace Core I/O PCA. e. If the problem persists, call the Response Center.
Chassis code A088	No console controller, unable to boot	a. Check console path and configured path. b. Check console cable and connections. c. Replace Core I/O PCA. d. If the problem persists, call the Response Center.
Chassis code A008	No bootable device found	a. Attempt to boot from another device. If boot succeeds, replace the boot device. If boot fails replace Core I/O PCA.
Chassis code BE00, xxxx, DEAD (looping)	MPE/iX Monitor Halt (Halt 0)	a. To determine cause and action to take, refer to Table 3-8 (xxxx is defined in table 3-8). b. If possible HPMC, refer to troubleshooting HPMC section.
Chassis code BE07, xxxx, DEAD (looping)	MPE/iX System Abort (Halt 7)	a. Perform a Transfer of Control (TOC). b. Perform a memory dump (refer to taking a memory dump section). c. If the problem persists, call the Response Center.
Chassis code CBFF, xxxx (looping)	Nested HPMC	a. Perform a Transfer of Control (TOC). b. Refer to troubleshooting HPMC section.

Table 3-8. MPE/iX OS Codes (Halt 0)

OS Code	Action
0001 to 0099	Take a memory dump and call the response center.
00F1 to 00F3	Take a memory dump. Replace the appropriate CPU card. This may also be an OS bug.
00F4 to 00F7 and 03xx	HPMC may have occurred. Refer to troubleshooting HPMC section.
00F8 to 00FB	Take a memory dump. Replace the appropriate CPU card. This may also be an OS bug.

Table 3-9. Memory Troubleshooting

Code	Description	Possible Cause
7000	HPMC in the memory system	Processor/Memory Bus module failed. **a.** Replace the Monarch CPU. **b.** Replace the Memory Carrier Card.
7001	Icache parity fault in memory test	
7002	Dcache parity fault in memory test	
7003	MSI read time-out (usually caused by reading beyond the end of memory)	
7004	MSI write time-out (usually caused by writing beyond the end of memory)	
7005	Processor/Memory bus parity fault	
7006	Write bomb fault (Processor/Memory bus parity detected on incoming data)	
7007	Memory address ECC fault	
7008	Multi-bit memory fault	
7009	Single-bit memory fault	
70FF	Unknown HPMC	
7FFF	Catastrophic memory fault	
7101	Master Memory Controller not responding	Bad Master Memory Controller on the system board.
7102	Master Memory Controller not ready fault	
7103	Master Memory Controller failed to clear	
7104	Master Memory Controller sticky bits	
7105	Master Memory Controller bad revision	
7106	Master Memory Controller register selftest fault	
7107	Master Memory Controller fault in ECC test	
7200	No Slave Memory Controller available	K100 only - Bad system board All others - Bad memory carrier card
721x	Slave Memory Controller failed, x = SMC number	SMC #0-3 = memory carrier 0 SMC #4-7 = memory carrier 1
722x	Bad Slave Memory Controller revision, x = SMC number	SMC #0-3 = memory carrier 0 SMC #4-7 = memory carrier 1
723x	Slave Memory Controller failed to respond, x = SMC number	SMC #0-3 = memory carrier 0 SMC #4-7 = memory carrier 1
7301	SIMM 0 bytes are not equal	Refer to the memory configuration tables for the deallocated memory bank.
7302	SIMM 1 bytes are not equal	
7303	SIMM 0 data <> SIMM 1 data	
7304	Unknown sizing compare fault	
7305	Multi-bit error occurred during sizing	
7306	Address test failed on bank	
7307	ECC test failed on bank	
7308	Single bit memory error caused HPMC	
7401	No memory SIMMs installed	Poor seating of SIMM pair

Table 3-9. Memory Troubleshooting (Continued)

Code	Description	Possible Cause
7402	Both EDO and STD memory SIMMs installed	EDO SIMMs not supported
7403	Address did not map to bank	Failed MMC or SMC
7404	Address did not map to Group Configuration Table	Failed MMC or SMC
7405	Dual issue test failed	Failed monarch processor
7500	No RAM found	No SIMM pairs installed or they are not seated
7501	Not enough good memory to run Operating System	Verify memory configuration using PDC ME command
7502	Not enough good memory to run Boot Console Handler	Verify memory configuration using PDC *ME* command. 256KB is required
7604	No bits set in test status	Contact the response center
7701	Using alternate memory configuration	Bad memory configuration detected
7702	Warning, abbreviated memory test	Fast Boot is Enabled
7703	SIMM loading warning	Contact the response center
7704	RAM bus warning	Verify memory configuration using PDC *ME* command
7705	Good memory required to run Operating System is greater than memory size	Verify memory configuration using PDC *ME* command
7706	Mixed DRAMs.	Both EDO and standard memory are present.
7800	PDT disabled warning	Verify PDT level with PDC *PDT* command
7800	PDT disabled halt	Verify PDT level with PDC *PDT* command
7801	Overwrite single bit error with multi-bit error in PDT	Check PDT level
7802	Duplicate PDT entry	Contact the response center
7803	EEPROM fault while updating PDT	Failed system board
7804	PDT table is full	Verify PDT level with PDC *PDT* command
7D00	HPMC memory error	HPMC in the memory system
7D01	HPMC I-cache parity error	I-cache parity error in the memory test

Table 3-9. Memory Troubleshooting (Continued)

Code	Description	Possible Cause
7D03	MSI read time-out (HPMC, caused by accessing beyond the end of memory or non-responding Slave Memory Controllers)	Analyze PIM dump
7D04	MSI write time-out (HPMC, caused by accessing beyond the end of memory or non-responding Slave Memory Controllers)	
7D05	Central bus parity fault (HPMC)	
7D06	Write bomb fault (HPMC, earlier write transaction to memory had a bus parity error)	
7D07	Memory address fault (HPMC)	
7D08	Multi-bit memory fault (HPMC)	
7D09	Single bit memory fault (HPMC)	Unexpected HPMC during memory self test
7D0A	Address did not map to bank (HPMC)	Failed MMC on system board or failed SMC
7FXY	X = Carrier Card number, Y = SIMM pair number	Replace SIMM pair indicated by Y
7FFF	Catastrophic memory fault	Contact the response center

Overtemperature Indications

Overtemperature situations are sensed by the Power Monitor card. There are two overtemperature messages that occur within the system specified operating temperature range. These messages DO NOT stop the system or shut off DC power. They are an indication of temperature rise and possible problems. Table 3-10 presents these indications along with the temperature power shutdown message as symptoms with cause and recommended actions.

Table 3-10. Overtemperature Troubleshooting Procedure

Symptom	Cause	Action
Overtemperature Warning (This warning does not stop the computer.)	Room temperature too high, or restricted air flow? (the computer sensed a temperature rise in excess of 35°C (95°F)).	**1.** Temperature in computer room may be rising so that a warning message is issued. Check that room air conditioning is operating properly. **2**. Make sure there is sufficient air flow space around the system. **3**. Make sure all bulkheads and air baffles are installed and secure. **4**. Check for fan movement. If fan is not moving, replace the fan **5.** If all the above are ok, replace the power monitor card.
Overtemperature Emergency Warning (This warning does not stop the computer.)	Room temperature too high, or restricted air flow? (the computer sensed a temperature rise in excess of 40°C (104°F)).	**1.** Temperature in computer room may be rising so that a warning message is issued. Check that room air conditioning is operating properly. **2**. Make sure there is sufficient air flow space around the system. **3**. Make sure all bulkheads and air baffles are installed and secure. **4**. Check for fan movement. If fan is not moving, replace the fan. **5.** If all the above are ok, replace the power monitor card.
Ambient Temperature Power Shutdown (This message turns the DC voltages off and stops the computer.)	Room temperature too high, or restricted air flow? (the computer sensed a temperature rise in excess of 43°C (109°F)).	**1.** Temperature in computer room may be rising so that a warning message is issued. Check that room air conditioning is operating properly. **2**. Make sure there is sufficient air flow space around the system. **3**. Make sure all bulkheads and air baffles are installed and secure. **4**. Check for fan movement. If fan is not moving, replace the fan. **5.** If all the above are ok, replace the power monitor card.

High Priority Machine Check (HPMC)

Another type of failure is the High Priority Machine Check (HPMC). An HPMC is an abnormal condition which has compromised the integrity of system processing. A CPU detects the HPMC and halts the system. Use the recovery procedures in Table 3-11 to resolve the problem, or refer to the *Troubleshooting HPMCs* section.

Table 3-11. HPMC Recovery Procedures

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

Troubleshooting HPMCs

When an HPMC occurs, the fault code is displayed on the front panel, and the console displays the status. An HPMC is handled initially by Processor Dependent Code (PDC), which builds an error log and displays chassis codes. When finished, it transfers control back to the operating system.

In HP-UX, when control is given back, a panic dump is created. The operating system saves a memory dump to a special location on disk and attempts to reboot the system. The chassis codes displayed by PDC are no longer visible.

On MPE/iX systems, further chassis codes are displayed on the console and the front panel. When the system halts, you perform a memory dump (refer to the *Performing a Memory Dump* section). The chassis codes displayed by PDC are no longer visible.

The HPMC error logs are the same for both operating systems. To access the error logs, reset the system. When you get the PDC main menu, type *SER* to access the service menu. Then type *PIM* to list the contents of the PIM dump. The most important information to look at are the timestamp, HPMC chassis code, requestor/responder addresses, and memory plus I/O module error logs. HPMC chassis codes are reported and logged by PDC for each processor detecting an HPMC. Refer to the following example of a CPU 0 PIM dump:

-------------------------------------- Processor 0 HPMC Information --------------------------------------						
Timestamp =	Thu Jan	12	18:03:07	GMT	1995	(19:95:01:12:18:03:07)
HPMC Chassis Code =	0xcbf0 [1] 0xcbfb [5]	0x5002 [2]	0x7d08 [3]	0x7f00 [3]	0x5408 [4]	0x5502 [4]

1. Initial status of HPMC processing; CBFx
2. HPMC type detected by the CPU reporting these codes; 5x0n, x = processor MID (0 to 3, 6, 7).
3. HPMC type detected by Master Memory Controller; 7D0n
4. HPMC type detected by an I/O Adaptor; 5x0n, x = I/O adaptor MID (4 — 7).
5. Final status of PDC HPMC processing; CBFx

HP-UX Procedure:

1. Reset the system.
2. Stop the autoboot process if it is enabled.
3. From PDC *service* menu, enter the **PIM** command. Record or print the PIM report, specifically timestamps, chassis codes, responder/requestor addresses, I/O module error log, and memory error log.
4. Refer to Table 3-12 for description and action for each HPMC chassis code. Table 3-13 identifies the slot numbers on the Processor/Memory bus.

MPE/iX Procedure:

1. Perform a TOC.
2. From the PDC service menu, enter the **PIM** command. Record or print the PIM report, specifically timestamps, chassis codes, responder/requestor addresses, I/O module error log, and memory error log.
3. Perform a memory dump (refer to *Performing a Memory Dump* section).
4. Refer to Table 3-12 for description and action for each HPMC chassis code.

For Major Category 5 (Bus Transactions) Chassis Codes, the Master ID (MID) will identify the CPU or IOA as follows:

Description	SPA	K2x0/K4x0	K370/K380	K570/K580
			MID	
CPU 0	FFFA0000	0	0	0
CPU 1	FFFA2000	1	1	1
CPU 2	FFFA4000	2	2	2
CPU 3	FFFA6000	3	3	3
CPU 4	FFFAC000	—	6	6
CPU 5	FFFAE000	—	7	7
IOA 0 (system board)	FFF88000	4	4	4
IOA 1 (system board)	FFF8A000	5	5	5
IOA 0 (HSC expansion I/O)	FFF8C000	—	—	6
IOA 1 (HSC expansion I/O)	FFF8E000	—	—	7
MMC	FFFB1000	7	—	—

Table 3-12. HPMC Codes

Code	Description	Action
	Cache HPMCs	
20B0	Data Cache parity error.	Replace the CPU Card reporting the error
20B1	Data Cache tag parity error.	
20B2	Data Cache word 0 parity error.	
20B3	Data Cache word 1 parity error.	
20C3	Instruction Cache word 1 parity error.	
	Processor Memory Bus HPMCs (x = MID number, y = 0, processor memory bus)	
5xy1	Internal error	Contact response center.
5xy 2	Path error	
5xy3	Mode phase error	
5xy4	Parity error	
5xy5	Protocol error	
5xy6	No slave ACK	
5xy7	Directed error	
5xy8	Broad error	
5xy9	Improper access error	
5xyA	Illegal response error	
5xyB	Bus timeout error	
5xyE	HP-PB bus adaptor error	
5xyF	I/O adaptor TLB error	
	Memory HPMCs	
7D03	Memory MSI read timeout	Contact response center.
7D04	Memory MSI write timeout	Contact response center.
7D05	Processor memory bus parity error detected by MMC	
7D06	Memory write bomb error	
7D07	Memory address error	
7D08	Memory multi-bit error	
7D09	Memory single-bit error	
7D0A	Address did not map to bank	

Table 3-12. HPMC Codes (Continued)

Code	Description	Action
HPMC Processing Status		
CBF0	HPMC occurred	Follow the action for other HPMC codes beginning with numerics.
CBF1	OS did not replace IVA	
CBF2	Invalid length for OS HPMC handler	
CBF3	Invalid address for OS HPMC	
CBF4	Invalid OS HPMC checksum	
CBF7	Entering PDC IO	
CBF8	Exiting PDC IO	
CBF9	PDC IO found unconfigured IOA/BC lower bus cannot be accessed	
CBFA	Previous HPMC PIM logged and not yet read, current HPMC cannot be logged	Contact response center.
CBFB	PDCE HPMC processing complete, branching to OS HPMC	Follow the action for other HPMC codes beginning with numerics.
CBFC	PDCE HPMC processing complete, failed to branch to OS HPMC, halt CPU	
CBFD	Could not determine why PDCE check (0xF000 0000) was entered	Contact response center.
CBFE	This HPMC interrupted a TOC, halt CPU	Contact response center.
CBFF	Another HPMC occurred on this CPU while it was executing PDCE HPMC, halt CPU	Contact response center.

Core I/O Troubleshooting

The Core I/O for the HP 3000 and HP 9000 computer systems are provided by two different cards. The make up of the individual core I/O cards can be seen in the block diagrams located in *Appendix B*. The Core I/O card is an FRU, so any failure of a component located on the core I/O card requires the replacement of the core I/O card. The only replaceable components of the core I/O card is the Internal Modem (both 3000 and 9000), audio card (HP VISUALIZE Kx60 workstations), and the Optional I/O (9000 only) slot.

Integrated Access Port

The Integrated Access Port (IAP) is a component of both (3000 and 9000) Core I/O cards. The IAP executes a selftest at power on, or a user initiated selftest (TA) can be launched from the Access Port Commands list of commands, located in *Appendix B*. Table 3-13. on page 3-20 is a list of Informational and error messages associated with the IAP:

Table 3-13. IAP Message and Error Codes

Informational Messages	
Code	**Message and Cause**
01	All tests passed. (APMSG 01) The Access Port has executed all tests and none have terminated with a fatal error.
02	SPU hardware was successfully reset. (APMSG 020 Well....
04	String was truncated to 23 characters. (APMSG 04) Only 23 displayable characters are permitted in the answer to the query on the screen. All characters past the 23rd were discarded. If the displayed string is acceptable, NO action is necessary. If the displayed string is not acceptable, re-execute the command and change it at the appropriate prompt.
05	AP configuration lost. Use CA and ER commands to recover. (APMSG 05) If this message reoccurs after each reset or power on, then the AP is bad, replace the Core I/O card.
06	SE terminated: returning to console/control mode. (APMSG 06) The remote console operator terminated the connection it had initiated with the SE command. The AP is reconnecting the port as a remote console. This message can also appear after SE is typed if the previous SE session was not cleanly terminated (the modem hung up before the operator could type "exit"). In this case, just hit break and type SE again.
Error Messages	
Error Codes	**Message and Cause**
02	Cannot verify deassertion of POW_ON signal. (APERR 02) The AP tried to de-assert the POW_ON signal, but doe not see it de-asserted when reading it back. Replace the Core I/O card.
05	AP failed Selftest number xx (APERR 05) A failure has occurred during a selftest. XX gives the decimal number of the failing selftest. Replace the core I/O card.
08	Permitted accesses to AP NVM exceeded. (APERR 08) Each time the AP writes NVM after the counter indicates the permitted number of accesses to the last block have been exhausted. Replace the core I/O card.
10	Illegal command, type HE fro help. (APERR 10) The first two characters entered in a command line are not the mnemonic fro the AP command. Help gives the correct mnemonic for legal commands.
11	Expecting "Y" or "N" (APERR 11) The AP expected a letter Y or N in either upper or lower case, as the reply to the screen prompt.
12	Expecting "H" or "L" (APERR 12) The AP expected a letter H or L in either upper or lower case, as the reply to the screen prompt.
13	Command may not be executed by a remote user. (APERR 13) This command is a valid AP command, but is intended for use form the local console port only. No action is required.

Table 3-13. IAP Message and Error Codes (Continued)

14	Your selection is outside of the legal range. (APEER 14) Either a number was entered when an alphabetic was expected, or an alphabetic was entered when a numeric was expected, or a number outside the permissible range was used.
15	Command may not be executed by a local user. (APERR 15) This command is a valid AP command, but is intended for use form the remote support modem port only. No action is required.
16	Expecting "S" or "M" (APERR 16) The only permissible input is the single letter S or M in upper or lower case.
20	SE failed: OS did not respond (check OS vs AP configurations). (APERR 20) The modem connection failed when the SE command was entered. The OS may not be fully booted yet, or the AP configuration is wrong, or the OS sees the port protocol as BELL while the AP sees it as CCITT. Check the modem port configuration or re-boot the OS.
21	Fatal error: POW_ON never came back. Waiting until it's reasserted... (APERR 21) The AP tried to de-assert the POW_ON signal, but does not see it as de-asserted. Replace the core I/O card.
22	Timeout error on NVM. (APERR 22) The NVM chip did not become ready within the specified time period. Replace the core I/o card.

Core I/O Card Status LEDs

The Core I/O cards have LED status indicators on the bulkheads. Figures 3-2, 3-3, and 3-4 show the names and locations 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 this section.

HP 9000 Core I/O

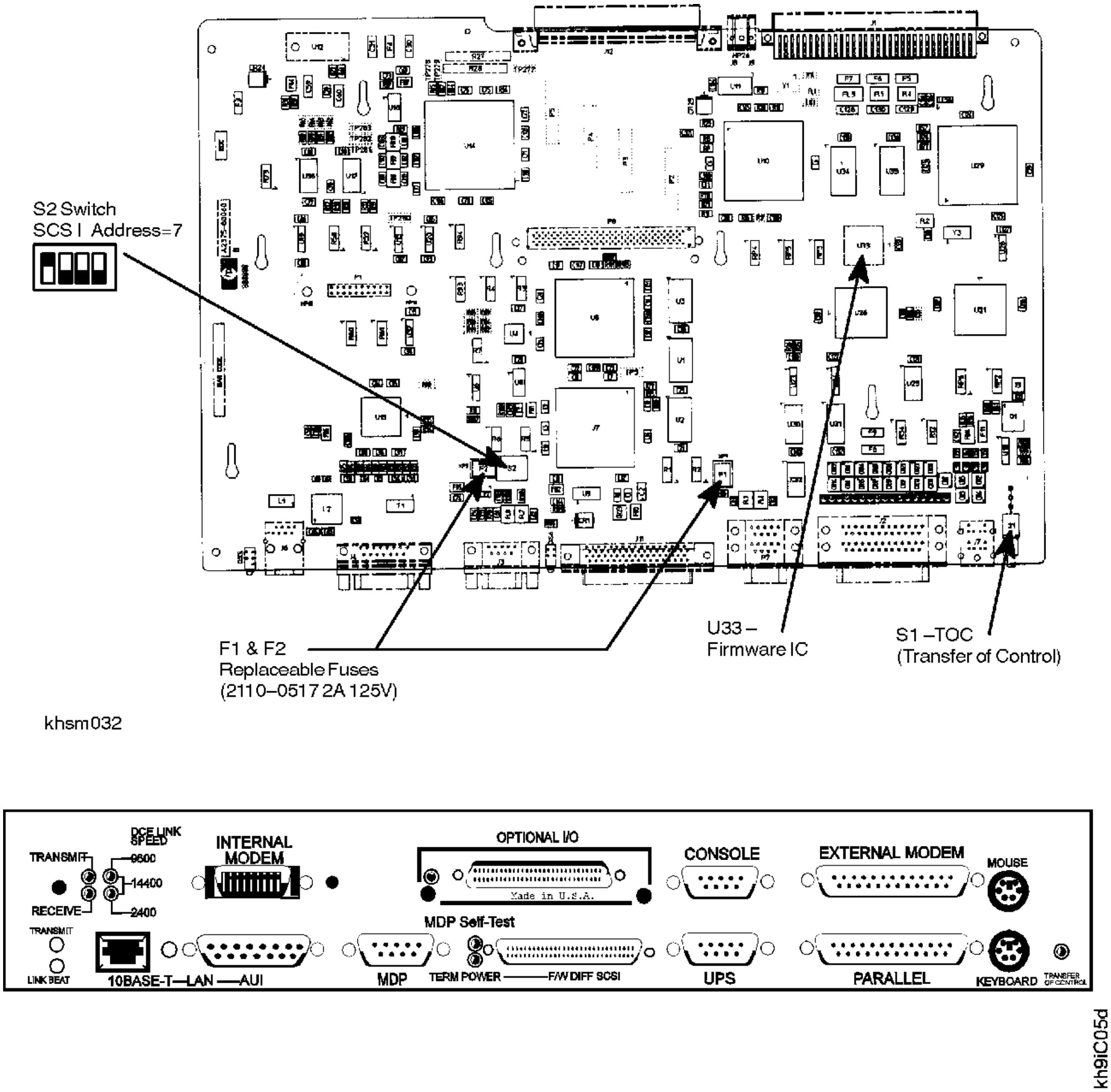


Figure 3-2. HP 9000 Core I/O Card

The Core I/O card for the HP9000 Kx50/Kx60/Kx70/Kx800 and HP VISUALIZE workstation models (see Figure 3-3) has a slightly different appearance, due to the addition of headset and microphone jacks for multimedia capability.

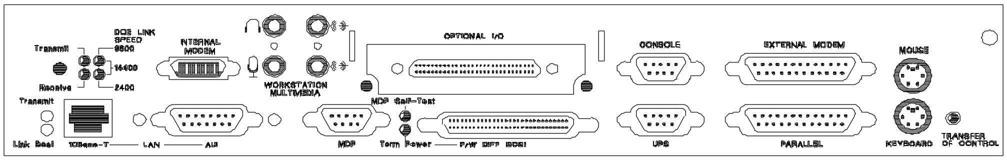


Figure 3-3. HP9000 Core I/O Card with Multimedia Jacks

The following informational blocks present the LED indicators of the HP 9000 Core I/O card shown in Figure 3-2 and Figure 3-3.

Internal Modem LEDs	Data Activity
Transmit	If blinking (or on) data is being transmitted
Receive	If blinking (or on) data is being received

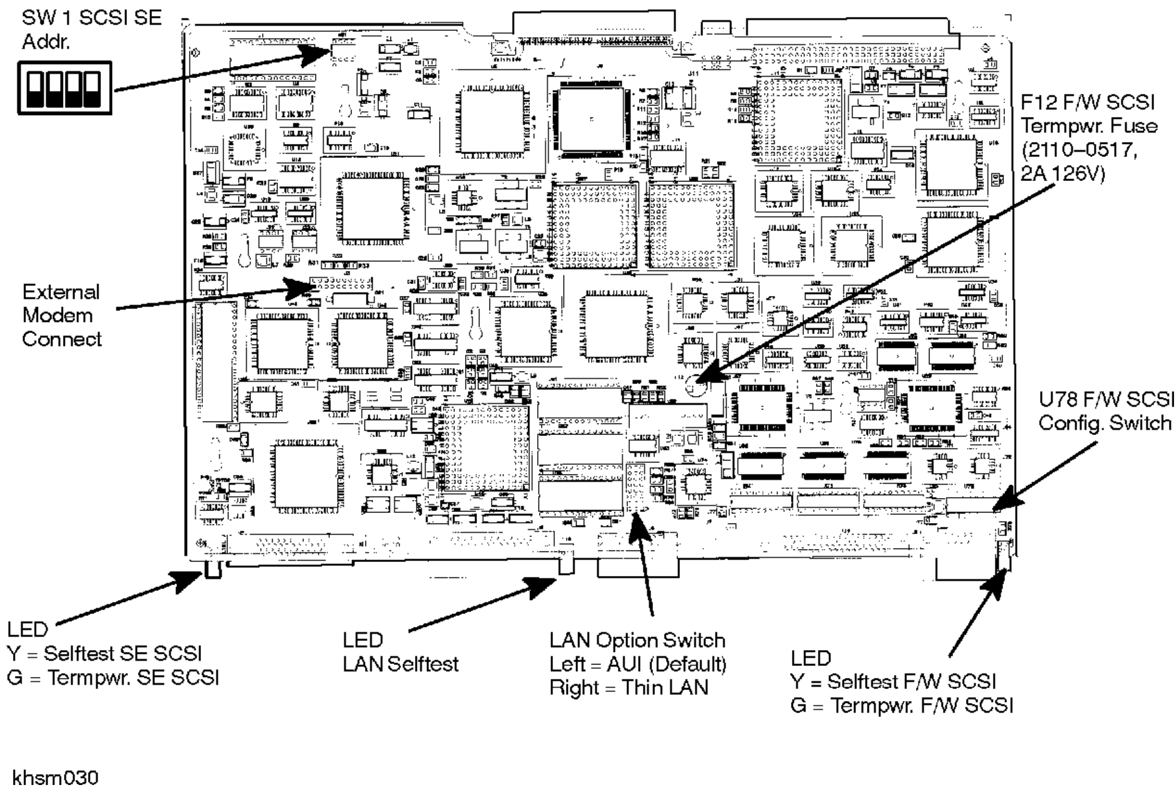
	DCE Link Speed			
Internal Modem LEDs	14400 bps	9600 bps	2400 bps	Other speed or no connect
9600	ON	ON	OFF	OFF
2400	ON	OFF	ON	OFF

LAN LEDs	Description	Function
Link Beat	Receive LED	Indicates receive status of 10 Base-T or AUI port. Turns on to indicate reception. Blinks at a rate dependent on the level of receive activity.
Transmit	Transmit LED	Indicates transmit status of 10 Base-T or AUI port. Turns on to indicate transmission. Blinks at a rate dependent on the level of transmit activity.

MDP Selftest LED	Function
OFF	LED will go off after a successful selftest.
Blinking	LED blinks during the selftest.
ON	LED stays on during a hard reset or if selftest fails.

F/W Diff SCSI Term Power	Description
ON	Indicates that the F/W SCSI circuitry is supplying termination power.
OFF	The termination power fuse is blown, replace fuse.

HP 3000 Core I/O



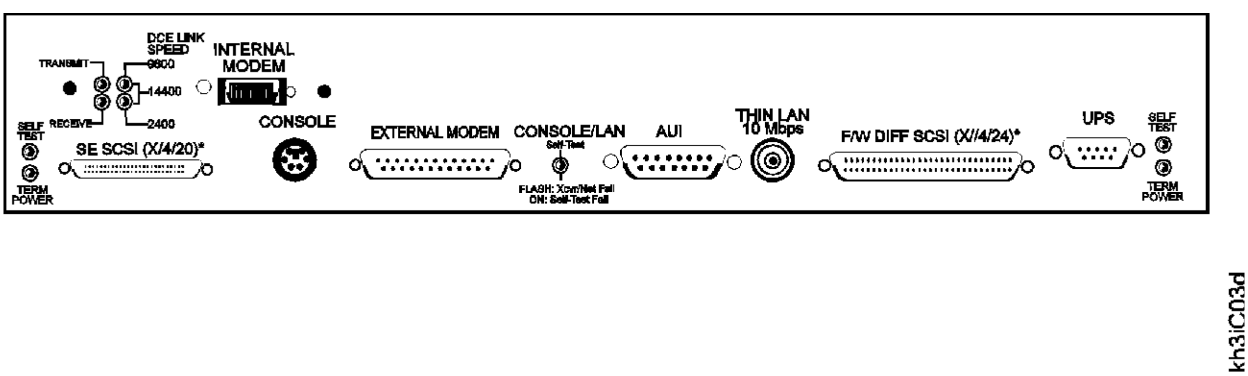


Figure 3-4. HP 3000 Core I/O

The following informational blocks present the LED indicators of the HP 3000 Core I/O card shown in Figure 3-4.

Internal Modem LEDs	Data Activity
Transmit	If blinking (or on) data is being transmitted
Receive	If blinking (or on) data is being received

	DCE Link Speed			
Internal Modem LEDs	14400 bps	9600 bps	2400 bps	Other speed or no connect
9600	ON	ON	OFF	OFF
2400	ON	OFF	ON	OFF

SE SCSI Selftest	Description
ON	SE SCSI Selftest failed.
OFF	SE SCSI Selftest passed.

SE SCSI Term Power	Description
ON	Indicates that the SE SCSI circuitry is supplying termination power.
OFF	The termination power fuse is blown. NOTE, the termpower fuse on this part of the Core I/O assembly is not field replaceable. Selftest will fail if the termpower fuse is bad.

Console/LAN Selftest	Description
ON	Console/LAN Selftest failed.
OFF	Console/LAN Selftest passed.
Blinking	LAN network error external to core I/O card.

F/W Diff SCSI Selftest	Description
ON	F/W SCSI Selftest failed.
OFF	F/W SCSI Selftest passed.

F/W Diff SCSI Term Power	Description
ON	Indicates that the F/W SCSI circuitry is supplying termination power.
OFF	The termpower fuse is blown, replace fuse. The termpower fuse on this part of the Core I/O is field replaceable. Selftest will fail if the termpower fuse is bad. (fuse part No. 2110-5017 (2A 125V))

HP 3000 Core I/O Configuration switches and Jumpers:

SW1 = SE SCSI Address = 7. This is set at the factory and sets the host adaptor address to 7 which is the highest priority on the SCSI bus.

U78 F/W SCSI Configuration Switch = This is the address, bus parity, and factory selftest configuration switch. Refer to Figure 3-5 for switch setting descriptions.

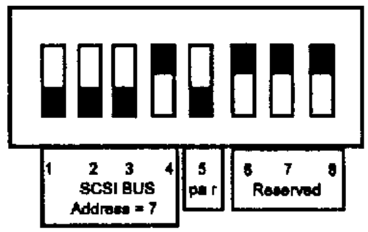


Figure 3-5. U78 Switch Settings

SCSI Address = 7 This is the default setting for positions 1 to 4.
par = SCSI bus parity checking enabled (1) or disabled (0). The default setting for switch 5 is a 1.
Reserved = Switches 6 to 8 are set to 0 and affect selftest operation if changed (manufacturing use only).

LAN Option Switch = Three rows of pins with a jumper block placed to capture all center pins plus left set of pins, or center pins plus right sets of pins, as described:

Jumper Block LEFT	AUI (Thick LAN) enabled. This is the default setting.
Jumper Block RIGHT	Thin LAN enabled.

External Modem Connect = This is the connection point for the new external modem card.

Troubleshooting LAN Problems

Table 3-14. LAN Troubleshooting Procedure

Symptom	Cause	Action
No communication over the network	Bad cable or connection	1. Check cable connections at all connection points. 2. Replace the cable between the Core I/O Card and the AUI or TP-MAU. 3. Verify LAN port configuration in the system. 4. MPE/iX only; Check the LAN Option Switch for AUI or Thin-LAN setting. 4. Call the Response Center.
	Bad LAN component	1. Run appropriate LAN diagnostic. 2. Replace indicated component. 3. Verify LAN port configuration in the system. 4. Call the Response Center.
	Unknown problem	Call the Response Center.

System Build-Up Procedure

The System Build-up Procedure is intended to help isolate a solid failure to a FRU. Start with minimum hardware and add FRUs according to chart below.

The System will display "Switch Off" on the front panel with the Key Switch set to stand-by, the Power Supply and Power Monitor installed and working, with AC power supplied.

Minimum hardware required for the System Build-Up procedure:

- System Card
- Power Supply
- Power Monitor PCA
- Front Panel

Begin with minimum hardware and install assemblies indicated in Table 3-15. on page 3-28.

NOTE

Be sure to put the computer key switch in the STANDBY position and remove the power cord before removing or installing computer components.

Table 3-15. System Build-UP Procedure

Step in procedure	Display/Console Results	Meaning
At PDC interface, set autoboot flag to ON. Power off the SPU and remove all assemblies except the system board.		
Install power supply, power monitor and display panel only.	**Proceeding to turn DC on**	At least one processor must be installed for PDC to take control of the boot process
Install CPU card in CPU slot 0.	**FLT 7200**	No SMC available
Install memory carrier with NO SIMMS	**FLT 7500**	No RAM available
Install SIMM in slot 0a on memory carrier	**FLT 7F00**	Bad SIMM pair
Install SIMM in slot 0b	**FLT A088**	No console found
Install core I/O card.	**WARN A008**	No bootable device found
Install peripheral bay.	(Operating system prompt)	Boot complete
Shut down the OS. Reboot and interrupt the boot process to stop at PDC. Set the autoboot flag to OFF.		
Power off the SPU and remove the peripheral bay.		
Reboot the system.	**INIT C440**	Initializing the stable storage console path
Type *bo pri*	**WARN 80F5** **Cannot find ENTRY_TEST** **Failed to initialize ENRTY_INIT** **Status = -7**	Boot device failed
Install the peripheral bay.	(PDC prompt)	
Type *bo pri*	(operating system prompt)	Boot complete

Soft Errors

This section provides information on Operating System (OS) soft errors that do not stop system operation. The following list are the basic steps in troubleshooting the OS failures:

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

You must determine the environment. This means observing the front panel display 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 error. Once you determine the cause of the error, you can act accordingly.

Performance Problems

Another type of soft error is performance problems. A performance problem is characterized by unusually slow response to one or more applications or user input. Some applications or user inputs may not get any response. If the system seems to have a performance problem, use the recovery procedures in Table 3-16. on page 3-29.

Table 3-16. System Performance Troubleshooting

Symptoms	**Recovery Procedure**
System responds slowly to one or more programs/users.	See if any active processes are making heavy use of computer resources. (For example, a massive compilation or a real time process.)
Other programs/users cannot seem to get a response.	Try sending an interrupt (*Control-C*) at a terminal.
System seems slow.	1. Check another terminal to verify that the problem is not just a console hang. 2. Check the memory configuration for maximum performance, especially if the memory has been recently upgraded. 3. Check CPU configuration with the **PR** command in the *Information* menu. 4. Check for excessive I-Cache LPMCs in the system (refer to *Diagnostic Tools* section). 5. Check IPRefetch configuration with the **IPR** command from the *Information* or *Configuration* menu.

Diagnostic Tools

MPE/iX or HP-UX prior to 10.20 IPR 9707

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 a list of available diagnostics in Chapter 5, *Diagnostics*. 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
LOGTOOL>	LIST LOG = Range TYPE = log type	Lists detail of specified range of logs of the specified type

System Exerciser (HP 3000 only)

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.

Other exercisers are available in a collection of tools called the Support Tool Manager. You can find out more information by referring to the *Hardware Online Tools User's Guide*.

HP-UX 10.2x or later

Refer to Chapter 5, *Diagnostics*.

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 Media. 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 a list of available diagnostics in *Chapter 5 Diagnostics*. 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.

MPE/iX System Hang

Table 3-17. on page 3-31 lists the symptoms and the recovery procedure for MPE/iX system hangs.

Table 3-17. MPE/iX System Hang Troubleshooting

Symptoms	Recovery Procedure
The machine is running, but no one can access the system.	1. Soft boot 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.) 2. Perform a memory dump. 3. Restart the system as soon as the dump is finished. 4. Have the memory dump analyzed.
The system console may or may not be hung.	
The Control-A ("=" prompt) may or may not be functioning.	
The hex display typically displays one of two possible states: 1. F0FF/FFFF (the hex display alternates between F0FF and FFFF), 2. FAFF/FFFF (the hex display alternates between FAFF and FFFF).	

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 Key Switch 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.

MPE/iX 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 that begins with a "Bx00" distinguishes it from the Bx07 (**system halt 7)** code of a system abort. Use the procedures in Table 3-18. on page 3-32 to resolve the problem.

Table 3-18. Monitor Halt Troubleshooting

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

MPE/iX System Abort

A system abort is a condition experienced by the 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 3-19. on page 3-32 to resolve the problem.

Table 3-19. System Abort Troubleshooting

Symptoms	**Recovery Procedure**
System halts ("System Halt 7" message).	1. Record entire system abort message on console.
All user activity stops.	2. Record the sequence of 4 digit codes at bottom of console display. (Press *Control-B* first.)
System abort message on console (usually).	3. Perform a memory dump.
Sequence of 4 digit codes at bottom of console display. (Press *Control-B* first.)	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.

HP-UX System Hang

Use the recovery procedure in Table 3-20. to resolve the problem.

Table 3-20. HP-UX System Hang Troubleshooting

Symptoms	Recovery Procedure
The machine is running, but no one can access the system. 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. 2. If the computer is really hung, perform a soft boot on the machine by issuing a *TC* command. (Do NOT use the *RS* command if possible; *RS* may destroy important troubleshooting information.) 3. Save the memory dump file (should be automatic) and call the HP Response Center to have it analyzed.

Performing a Memory Dump

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

MPE/iX Memory Dump 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 Detailed Procedures

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*. 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 auto-boot 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 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. 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

3. Then retry the DAT command. 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. 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 **/var/adm/crash** directory on disk.

Specifically, the **/etc/rc.log** bootup script runs *savecore* (1M), the command for saving the core file and the **/stand/vmunix** file to disk. By default, the */etc/rc.log* script specifies the target directory as **/var/adm/crash**.

The two files copied by *savecore* are named:

- **vmunix.n** (a copy of the original kernel, **/stand**)
- **vmcore.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.log** script.
- The directory in which *savecore* has been told to put the crash file does not exist. By default this directory is **/var/adm/crash**.

> **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 may not be useful for troubleshooting a specific problem.

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.log** 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 /var/adm/crash      /* assuming /tmp has enough space */
# cd /var/adm/crash
# /sbin/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.

4

Front Panel Display Codes

This chapter is a collection of PDC Chassis codes and error codes that can be displayed on the system console and the front panel LCD display located on the SPU cabinet.

PDC Chassis Codes

This section lists the PDC chassis display codes. The display codes are listed in numerical order and by SPU function. The first column contains the *ostat* or operating state of the computer. The ostat values are: OFF, FLT (fault), TEST, INIT (initialize), SHUT (shutdown), WARN (warning), RUN, and ALL.

The *Code* consists of four hex digits (D0, D1, D2, and D3). D0 is considered the Major Code Category. The Categories are 0 through F and are defined as follows:

Table 4-1. Major Code Category definitions

0	Reserved
1	Interrupts, Selftests, Diagnostics, and Boot codes
2	Cache (selftests and diagnostics)
3	Processor Dependent Hardware (PDH)
4	Late Selftests
5	Bus Transactions
6	Reserved
7	Memory Subsystem Faults and PDCE_HPMC Memory Faults
8	I/O Device Faults
9	Console Initialization Errors
A	Boot Device Initialization Errors
B	Operating System Panic (OS)
C	System Initialization (Processor, Memory, Monarch Extended Selftest, console, Boot device and IPL for primary path, Boot device and IPL for all other paths, TOC, LPMC, HPMC, Slave CPU, Bus) Codes
D	Shutdown Codes (OS)
E	Warning Codes (OS)
F	Run Codes (OS)

NOTE

For all fault codes listed within the majority codes, refer to Chapter 3 Troubleshooting, for the appropriate procedure or action to perform.

Major Code Category 1

Interrupts, Selftests, Diagnostics, and Boot Codes

Table 4-2. Major Code 1, Interrupt

Ostat	Code	**Description** (Where x = Processor Memory bus slot number) Descriptions preceded by an asterisk are applicable only for the following systems: HP 9000 K250/K260/K450/K460/Kx70, HP VISUAL-IZE K260-EG/K460-EG/K460-XP, and HP 3000 979KS.
FLT	1x01	HPMC
FLT	1x02	UNUSED
FLT	1x03	Recovery counter trap
FLT	1x04	External interrupt
FLT	1x05	LPMC
FLT	1x06	ITLB page fault
FLT	1x07	Instruction memory protection trap
FLT	1x08	Illegal instruction trap or missing/faulty crystal
FLT	1x09	Break instruction trap or missing/faulty crystal
FLT	1x0A	Privileged operation trap
FLT	1x0B	Privileged register trap
FLT	1x0C	Overflow trap
FLT	1x0D	Conditional trap
FLT	1x0E	Assist exception trap
FLT	1x0F	DTLB miss/page fault
FLT	1x10	Non-access ITLB fault
FLT	1x11	Non-access DTLD/page fault
FLT	1x12	Data memory protection trap or unalign data reference trap
FLT	1x13	Data memory break trap
FLT	1x14	TLB dirty bit trap
FLT	1x15	Page reference trap
FLT	1x16	Assist emulation trap
FLT	1x17	Higher-privilege transfer trap
FLT	1x18	Lower-privilege transfer trap
FLT	1x19	Taken branch trap
FLT	1x1A	Data memory access rights trap
FLT	1x1B	Data memory protection ID trap
FLT	1x1C	Unaligned data reference trap

Table 4-3. Major Code 1, Selftests and Diagnostics

Ostat	Code	**Description** (Where x = CPU number) Descriptions preceded by an asterisk are applicable only for the following systems: HP 9000 K250/K260/K450/K460/ Kx70, HP VISUAL-IZE K260-EG/K460-EG/K460-XP, and HP 3000 979KS.
TEST	1x20	Starting CPU basic selftest
TEST	1x21	Starting CPU ALU selftest
TEST	1x22	Starting CPU branch selftest
TEST	1x23	Starting CPU arithmetic condition selftest
TEST	1x24	Starting CPU bit operation selftest
TEST	1x25	Starting CPU control register selftest
TEST	1x26	Starting CPU external interrupt selftest
TEST	1x27	Starting CPU Itimer selftest
TEST	1x28	Starting CPU Multimedia selftest
TEST	1x29	Starting CPU Shadow register selftest
TEST	1x2A	Starting CPU Diagnose register selftest
TEST	1x2B	Starting CPU Remote Diagnose register selftest
TEST	1x2C	Starting CPU Bypass selftest
TEST	1x30	Starting early selftest
TEST	1x3E	Exiting early selftest
TEST	1x40	Starting CPU basic selftest
TEST	1x49	Starting CPU ALU selftest
TEST	1x51	Starting CPU branch selftest
TEST	1x59	Starting CPU side effect selftest
TEST	1x67	Starting CPU arithmetic condition selftest
TEST	1x76	Starting CPU bit operation selftest
TEST	1078	CPU SAR selftest
TEST	107A	Starting CPU extract/deposit selftest
TEST	1081	Starting CPU branch on bit selftest
TEST	1x84	Starting CPU control register selftest
TEST	1x8B	Starting CPU external interrupt selftest
TEST	1x8E	Starting CPU interval time selftest
TEST	1x94	Starting CPU shadow register selftest
TEST	1x98	Starting CPU diagnostics register selftest
TEST	1xA0	Starting Coprocessor selftest
TEST	10B0	TLB initialization test
TEST	1xA1	Starting COPROC register selftest
TEST	1xA2	Starting COPROC instruction selftest
TEST	1xA3	Starting COPROC traps selftest
TEST	1xA4	Starting COPROC miscellareous selftest

Table 4-3. Major Code 1, Selftests and Diagnostics (Continued)

Ostat	**Code**	**Description** (Where x = CPU number) Descriptions preceded by an asterisk are applicable only for the following systems: HP 9000 K250/K260/K450/K460/Kx70, HP VISUAL-IZE K260-EG/K460-EG/K460-XP, and HP 3000 979KS.
TEST	1xA5	Starting COPROC Bypass selftest
TEST	10B1	TLB RAM test
TEST	10B2	TLB translation/protection/access rights test
WARN	1x31	Early selftest skipped
WARN	1xAF	FPUs are disabled
WARN	1x4*y*	RDR selftest failure, *y*=rdr number
WARN	1x61	Starting CPU carry/borrow selftest
INIT	1x3C	Initialize the CPU
INIT	1xBC	Finished test for matching CPU speeds
FLT	1x20	CPU basic selftest failure
FLT	1x21	CPU ALU selftest failure
FLT	1x22	CPU branch selftest failure
FLT	1x23	CPU arithmetic condition selftest failure
FLT	1x24	CPU bit operation selftest failure
FLT	1x25	CPU control register selftest failure
FLT	1x26	CPU external interrupt selftest failure
FLT	1x27	CPU Itimer selftest failure
FLT	1x28	CPU Multimedia selftest failure
FLT	1x29	CPU Shadow register selftest failure
FLT	1x2A	CPU Diagnose register selftest failure
FLT	1x2B	CPU Remote Diagnose register selftest failure
FLT	1x2C	CPU Bypass selftest failure
FLT	1x32	Bad CPU test mode
FLT	1x3F	Cache load fault
FLT	1x40 - 1048	CPU basic selftest failure
FLT	1x49 - 1050	CPU ALU selftest failure
FLT	1x51 - 1058	CPU branch selftest failure
FLT	1x59 - 105A	CPU side effect selftest failure
FLT	1x61 - 1066	CPU carry/borrow selftest fault
FLT	1x67 - 1075	CPU arithmetic condition selftest fault
FLT	1x76 - 1077	CPU bit operation selftest fault
FLT	1x78 - 1x79	CPU SAR selftest fault
FLT	1x7A - 1x80	CPU extract/deposit selftest fault
FLT	1x81 - 1x83	CPU branch on bit selftest fault
FLT	1x84 - 1x89	CPU control register selftest fault

Table 4-3. Major Code 1, Selftests and Diagnostics (Continued)

Ostat	Code	**Description** (Where x = CPU number) Descriptions preceded by an asterisk are applicable only for the following systems: HP 9000 K250/K260/K450/K460/Kx70, HP VISUAL-IZE K260-EG/K460-EG/K460-XP, and HP 3000 979KS.
FLT	1x8B - 1x8D	CPU external interrupt selftest fault
FLT	1x8E - 1x93	CPU interval time selftest fault
FLT	1x94 - 1x97	CPU shadow register selftest fault
FLT	1x98 - 1x99	CPU diagnostics register fault
FLT	1xA0	CPU COPROC selftest failure
FLT	1xA1	COPROC register selftest failure
FLT	1xA2	COPROC instruction selftest failure
FLT	1xA3	COPROC traps selftest failure
FLT	1xA4	COPROC miscellareous selftest failure
FLT	1xA5	COPROC Bypass selftest failure
FLT	10B0	TLB initialization fault
FLT	10B1	TLB RAM selftest error
FLT	10B2	TLB translation selftest error

Table 4-4. Major Code 1, Boot Codes

Ostat	Code	**Description** (Where x = CPU number)
TEST	1xBC	Test for matching CPU speeds
INIT	1xBC	Finished test for CPU clock speed
INIT	1xCA	Initializing runway CPU arbitration
INIT	1xFC	Synchronizing CPUs
WARN	1xBC	Skipped test for CPU clock speed
WARN	1xC0	*PDC processors could not be loaded in memory
WARN	1xCD	CPU was deconfigured
WARN	1xCE	CPU was extinguished due to call to PDC_PROC
WARN	1xDy	Monarch (x) deconfigured slave (y)
WARN	1xEF	Selftest returned a warning
WARN	1xF*y*	Monarch(x) has stopped a non-respondinging slave(*y*)
FLT	1xBA	Bad Monarch CPU
FLT	1xBB	Bad CPU number. CPU number not 0, 1, 2, or 3.
FLT	1xBC	Failed test for matching CPU speeds (100MHz mixed with 120MHz)
FLT	1xBD	CPUs not installed in sequential order.
FLT	1xBE	*Missing load board
FLT	1xBF	Slave CPU halted due to catastrophic boot failure
FLT	1xCB	Mismatched CPU revisions
FLT	1xCC	Mismatched cache sizes

Table 4-4. Major Code 1, Boot Codes

Ostat	Code	Description (Where x = CPU number)
FLT	1xCE	CPU was stopped via PDC_PROC call
FLT	1xCF	Slave halted when selftest returned a negative code
FLT	1xDA	*Bad CPU MID
FLT	1xDF	Monarch failed dual-issue test
FLT	1xFF	Monarch Selftest returned a failure

Major Code Category 2

Table 4-5. Cache (Selftests and Diagnostics) Codes

Ostat	Code	Description (Where x = CPU number) Descriptions preceded by an asterisk are applicable only for the following systems: HP 9000 K250/K260/K450/K460/Kx70, HP VISUAL-IZE K260-EG/K460-EG/K460-XP, and HP 3000 979KS.
TEST	2x00	Starting instruction cache address line selftest
TEST	2x10	Starting instruction cache data line selftest
TEST	2x10	*Starting instruction cache address line selftest
TEST	2x1F/C/8/4	Icache Address line stest forward progress
TEST	2x20	Starting instruction cache RAM selftest
TEST	2x21/2/3	Icache RAM stest forward progress indicator
TEST	2x30	Starting instruction cache tag selftest
TEST	2040	Starting cache ierr selftest
TEST	2x50	Starting data cache address line selftest
TEST	2x60	Starting data cache data line selftest
TEST	2x60	*Starting data cache RAM selftest
TEST	2x70	Starting data cache RAM selftest
TEST	2x70	*Starting data cache DTAG selftest
TEST	2x80	Starting data cache tag selftest
TEST	2x90	Starting Cache derr selftest
TEST	2xA0	Starting PM cache selftest
TEST	2xA1	Starting PM cache RAM selftest
TEST	2xA3	Starting PM cache pointer selftest
TEST	2xA7	Starting PM cache CAM selftest
FLT	2x01 - 2x03	Instruction cache address line fault
FLT	2x11 - 2x12	Instruction cache data line fault
FLT	2x11 - 2x12	*Instruction cache address line fault
FLT	2x21 - 2x23	Instruction cache RAM fault
FLT	2x25 - 2x26	Instruction cache RAM load error

Table 4-5. Cache (Selftests and Diagnostics) Codes (Continued)

Ostat	Code	Description (Where x = CPU number) Descriptions preceded by an asterisk are applicable only for the following systems: HP 9000 K250/K260/K450/K460/Kx70, HP VISUAL-IZE K260-EG/K460-EG/K460-XP, and HP 3000 979KS.
FLT	2x30 - 2x33	Instruction cache tag fault
FLT	2030	*Dcache alt. write word 0
FLT	2x40-2x43	Cache ierr fault
FLT	2x51 - 2x53	Data cache address line fault
FLT	2x61 - 2x62	Data cache data line fault
FLT	2x61 - 2x62	*Data cache RAM data fault
FLT	2x70	*Data cache DTAG fault
FLT	2x70 - 2x73	Data cache RAM fault
FLT	2x80 - 2x83	Data cache tag fault
FLT	2x91-2x93	Cache derr fault
FLT	2xA1-2xA2	PM cache RAM selftest fault
FLT	2xA3-2xA6	PM pointer selftest failure
FLT	2xA7-2xA8	PM CAM selftest failure
FLT	20B0	HPMC data cache parity fault
FLT	20B1	HPMC data cache parity fault in tag
FLT	20B1	*HPMC data cache parity fault in even tag
FLT	20B2	HPMC data cache parity fault in word 0
FLT	20B2	*HPMC data cache parity fault in odd tag
FLT	20B3	HPMC data cache parity fault in word 1
FLT	20B3	*HPMC data cache parity fault in even data
FLT	20B4	*HPMC data cache parity fault in odd data
FLT	20C3	HPMC Instruction cache word 1 parity fault
WARN	2xCO	Instruction cache parity error
WARN	2xC1	Instruction cache tag parity error
WARN	2xC2	Instruction cache word0 parity error
WARN	2xC3	Instruction cache word1 parity error

Major Code Category 3

Table 4-6. Processor Dependent Hardware (PDH) Codes

Ostat	Code	Description (Where x = Processor Memory bus slot number) Descriptions preceded by an asterisk are applicable only for the following systems: HP 9000 K250/K260/K450/K460/Kx70, HP VISUAL-IZE K260-EG/K460-EG/K460-XP, and HP 3000 979KS.
TEST	3x00	Start checksuming the FEPROM
TEST	3x01	Testing PDH control register
TEST	3x02	Scratch RAM under test
TEST	3xBC	Test system clock setup
TEST	3xCD	Checking Stable Storage validity
INIT	3x00	FEPROM checksum correct
INIT	3x01	Initialize the PDH control register
INIT	3x02	Scratch RAM successfully initialized
INIT	3x07	Entering LDB
INIT	3xBC	Finished testing system clock
INIT	30C4	Clearing and revalidating EEPROM
INIT	3xCD	Initializing Stable Storage
WARN	3x03	Error reading stable storage, contents are invalid
WARN	3x04	Error writing to the EEPROM
WARN	3x06	Error reading EEPROM
WARN	3x1A	System Hversion in stable storage does not match the hardware
WARN	3x2A	Calculation of HVERSION failed for CPU x
WARN	3xBC	Skipped system clock test
FLT	3x00	FEPROM checksum failure
FLT	3x01	PDH control register failure
FLT	3x02	Fatal fault in scratch RAM
FLT	3x03	Fault reading stable storage and no console present
FLT	3x04	Fatal fault writing to the EEPROM
FLT	3x05	Write limit exceeded
FLT	3x06	Fatal fault reading EEPROM
FLT	3xCC	*PDH cache size bad
FLT	3xCD	Fatal error initializing Stable Storage
FLT	3x08	Invalid system board byte
FLT	3x09	Invalid system mode byte
FLT	3x0A	Invalid system MFG test byte
FLT	3xBC	Invalid system clock setup (CPU clock speed mismatch)
FLT	30F4	Number of boots exceeded 95,000

Major Code Category 4

Table 4-7. Late Selftests

Ostat	Code	Description (Where x = CPU number) Descriptions preceded by an asterisk are applicable only for the following systems: HP 9000 K250/K260/K450/K460/Kx70, HP VISUAL-IZE K260-EG/K460-EG/K460-XP, and HP 3000 979KS.
TEST	4x00	Starting late selftest
TEST	4x0E	Exiting late selftest
TEST	4010	Starting PM cache byte selftest
TEST	4x20	Starting data cache byte selftest
TEST	4x20	*Starting execution of early cpu selftest
TEST	4x21	Starting late cpu basic selftest
TEST	4x22	Starting late cpu alu selftest
TEST	4x23	Starting late cpu br selftest
TEST	4x24	Starting late arith cond selftest
TEST	4x25	Starting late cpu bit operations selftest
TEST	4x26	Starting late cpu control register selftest
TEST	4x27	Starting late cpu external interrupt selftest
TEST	4x28	Starting late cpu itimer selftest
TEST	4x29	Starting late cpu multimedia selftest
TEST	4x2A	Starting late shadow register selftest
TEST	4x2B	Starting late diagnose register selftest
TEST	4x2C	Starting late remote diagnose register selftest
TEST	4x2D	Starting late cpu register bypass selftest
TEST	4x30	Starting PM cache flush selftest
TEST	4x30	*Starting cache byte selftest
TEST	4x40	Starting data cache flush selftest
TEST	4x50	Starting Instruction cache miss selftest
TEST	4x60	Starting Data cache miss selftest
TEST	4x70	Starting dual issue selftest
TEST	4x70	*Starting data cache error circuitry selftest
TEST	4x80	Starting Dcache store queue selftest
WARN	4x01	Skipping late selftest
WARN	4x60	Data cache miss selftest warning
FLT	4x10	PM cache byte selftest fault
FLT	4x20 - 4x29	Late cpu selftest fault
FLT	4x29	Late cpu multimedia selftest failure
FLT	4x2A	Late shadow register selftest
FLT	4x2D	Late cpu bypass register selftest failure

Table 4-7. Late Selftests (Continued)

Ostat	Code	**Description** (Where x = CPU number) Descriptions preceded by an asterisk are applicable only for the following systems: HP 9000 K250/K260/K450/K460/Kx70, HP VISUAL-IZE K260-EG/K460-EG/K460-XP, and HP 3000 979KS.
FLT	4x30	PM cache flush selftest fault
FLT	4x30	*Late cache byte selftest fault
FLT	4x40 - 4x47	Data cache flush selftest fault
FLT	4x51	Instruction cache miss selftest fault
FLT	4x60 - 4x66	Data cache miss selftest fault
FLT	4x70	*Data cache error circuitry fault
FLT	4x71	Dual issue selftest fault
FLT	4x81	Data cache store queue data failure

Major Code Category 5

Table 4-8. Bus Transactions

Ostat	Code	**Description** (x = MID number and y = bus number, 0 for runway)
FLT	5xy0	Unknown bus fault
FLT	5xy1	I/O module internal fault
FLT	5xy2	Assertion of path fault detected
FLT	5xy3	Mode phase fault
FLT	5xy4	Data parity fault
FLT	5xy5	Bus protocol fault
FLT	5xy6	Failure to assert path slave ACK
FLT	5xy7	Processor Memory bus directed fault
FLT	5xy8	Processor Memory bus broad fault
FLT	5xy9	Improper access fault
FLT	5xyA	Illegal response
FLT	5xyB	Bus time-out
FLT	5xyD	HSC module failed to release the bus (one of the HSC guests hung the HSC bus and failed to get off the bus, even when the I/O Adapter asserted error L)
FLT	5xyE	Bus converter error transaction (the HP-PB adapter sends a special error transaction to the I/O adapter when it detects an error on a transaction after it has already told the HP-PB adapter the transaction completed successfully)
FLT	5xyF	TLB fault in the I/O adapter or invalid PDIR entry

Table 4-9. Processor/Memory Bus (Bus 0) Slot Identification

MID #	Description
0	Processor (CPU) slot 0
1	Processor (CPU) slot 1
2	Processor (CPU) slot 2
3	Processor (CPU) slot 3
4	IOA0 (system board)
5	IOA1(system board)
6	IOA2 (Dual Bus 4-slot HSC Expansion I/O) or CPU Slot 4
7	IOA3 (Dual Bus 4-slot HSC Expansion I/O) or CPU Slot 5

Major Code Category 7

Table 4-10. Memory Subsystem Codes

Ostat	Code	Description
FLT	7000	HPMC in the memory system
FLT	7001	Icache parity fault in memory test
FLT	7002	Dcache parity fault in memory test
FLT	7003	MSI read time-out (usually caused by reading beyond the end of memory)
FLT	7004	MSI write time-out (usually caused by writing beyond the end of memory)
FLT	7005	Processor/Memory bus parity fault
FLT	7006	Write bomb fault (Processor/Memory bus parity detected on incoming data)
FLT	7007	Memory address ECC fault
FLT	7008	Multi-bit memory fault
FLT	7009	Single bit memory fault
FLT	70FF	Unknown HPMC
FLT	7FFF	Catastrophic memory fault
FLT	7101	Master Memory Controller not responding
FLT	7102	Master Memory Controller not ready fault
FLT	7103	Master Memory Controller failed to clear
FLT	7104	Master Memory Controller sticky bits
FLT	7105	Master Memory Controller bad revision
FLT	7106	Master Memory Controller register selftest fault
FLT	7107	Master Memory Controller fault in ECC test
FLT	7200	No Slave Memory Controller available
FLT	721x	Slave Memory Controller failed, x = SMC 0-3 on memory carrier 0 x = SMC 4-7 on memory carrier 1

Table 4-10. Memory Subsystem Codes (Continued)

Ostat	Code	Description
FLT	722x	Bad Slave Memory Controller revision, x = SMC 0-3 on memory carrier 0 x = SMC 4-7 on memory carrier 1
FLT	7230	Slave Memory Controller failed to respond
FLT	7301	SIMM 0 bytes are not equal
FLT	7302	SIMM 1 bytes are not equal
FLT	7303	SIMM 0 data <> SIMM 1 data
FLT	7304	Unknown sizing compare fault
FLT	7305	Multi-bit error occurred during sizing
FLT	7306	Address test failed on bank
FLT	7307	ECC test failed on bank
FLT	7308	Single bit memory error caused HPMC
FLT	7401	No memory SIMMs installed
FLT	7402	Both EDO and STD memory SIMMs installed
FLT	7403	Address did not map to bank
FLT	7404	Address did not map to Group Configuration Table
FLT	7405	Dual issue test failed
FLT	7500	No RAM found
FLT	7501	Not enough good memory to run Operating System
FLT	7502	Not enough good memory to run Boot Console Handler
FLT	7604	No bits set in memory test status
FLT	7Fxy	x=SMC#, y=SIMM pair
WARN	7701	Using alternate memory configuration
WARN	7702	Memory not tested, initialized only
WARN	7703	SIMM loading warning
WARN	7704	RAM bus warning
WARN	7705	Good memory required to run Operating System is greater than memory size
WARN	7706	Both EDO and Standard DRAMs in system.
WARN	770F	Rev 1 Slave Memory Controller installed
TEST	C210	Memory hard reset
TEST	C220	Physical configuring memory
TEST	C230	Sizing memory banks
TEST	C240	Loading memory configuration from EEPROM
TEST	C250	Configuring memory interleave
TEST	C260	Testing memory interleave
TEST	C261	Testing first page of memory
TEST	C262	Testing dual issue
TEST	C263	Testing memory, write test
TEST	C264	Testing memory, read/write test

Table 4-10. Memory Subsystem Codes (Continued)

Ostat	Code	Description
TEST	C265	Testing memory, read test
TEST	C270	RE-interleaving memory
TEST	C280	Configure to EEPROM
TEST	C278	Configure to EEPROM
TEST	C2A0	*Flat configuration
TEST	C2B0	*Flat ROM configuration
TEST	C2E0	Memory testing done
TEST	C2C1	Memory soft reset
TEST	C2C2	Memory non destructive RAM test
WARN	7800	PDT disabled warning
FLT	7800	PDT disabled halt
WARN	7801	Overwrite single bit error with multi-bit error in PDT
WARN	7802	Duplicate PDT entry
FLT	7803	EEPROM fault while updating PDT
FLT	7804	PDT table is full
FLT	7D00	Memory fault
FLT	7D01	Icache parity error in memory test
FLT	7D02	Dcache parity error in memory test
FLT	7D03	MSI read time-out (HPMC, caused by accessing beyond the end of memory or non-responding Slave Memory Controllers)
FLT	7D04	MSI write time-out (HPMC, caused by accessing beyond the end of memory or non-responding Slave Memory Controllers)
FLT	7D05	Processor Memory bus parity fault (HPMC)
FLT	7D06	Write bomb fault (HPMC, earlier write transaction to memory had a bus parity error)
FLT	7D07	Memory address fault (HPMC)
FLT	7D08	Multi-bit memory fault (HPMC)
FLT	7D09	Single bit memory fault (HPMC)
FLT	7D0A	Address did not map to bank (HPMC)
FLT	7Fxy	x = memory carrier card number, y = SIMM pair slot number

Major Code Category 8

Table 4-11. I/O Device Fault Codes

Ostat	Code	Description
FLT	8x00	IOA RAM fault (x = IOA, 8 = IOA0, A = IOA1)
FLT	8x01	IOA TLB fault (x = IOA, 8 = IOA0, A = IOA1)
FLT	8x02	IOA DMA fault (x = IOA, 8 = IOA0, A = IOA1)
WARN	800A	Boot disk failed to spin up, retrying after waiting time specified in Boottimer
WARN	80F3	PDC IODC failed to retrieve header information
WARN	80F4	PDC IODC failed to return Entry Init
WARN	80F5	Error executing Entry Init
WARN	80F6	PDC IODC failed to return Entry I/O
WARN	80F7	Error executing Entry IO
WARN	80F8	Invalid device class, must be sequential, random, or tftp
WARN	80F9	PDC IODC failed to return Entry Test
WARN	80FA	Error executing Entry Test
WARN	80FC	Invalid device (internal PDC structure error)
FLT	802B	I/O bus overlap (usually due to graphics configuration violation)
FLT	803D	To many graphics responding to the same address
TEST	8xy0	HP-PB bus converter register selftest (x= HSC slot, y= HSC bus #)
FLT	8xy1 - 8xy4	HP-PB bus converter register faults (x= HSC slot, y= HSC bus #)
WARN	8FFF	Late I/O selftest warning
FLT	8FFF	Late I/O selftest fault

Major Code Category 9

Table 4-12. Console Initialization Errors

Ostat	Code	Description
WARN	9000	Stable storage console not found
WARN	9001	Alternate console(s) not found

Major Code Category A

Table 4-13. Boot Device Initialization Errors

Ostat	Code	Description
FLT	Ax88	No console found, unable to boot
WARN	Ax08	No bootable device found
WARN	A50F	Initialize primary path failed boot
WARN	A70F	Initialize other boot path failed
WARN	Ax0F	Retrieve path failed
WARN	AxBD	Entry Initialization returned a -8, device not ready
FLT	A0FF	Unknown launch fault (control returned from IPL)

Major Code Category B

Major code category B needs to be split into HP-UX and MPE/iX sections. The HP-UX codes listed in Table 4-13 are straight forward as code and definition. The MPE/iX codes are more complicated and need more explanation, please refer to that section for the codes and definitions.

HP-UX Category B Codes

Table 4-14. HP-UX System Panic Codes

Code	Description
B000	Kernel panic
B009	Panic dump completed (disks not fully synchronized)
B00A	Panic dump completed (disks fully synchronized)

MPE/iX Category B Codes

When the system halts, the reason for the halt can be determined from the front panel display. The MPE/iX display is composed of multiple, four digit hex codes displayed in a repeating sequence. Refer to Figure 4-1.

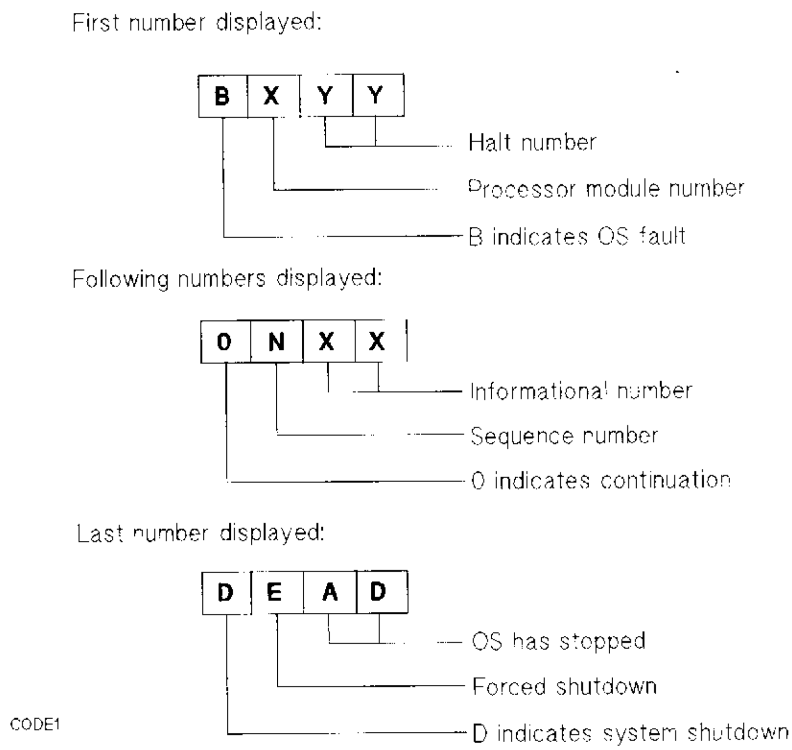


Figure 4-1. MPE/ix Code Display Description

The two original halt codes are B000 (for Monitor Halt) and B007 (for System Abort). In the following numbers displayed portion, N in Figure 4-1, is a sequence number, so that all informational numbers in a sequence can be added together to obtain the number equaling definition for the halt. Those number are found in Tables 4-14 and 4-15.

Table 4-15. MPE/iX B000 Halt Codes

Code	Description
0001 to 0019	The breaker handler to remote data base was re-entered
0020	A breaker 0 instruction was encountered without R
0021	An unknown HPMC occurred
0022	A non recoverable LPMC occurred
0028	Reinitialize IODC failed to read entry init
0029	Reinitialize IODC failed to read entry I/O
0030	Image larger than first memory controller
0031	Series 800 processor will not function in a Series 900 system
003E	A non recoverable branch taken or break trap occurred
003F	A bad instruction received from remote data base
0040	A configured module was lost on power fail
0041	A bus converter was lost on power fail

Table 4-15. MPE/iX B000 Halt Codes (Continued)

Code	Description
0042	A bus converter was added on power fail
0043	Memory was added on power fail
0044	A module was added on power fail and generated an address conflict
0045	memory selftest failed in map-system-state
0046 to 004E	Error on call to entry-init in reinit-iodc (error return number is 0x50)
005B to 005F	The parallel card driver (RDB communications) encountered something that it could not interpret
0066 to 006E	Error on call to entry-io in console-read or console-write (error return number is 0x50)
0080 to 0099	A trap that neither RDB or MPE/iX could interpret occurred (080n is the hex trap number)
00A0	Bad TSTAT in write to disk for expanded taken branch
00A1	Write failure in expanded taken branch logging
00A2	Expanded taken branch logging caused lost disk I/O
00B0	A bad command was received in the MP RDB handler
00B1	The MP RDB handler semaphore was not owned by a sender
00F1	Non recoverable instruction TLB error
00F2	Non recoverable data TLB error
00F3	Non recoverable bus address error
00F4	Non recoverable bus error on I/O space read
00F5	Non recoverable bus error on memory read or write
00F6	Non recoverable bus error on I/O space write
00F7	Non recoverable bus error with processor slave
00F8	Non recoverable cache tag error
00F9	Non recoverable data cache error
00FA	Non recoverable assist coprocessor error
00FB	Non recoverable instruction cache error
0300	A critical HPMC occurred
0301	Bad state prevented HPMC recovery
0302	bad reserved bits prevented HPMC recovery
0303	HPMC handling corrupted the real mode stack
0321	Cache data was corrupted and cannot be located
0322	Cache data for a known address was corrupted
0340	A bus error resulted in an HPMC
0361	A coprocessor other than 0 asserted HPMC
0362	An SFU asserted HPMC
03A1	The TLB is non functional

Table 4-16. MPE/iX B007 Halt Codes

Hex Code Range	Decimal Range	OS Module Error
0000 to 0013	00 to 19	Genesis
0032 to 0045	50 to 69	Configuration of genesis
0046 to 0063	70 to 99	Soft dump
0064 to 00C7	100 to 199	Start
00C8 to 018F	200 to 399	Update/Install
01C2 to 01D5	450 to 469	Job/Session
01F4 to 0212	500 to 530	Storage management
0258 to 02BB	600 to 699	File system
02BC to 0383	700 to 899	Network manager ports
0384 to 03B5	900 to 949	High level I/O
03E8 to 0513	1000 to 1299	Memory manager
0514 to 0527	1300 to 1319	Switch
0528 to 053B	1320 to 1339	Clocks
053C to 054F	1340 to 1359	Traps
0550 to 0559	1360 to 1369	Support management and VSM
0564 to 056D	1380 to 1389	External INT handler
0578 to 0581	1400 to 1409	IOSERV
0582 to 058B	1410 to 1419	System logging
058C to 0595	1420 to 1429	Table management
05AA to 05DB	1450 to 1499	Process management
05DC to 0671	1500 to 1649	Dispatcher
06A4 to 07CF	1700 to 1999	Virtual space management
07D0 to 0833	2000 to 2099	SEC storage management
0834 to 08C9	2100 to 2249	Transaction management
0960 to 09F5	2400 to 2549	CM ports
09F6 to 09FE	2550 to 2558	CM support
09FF	2559	CM fatal
0A00 to 0A13	2560 to 2579	CM stack size management
0A14 to 0A27	2580 to 2599	CM object management
0A8C to 0A95	2700 to 2709	Command interpreter
0AF0 to 0B53	2800 to 2899	Break
0B54 to 0BB7	2900 to 2999	Turbo image
0BB8 to 0BC1	3000 to 3009	QA testing
0BCC to 0BD5	3020 to 3029	Network interface
0BE0 to 0BE9	3040 to 3049	Internet protocol

Table 4-16. MPE/iX B007 Halt Codes (Continued)

Hex Code Range	Decimal Range	OS Module Error
0BF4 to 0BFD	3060 to 3069	Mapping table
0C08 to 0C11	3080 to 3089	Transmission protocol
0C12 to 0C1B	3090 to 3099	Buffer manager
0FA0 to 1387	4000 to 4999	NS transport modules
1388 to 13EC	5000 to 5100	Bug cache

Major Code Category C

Table 4-17. PDC Initialization Codes

Ostat	Code	Description
INIT	C10x	Starting the monarch processor selection
INIT	C200	Starting memory configuration
INIT	C201	Starting the destructive memory initialization
INIT	C202	Starting the non-destructive memory initialization
INIT	C20F	RAM configuration forward progress indicator
INIT	C300	Monarch is executing extended selftests
INIT	C30C	Monarch slave check, making sure slaves responded
TEST	C3AA	Monarch slave test
TEST	C3EE	Monarch slave test ended
TEST	C3FF	Late monarch test ended
INIT	C400	Retrieving the stable storage console path
INIT	C440	Initializing the stable storage console path
INIT	C4CC	Initialize close console
INIT	C4CD	Close console not found
INIT	C4CF	Found the close console
INIT	C500	Retrieving the primary boot path from stable storage
INIT	C540	Initialize primary path
INIT	C550	Execute entry test for primary boot path
INIT	C580	Load IPL primary path
WARN	C5F0	Primary IPL warning
FLT	C5F0	Primary IPL fault
WARN	C5F1	Primary IPL address warning, bad IPL address in LIF header
WARN	C5F2	Primary LIF warning, bad magic number on LIF volume
WARN	C5F3	Primary IPL size warning, bad IPL size in LIF header
WARN	C5F4	Primary IPL entry warning, bad IPL entry point in LIF header
WARN	C5F8	Primary IPL checksum warning
INIT	C5FF	Branching to IPL on stable storage boot device

Table 4-17. PDC Initialization Codes (Continued)

Ostat	Code	Description
INIT	C600	Retrieving the default console path
INIT	C601	Get graphics console path
INIT	C602	Get keyboard console path
INIT	C603	Get mfg SS console path
INIT	C640	Initialize default console path
INIT	C641	Initialize graphics console
INIT	C642	Initialize keyboard console
INIT	C643	Initialize the mfg SS console path
INIT	C700	Get manufacturing defaults
INIT	C740	Initialize a non-primary boot path
INIT	C750	Execute entry test for a non-primary boot path
INIT	C780	Loading IPL from a non-primary boot path
INIT	C7F0	An error occurred reading IPL
INIT	C7F1	LIF file address is not 2K byte aligned or it is zero
INIT	C7F2	LIF file not present on media, bad magic
INIT	C7F3	LIF file is not a multiple of 2K bytes, is zero, or is greater than 256K bytes
INIT	C7F4	LIF file entry point is not word aligned or is greater than or equal to the size
INIT	C7F8	The arithmetic sum of the words in IPL <> 0
INIT	C7FF	Branching to IPL from a non-primary boot device
INIT	CB00	Transfer Of Control initiated
WARN	C7F0	Error reading IPL
WARN	C7F1	LIF file address is not 2K byte aligned or it is zero
WARN	C7F2	LIF file not present on media
WARN	C7F3	LIF file is not a multiple of 2K bytes, is zero, or is greater than 256K bytes
WARN	C7F4	LIF file entry point is not word-aligned or is >= the size of the file
WARN	C7F8	IPL checksum error.
WARN	CB01	No Operating System TOC vector found
WARN	CB02	Invalid OS TOC vector
WARN	CB03	Invalid OS TOC code
WARN	CB04	Invalid OS TOC code length
WARN	CB05	Invalid checksum for OS TOC code
WARN	CB0A	Previous TOC PIM logged, current TOC PIM data is lost
INIT	CB0B	Branching to OS TOC handler
WARN	CB0C	Branch to OS TOC failed
WARN	CB10	*LPMC handling initiated
WARN	CB15	Central bus LPMC error
INIT	CB1B	Branching to OS_LPMC handler
FLT	CB1F	Branching to OS LPMC failed

Table 4-17. PDC Initialization Codes (Continued)

Ostat	Code	Description
FLT	CBF0	High Priority Machine Check occurred
FLT	CBF1	OS did not replace PDC IVA
FLT	CBF2	Invalid length for OS HPMC code
FLT	CBF3	Invalid address for OS HPMC code
FLT	CBF4	Invalid checksum for OS HPMC code
FLT	CBF5	IVA + 32 was equal to zero
INIT	CBF7	PDC_IO initialization started
INIT	CBF8	PDC_IO initialization completed
WARN	CBF9	PDCE_HPMC or PDC_IO found unconfigured IOA or bus converter
WARN	CBFA	Previous HPMC PIM logged, current HPMC can not be logged
FLT	CBFB	Branching to the OS HPMC handler
FLT	CBFC	Branch to OS HPMC failed
FLT	CBFD	Fault occurred for unknown reason
FLT	CBFE	HPMC interrupted a TOC
FLT	CBFF	Nested HPMC occurred
INIT	CC0x	Operating System rendezvous, Where x = CPU slot
INIT	CC1x	Early CPU rendezvous, Where x = CPU slot
INIT	CC2x	CPU rendezvous, Where x = CPU slot
INIT	CC3x	Cache CPU rendezvous, Where x = CPU slot
INIT	CC4x	Memory CPU rendezvous, Where x = CPU slot
FLT	CCF0	CPU slave fault
TEST	CD00	I/O Adapter test
INIT	CDxy	Indicates system found a device and is resetting it; x = bus and y = slot
TEST	CDxy	Indicates system is looking for the device; x = bus and y = slot
INIT	CD04	Initialize I/O Adapter 0; 0 = central bus and 4 = Master ID (PDC I/O)
INIT	CD05	Initialize I/O Adapter1; 0 = central bus and 5 = MasterID (PDC/I/O)
INIT	CD06	Initialize I/O Adapter 2; 0 = central bus and 6 = MasterID (PDC/I/O)
INIT	CD07	Initialize I/O Adapter 3; 0 = central bus and 7 = Master ID (PDC I/O)
INIT	CDxC	Initialize Graphics; x = HSC bus number
INIT	CDxD	(init hyperdrive) x = GSC+ bus number (graphics hyperdrive/dodger)
INIT	CDxF	(init lasi) x = GSC+ bus number
INIT	CDFF	Building the system map table
FLT	CDxy	Initialize I/O fault, x=bus number, y=slot on the bus

Table 4-18. MPE/iX ISL Boot Codes

Code	Description
CE40	MMSAVE Launched
CE41	Established 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 form volume label
CE48	Reading LIF directory
CE49	Find disk address and size of DUMPARE LIF file
CE4A	DUMPARAE found, start writing to disk
CE4B	Memory written to DUMPARAE, 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

Table 4-19. HP-UX ISL Boot Codes

Code	Description
CB00	Transfer of Control (TOC) initiated by the firmware
CEC0	HP-UX boot has been loaded and initialization begun
CED0	HP-UX boot has entered main
CED2	HP-UX boot is about to configure the I/O system
CED4	HP-UX boot is about to mount the root file system
CEDA	HP-UX boot is about to list the contents of a directory
CEDB	HP-UX boot is about to load the kernel into memory
CEDC	HP-UX boot is about to start a copy operation
CEDD	HP-UX boot is about to stop (return to Remote Data Base)
CEDE	HP-UX boot is about to return to ISL
CEDF	HP-UX boot is about to launch the kernel

Table 4-20. HP-UX System Initialization Codes

Code	Description
CEE0	Kernel was loaded and initialization has begun
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 demon
CEF8	Kernel is about to start the initialization process

Table 4-21. MPE/iX System Initialization Codes

Code	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

Major Code Category D

Table 4-22. HP-UX System Shutdown Codes

Code	Description
D000	Shutdown begun, boot () has been entered
D004	Transfer of Control (TOC) core dump begun
D010	High priority machine check (HPMC) core dump begun
D400	Shutdown in progress, returned from update (), about to wait for buffers to be flushed

Table 4-22. HP-UX System Shutdown Codes

Code	Description
D600	Shutdown in progress, busy-wait after update () has completed
D900	Shutdown completed, disks not fully synchronized
D904	TOC dump completed, disks not synchronized)
D910	HPMC completed, disks not synchronized
DA00	Shutdown completed, disks fully synchronized

Table 4-23. MPE/iX System Shutdown Codes

Code	Description
D100	Shutdown job sessions
D200	Shutdown error encountered
D300	Shutdown system processes
D400	Shutdown system managers
D500	Shutdown terminating
DA00	Shutdown complete

Major Code Category E

Table 4-24. MPE/iX Warning Codes

Code	Description
Ex40	Power warning
EA10	Mid-temperature warning
EA20	Low-temperature warning
EE80	Monitor, wait for remote power
EE81	Monitor, remote power up

Major Code Category F

Table 4-25. HP-UX and MPE/iX Run Code

Code	Description
FxnF (HP-UX)	Indicates the system is running. An F in the first and fourth digits indicates the system is running normally. The 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 n indicates the number of processors (1, 2, 3,or 4).
FxFF (MPE/iX)	Indicates the system is running. An F in the first, third, and fourth digits indicates the system is running normally.the x is an approximate percentage of process activity (times ten).

Selftest Console Display Messages

The Boot Console Handler (BCH) messages in this section pertain to memory or processor related warning messages. These messages would be displayed during the particular components selftest routine. These warnings can also be displayed on the console by issuing the **warn** command (Kx50, Kx60, and Kx70 systems)

Memory Warning Messages

There are seven possible memory warning messages that may be displayed, they are as follows:

Not enough error-free contiguous memory (GoodMem). Refer to the ME command in the INFORMATION menu, and the PDT command in the SERVICE menu for error information.

Memory page deallocation has been disabled because the Page Deallocation Table (PDT) is full. If the Boot command is disabled, a memory error was detected after the table was full. Refer to the PDT command in the SERVICE menu for error information.

Memory has been initialized, but not tested as a result of FASTBOOT being enabled. To test memory, use the FASTBOOT command in the CONFIGURATION menu and reboot the system.

> **NOTE**
>
> Some memory configurations which are valid may erroneously cause the following message to be displayed. Verify memory configuration, and if valid disregard the message. If not valid, refer to memory configuration rules and correct the problem.

Memory configuration is not optimized for performance. Refer to Appendix C of this manual for memory configuration guide lines.

An empty memory slot has been detected which should contain a SIMM. The Boot command has been disabled to prevent thermal damage. Refer to the memory configuration label for proper sequence.

Memory has been reconfigured due to a physical change or because the Page Deallocation Table (PDT) was cleared. This is for information only. No action is required.

Memory banks deallocated due to a SIMM size mismatch or a SIMM failure. Refer to the ME command in the INFORMATION menu for error information.

Processor Warning Messages

There are two possible processor warning messages that may be displayed, they are as follows:

A processor has failed selftest and has been deconfigured. Refer to the PR command in the INFORMATION menu for a list of deconfigured processors.

Processors are not installed in numerical order (0 to 5).

Boot process has been halted. Refer to PR command in the INFORMATION menu for processor configuration information.

BCH Warning Messages

When the BCH first comes up, these warning messages may be generated if problems or certain conditions are found during selftest, initialization, or specific checks done in bootstrap code.

```
WARNING:    Link to HP-PB I/O Expansion Module failed at 8/12.
            Check cables and power to Expansion Module
            then reboot machine.
```

An HP-PB Bus Converter installed in a 2- or 4-slot HSC Expansion I/O card at slot 8/12 has failed. Check the cables and seating of the HP-HSC Expansion I/O card and reboot the system.

```
WARNING:    Link to HP-PB I/O Expansion Module failed at 8/8.
            Check cables and power to Expansion Module
            then reboot machine.
```

An HP-PB Bus Converter installed in a 2- or 4-slot HSC Expansion I/O card at slot 8/8 has failed. Check the cables and seating of the HP-HSC Expansion I/O card and reboot the system.

```
WARNING:    Link to HP-PB I/O Expansion Module failed at 8/4.
            Check cables and power to Expansion Module
            then reboot machine.
```

An HP-PB Bus Converter installed in a 2- or 4-slot HSC Expansion I/O card at slot 8/4 has failed. Check the cables and seating of the HP-HSC Expansion I/O card and reboot the system.

```
WARNING:    A 4 slot HSC I/O expansion was inserted--system cannot boot.
            This computer model does not support 4 slot HSC I/O expansion.
            Remove or replace with 2 slot HSC I/O before booting.
```

Your system does not support the Dual-Bus 4-Slot HP-HSC Expansion I/O module.

```
WARNING:    A 3-D graphics card was inserted--system cannot boot.
            This computer model does not support that 3-D graphics card.
            Remove 3-D graphics card before booting.
```

3-D graphics cards are supported only in HP9000 K450/K460/Kx70/Kx80 systems.

```
WARNING:    System integrity is at risk: Selftests have been disabled.
            Enabling selftests with SER SEL ON will prevent this warning.
```

Selftests should be disabled only as needed during diagnostic testing and troubleshooting. Enter the command SER SEL ON and re-boot the system.

```
WARNING:    Memory is not configured for optimized performance due to
            an improper grouping of module types.
```

Re-sequence the memory SIMMs in accordance with Appendix C of this manual.

```
WARNING:    The processor(s) installed in this system do not match the
            Hversion value stored in EEPROM on the system board.
```

Your system board may have the wrong processors installed. Replace the system board or processors as appropriate.

```
WARNING:    Processors are not installed in numerical order (0 to 5).
            Boot process has been halted.  Refer to the  “PR “ command in
            the INFORMATION menu for processor configuration information.
```

Re-install processor boards in the correct sequence (see Chapter 7 of this manual) and re-boot the system.

WARNING: The Core I/O board or system board has failed, resulting in reduced I/O slot availability.

Use the IN IO command to verify .

WARNING: Not enough error-free contiguous memory (GoodMem). Refer to the “ME “ command in the INFORMATION menu and the “PDT “ command in the SERVICE menu for error information.

Check the PDT and replace SIMMs as necessary

Memory page deallocation has been disabled because the Page Deallocation Table (PDT) is full. If the Boot command is disabled, a memory error was detected after the table was full. Refer to the “PDT “ command in the SERVICE menu for error information.

Check the PDT and replace SIMMs as necessary.

WARNING: Memory has been initialized, but not tested as a result of FASTBOOT being enabled. To test memory, use the “FASTBOOT “ command in the Configuration menu and reboot the system.

Disable FASTBOOT by the "Fastboot OFF" command in the CONFIGURATION menu and reboot the system.

WARNING: Memory configuration is not optimized for performance. Refer to the System Installation or Memory Installation manuals for memory configuration guidelines.

Re-sequence the memory SIMMs in accordance with the referenced guidelines (also contained in Appendix C of this manual).

WARNING: An empty memory slot has been detected which should contain a SIMM. BOOT COMMAND DISABLED.

Re-sequence the memory SIMMs in accordance with the guidelines contained in Appendix C of this manual.

WARNING: Memory has been reconfigured due to a physical change or because the Page Deallocation Table (PDT) was cleared. This is for information only. No action is required.

Advisory message only.

WARNING: Memory has been deallocated due to a SIMM size mismatch or a SIMM failure. Refer to the “ME “ command in the INFORMATION menu for error information.

Verify that the SIMM pairs (0A/0B, 1A/1B, etc.) are of the same size.

WARNING: Memory is not configured for optimized performance due to an improper distribution of memory module types across extenders.

Re-sequence the memory SIMMs in accordance with the guidelines contained in Appendix C of this manual.

WARNING: A Processor has failed selftest and has been deconfigured. Refer to the “PR “ command in the INFORMATION menu for a list of deconfigured processors.

A processor failed the Floating Point Unit selftest. Replace the processor card.

Internal Modem Error Codes

Modem Error: 100

Error Message: ***ERROR - unable to access the internal modem port. (MODMERR100)

Cause: 1. The Core I/O board is defective.
Action: Replace the Core I/O board.
Cause: 2. Port 7 of the Core I/O is not mounted on the dev directory.
Action: Use SAM to mount the Core I/O board on the dev directory.

Modem Error: 104

Error Message: ***ERROR - Unsupported modem connection to port 7 of CAPMUX board. (MODMERR 104)

Cause: This utility only supports the MT1432 modem.
Action: Replace the existing modem with an MT1432 modem.

Modem Error: 108

Error Message: ***ERROR - Unable to communicate with the internal modem (MODMERR108)

Cause: The modem is defective or not installed properly.
Action: Check modem installation or replace modem.

Modem Error: 112

Error Message: ***ERROR - Unable to communicate with the modem (MODMERR112)

Cause: The modem port or modem is not properly configured.
Action: Run the port configuration test to check for proper configuration.

Modem Error: 116

Error Message: ***ERROR - EPROM checksum test failed (MODMERR116)

Cause: The modem is defective.
Action: Replace the modem.

Modem Error: 120

Error Message: ***ERROR - RAM check test failed (MODMERR120)

Cause: The modem is defective.
Action: Replace the modem.

Modem Error: 124

Error Message: ***ERROR - DSP check test failed (MODMERR124)

Cause: The modem is defective.
Action: Replace the modem.

Modem Error: 128

Error Message: ***ERROR - UART test failed (MODMERR128)

Cause: The modem is defective.
Action: Replace the modem.

Modem Error: 132

Error Message: ***ERROR - Unable to communicate with the modem, please run port configuration test (MODMERR132)

Cause: The modem port or modem is not properly configured.
Action: Run the port configuration test to check for proper configuration.

Modem Error: 136

Error Message: ***ERROR - The modem local analog loopback test failed in placing the modem in analog loop (MODMERR136)

Cause: The modem is defective.
Action: Replace the modem.

Modem Error: 140

Error Message: ***ERROR - The modem local analog loopback test failed. Character sent over___ and received___ (MODMERR140)

Cause: Data bus problem on the Core I/O board or the internal modem.
Action: No recommendation at this time.********(I need an action for this one)

Modem Error: 144

Error Message: ***ERROR - The modem local analog loopback test failed while it exits the answer mode (MODMERR144)

Cause: The modem is defective.
Action: Replace the modem.

Modem Error: 148

Error Message: ***ERROR - Unable to communicate with the modem, please run port configuration test (MODMERR148)

Cause: The modem or modem port is not properly configured.
Action: Run the port configuration test to check for proper configuration.

Modem Error: 152

Error Message: ***ERROR - Required a remote unit for test (MODMERR152)

Cause: This is a remote test, it needs a remote unit to execute.
Action: Connect to a remote unit prior to initiating this test.

Modem Error: 156

Error Message: ***ERROR - Unable to communicate with the remote unit by number ___ (MODMERR156)

Cause: Incorrect number for the remote unit.
Action: Acquire the correct number for the remote unit.

Modem Error: 160

Error Message: ***ERROR - The modem remote digital loopback test failed. Character sent over___ and received___ (MODMERR160)

Cause: The internal modem is defective, if the remote unit is known good.
Action: Replace the modem.

Modem Error: 164

Error Message: ***ERROR - The modem remote digital loopback test failed (MODMERR164)

Cause: The modem is defective.
Action: Replace the modem.

Modem Error: 168

Error Message: ***ERROR - The correct modem (MT1432) is not installed. This mode only supports the MT1432 modem (MODMERR168)

Cause: The installed modem is not supported by this utility.
Action: Replace the installed modem with an MT1432.

5

Diagnostics

This chapter provides information on the following diagnostic aids:

- Online diagnostics and utilities
- Offline diagnostics and utilities
- Procedure for booting the system from the support tape

For detailed information on the diagnostic subsystems and utilities, refer to the most current editions of the Offline Diagnostics Environment User’s Guide (HP part number 5962-3648)

Online Diagnostics and Utilities

There are two Hewlett-Packard Online Diagnostic methods available:

- Support Tools Manager
- SYSDIAG

Using the Support Tools Manager

Note
Beginning with HP-UX 10.10, the Support Tools Manager replaced SupportWave as the primary diagnostic tool.

The Support Tools Manager (STM) is a platform for online support tools currently available for HP9000 Series 700 and 800 machines.

Upon startup, you connect to a local or remote system. STM displays a map of the hardware configuration. You use this system map to select one or more devices, then run the desired tool (such as a verifier, exerciser, or expert tool) on the selected device(s). Results are displayed on the system map.

STM was first introduced in 1991 and was significantly enhanced in 1995 with HP-UX 10.10. Further enhancements were introduced in 1996 with HP-UX 10.20. More tools will be added to STM in future releases.

From your user login, you can access the Support Tools Manager while in a terminal window. If you are using HP VUE as your interface, you can also access the Support Tools Manager through **sys_admin** directory.

Three interfaces are available with the Support Tools Manager:

- A command line interface (accessed through **cstm** command).
- A menu-driven interface (accessed through the **mstm** command).
- A graphical user interface (accessed through the **xtsm** command).

For more information on Support Tools Manager user interfaces, see the online man pages for those commands.

Running STM

To start STM and run support tools:

1. Enter the command appropriate for your terminal.
   A. For X Windows terminals and workstations, enter **/usr/sbin/xstm.**
   B. For non-graphics terminals, enter **/usr/sbin/mstm** (menu-based version) or **/usr/sbin/cstm** (command-line version).
2. If you want to test a remote machine, select the computer system to test. The remote machine must be running a compatible version of STM (i.e., the version running on the system you wish to connect to must be identical to, or a later version than, the version running on the system you are connecting from).
3. Select one or more devices from the system map that is displayed.
4. Choose a support tool (for example, a verifier) to run on the selected device(s).
5. Results appear on the system map (for example, on xstm, a green icon indicates that a device successfully passed the test).
6. If the device fails, see the device Tool Failure Log for the cause of the failure and suggested actions.
7. If a test result is anything other than Successful or Failure, look at the Tool Test Activity Log for the device.

The specific steps depend on whether you are running xstm, mstm, or cstm. For example, in xstm, commands are accessed by means of pull-down menus. In mstm, you traverse menus and select commands by pressing function keys. In cstm, you enter the command name (or its abbreviated form) at the prompt.

For detailed instructions, use the STM online help system. Additional detailed information can be found at the Diagnostics and Support Tools web page at **http://hpdst41.cup.hp.com/DST.html.**

Using SYSDIAG

Note

With HP-UX 10.30 and 10.20 IPR9707 releases, STM will completely replace the sysdiag diagnostics.

To start the online diagnostics, perform the following steps:

1. Log onto the system.
2. Enter ***sysdiag*** at the prompt. SYSDIAG loads the Diagnostics User Interface (DUI).
3. Enter ***help*** to list the commands.
4. Enter ***help command_name*** to display information about any command.
5. Enter ***help diagnostic_name*** to display information about any diagnostic.
6. Enter ***help diagnostic name sections*** to display the test sections for a specific diagnostic.

7. Enter ***help diagnostic name sections=nn*** to display the commands that apply to specific test sections of a specific diagnostic.

Offline Utilities

There are two Hewlett-Packard Offline Diagnostic methods available:

- ODE-Based Diagnostics
- Support Media

Using ODE-Based Diagnostics

The HP Support Media contains Offline Diagnostic Environment (ODE) which consists of diagnostic modules for testing and verifying system operation. ODE provides the necessary functions for the user to load specified tests and interact with those tests.

ODE is an ISL utility. To boot ODE, follow these steps:

1. Invoke the ISL environment from the system disk.
2. Type **ode** after the `ISL>` prompt to invoke ODE from the LIF directory on the system disk. The prompt changes to `ODE>`.

Not all of the test modules are available on all systems. To see what test modules are available to run on this system, type **ls** at the `ODE>` prompt. The available modules include the following:

- **lasidiag** — test and verifies the core I/O functionality. The diagnostics test the SCSI interface, LAN interface, parallel interface, audio, RS-232, PS2 keyboard and mouse interface, real time clock, and the PC floppy interface and drive.

- **pdiag** — test and verifies the basic functionality of the PA7200 processor chip. This tool test the CPU, cache, TLB, and floating point functions.

- **udiag** — test and verifies the basic functionality of the PA8000 and PA 8200 processor chip. This tool test the CPU, cache, TLB, and floating point functions.

- **memtest** — test and verifies the memory arrays. If an error is detected, the diagnostic reports the memory card and its slot number that needs replacement. Memtest also provides a map of the memory configuration so that the user can identify the type of memory and its slot location.

- **update** — updates the system's Processor Dependent Code (PDC) firmware on the EEPROM.

- **mapper** — identifies the configuration of HPPA systems. It displays path, identification, and revision information, I/O components, configuration of memory controllers, processors, co-processors, cache, and TLB, as well as processor board component revisions and values of various HPPA system identifiers, revisions, and capabilities.

For further information on the vairous ODE commands and a complete listing of the command set, type **help** at the `ODE>` prompt or at the prompt of one of the test modules.

Using the Support Media

Offline utilities are available under the ISL environment. ISL based offline utilities are implemented on the support media. Some utilities are also implemented on the boot disk. When you are at the ISL> prompt, enter ***help*** to list the commands available.

The following list shows the available offline diagnostics:

COPYUTIL
CRAYON
DISKEXPT
DISKUTIL
IOTEST
MAPPER
MEMTEST
PDIAG
PERFVER
U2TEST
UPDATE

HP-UX Recovery Kernel

The recovery kernel on the support media allows you to diagnose problems when the HP-UX operating system cannot be booted from the system disk. For additional information on the use of the support media, refer to the most current version of the Support Media User's Manual.

To use the support media, the system has to have a minimum hardware configuration, as shown:

- 16 Mbytes of memory
- Console
- A removable media device

Support Media Boot

If the system has halted and cannot be booted from the system disk, you need to boot from the support media. Perform the following steps:

1. Select a media drive to boot from and determine the drives physical address.
2. Load the support media on the device and put the device online.
3. Press the system reset button and wait approximately 30 seconds.
4. If autoboot is enabled, the following display appears on the console.

Processor is starting autoboot process
To discontinue, press any key within 10 seconds

At this point, you can enter the **BO**ot **PRI** or **BO**ot **ALT** command. When the boot process is complete, the following prompt is displayed:

```
ISL> _
```

At this point, enter **help** to see which ISL utilities are available. If you want to run the mini-kernel, enter **support**. The kernel will load, taking several minutes..

> **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 login prompt appears on the System Console. Login as root. The password is **support**. After you login, the support media main menu is displayed on the console.

Support Media Main/Utilities Menus

To make a selection from the main menu, enter the alphabetic character that corresponds to the desired function, as shown:

s	Search for file
b	Reboot
l	Load a file
d	Online diagnostics
m	Display manual page for specific command
r	Recover an unbootable HP-UX system
u	Utilities
x	Exit to shell

6

Replaceable Parts

This chapter contains the listings of all the replaceable parts in the HP 3000 and HP 9000 computer systems. Table 6-1 contains the exchange assemblies and Table 6-2 contains the non-exchange assemblies. The locator numbers correspond to the call-outs in Figures 6-1, 6-2, and 6-3. Power cords are listed separately in Table 6-5 on page 6-10

Table 6-1 Exchange Assemblies

Item in Figures 6-1 through 6-5	New Assembly Part Number	Exchange Assembly Part Number	Description
Not shown	2090-0503	A4032-69001	17" Multi-sync color monitor
Not shown	2090-0328	A4033-69001	20" Multi-sync color monitor
15	A3398-60001	A3398-69001	3D Graphics Big Board (Thunder 2)
15	A3641-60018	A3641-69018	3D Graphics Big Board (Kx70))
15	A3398-60004	A3398-69004	3D Graphics Texture Map Board
5	A3024-60001	A3024-69001	A3024A 8mm Tape drive, 5Gb
6	A3058-60001	A3058-69001	F/W SCSI Disk drive, 1Gb
6	A3351-60003	A3351-69003	F/W SCSI Disk drive, 2Gb
6	A3353-60002	A3353-69002	F/W SCSI Disk drive, 4GB
6	A3629-67001	A3629-69001	F/W SCSI Disk drive, 9GB
6	C1504-67201	C1504-69201	C2478SZ DDS Tape drive, 2Gb
5	C1533-67203	C1533-69203	A3183A DDS-2 Tape drive, 4Gb
5	C1539-67201	C1539-69201	A3183A DDS-2 Tape drive, 4Gb
5	C1537-67021	C1537-69021	A3542A DDS-3 Tape drive, 12Gb
14	A3453-60010	A3453-69010	Core I/O card,HP 3000
14	A3453-60008	A3453-69108	Core I/O card, HP9000
14	A2375-69096	A2375-69196	Core I/O card, HP9000 w/ audio capability
15	A3489-60003	A3489-69003	HSC Expansion I/O, 2 slot (K2x0/K4x0)
15	A3641-60013	A3641-69013	HSC Expansion I/O, 2 slot (Kx70)
15	A3489-60002	A3489-69002	HSC Expansion I/O, 4 slot (K2x0/K4x0)
15	A3641-60005	A3641-69005	HSC Expansion I/O, 4 slot (K570)
26	A3641-60003	A3641-69003	HSC Expansion, Dual-Bus, 4 slot
3	A2375-60054	A2375-69054	Memory carrier card
4	A2579-60001	A2579-69001	Memory SIMM, 16MB
4	A2580-60001	A2580-69001	Memory SIMM, 64MB
4	A1236-60001	A1236-69001	Memory SIMM, 32MB
4	A3398-60014	A3398-69014	Memory SIMM, 128MB

Table 6-1 Exchange Assemblies (Continued)

Item in Figures 6-1 through 6-5	New Assembly Part Number	Exchange Assembly Part Number	Description
4	A3737-60001	A3737-69001	Memory SIMM, 256MB
Not shown	A2375-81801	A2375-89801	PAL chip, 8 slot (system board)
16	0950-3032	0957-0279	Power Supply, 925 VA
16	0950-3020	0957-0280	Power Supply, 1700 VA (Kx50/Kx60)
16	0950-3259	0957-0287	Power Supply, 1700 VA (Kx70)
16	0950-3317	0957-0085	Power Supply, 1700 VA (Kx80)
2	A2375-60078	A2375-69078	Processor Card, 100MHz 256KB Cache
2, 27	A2375-60055	A2375-69055	Processor Card, 120 MHz 256 KB Cache
2, 27	A3398-60002	A3398-69002	Processor Card, 120 MHz 1MB Cache
2, 27	A3261-60013	A3261-69013	Processor Card, 160 MHz 1MB Cache
2, 27	A3261-60004	A3261-69004	Processor Card, 180 MHz 1 MB Cache
2, 26, 27	A3641-60022	A3641-69022	Processor Card, 200 MHz, 2MB Cache
2, 26,27	A4837-60001	A4837-69001	Processor Card, 240 MHz, 2MB Cache
Not shown	A2375-60097	A3453-69014	System board, 4 way (K200 only)
Not shown	A3453-60098	A3453-69003	System board, 4 way (K400 or 9x9KS)
Not shown	A3453-60003	A3453-69003	System board, 4 way (K410 and K420)
Not shown	A2375-60088	A3453-69003	System board, 4 way (K410)
Not shown	A3284-60005	A3284-69105	System board, 4 way (K450 and K460)
Not shown	A3284-60010	A3284-69110	System board, 4 way (K250 and K260)
Not shown	A2373-60002	A2373-69102	Uniprocessor System board (K100 only)
Not shown	A3453-60014	A3453-69014	System board, 2 way (K210 and K220)
Not shown	A3641-60002	A3641-69002	System board, 6 way (K570)
Not shown	A3641-60017	A3641-69017	System board, 6 way (K370)
Not shown	A4837-60003	A4837-69003	System board, 6 way (K380)
Not shown	A4837-60002	A4837-69002	System board, 6 way (K580)
Not shown	A3641-60016	A3641-69106	Upper Bus Converter

Table 6-2 Non-Exchange Assemblies

Item in Figures 6-1 through 6-5	HP Part Number	Description
Power System		
1	A2375-60007	Power Monitor card
Not shown	A3641-60025	Power Monitor card (Kx70)
12	0957-0264	Power Supply fan kit (for 1700 VA power supply)
PCAs		
14, 15	A2636-66023	2D Graphics, HSC card (Artist)
14, 15	A3519-60001	2D Graphics, HSC card (Graffiti)
17	A4248-66001	Video Out Board (Thunder 2)
14	A3398-60005	Audio Board for Core I/O

Table 6-2 Non-Exchange Assemblies (Continued)

Item in Figures 6-1 through 6-5	HP Part Number	Description
13	1990-1701	Display assembly
Not shown	A2969-60001	F/W SCSI, HSC card
Not shown	A1658-62024	F/W SCSI Terminator
21	A2375-60002	Peripheral bay interconnect card
Not shown	A1658-62016	S/E SCSI Terminator
	Peripherals	
Not shown	A1658-60002	A3086A CD-ROM drive
5	A3416-60001	A3416A 4X CD-ROM drive
5	A2292-63002	A3184A 650Mb CD-ROM drive
5	A1658-60018	A3715A 12X CD-ROM drive
	Housing	
Not shown	A2375-60037	Front bezel
Not shown	A2375-60039	Front bezel, rack mount
9	A2375-40004	Left side, plastic
7	A2375-60017	Peripheral bay housing
20	A2375-40009	Rear bezel, bottom
19	A2375-40008	Rear bezel, top
10	A2375-40005	Right side, plastic
8	A2375-40006	Top Cap
	Sheet Metal	
18	5062-3343	Bulkhead, single high - HPPB
26	A3641-60008	Carrier, dual bus 4-slot HSC
15	A3641-60009	Carrier, sheetmetal, 2/4 slot HSC (Kx70)
15	A3398-60015	Carrier, sheetmetal, 2/4 slot HSC (K100/K2xx/K4xx)
15	A3641-60010	Carrier, sheetmetal, Thunder 2 Graphics (Kx70)
Not shown	A2375-60047	Chassis, rack mount
Not shown	A2375-60064	Chassis, standalone
Not shown	A3398-00019	Cover plate, processors 2 and 3
Not shown	A3641-00005	Cover plate, processors 4 and 5
Not shown	A3641-00008	Cover plate, HSC Expansion I/O (Kx70 only)
Not shown	A3453-00003	Cover plate, HSC Expansion I/O (K2x0/K4x0)
Not shown	A3453-00007	Cover plate, HP-HSC Slots
25	A3453-60015	Display, Bulkhead Assy, new
Not shown	A3453-60005	Processor/Memory cover (K2xx, K3xx,K4xx,K5xx)
Not shown	A2375-00028	Processor/Memory cover (K100)
	Cables	
Not shown	A2375-63001	Cable, display assembly
Not shown	8120-6861	EBC Adapter cable - VGA monitor
23	A2375-63004	F/W SCSI cable, internal
Not shown	24542G	HP-UX Console cable

Table 6-2 Non-Exchange Assemblies (Continued)

Item in Figures 6-1 through 6-5	HP Part Number	Description
Not shown	A1703-63003	MPE/iX Console cable
22	A2375-63003	Peripheral bay power cable
Not shown	A2375-63002	Primary power cable, for fans
24	A2375-63005	S/E SCSI cable, internal
Not shown	5061-2575	UPS data cable (RS-232)
Not shown	A2375-63006	Y power cable, for fans
Miscellaneous		
Not shown	A2375-40015	Chock block, anti-roll device
12	A3453-60016	Fan assembly
Not shown	5062-9367	NIO 2 board adapter
Not shown	A3181-82002	K class name plate
Not shown	116262126	Key, new
11	A2375-60040	Keyswitch, three position
Not shown	A2375-81401	PAL chip, 4 slot
Not shown	1813-1167	Oscillator, 45MHz (180 MHz processor)
Not shown	1813-1017	Oscillator, 60MHz[1] (120 MHz processor)
18	A2375-60032	Plastic bulkhead support - HPPB
26	A3641-40001	Processor Card Guide (upper), snap in (Kx70/Kx80)
26	A3641-40002	Processor Card Guide (lower), snap in (Kx70/Kx80)
Not shown	C2804A	Rack mount kit
Not shown	A2373-82003	Series 900 name plate

External HP-PB I/O Card Cage Replaceable Parts

Table 6-3 External HP-PB I/O Card Cage Replaceable Parts

Item in Figure 6-6	Part Number	Description
Power System		
Not shown	5062-9367	NIO 2 board adapter
1	0950-2246	Power Supply - 260W
2	1420-0656	Assembly, Battery/Fuse
8	A1824-00015	Lock, Battery
9	A1824-00014	Holder, Battery
Not shown	2110-0030	Fuse - Battery 5A/250 V (slow blow)
PCAs		
3	A1809-60129	System Power Control Module (SPCM) board
11	A1824-60002	PCA, LED
5	A1809-60017	PCA, HP-PB Backplane
Assemblies		
4	A1824-60009	Assembly, Backplane Panel
7	A1824-60011	Assembly, Shield
10	A1824-60004	Assembly, Riveted
Cables		
Not shown	8120-1396	Cable, Assy 18 AWG
Not shown	A1824-63001	Cable, A/C
Not shown	A1824-63003	Cable, Power LED
12	A1824-63005	Cable, Fan Assembly (Includes Fan — A1824-63004 replacement)
Cabinet Parts		
Not shown	A1824-60014	Bezel Kit
Not shown	A1824-80005	Label, Nameplate
6	C2786-40002	Snap for Bezel Attachment
Not shown	A1824-60015	Power Switch Assembly (order A1824-63003, listed above)

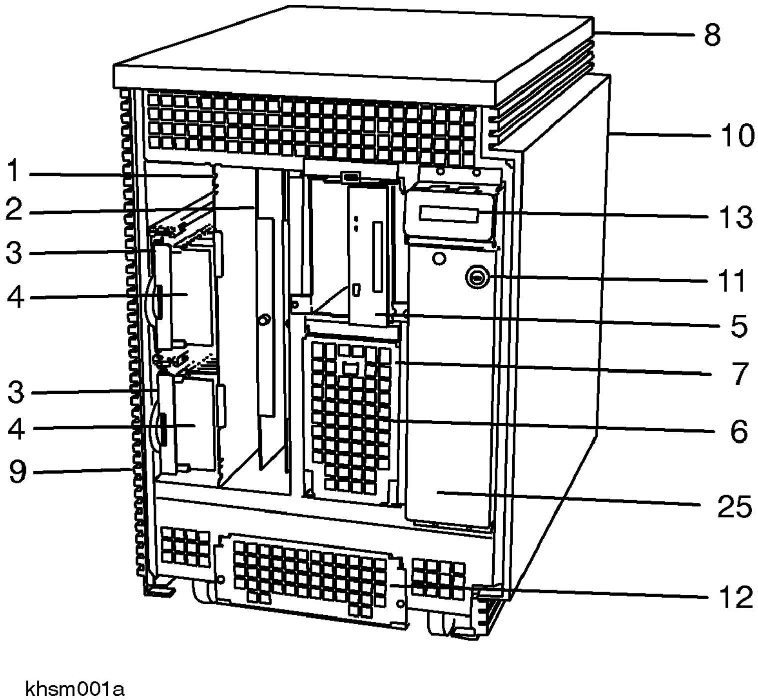


Figure 6-1. SPU Front View

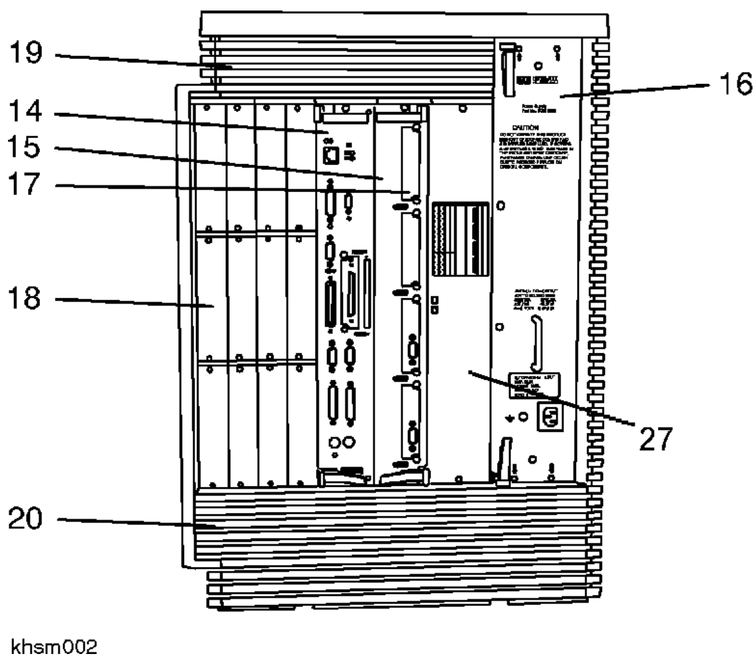


Figure 6-2. SPU Rear View

The Power Supply (callout 16) will appear slightly different for models K250/K260/K450/K460 and HP3000/979KS

Figure 6-3 shows the SPU rear view for the HP9000 Kx70/Kx80.

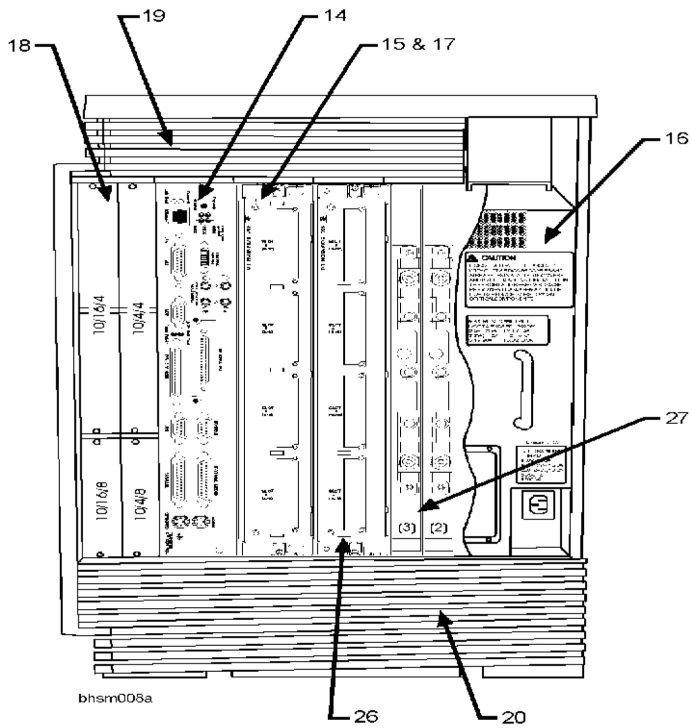


Figure 6-3. SPU Rear View — HP9000 Kx70/Kx80

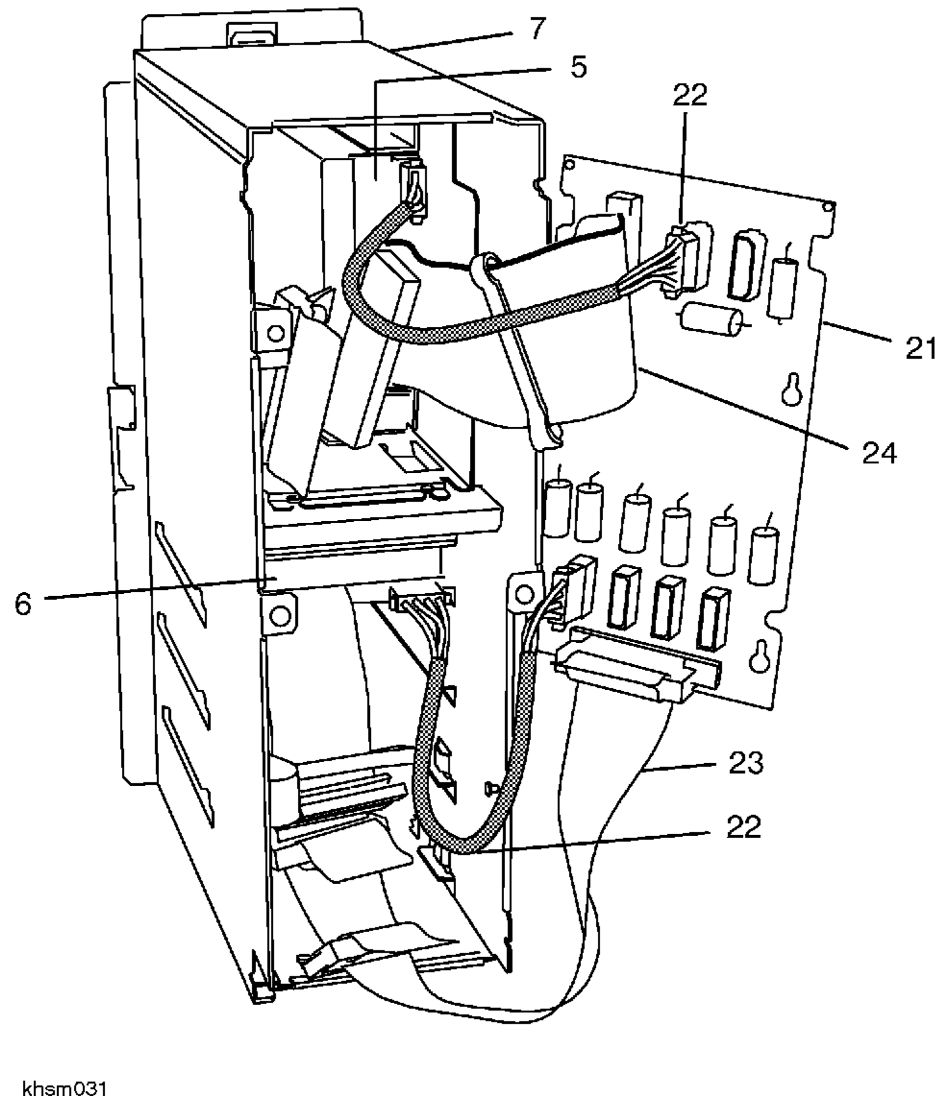


Figure 6-4. Peripheral Bay Expanded View

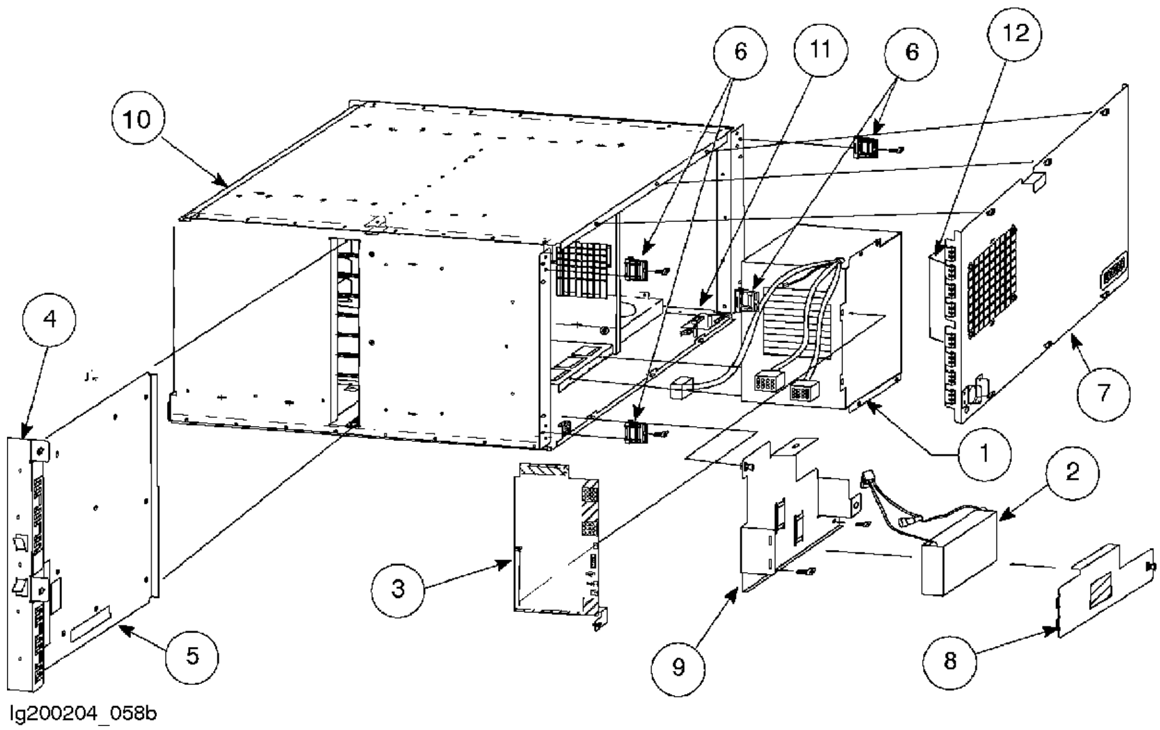


Figure 6-5. External HP-PB I/O Card Cage Parts

Table 6-4 Internal Modem and LAM Part Number

HP Part Number	Description
A2991-60022	HP Modem Card - Remote Support
A2991-60002	Line Access Module - Germany
A2991-60003	Line Access Module - France
A2991-60004	Line Access Module - Belgium
A2991-60005	Line Access Module - UK
A2991-60006	Line Access Module - Sweden
A2991-60007	Line Access Module - Norway
A2991-60008	Line Access Module - Finland
A2991-60009	Line Access Module - Denmark
A2991-60010	Line Access Module - Austria
A2991-60011	Line Access Module - Spain
A2991-60012	Line Access Module - Italy
A2991-60013	Line Access Module - Japan
A2991-60014	Line Access Module- Netherlands
A2991-60015	Line Access Module - Switzerland
A2991-60016	Line Access Module - North America.
A2991-60017	Line Access Module - Australia
A2991-60018	Line Access Module - New Zealand

Power Cords

.

Table 6-5 . Power Cords

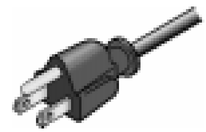
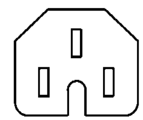
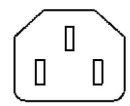
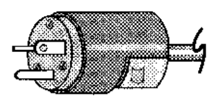
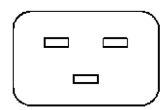
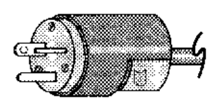
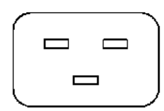
Part Number	Volt/Amp	Length	Country	Male Connector[1]	Female Connector	Remarks
8120-5337	125V 10A	2.5 m	No. Amer.	NEMA 5-15P 	 IEC 320 C15	
8120-5338	250V 10A	2.3 m	No. Amer.	NEMA 6-15P 	 IEC 320 C13	
8120-6893	120V 20A	4.5 m	No. Amer.	NEMA 6-20P 	 IEC 320 C19	Kx50/K260/K460/Kx70/ Kx80/979KS
8120-6894	20A 120V	4.5 m	No. Amer.	NEMA 5-20P 	 IEC 320 C19	Kx50/K260/K460/Kx70/ Kx80/979KS

Table 6-5 . Power Cords (Continued)

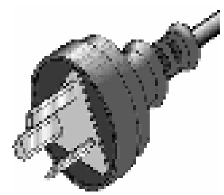
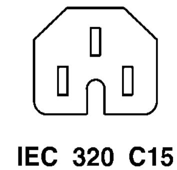
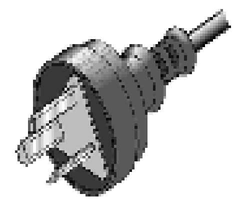
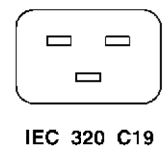
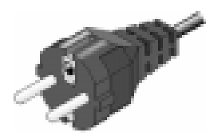
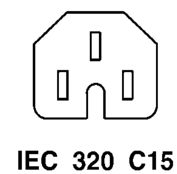
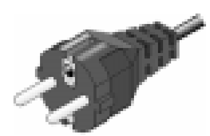
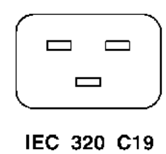
Part Number	Volt/Amp	Length	Country	Male Connector[1]	Female Connector	Remarks
8120-5335	250V 10A	2.5 m	Australia	AS-3112 		
8120-6900	240V 20A	4.5 m	Australia	AS-3112 2 		Kx50/K260/K460/Kx70/ Kx80/979KS
8120-5336	250V 10A	2.5 m	Continental Europe	CEE7 		
8120-6899	240V 20A	4.5 m	Continetal Europe	CEE7 		Kx50/K260/K460/Kx70/ Kx80/979KS

Table 6-5 . Power Cords (Continued)

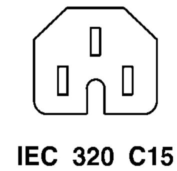
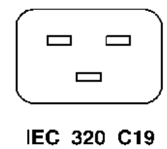
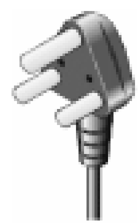
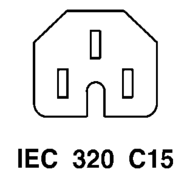
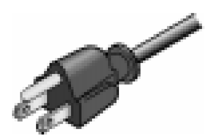
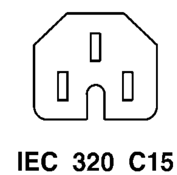
Part Number	Volt/Amp	Length	Country	Male Connector[1]	Female Connector	Remarks
8120-5340	250V 10A	2.5 m	Denmark	SR 107-2-D 	 \	
8120-6897	240V 20A	4.5 m	Denmark, Sweden	NEMA 6-30P 		Kx50/K260/K460/Kx70/ Kx80/979KS
8120-5341	250V 10A	2.5 m	India, S. Africa	IEC 83-B1 	 \	
8120-5342	125V 15A	2.5 m	Japan	JIS 8303 		

Table 6-5 . Power Cords (Continued)

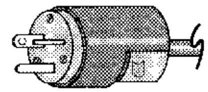
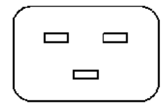
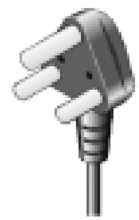
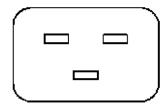
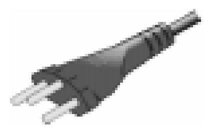
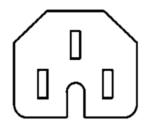
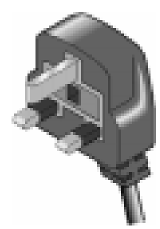
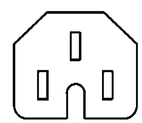
Part Number	Volt/Amp	Length	Country	Male Connector[1]	Female Connector	Remarks
8120-6902	120V 20A	4.5 m	Japan	NEMA L5-20 	 IEC 320 C19	Kx50/K260/K460/Kx70/ Kx80/979KS
8120-6896	240V 20A	4.5 m	S. Africa	Male AS-3112 	 IEC 320 C19	Kx50/K260/K460/Kx70/ Kx80/979KS
8120-5339	250V 10A	2.5 m	Switzerland	SEV Type 12 	 IEC 320 C15	
8120-5334	250V 10A	2.5 m	U.K.	BS 1363 	 IEC 320 C15	

Table 6-5 . Power Cords (Continued)

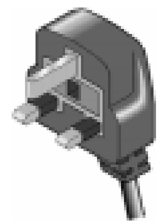
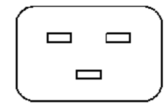
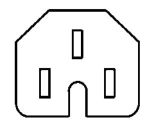
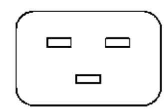
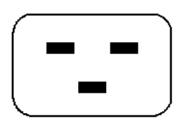
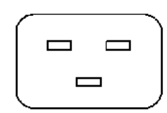
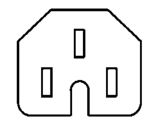
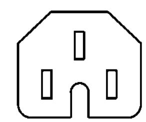
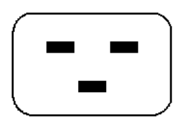
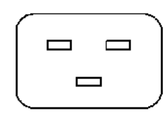
Part Number	Volt/Amp	Length	Country	Male Connector[1]	Female Connector	Remarks
8120-6898	240V 20A	4.5 m	U. K.	BS 1363 	 IEC 320 C19	Kx50/K260/K460/Kx70/ Kx80/979KS
8120-6358	250 V 15A	0.762 m		IEC320 C14	 IEC 320 C15	Cabinet PDU Convenience Cord
8120-6961	250V 20A	4.0 m		IEC 320 C20	 IEC 320 C19	SPU to UPS
8120-6884	250V 20A	2.5 m		 IEC 320 C20	 IEC 320 C19	SPU to PDU/UPS

Table 6-5 . Power Cords (Continued)

Part Number	Volt/Amp	Length	Country	Male Connector[1]	Female Connector	Remarks
8120-6371	15A	2.5 m		C16G	 IEC 320 C15	UPS Convenience Cord
8120-1625	250V 16A	8 ft		CEE22	Female CEE22	UPS Convenience Cord
8120-6366	250V 15A	5.0 m		IEC 320 C14	Female IEC 320 C13	UPS Convenience Cord
8120-6412	250V 10A	2.5 m		C16G	 IEC 320 C15	UPS Convenience Cord
8120-6961	250V 20A	4.0 m		 IEC 320 C20	 IEC 320 C19	UPS Power Output Cord

1. In Table 6-5, ". Power Cords," typical male connector configurations are shown for each of the country options. Plug jackets may vary slightly for each power cord.

7

Removal and Replacement Procedures

This chapter contains the procedures for removing and replacing all the Field Replaceable Units (FRUs) of the HP 3000/9x9KS and HP 9000/Kx00 SPUs. It also contains the removal and replacement procedures for the Rackmount Cabinets.

Preparing the SPU

Before any maintenance procedure is performed, the following steps should be taken to ensure no loss of customer data or damage to the computer system:

- Be sure the customer has done a full (or at least a data base) backup.
- Log off all users and stop all current applications.
- Perform a system shutdown.
- Put the keyswitch in the Standby position.
- Unplug the power cord from the AC outlet.

WARNING

Hazardous voltages are present inside the SPU. To prevent risk of electrical shock or energy hazard, turn the keyswitch to the standby position and disconnect the AC power cord from the AC outlet before opening the SPU. The AC power cord is the main power disconnect for the computer cabinet. Allow 10 to 15 seconds for residual voltage inside the cabinet to dissipate before accessing the inside of the SPU cabinet.

The SPU is now ready for any FRU to be removed and replaced. Be sure to have enough anti-static pads if a number of cards or components need to be removed. Observe all ESD precautions while handling the SPU components.

Tools Required

- #10 TORX head driver
- #15 TORX head driver
- Small flat blade screw driver
- Anti-static protective mats
- Grounding wrist strap

CAUTION

Handle all FRUs carefully. Dropping or otherwise jarring the FRUs will damage them. Follow ESD procedures. Always use an ESD grounding wrist strap while performing service procedures.

Note
Some new replacement boards no longer use extractor tabs. Be sure to remove the screws and clamp brackets when installing a new board without extractor tabs. Instructions are provided with the replacement boards. All new boards are provided with connector covers. Check for and remove connector covers prior to installing new boards.

Front Bezel

Removal: Refer to Figure 7-1

1. Remove the key from the keyswitch.
2. Reach under the bottom of the front bezel (each side) and press the two latch tabs (1) holding the bezel in place.
3. Pull the bottom of the front bezel away from the chassis.
4. Pull the front bezel down and away from the chassis.

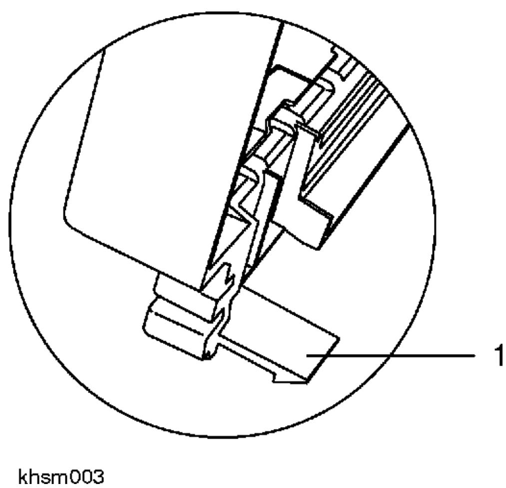


Figure 7-1 Front Bezel Tab

Replacement:

1. Angle the top of the bezel toward the chassis and slide it under the front edge of the top cap and push up.
2. Swing the bottom of the bezel to the chassis until it snaps into place.

Top Cap, Sides, and Rear Bezels

The top cap, sides and rear bezels do not have to be removed in order to access any FRUs. The top cap has to be removed before the sides can be removed. The rear bezels (one top and one bottom) can be removed without removing the top cap or sides.

Top Cap

Removal:

1. Remove the front bezel.

2. Push the front edge of the top cap toward the rear of the cabinet. Be sure to secure the SPU while pushing the top cap, or it may roll in the direction being pushed.

3. When the top cap snaps back, lift it straight up and away from the chassis.

Replacement:

1. Position the top cap over the chassis aligning the lock tabs over the key-lock slots in the top of the chassis. Lower the top cap onto the chassis.

2. Push the top cap toward the front of the cabinet until; it snaps into place. Be sure to secure the SPU while pushing the top cap, or it may roll in the direction being pushed.

3. Replace the front bezel.

Sides

Note that SPU sides are not reversible, this is due to the chassis angle on the right side of the cabinet.

Removal:

1. Remove the top cap.

2. Grasp the bottom of the side and pull straight up until alignment tabs clear the chassis slots.

3. Pull the side away from the chassis.

Replacement:

1. Position side next to chassis (parallel and slightly higher that top edge of chassis) with alignment tabs over slots in chassis.

2. Push in and down to lock side into place.

Rear Bezels

The rear bezels snap onto the chassis.

Processor Card

The HP9000/Kx70 can have up to six (2 in the front and 4 in the back) processor cards installed. The HP 3000/959KS/969KS/979KS and HP 9000/K4x0 can have up to four (two in the front and two in the back) processor cards installed. The HP 9000/K2x0 can have 1 or 2 processor cards (two in the front). The HP3000/939KS can have only one processor card mounted in the front.

NOTE

The HP9000/K100 Processor chip is mounted on the system card. To replace the CPU, the entire system card has to be replaced.

Front Processor Card

The front Processor cards are Processor slots 0 and 1.

Removal: Refer to Figure 7-2 and Figure 7-3.

1. Remove the front bezel.
2. Remove the Processor/Memory cover plate (1), by loosening the four captive screws and pulling it away.

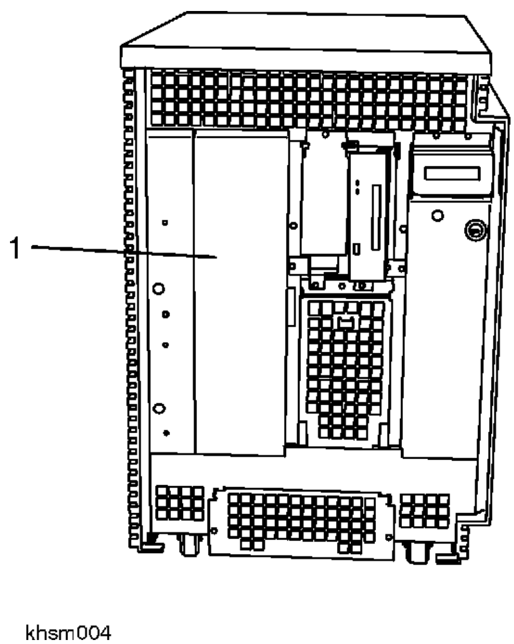
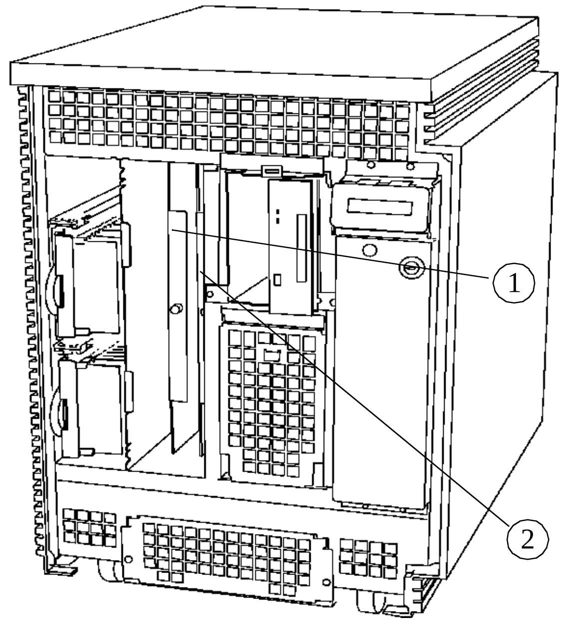


Figure 7-2 Processor/Memory Cover Plate

3. Grasp the formed edge of the processor card (1 or 2 in Figure 7-3, with the rubber bumper), and gently pull the card to unseat it from the system board and remove it from the cabinet.



1 — Processor 0
2 — Processor 1

Figure 7-3 Processor Card Location

4. Place the CPU card on an antistatic pad.

Replacement:

1. Align the Processor card in the appropriate slot (with the air guide and components toward the right side of the card).

2. Insert the Processor card until it contacts the system card, then press firmly.

3. Replace the Processor/Memory cover plate.

Back Processor Card

The back processor cards are processor slots 2 and 3 (HP9000 K2x0/K4x0 and HP3000 959KS/969KS/979KS) or processor slots 2-5 (HP9000 Kx70).

> **Note**
>
> The HP3000/979KS, HP9000/Kx50/Kx60/Kx70/Kx80 servers and HP VISUALIZE workstations require the removal of the power supply to access the Processor/Memory cover plate. For those models, refer to the power supply removal instructions on page 7-29.

Removal: Refer to Figure 7-4 (Refer also to Figure 7-5, which shows processor slots 2-5 on HP9000 Kx70 models.)

1. Remove the back processor cover plate (2) by loosening the two captive screws and pulling the cover plate away. This cover plate has no color stripe. This allows access to processor slots 2 and 3.

   The cover plate for processors 4 and 5 (Kx70 only) has a color stripe that is half burgundy and half violet. Remove this cover plate by loosening the two captive screws and pulling the cover plate away.

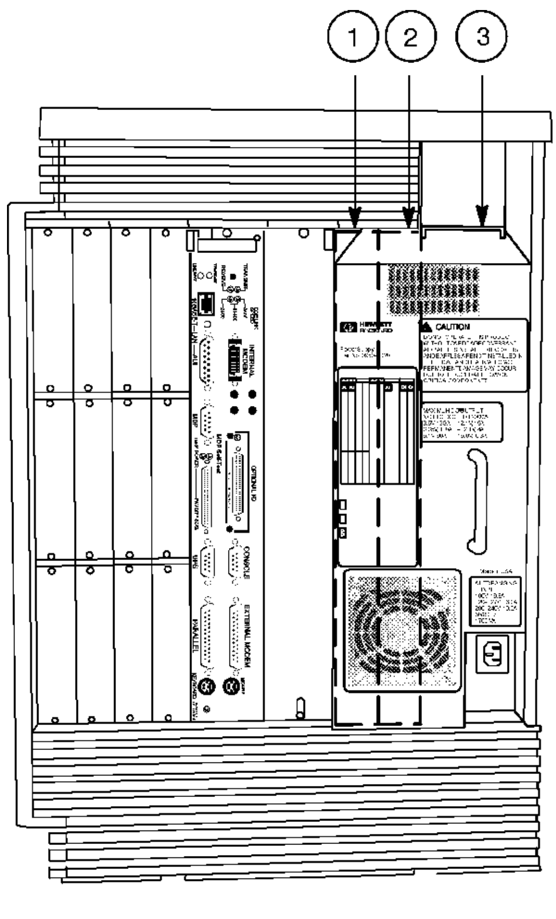


Figure 7-4 Back Processor Cover Plate

Note

It is necessary to remove the power supply, cover plate 2/3, and cover plate 4/5 to remove and replace processors 4. This is due to interference from the EMI clips on the processor 2/3 cover plate.

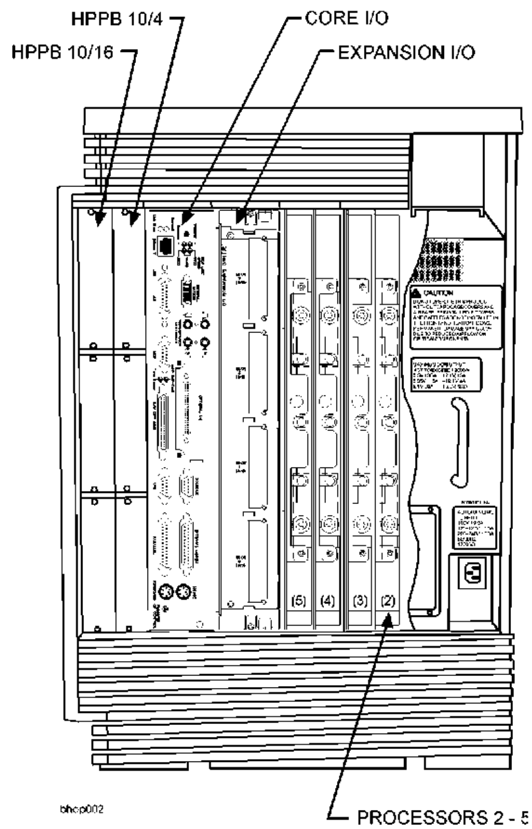


Figure 7-5 HP9000 Kx70/Kx80 slot locations

2. Grasp the edge of the processor card (with the rubber bumper) and gently pull the card to unseat it from the system board.

3. Pull the Processor card out of the slot by the formed edge.

Replacement:

1. Align the Processor card in the appropriate slot (with the air guide and components toward the right side) with the extractor levers pulled out.

2. Insert the Processor card until it contacts the system card, then press firmly.

3. Replace the Processor cover plate.

Note

Do not mix processor cover plates. They are not interchangeable.

Power Monitor Card

Removal: Refer to Figure 7-6

1. Remove the front bezel.
2. Remove the Processor/Memory cover plate by loosening the four captive screws and pulling it away from the chassis.
3. Grasp the Power Monitor card (1) and pull it out of the cabinet.

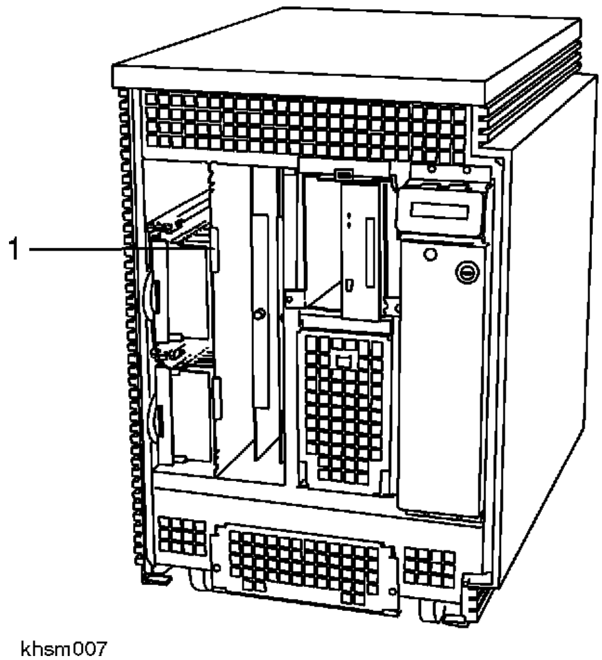


Figure 7-6 Power Monitor Card Location

Replacement:

1. Align the Power Monitor card in the appropriate slot (with the components toward the right side).
2. Insert the Power Monitor card until it contacts the system card, then press firmly.
3. Replace the Processor/Memory cover plate and tighten the four mounting screws.

Memory SIMMs

Be sure to observe all memory SIMM configuration rules. The memory SIMMs on the HP 9000/K100 are located on the system card (inside the cabinet, rear access). The memory SIMMs on the HP 3000/939KS/959KS/969KS and the HP 9000/K2x0/K4x0 are located on removable Memory Carrier cards. You must be aware of the SIMM loading if two memory carriers are present.

HP 9000/K100 SIMM Removal

For memory SIMM location identification, refer to the **MEMORY INSTALLATION** label on the rear cover plate (or bulkhead). You may also need a flashlight or alternate light source to see inside the cabinet.

1. Remove the rear cover plate by loosening the four captive screws and pulling it away.

2. Carefully reach inside the cabinet and push down on the SIMM extractor lever to un-seat the memory SIMM.

3. Grasp the SIMM card on the top and bottom edge and pull out of the connector.

HP 9000/K100 SIMM Replacement

1. Carefully align the SIMM card to the appropriate memory connector.

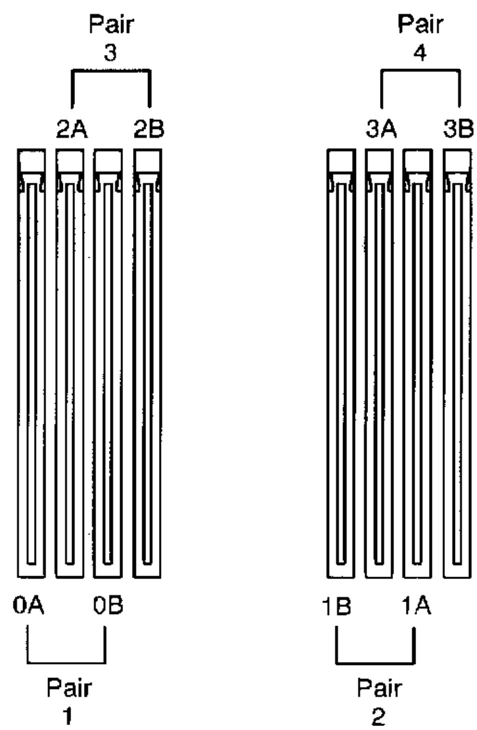


Figure 7-7 HP 9000/K100 Memory SIMM Location

2. Press firmly into place (be sure the extractor lever is up against the SIMM cards).

3. Be sure the SIMM card is fully seated before re-installing the cover plate and turning the SPU on.

HP 3000/939KS/959KS/969KS/979KS and HP 9000/K2x0/K4x0/Kx70 SIMM Removal

1. Remove the front bezel.

2. Remove the front cover plate (for memory, power monitor, and CPU).

3. Grasp the memory carrier card extractor ring (1), and pull the carrier card out of the slot by the extractor ring. Refer to Figure 7-8

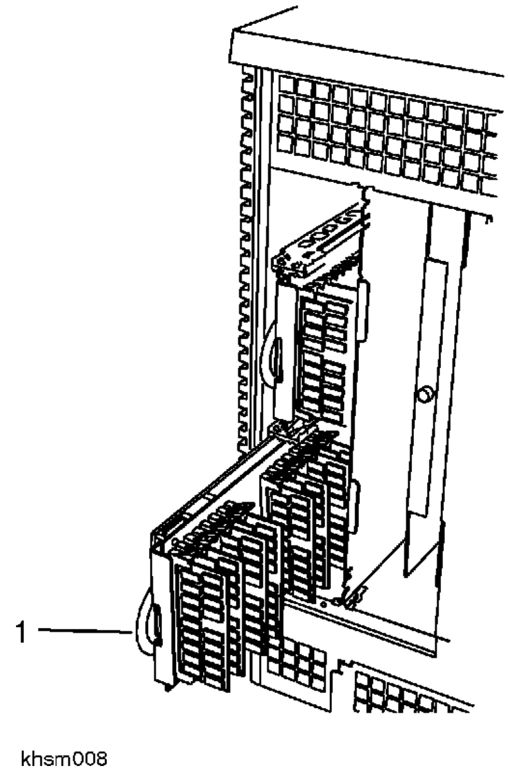


Figure 7-8 Memory Carrier Removal

4. Place the carrier card on an anti-static pad (which should be on a solid, flat surface).
5. Push down on the SIMM card extractor lever (2) to unseat the SIMM card. See Figure 7-9

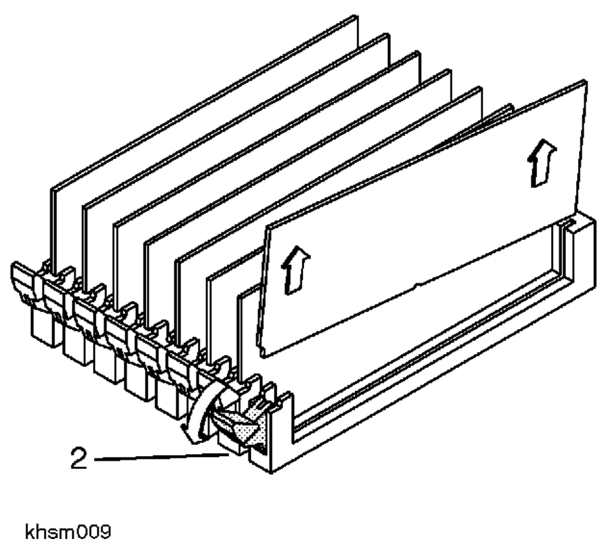


Figure 7-9 Memory SIMM Removal

6. Grasp the outside edges of the SIMM card and lift the SIMM out of the carrier connector.

HP 3000/939KS/959KS/969KS/979KS and HP 9000/K2x0/K4x0/Kx70 SIMM Replacement

1. Align SIMM card over the appropriate carrier connector (white edge and part number toward the extractor end of the connector).

2. Put the extractor lever in the up position.

3. Press the SIMM card firmly into the connector. Be sure the SIMM is fully seated into the carrier connector.

4. Replace the carrier card from the slot (0 or 1) from which it was removed.

5. Insert the carrier card until contact with the system board is made, then push the extractor levers down to fully seat the carrier card. The extractor levers should be flat against the carrier card edge.

6. Replace the front cover plate.

7. Replace the front bezel.

LCD Display

Removal:

1. Remove the front bezel.

2. Press the two mounting tabs on top of the display, while pulling the top of the display away from the chassis.

3. Lift the display up and slightly away from the chassis.

4. Disconnect the interface cable from the back of the display assembly.

Replacement:

1. Attach the interface cable to back of the display.

2. Angle the bottom of the display to hook over the edge of the mounting hole in the chassis.

3. Push the top of the display toward the chassis, while pushing slightly down on the mounting tabs, until the tabs snap into the chassis mounting slots.

4. Replace the front bezel.

Internal Peripheral Bay

The peripheral bay can house up to six devices. The top two slots are for removable media (i.e. floppy disks, CDs, or tape) the bottom four slots are for hard disk devices.

Removal: Refer to Figure 7-10

1. Remove the front bezel.

2. Loosen the four captive mounting screws — two on top (1) and two on bottom (1). (The two in the middle are for the upper slots).

3. Pull the peripheral bay extractor levers (2) up.

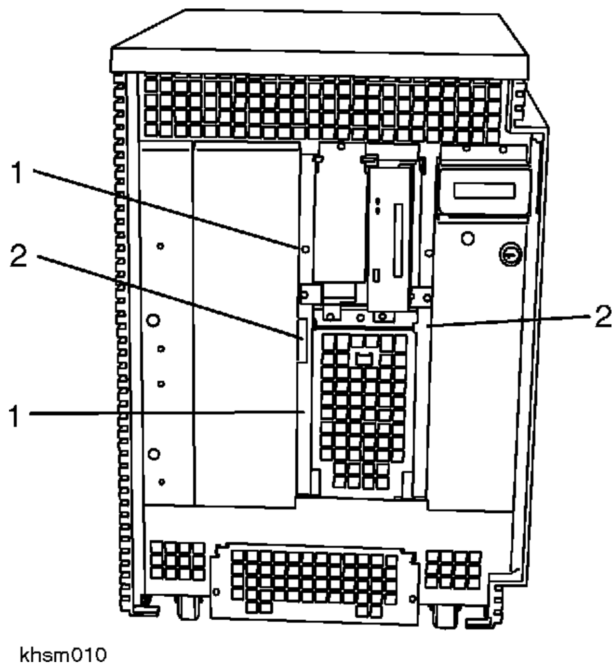


Figure 7-10 Peripheral Bay Removal

4. Pull the peripheral bay out of the chassis by the extractor levers. There are no cables to disconnect to remove the bay from the chassis.

Replacement:

> **NOTE**
>
> Make sure all device mounting screws are installed, the interconnect card is properly seated on the mounting pegs, and that all cables are inside the peripheral bay sheet metal.

1. Align the bay with the chassis.
2. Push the bay into the chassis until it fully seats into the system card.
3. Tighten the four captive mounting screws.
4. Replace the front bezel.

Upper Peripherals

Removal: Refer to Figure 7-11 and Figure 7-12

1. Remove the peripheral bay.
2. Remove the peripheral interconnect card (1) located on the back of the peripheral bay. Grasp the card by the edges, lift up and pull away from the bay (it is mounted by keyed slots (2)).
3. Disconnect the device SCSI cable (3) and power cable (4).

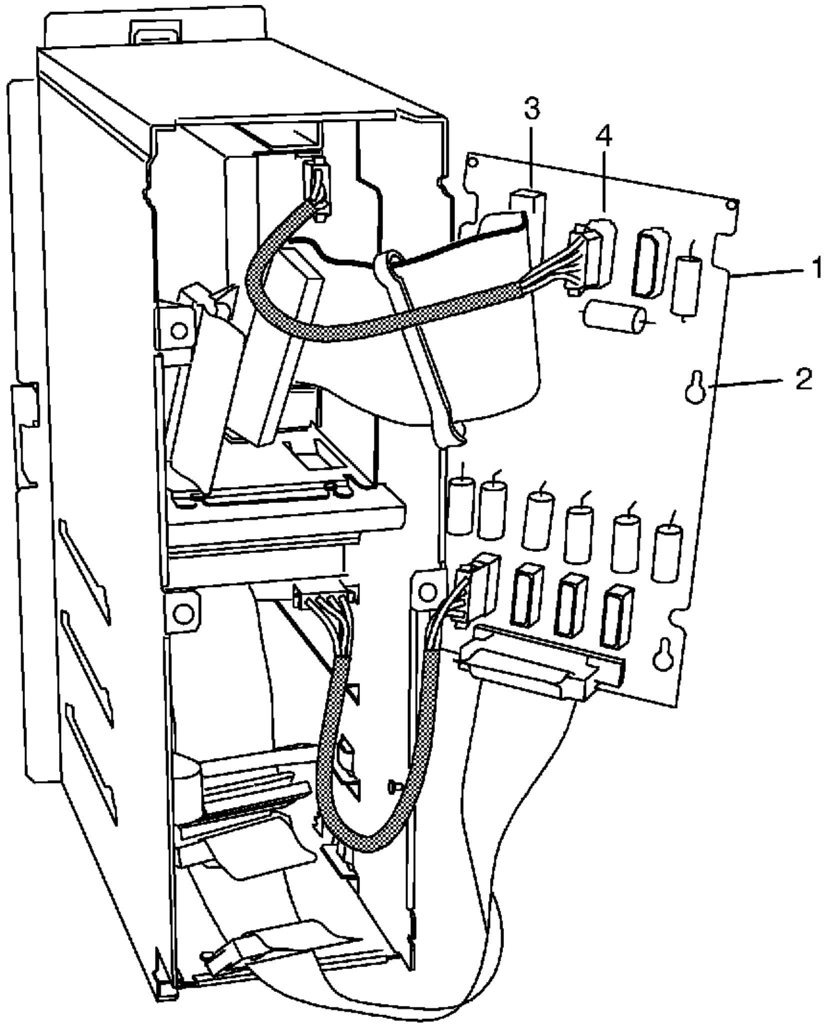


Figure 7-11 Peripheral Bay Rear View

4. Loosen the two captive mounting screws (4) and pull the upper tray out of the peripheral bay.

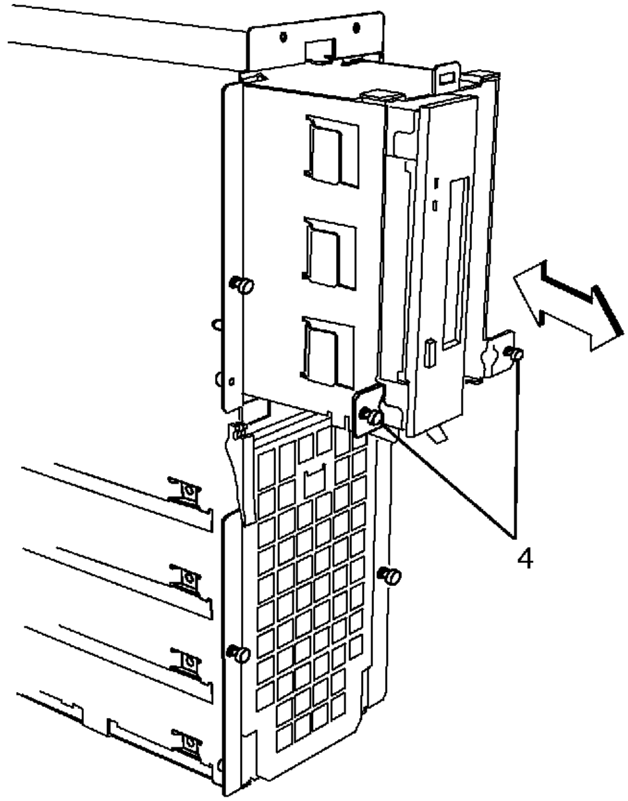


Figure 7-12 Upper Peripheral Removal

5. Remove the eight (four on top and four on bottom) mounting screws holding the device in the upper tray.

Replacement:

1. Align the device into the upper tray and insert the eight (four on top and four on bottom) mounting screws.

2. Insert the upper tray into the peripheral bay and push it all the way in. Tighten the two mounting screws.

3. Connect the SCSI cable and power cable.

4. Mount the peripheral interconnect card on the back of the peripheral bay.

5. Replace the peripheral bay into the chassis.

Lower Peripherals

Removal: Refer to Figure 7-13

1. Remove the peripheral bay.

2. Remove the lower bay front grill by loosening the two captive mounting screws (just under the top peripheral drawer).

3. Remove the peripheral interconnect card (1).

4. Disconnect the appropriate SCSI cable (2) and power cable (3).

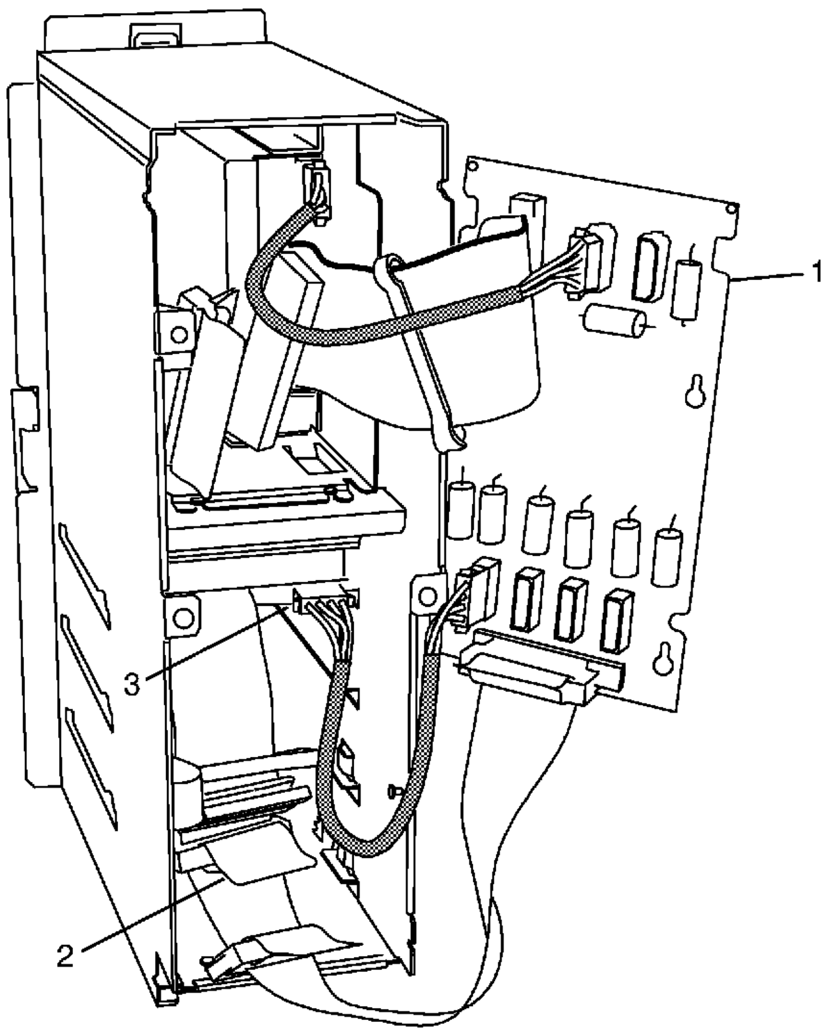


Figure 7-13 Lower Peripheral Removal

5. Remove the four (2 on each side) device mounting screws.

6. Remove the device from the front of the lower peripheral bay.

Replacement:

NOTE
Be sure any address jumpers or switches match the settings of the device that was removed.

1. Insert the device into the peripheral bay from the front. Use the slot guides on each side of the peripheral bay to align the device.

2. Insert the four mounting screws.

3. Connect the SCSI cable and power cable.

4. Mount the peripheral interconnect card on the back of the peripheral bay.

5. Install the lower bay front grill, by inserting the bottom tabs on the grill into the slots in the bottom of the bay and tighten the mounting screws.

6. Replace the peripheral bay into the chassis.

Key Switch

Removal:

1. Remove the front bezel.

2. Remove the front LCD display and key switch bracket by loosening the four (2 top and 2 bottom) mounting screws.

3. Disconnect the LCD display cable and the key switch cable.

4. Remove the nut on the back of the key switch and pull the key switch through the mounting hole.

Replacement:

1. Insert the key switch through the mounting hole.

2. Replace the nut on the back of the key switch and tighten it.

3. Reconnect the LCD display cable and key switch cable.

4. Attach the front LCD display and key switch bracket to the chassis.

5. Replace the front bezel.

Core I/O Card

Refer to the special note regarding extractor brackets on the page following.

Removal: For K2xx/K4xx/9x9KS systems, refer to Figure 7-14 For Kx70 systems, refer to Figure 7-5.

1. Disconnect all cables from the Core I/O bulkhead.
2. Loosen the two (one top and one bottom) captive mounting screws (1).
3. Pull the extractor levers (2) out, pull the core I/O card out of the chassis by the extractor levers.

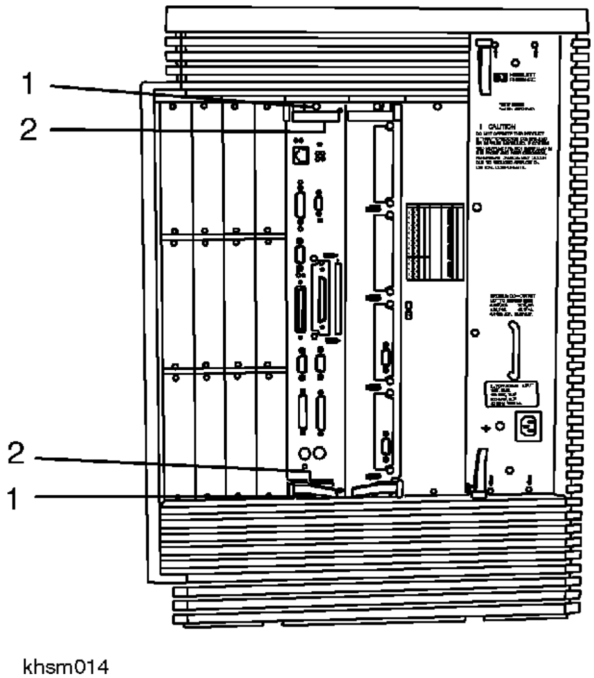


Figure 7-14 Core I/O Removal

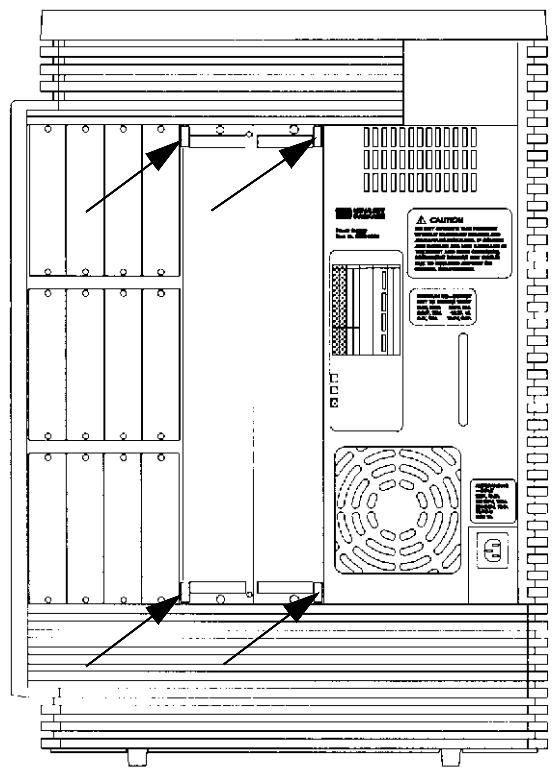
(For HP9000/Kx70 slot locations, see Figure 7-5)
Replacement:
Be sure to move the card in the *Optional I/O* slot if a different Core I/O card is being installed in the computer.

1. Align the core I/O card in the appropriate slot.
2. Insert the core I/O card into the chassis until it contacts the system card and the extractor levers engage the chassis tabs.
3. Push extractor levers down to fully seat the core I/O card into the system card. The levers should be parallel with the rear bezels.
4. Reconnect all cables that were removed.

Special Note Regarding Extractor Brackets

Prior to installing new cards in the Core I/O or HSC Expansion I/O slots, unscrew and remove the top and bottom extractor brackets, *if present*, from the chassis as shown in the figure below. The newer cards do not use the older-style extractor levers and will not be able to seat into the slot if the brackets have not been removed. **Do not confuse the extractor brackets, which are screwed onto the chassis, with the newer pull-tab release levers which are part of the board assembly**.

You will need to remove the system's front bezel and top bezel, then the rear top and bottom bezels to access the extractor bracket screws.



Internal Modem

Removal: Refer to Figure 7-15

1. Remove the core I/O card.

2. Remove the internal modem by removing the two mounting screws on the bulkhead by the modem connector.

3. Grasp the back of the internal modem and lift it up to disengage the core I/O card connection (1).

4. Pull the internal modem card away from the core I/O card and bulkhead.

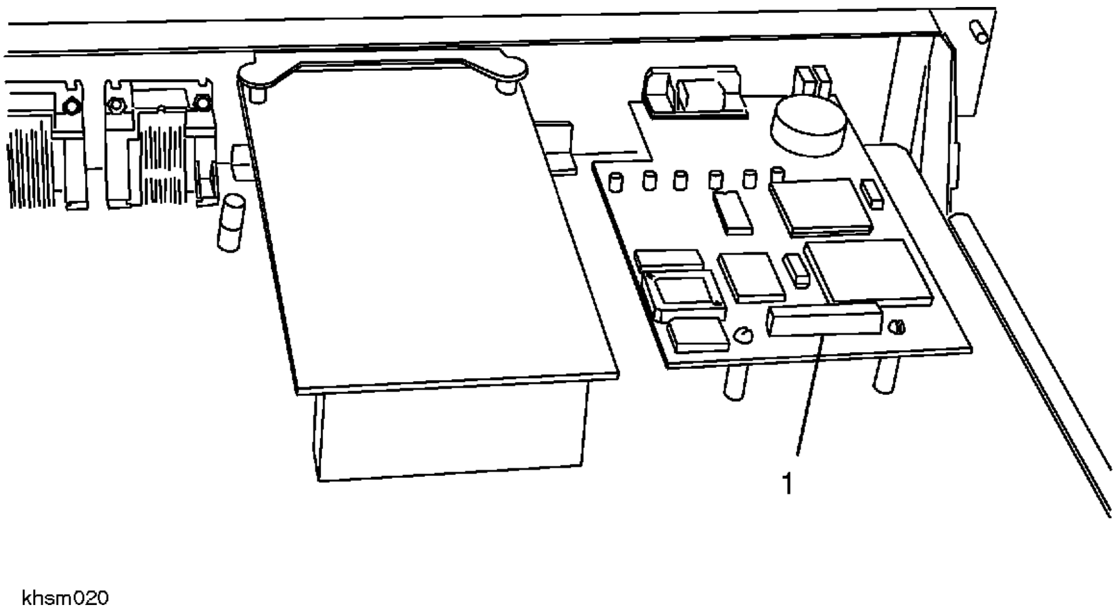


Figure 7-15 Internal Modem Removal

Replacement:

1. Align the internal modem bulkhead connector and LEDs with the holes in the bulkhead (modem card components facing up).

2. Carefully press the core I/O pins into the rear connector on the internal modem (1).

3. Replace the two mounting screws into the core I/O bulkhead, modem connector.

4. Replace the core I/O card.

5. Reconnect all the cables that were removed.

Audio Card (HP VISUALIZE K260/K450/K460 Workstations)

Removal: Refer to Figure 7-16

1. Remove the core I/O card.
2. Disconnect the audio card by grasping the card on the edges and lifting the card off the two standoffs on the core I/O board and off the connector pins. This will disengage the core I/O connection. (Note that the connectors between the standoffs pass through the holes in the audio board. These connectors are for connection to the internal modem card.)
3. Pull the audio card away from the core I/O card and bulkhead.

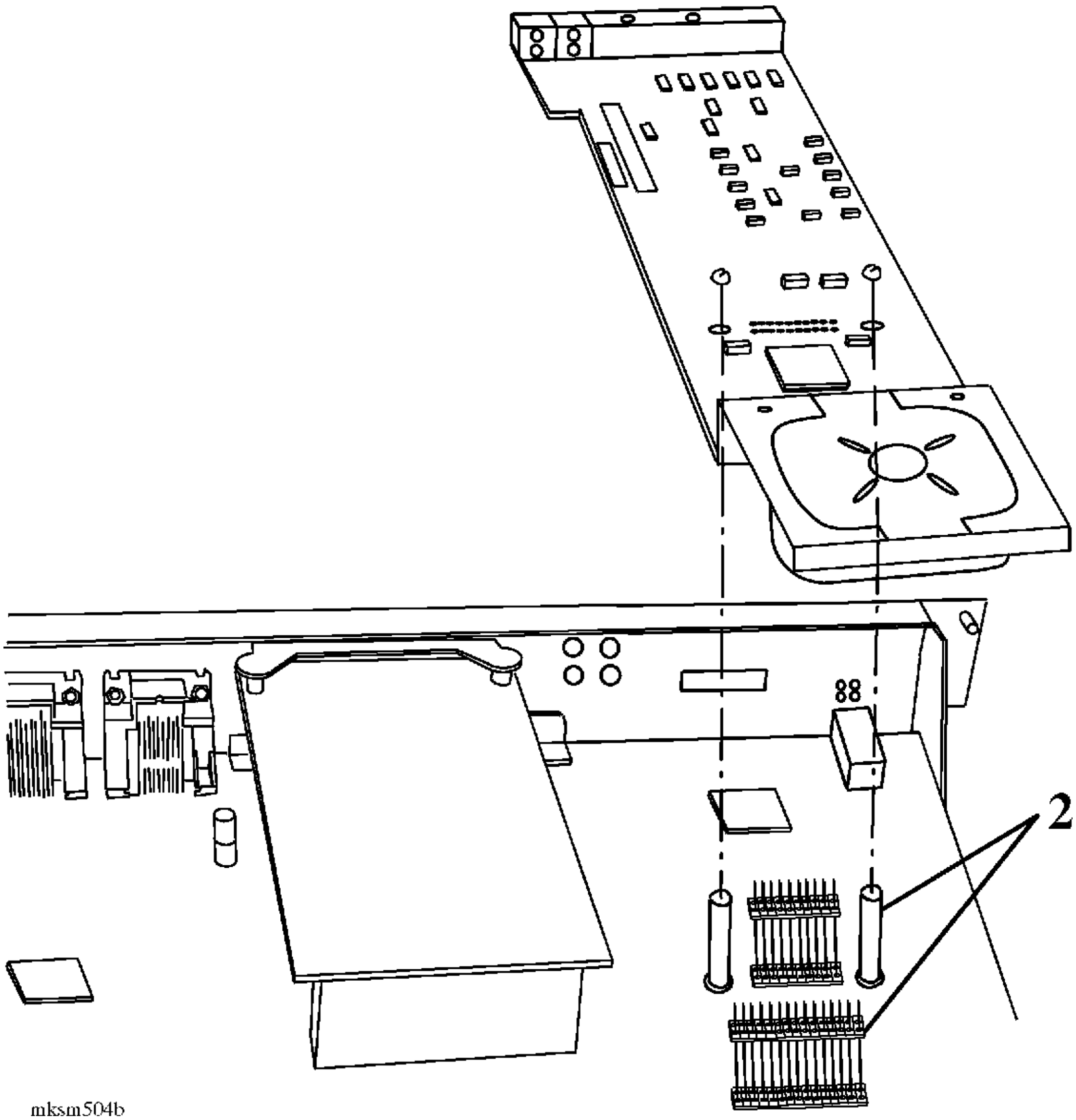


Figure 7-16 Audio Card Removal and Replacement

Replacement:

1. Align the audio card bulkhead connector and LEDs with the holes in the bulkhead (audio card components facing up). The four jacks for headset and microphone align with the four holes shown in the bulkhead.
2. Align the card over the two standoffs as shown in Figure 7-16 Carefully press the core I/O pins into the rear connector on the audio card.

3. Replace the two mounting screws into the core I/O bulkhead, audio connector.
4. Replace the core I/O card.
5. Reconnect all the cables that were removed.

HP-HSC Card (HP9000 only).

There is a slot on the core I/O card for one HP-HSC card.

Removal: Refer to Figure 7-17

1. Remove the core I/O card.
2. Loosen the two (one on each side of the HP-HSC connector) captive mounting screws on the core I/O card bulkhead.
3. Pull the back of the HP-HSC card up, disconnecting it from the core I/O card connector (1).
4. Continue to lift the back of the HP-HSC card until angled enough to dis-engage the hooked tabs from the mounting slots in the bulkhead.

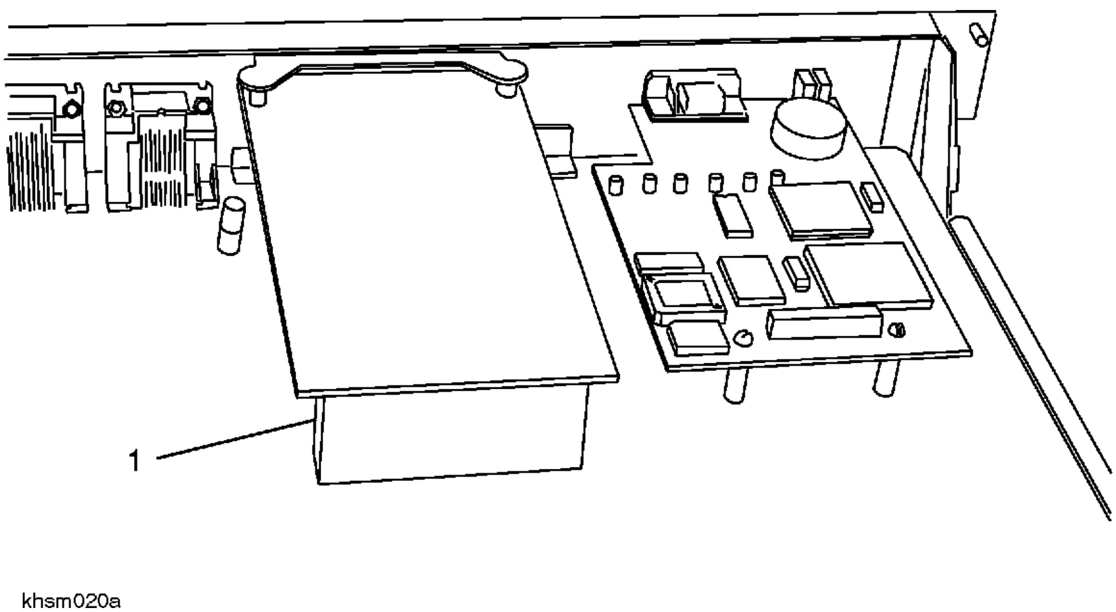


Figure 7-17 HP-HSC Card Removal

Replacement:

1. Angle the HP-HSC card so the hooked tabs slide through the core I/O bulkhead slots.
2. Push the back of the HP-HSC card down to fully seat the card into the connector on the core I/O card.
3. Tighten the two captive mounting screws on the core I/O card bulkhead to secure the HP-HSC card to the core I/O bulkhead.
4. Replace the core I/O card into the chassis.
5. Reconnect all cables that were removed.

HP-HSC Expansion I/O Card

The 4-slot HP-HSC Expansion I/O card is only used on the HP 9000/K4x0/K5x0 only. The 2-slot HP-HSC Expansion I/O card is used on Kx70 and K4xx only.

Removal: Refer to Figure 7-18 (For HP9000/Kx70/Kx80 slot locations, see Figure 7-5)

1. Disconnect all cables.
2. Loosen the two (one top and one bottom) captive mounting screws (1).
3. Pull extractor levers (2) out, pull the card out of the chassis by the extractor levers.

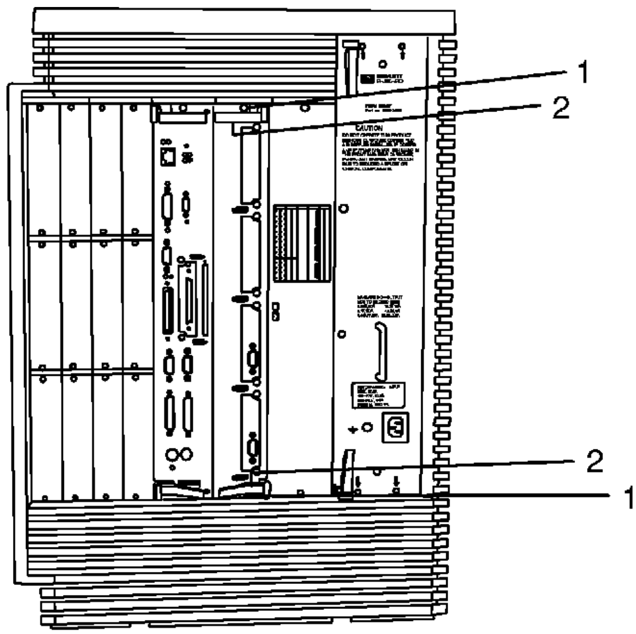


Figure 7-18 HP-HSC Expansion Card Removal

4. Place the card on an ESD mat.
5. Remove any HSC cards as shown in Figure 7-22
6. Remove the two Phillips head screws from card and sheet metal assembly (see Figure 7-19).
7. Slide the PCB away from the bulkhead and lift off the sheet metal carrier.

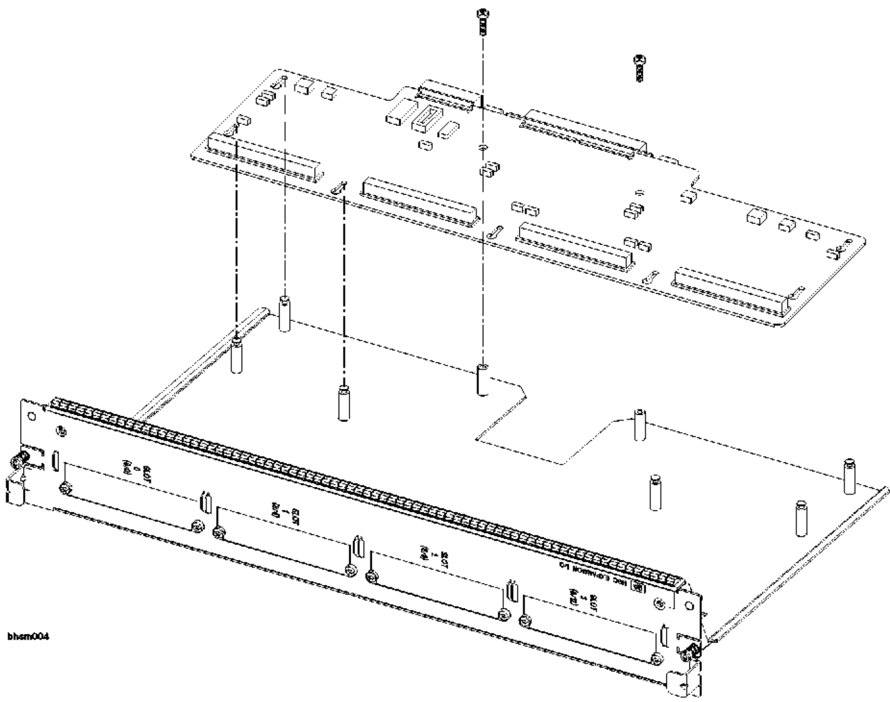


Figure 7-19 HSC Expansion I/O Card Disassembly

Replacement:

1. Position the HSC Expansion I/O exchange PCB, component side up, over the alignment pins (see Figure 7-19).
2. Lower the PCB onto the alignment pins and slide the PCB toward the bulkhead assembly until the PCB stops against the alignment pins.
3. Insert and tighten the two Phillips head screws, taking care to not strip the screw standoffs.
4. Align the expansion I/O card in the appropriate slot.
5. Insert the expansion I/O card into the chassis until it contacts the system card and the extractor levers engage the chassis tabs.
6. Push extractor levers down to fully seat the expansion I/O card into the system card. The levers should be parallel with the rear bezels.
7. Reconnect all cables that were removed.

Dual Bus 4-Slot HSC Expansion I/O Card (K570/K580 only)

K5x0 servers support up to two HSC Expansion cards. The primary HSC Expansion Card can be either a 2 or 4 slot HSC Expansion card. The primary HSC Expansion I/O card will only fit in the HSC Expansion I/O slot. Both the slot and the card are color-coded with an orange stripe.

The second HSC Expansion I/O card is referred to as the Dual Bus 4-slot HSC Expansion I/O card. As the name implies, this card is only available in a 4-slot configuration. The Dual Bus 4-slot HSC Expansion I/O card is only supported on K5x0 servers. It will only fit in the dual purpose slot. The dual purpose slot is color coded burgundy and violet to represent that either processor cards (violet stripe) or the Dual Bus 4-slot HSC Expansion I/O card (burgundy stripe) can be installed in that slot.

The Dual Bus 4-slot Expansion I/O card (see Figure 7-20)has a (1) crystal configuration switch (S1), (2) one socketed crystal (Y1), and (3) an empty socket for a second crystal (XY2).

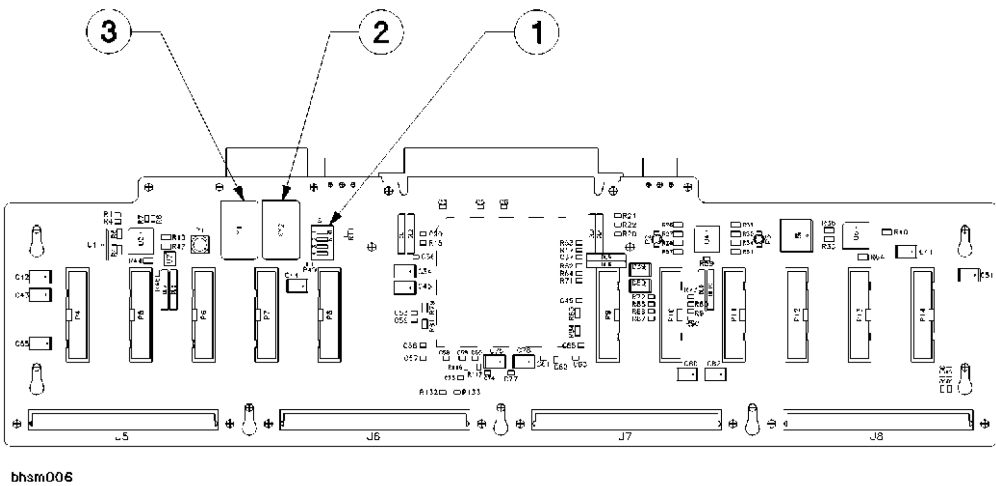


Figure 7-20 Dual Bus 4-slot HSC Expansion I/O PCB

S1 and XY2 were added to allow the two HSC busses (2 and 3) to run at different speeds. This is a feature that is not yet implemented as of this publication date. Currently, the ONLY valid settings for S1 are all switches in the OFF position (see Figure 7-21).

> **Caution**
>
> Do not set switches 2 and 3 ON simultaneously as hardware damage may result to the card.

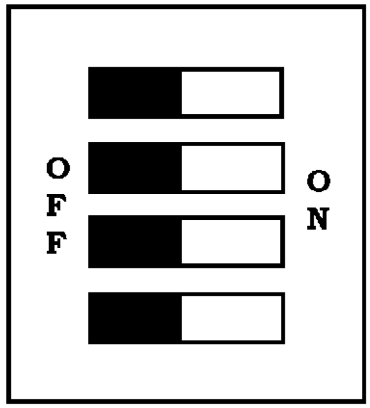


Figure 7-21 S1 Switch Settings

HP-HSC I/O Card

The following applies to 2, 4, and Dual Bus 4-slot HSC Expansion I/O cards.

Removal: Refer to Figure 7-22

1. Remove the HP-HSC Expansion I/O card.

2. Loosen the two (one on each side) captive mounting screws on the expansion I/O card bulkhead.

3. Pull the back of the HP-HSC I/O card up, disconnecting it from the HP-HSC Expansion I/O card connector (1).

4. Continue to lift the back of the HP-HSC I/O card until angled enough to dis-engage the hooked tabs from the mounting slots in the bulkhead.

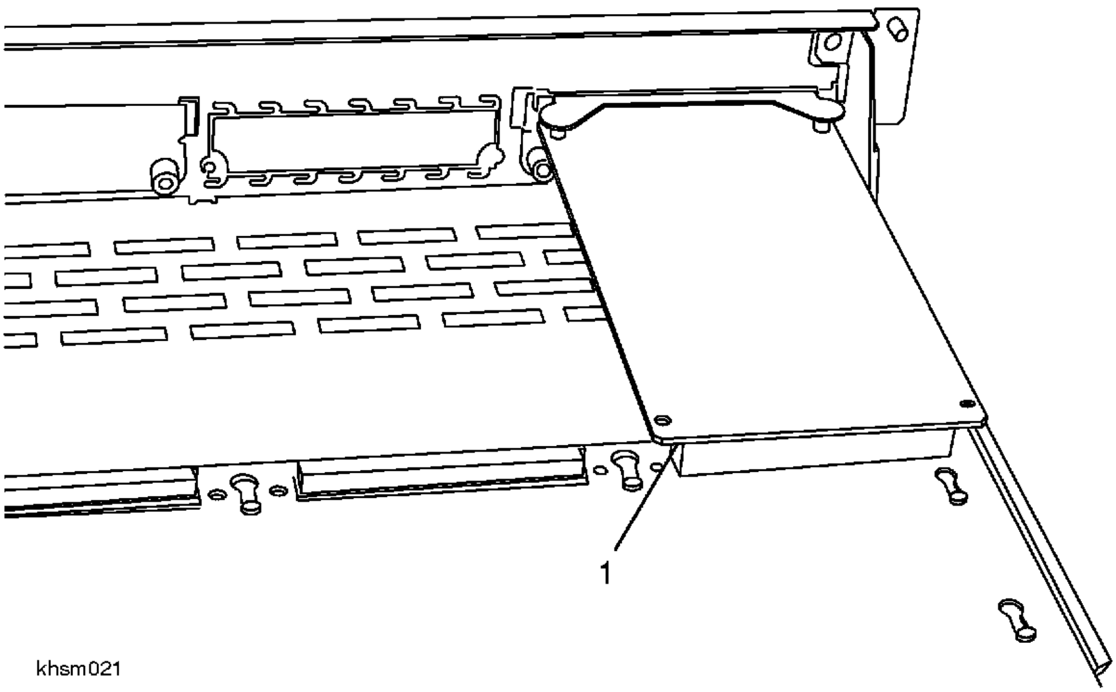


Figure 7-22 HP-HSC Expansion Card Removal

Replacement:

1. Angle the HP-HSC I/O card so the hooked tabs slide through the bulkhead slots.
2. Push the back of the HP-HSC I/O card down to fully seat the card into the mother board.
3. Tighten the two captive mounting screws on the expansion I/O card bulkhead, to secure the HP_HSC I/O card to the mother board.
4. Replace the HP-HSC Expansion I/O card into the chassis.
5. Reconnect all cables that were removed.

HP-PB I/O Card

Removal:

1. Remove the interface cable.
2. Loosen the two (1 top and 1 bottom) captive mounting screws.
3. Pull the extractor levers out, pull the card out of the chassis by the extractor levers.

Replacement:

1. Align the card in the appropriate slot.
2. Press firmly to fully seat the card into the system card.
3. Reconnect the cable to the card.

Power Supply (all models except HP3000/979KS, HP9000/K250/K260/K450/460 and HP VISUALIZE Workstation models)

Removal: Refer to Figure 7-23

1. Disconnect the power cord (1).

2. loosen the four (two top and two bottom) captive mounting screws (2).

3. Pull the extractor levers (3) out to disengage the power supply from the chassis.

4. Grasp the handle (4) on the power supply bulkhead and pull the power supply out of the chassis.

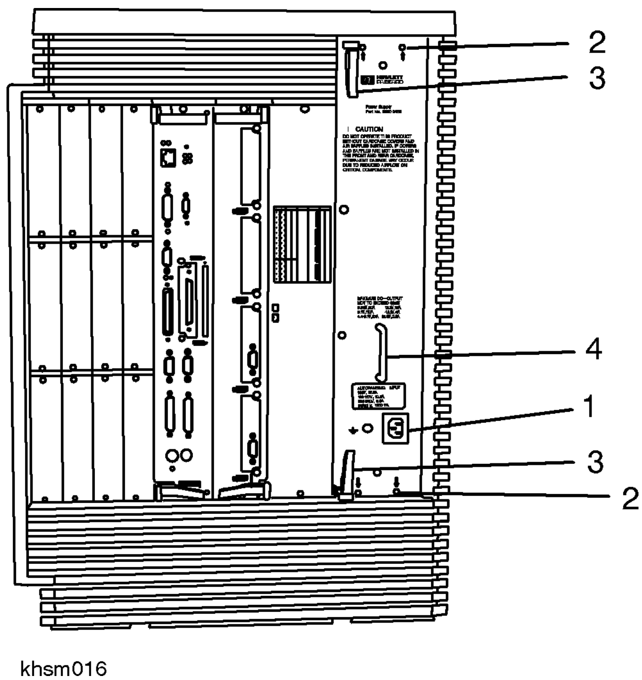


Figure 7-23 1250 VA Power Supply Removal

Replacement:

1. Align the power supply in the chassis.
2. Push the power supply into the chassis very firmly to fully seat it into the system card.
3. Tighten the four mounting screws.
4. Plug the power cord into the power supply receptacle.

Power Supply (HP3000/979KS, HP9000/Kx50/Kx60/Kx70/Kx80, and HP VISUALIZE Workstation Models)

Removal: Refer to Figure 7-24

1. Loosen the six captive screws (1) along the top and bottom of the power supply unit.
2. Pull the extractor levers (2) out. Using the extractor levers, pull the power supply unit out from the chassis.
3. Grasp the power supply unit by the handle (3) and remove it from the chassis.

> **Caution**
> The power supply unit is extremely heavy. Be careful removing and lifting the unit to avoid damage to the power supply.

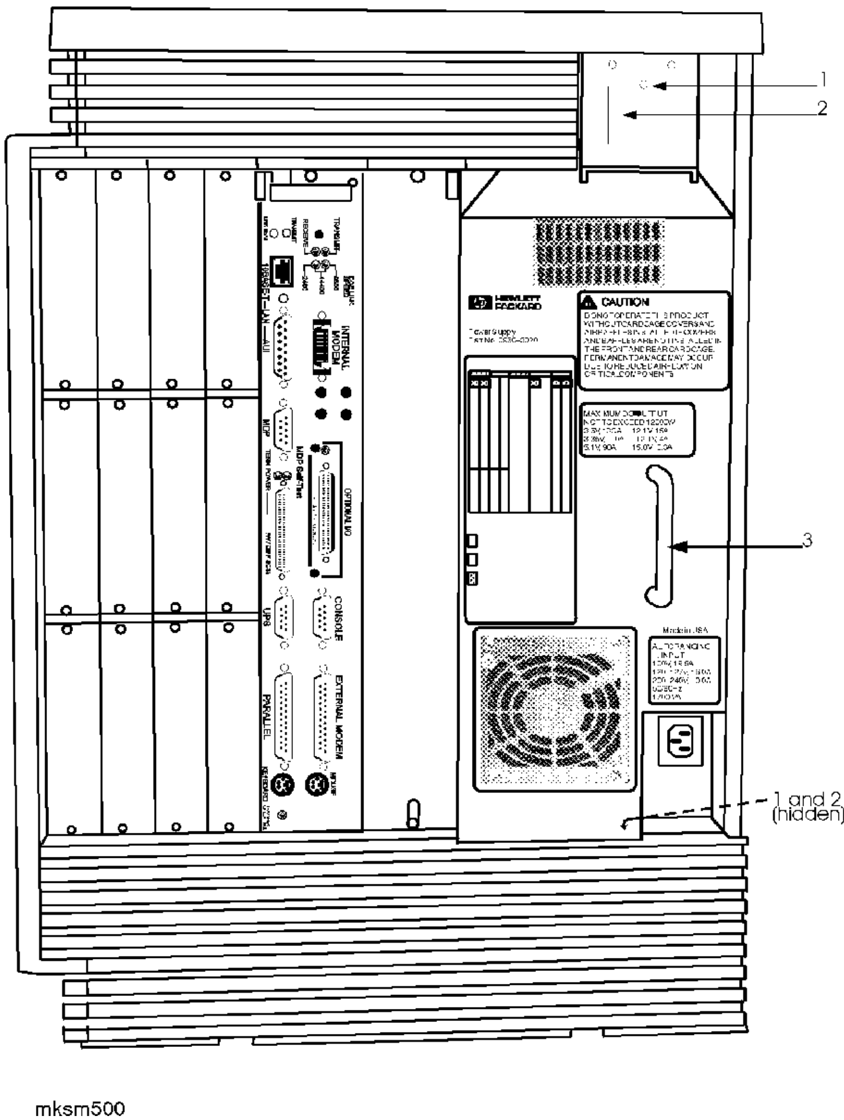


Figure 7-24 1700VA Power Supply Removal

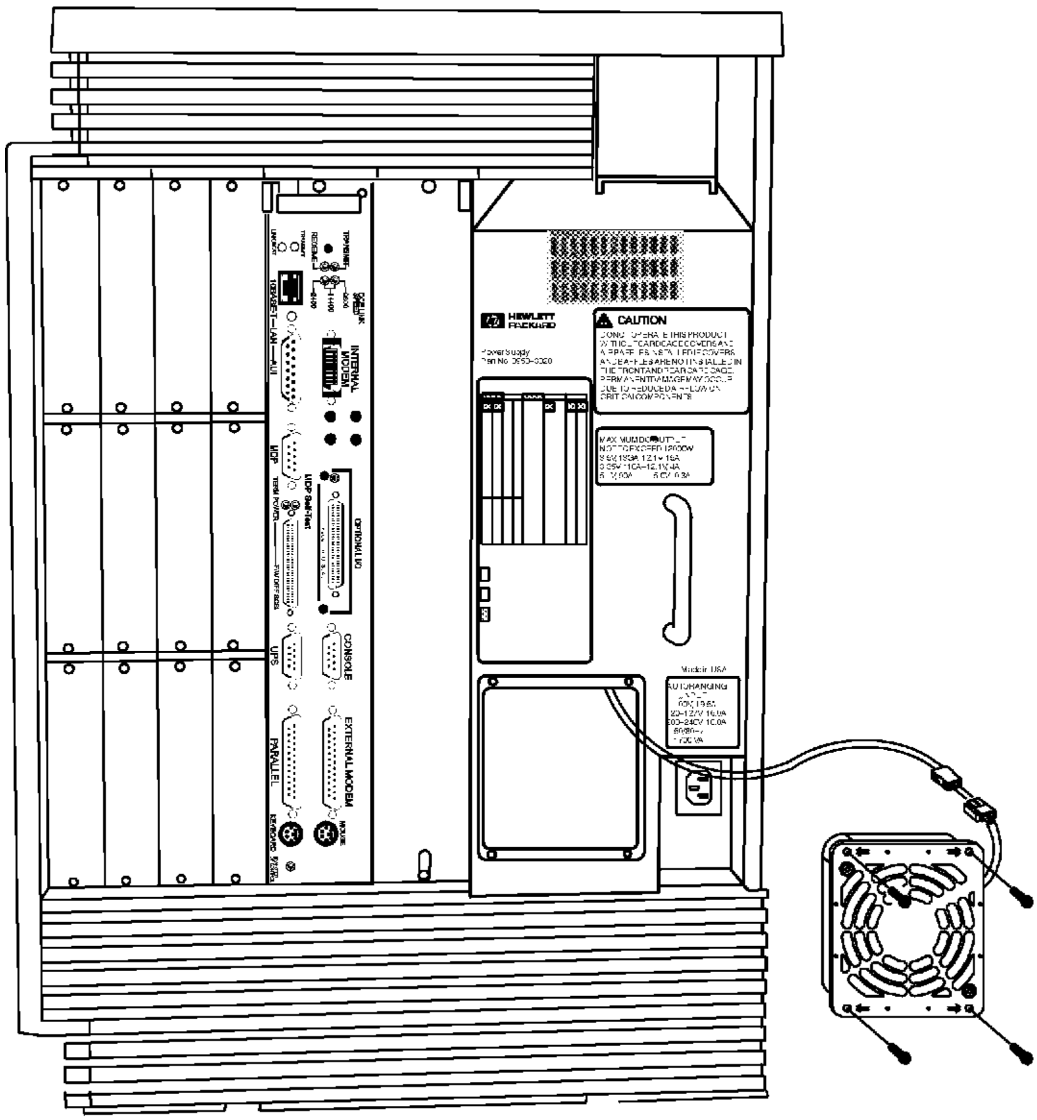
Replacement:

1. Align the power supply in the chassis.
2. Guide the power supply into the chassis slot, then lift the extractor levers (2) to firmly seat the power supply into place.
3. Close the extractor levers.
4. Secure the power supply in place using the six captive screws(1).

Power Supply Fan Assembly

Removal: Refer to Figure 7-25

1. Ensure power is OFF. Disconnect the power cord from the system.
2. Remove the four screws indicated by arrows on the face of the fan assembly.
3. Pull the fan assembly away from the power supply.
4. Disconnect the fan assembly power cable.



mksm100

Figure 7-25 Power Supply Fan Assembly

Replacement:

1. Re-connect the fan assembly power cable.
2. Insert the fan assembly body into the power supply.
3. Secure the fan assembly in place using the four screws in the locations shown by arrows.
4. Re-connect power to the system.

Fan Tray

There are two fans, one in the front and one in the back, located at the bottom, center of the cabinet. Also note that there are no cables to disconnect on the fan tray.

Front Fan removal:

1. Remove the front bezel.

2. Remove the two mounting screws (on top of the fan tray).

3. Grasp the two protruding sheet metal tabs and pull the fan tray out of the chassis.

Front Fan Replacement:

1. Align the fan tray in the chassis slot at the bottom and push it in until it is flush with the chassis.

2. Insert the two mounting screws in the top mounting holes.

3. Replace the front bezel.

Rear Fan Removal:

1. Remove the lower back bezel by pressing down on the two top mounting tabs and tilting the top of the bezel away from the chassis, and lifting up.

2. Remove the two mounting screws (on top of the fan tray).

3. Grasp the two protruding sheet metal tabs and pull the fan tray out of the chassis.

Rear Fan Replacement:

1. Align the fan tray in the chassis slot at the bottom and push it in until it is flush with the chassis.

2. Insert the two mounting screws in the top mounting holes.

3. Replace the lower back bezel.

System Board

To remove the system board everything must be removed from the back of the cabinet, and everything in the front has to be unplugged (but not removed) from the front.

> **CAUTION**
>
> HP 3000/9x9KS and HP 9000/Kx00 computers contain a lithium battery on the System Board. The lithium battery is **NOT** an FRU. If the lithium battery is bad or depleted, the system board must be replaced.

HP 9000/K100

Front Preparation:

1. Remove the front bezel.
2. Remove the front cover plate.
3. Grasp the power monitor card and pull it out approximately one inch.
4. Loosen the four (two left and two right) captive mounting screws on the peripheral bay. Pull the extractor levers out and slide the peripheral bay out approximately one inch.

System Board Removal: Refer to Figure 7-26

1. Remove all I/O cards and empty slot cover plates. The plastic card guides need to be removed also.
2. Remove the Core I/O card.
3. Remove the back cover plate.
4. Remove the Power Supply.
5. Reach inside the cabinet and loosen the three thumb screws (1) holding the system board in the cabinet.

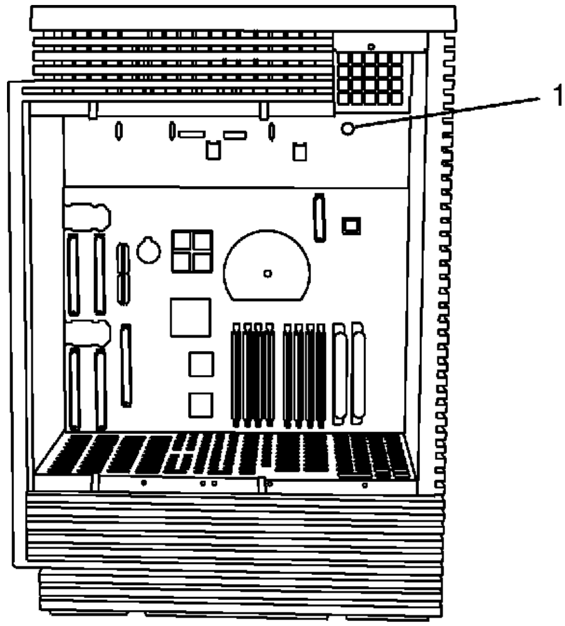


Figure 7-26 K100 System Board Removal

6. Carefully pull the top of the system board toward the rear of the cabinet and lift it out of the cabinet.

If the system board is being replaced, the memory SIMMs need to be transferred to the new system board, along with the PAL chip.

System Board Replacement

1. Carefully insert the system card into the cabinet with the top of the system board angled toward the back and the bottom angled toward the front of the cabinet.

2. When the bottom of the system board aligns with the mounting slots inside the cabinet, gently push the top of the system board forward and tighten the three thumb screws.

3. Replace the power supply.

4. Replace the back cover plate.

5. Replace the Core I/O card.

6. Replace all I/O cards that were removed.

7. Re-insert the peripheral bay and power monitor card at the front of the system.

8. Replace the front cover plate.

9. Replace the front bezel.

HP 3000/9x9KS and HP 9000/K2x0/K4x0/Kx70

Front Preparation:

1. Remove the front bezel.
2. Remove the front cover plate.
3. Pull the memory carrier card(s) extractor ring(s) until the memory carrier card(s) is out approximately one inch.
4. Pull the CPU card(s) out approximately one inch.
5. Pull the Power Monitor out approximately one inch.
6. Loosen the four (two left and two right) captive mounting screws on the peripheral bay. Pull the extractor levers out and slid the peripheral bay out approximately one inch.

System Board Removal: Refer to Figure 7-27, which shows an example for K4xx/959KS/969KS/979KS systems.

1. Remove all I/O cards.
2. Remove the Core I/O card.
3. For the HP 9000/K2x0/K4x0/Kx70 only, remove all HP-HSC Expansion I/O cards.
4. Remove the Power Supply.
5. Remove the back cover plate.
6. Remove the CPU card(s).
7. Reach inside the cabinet and loosen the three thumb screws (1) holding the system board in the cabinet.

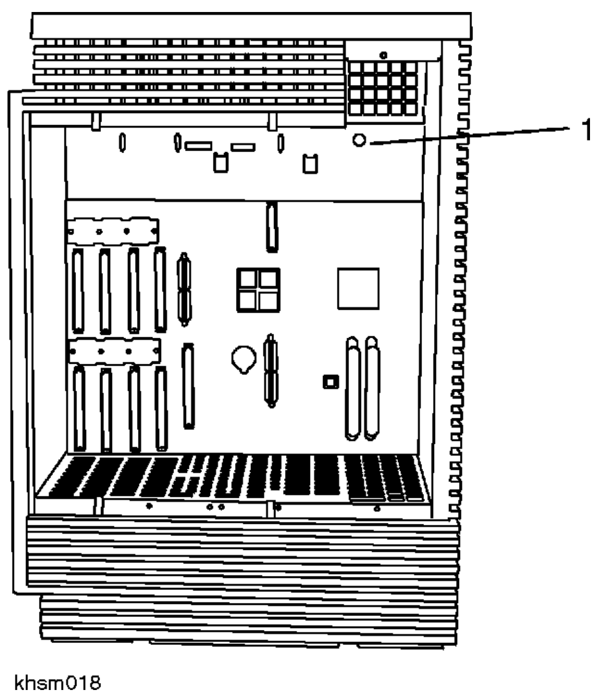


Figure 7-27 System Board Removal

8. Carefully pull the top of the system card toward the rear of the cabinet and lift it out of the cabinet.
9. Transfer the PAL chip (position U30 in Figure 7-29) from the removed system board to the new system board (replacement procedure only - not applicable to system upgrades to Kx70).
10. If the original board has an external oscillator, transfer this to the new board.
11. Check the frequency switches for the correct setting.

See Figure 7-28 for the locations of the PAL chip, oscillator crystal, and frequency select settings. Frequency switch positions are shown in Figure 7-30

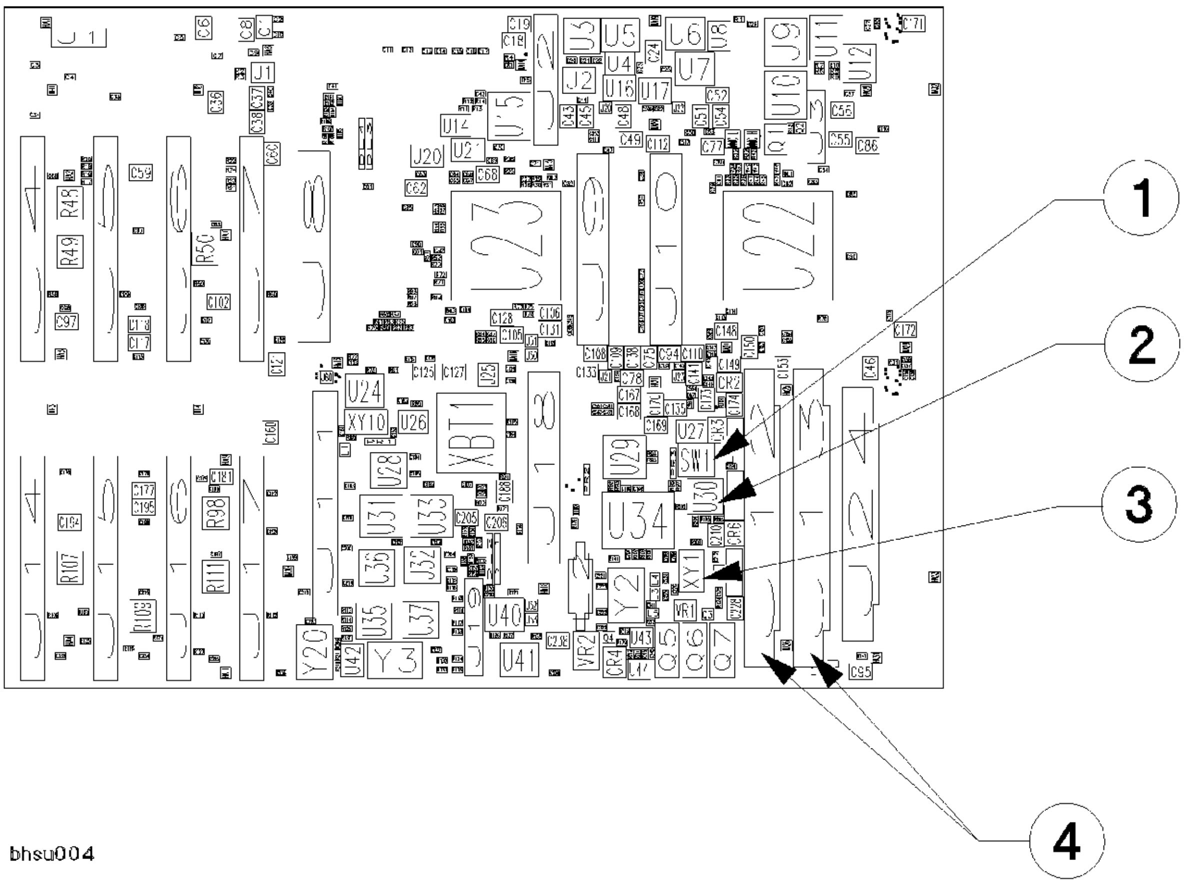


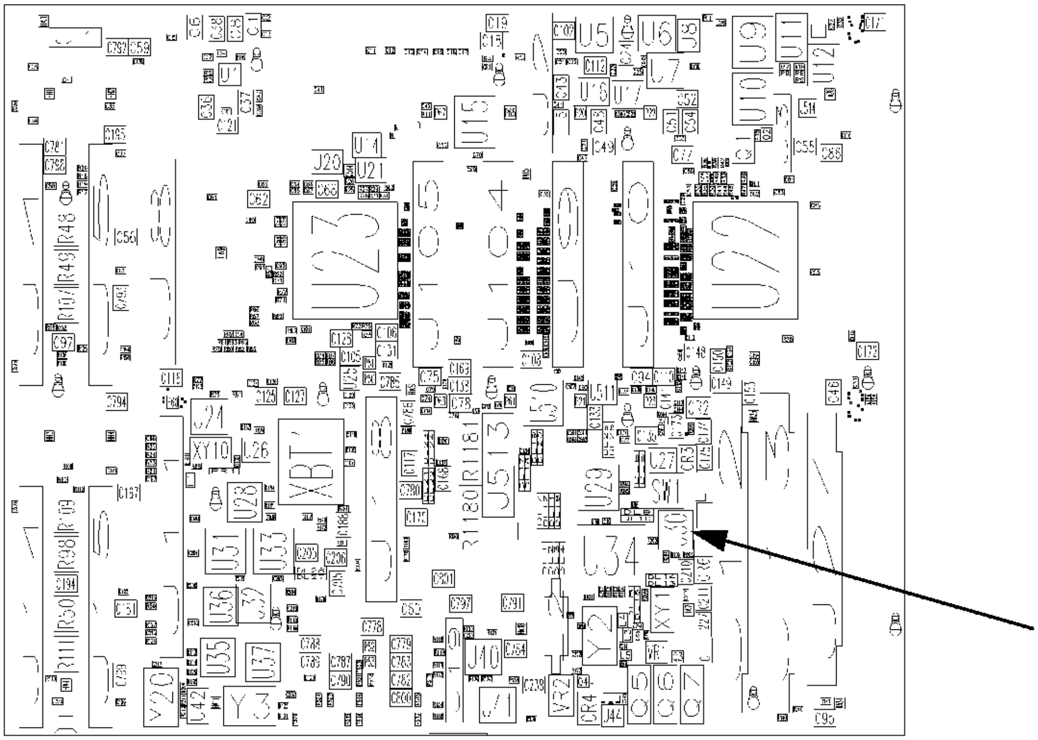
Figure 7-28 System Board Locations - K2xx/K4xx and 9x9KS

1-SW1 is the frequency select switch block

2-U30 is the PAL chip

3-XY1 is the Clock Oscillator Crystal slot

4 - J12/J13 Power Supply Connectors



bhsm010

Figure 7-29 Kx70 System Board

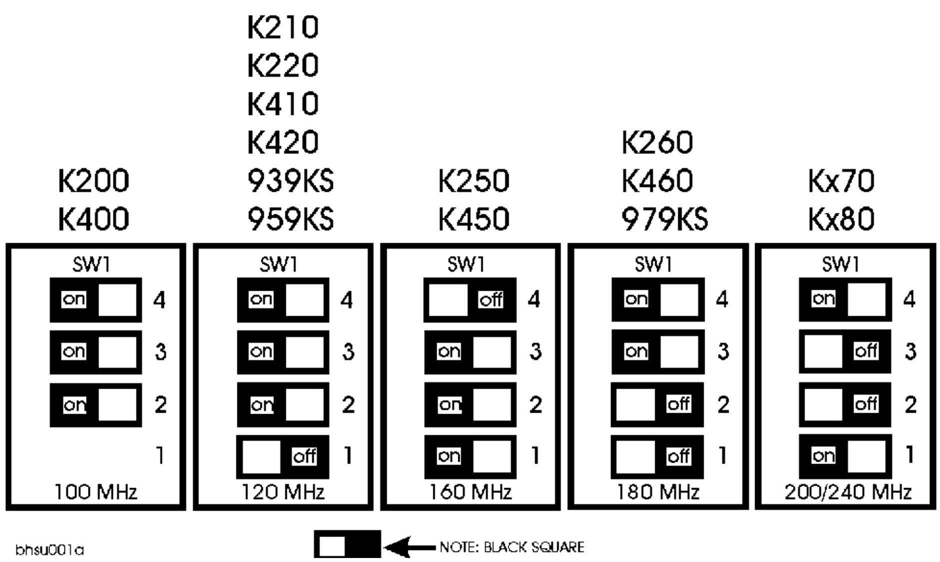


Figure 7-30 Frequency Switch Settings

System Card Replacement:

1. Carefully insert the system card into the cabinet with the top of the system card angled toward the back and the bottom angled toward the front of the cabinet.
2. When the bottom of the system card aligns with the mounting slots inside the cabinet, gently push the top of the system card forward and tighten the three thumb screws.
3. Replace the CPU card(s).
4. Replace the back cover plates.
5. Replace the power supply.
6. Replace the HP-HSC Expansion I/O cards (HP 9000/K4x0/Kx70 only).
7. Replace the Core I/O card.
8. Replace all I/O cards.
9. Re-insert the Peripheral bay, power monitor card, CPU card(s), and memory carrier card(s).
10. Replace the front cover plate.
11. Replace the front bezel.

HP-PB I/O Card Cage and Card Cage Power Supply (HP3000 969/979/989 and HP9000 K3xx/K4xx/K5xx)

The procedures in this section describe the removal and replacement of the following external HP-PB I/O assemblies:

- I/O cards
- HP-PB I/O card cage
- Power Supply
- SPCM Card
- Backplane

I/O Card Removal

To remove an I/O card from the HP-PB I/O card cage (see Figure 7-31):

1. Make sure that power has been disconnected from the cabinet and you have a grounding wriststrap attached to your wrist.
2. From the rear of the cabinet, detach any cables connected to the I/O card that you want to replace.
3. Loosen the two captive screws securing the card to the card cage.
4. Use the extractor handles to release the card from the card cage, and slide the card gently out of the card cage along the slot guides.

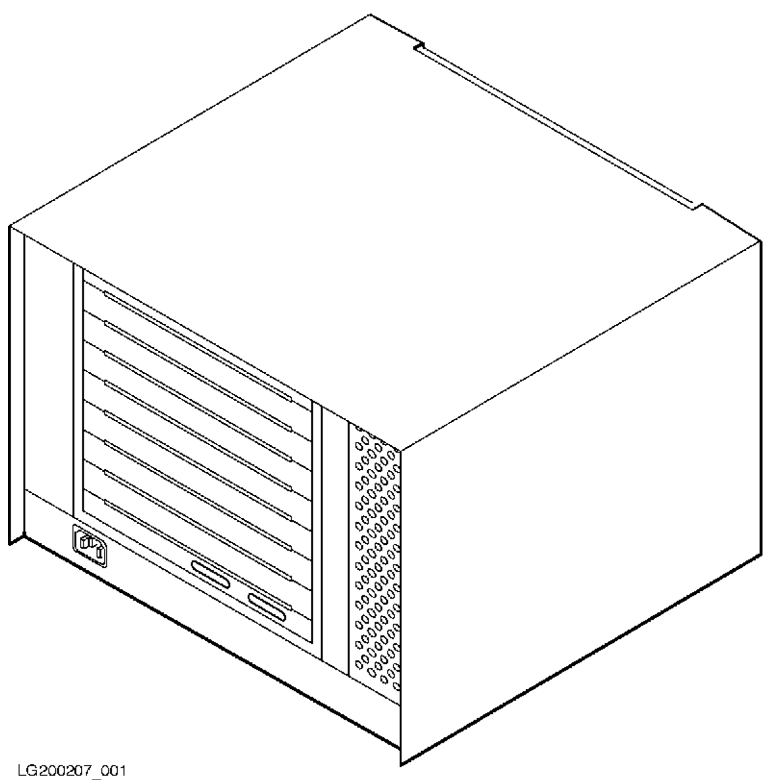


Figure 7-31 HP-PB Card Cage - Rear View

To replace the card, reverse the above procedures.

HP-PB I/O Card Cage Removal

Refer to Figure 7-32 while performing these steps:

1. Make sure that power has been **disconnected** from the cabinet and the power switch is in the OFF position.
2. From the rear of the cabinet, detach any cables connected to cards in the HP-PB I/O card cage.
3. From the rear of the cabinet, remove the connector plug.

WARNING

Hazardous voltages are present even with the power switch in the OFF position. Verify that the SPU cabinet is disconnected from the AC power source.

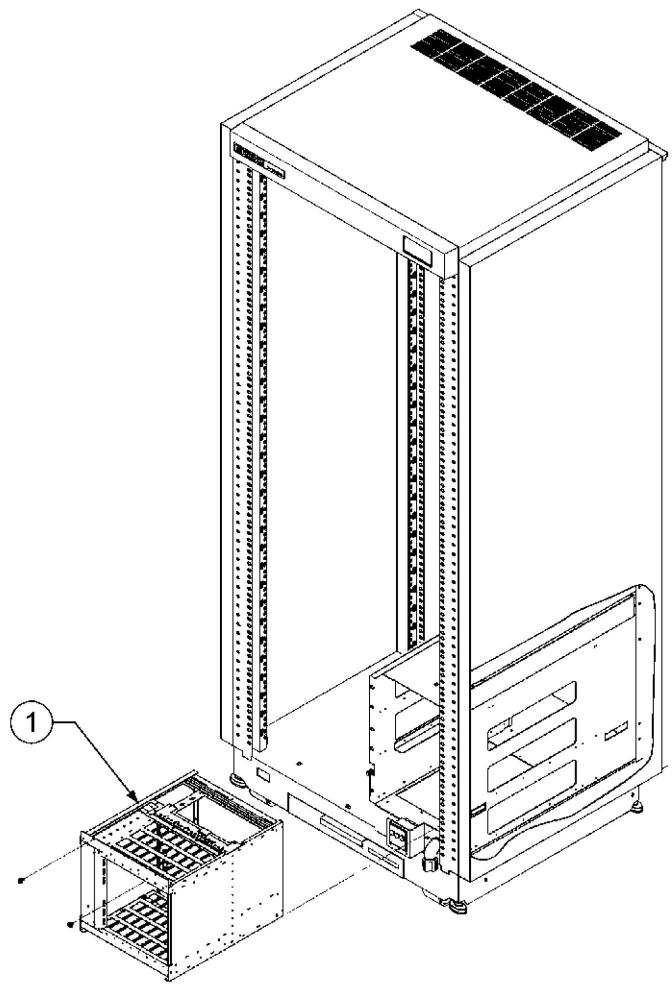


Figure 7-32 Removing the HP-PB I/O Card Cage

4. Remove the four screws (two front and two rear) holding the HP-PB I/O card cage in place.
5. From the front of the cabinet, push the card cage (item 1 in Figure 7-32) toward the rear of the cabinet. Then pull the card cage out from the back of the cabinet along its rails.

To replace the HP-PB I/O card cage, follow the above steps in reverse order.

Power Supply Removal

Refer to Figure 7-33 while performing these steps:

1. Remove the six screws from the rear cover (item 7).
2. Remove the two screws from the top of the power supply (item 1)
3. Remove the three power supply cables (3) from the SPCM board.
4. Disconnect the one power supply cable underneath the power supply.
5. Disconnect the AC connector from underneath the power supply.

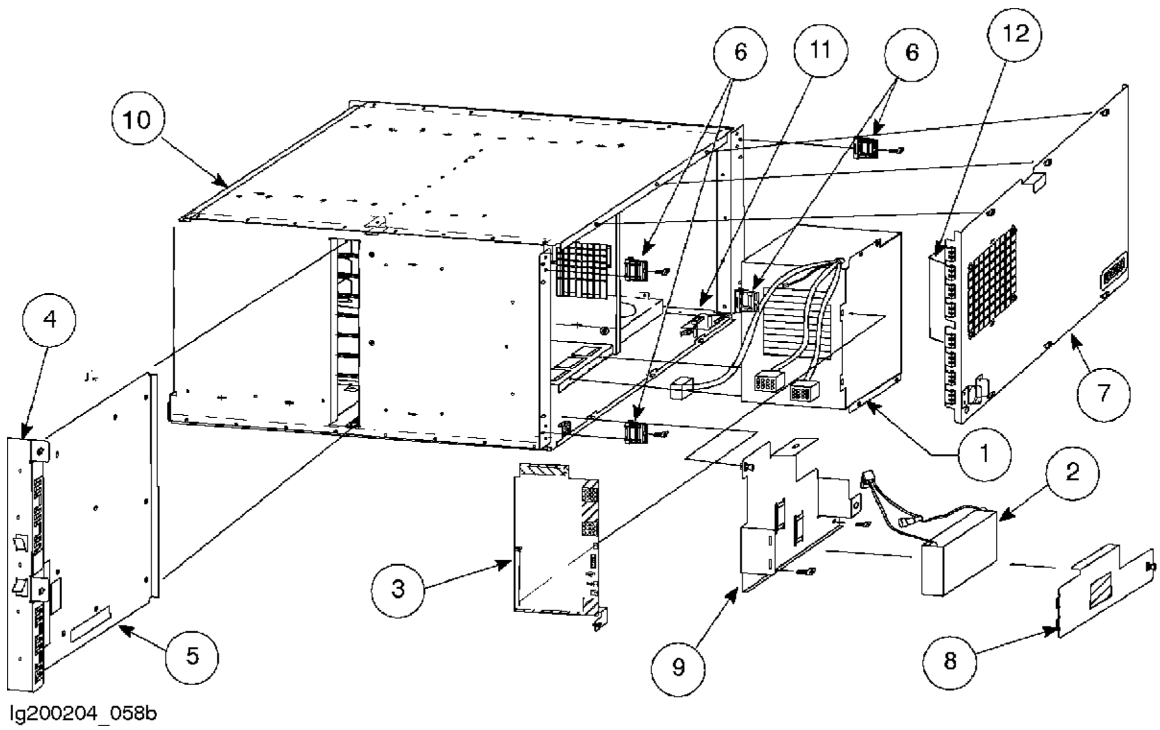


Figure 7-33 HP-PB I/O Card Cage Internal Components

To replace the power supply, reverse the above procedures. Refer to the cable connection diagram located on the rear cover of the card cage to find out how to reconnect the cables.

SPCM Card Removal

Refer to Figure 7-33 while performing these steps:

1. Remove the five cables from the SPCM card (item 3). Make note of their location so you can reattach them correctly.
2. Loosen the one screw and the retaining clip located at the bottom of the SPCM card.
3. Use the extractor handle to release the SPCM card from the backplane, and gently slide the card out of the card cage along the slot guides.

To replace the SPCM card, reverse the above procedures.

Note

It is recommended that you install the SPCM card into the backplane before connecting the power supply cables. This reduces the risk of damaging the connector.

Refer to the cable connection diagram located on the rear cover of the card cage to find out how to reconnect the cables.

HP-PB Card Cage Backplane Removal

The HP-PB backplane can be removed once the card cage has been removed.

Refer to Figure 7-33 while performing these steps:

1. Remove the two screws that secure the card cage backplane to the cabinet chassis from the bottom front of the HP-PB card cage.
2. Pull the slide sheet metal handle to remove the backplane (item 48).

To replace the HP-PB card cage, reverse the above procedures.

WARNING

The card cage assembly is heavy (approximately 35 lbs). Take the necessary lifting precautions.

Rack-Mount Cabinet Procedures

This chapter lists all the parts of the HP A1884A, and HP A1897A rack-mount cabinet that can be replaced if damaged. It also provides the procedures for accomplishing the replacement of a damaged part. Refer to Table 7-1 for a list of the cabinet parts that can be replaced if damaged.

The A1884A and A1897A cabinets are identical (accept for the system installed). All parts are removed and replaced the same. Refer to Figure 7-34 and Figure 7-35 for parts identification and while performing the procedures outlined in this section.

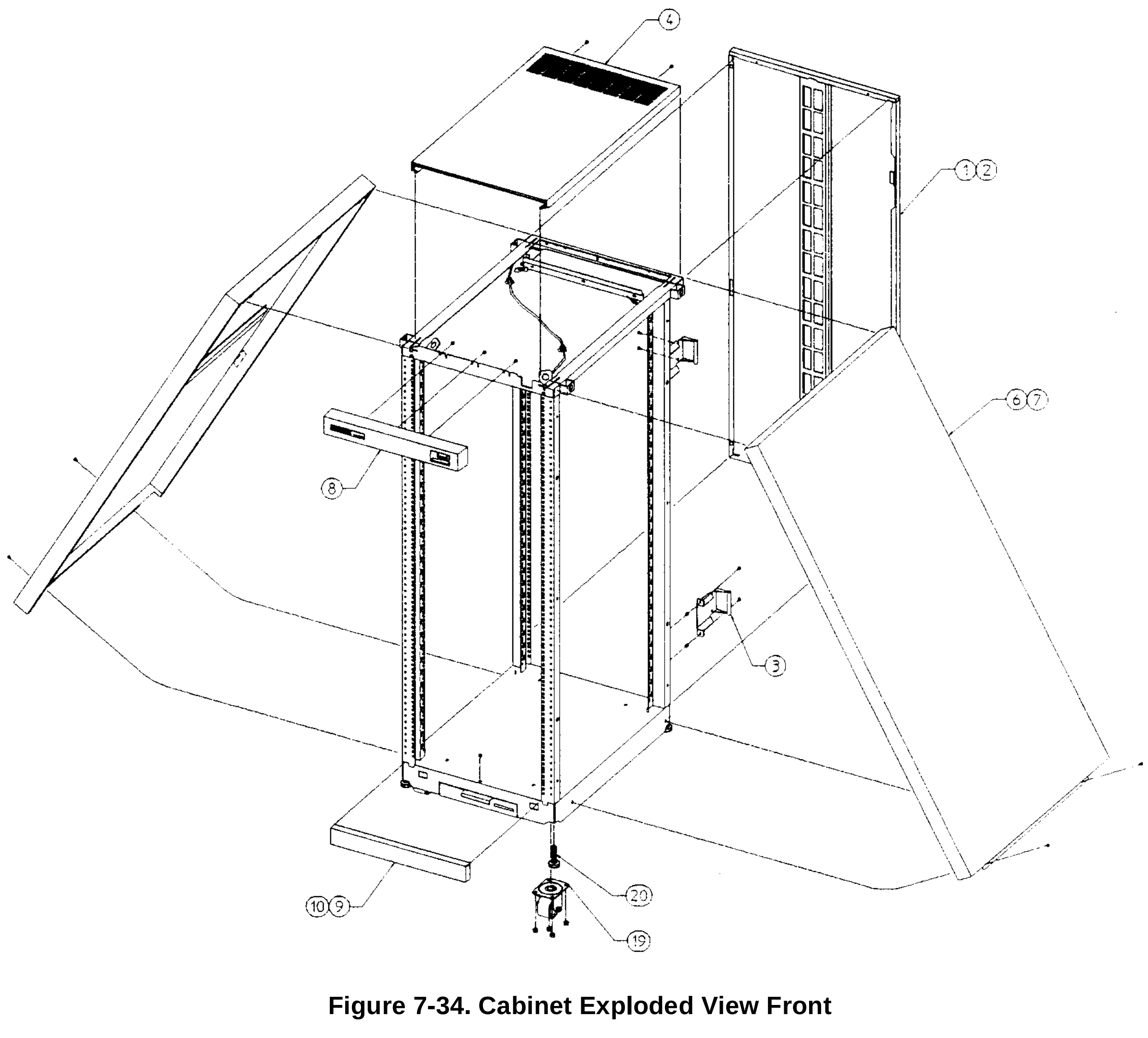


Figure 7-34. Cabinet Exploded View Front

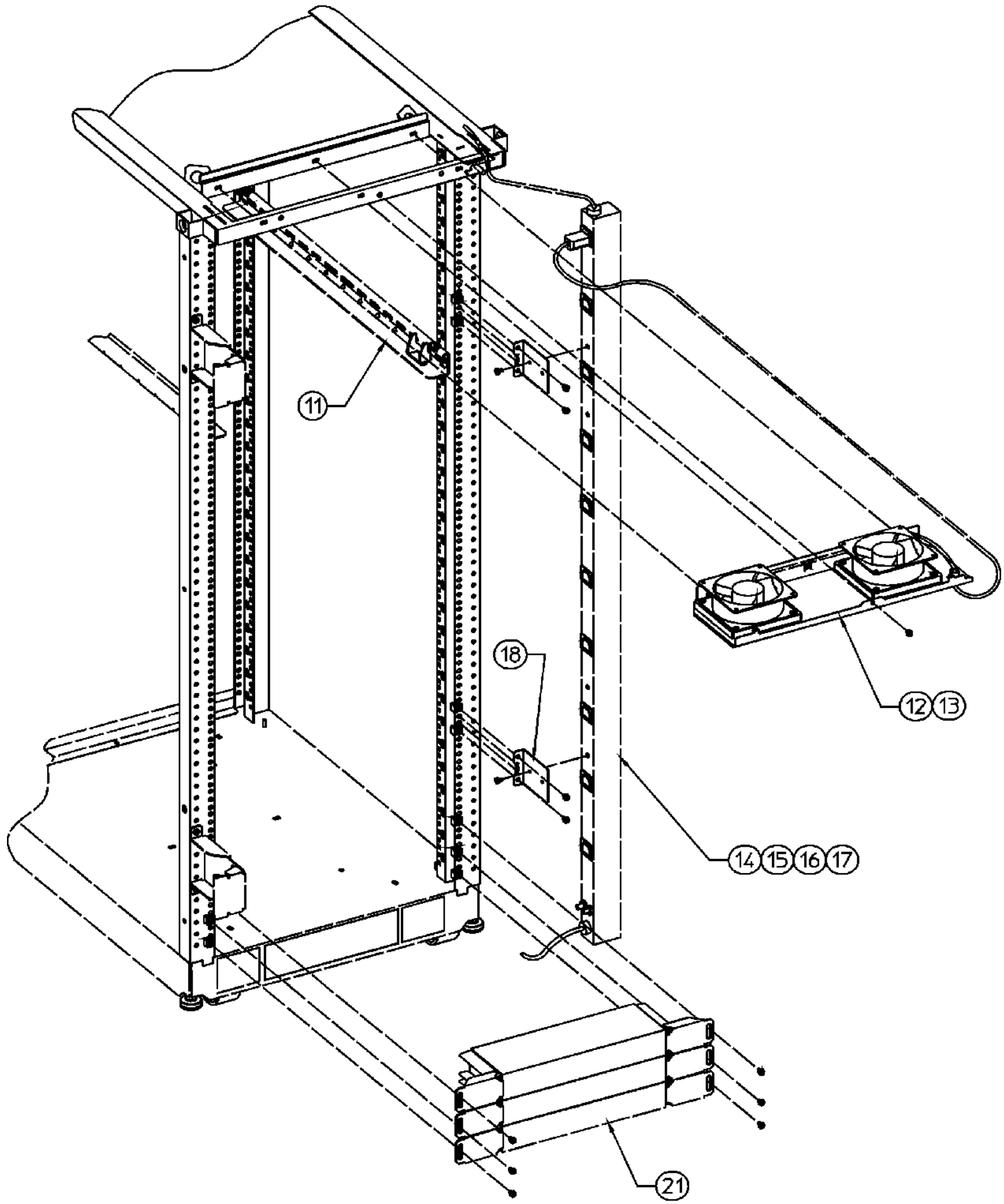


Figure 7-35 . Cabinet Exploded View Rear

Table 7-1. Rack-mount Cabinet Replaceable Parts

No.	Part No.	Description
1	C2786-60016	Rear door assembly, 1.6 meter
	1390-0489	Strike Plate
	1390-0265	Magnetic Door Catch
	0403-0780	Door Bumper
3	C2786-00012	Rear hinge
4	C2786-60015	Vented top cap
5	C2785-60007	Non-vented top cap
6	C2786-60014	Side cover, 1.6 meter
8	C2786-60004	Forehead assembly (with On/Off Switch)
	5181-8713	On/Off Switch 120V
	5181-8714	On/Off Switch 220V
9	C2786-00014	Base cover, 1.6 meter
11	C2786-60018	Rail assembly
	C2786-00019	Rear Stop Bracket
12	C2786-60024	230V Fan assembly
	3160-0378	115V Fan
13	C2786-60005	115V Fan assembly
	3160-0228	230V Fan
14	C2786-63006	US 208-240V PDU, 1.6 meter
15	C2786-63007	EURO 230V PDU, 1.6 meter
18	C2786-00021	PDU Support Bracket
19	1492-0159	Caster
	0535-0096	Nut- Wiz, M8 x 1.25 (caster)
20	0403-0778	Leveler
21	C2786-60017	Ballast assembly
	0590-0804	Nut- Tinnerman 10/32
	2680-0278	Screw, T15 10/32 w/washer
	2680-0281	Screw, T25 10/32
	C2786-60001	1U Filler assembly
	8120-5470	Rack device Power cord, 20 inches
	8120-1396	Rack device power cord, 30 inches
	C2786-00036	ADP mounting bracket

Cabinet Removal and Replacement Procedures

The following procedures are for the HP Field Replaceable Units (FRUs) contained in the HP A1884A or HP A1897A rack-mount cabinets.

Rear Door

Rear Door Removal:

1. Open the rear door of the cabinet.
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

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.
4. Plug the cabinet power cord into the wall outlet and power up the computer system.

Side Cover

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.

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

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

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.

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 7-36 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.

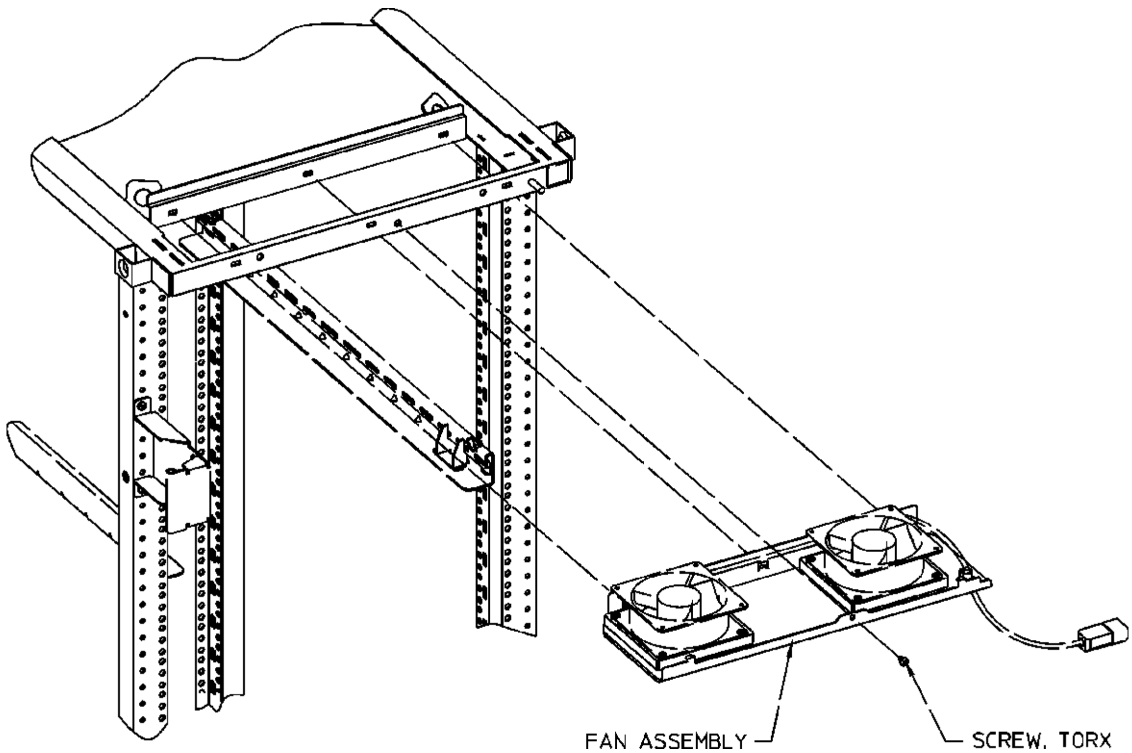


Figure 7-36. Fan Assembly

Fan

Refer to Figure 7-37 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).

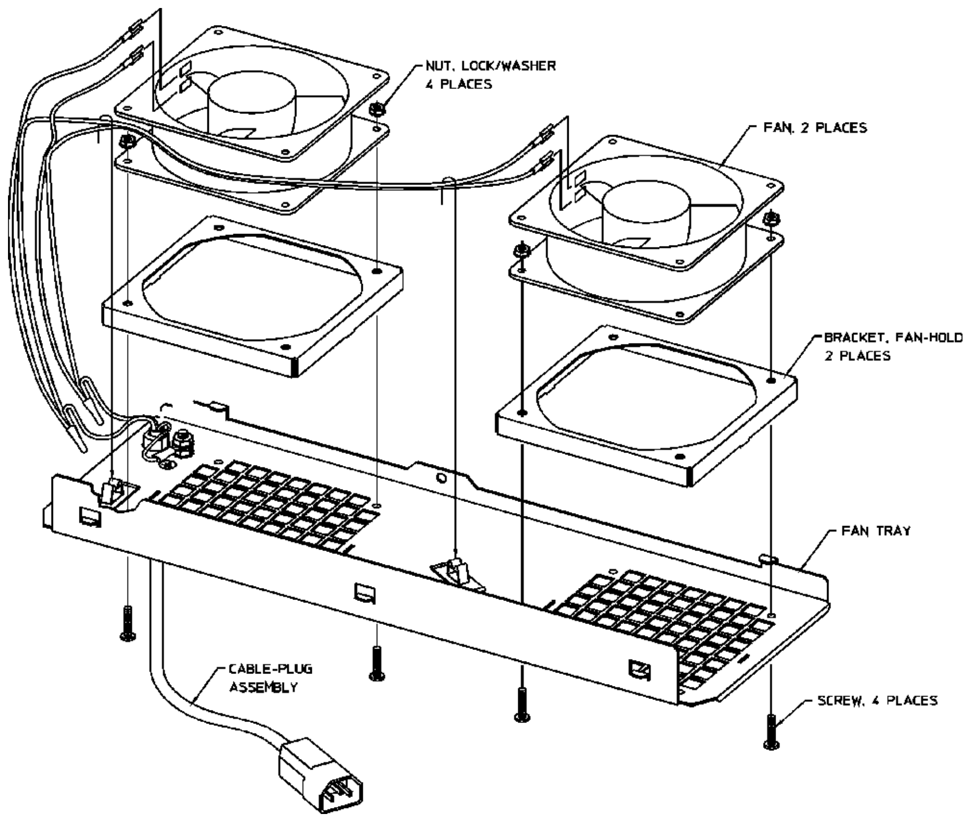


Figure 7-37. Fan Diagram

PDU

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

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 the bumper 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.

8

SCSI Peripherals and I/O Information

Introduction

This section is being provided to assist in identifying problems with the SCSI peripherals and Buses supported in this system.

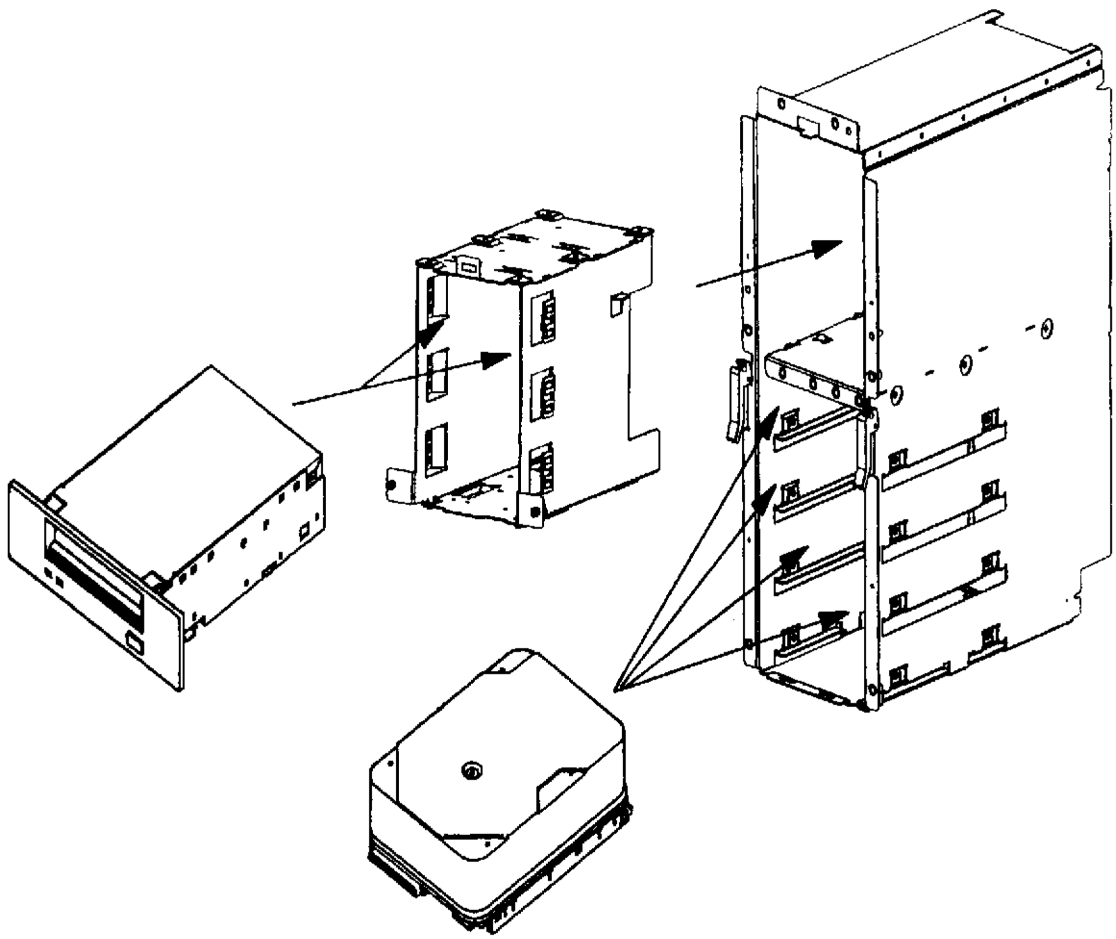


Figure 8-1. Peripheral Bay Exploded view

Figure 8-1 is a view of the peripheral bay outside the computer cabinet.The peripheral bay supports both Single-Ended SCSI and Fast Wide Differential SCSI Products. The only Products supported on the Fast Wide Differential SCSI Bus are Disk units. Please see the appropriate peripheral entry in this section for information on the supported units.

Configuration

1. HP's current implementations of SCSI supports 8 devices consisting of one or more device adapters (Initiators) and up to 7 peripheral devices (Targets) on the 50 pin busses, and up to 16 Initiator or Target devices on the 68 pin busses.

2. All SCSI buses must be terminated at both ends with an appropriate 50 pin or 68 pin ACTIVE terminator. (see the associated part number list).

3. Single Ended vs. Differential

   There are 2 structural alternatives available for host/device interconnect, each of which are mutually exclusive within a system.

   Single Ended - is a terminated bus which cannot exceed 6 meters including all internal and external cabling. (50 Pin Bus, Internal = Flat Cable, External = High or Low density connector, shielded cable)

   NOTE

   Single Ended internal system length is 0.5 meters, external length maximum is 5.5 meters.

   Differential - is a terminated bus which cannot exceed 25 meters including all internal and external cabling. (68 Pin Bus, Internal = Flat Cable, External = High density connector, shielded cable)

   NOTE

   Differential internal system length is 0.5 meters, external length maximum is 24.5 meters.

4. There must be at least one source of TERM POWER (usually host adapter supplied). It is acceptable to have more than one source of TERM POWER on a SCSI bus. If 2 or more sources of TERM POWER are available, the second source should be at the opposite end of the bus from the host adapter.

   NOTE

   Fast Wide SCSI disks internal in the system *ALL* provide TERM POWER to the SCSI bus.

5. The first host adapter SCSI address on either internal bus should be set to 7.

6. Priority is determined by SCSI address. Address 7 is the highest priority and address 0 is the lowest on the 50 pin bus or address 8 on the 68 pin bus.

   Highest (7,6,5,4,3,2,1,0,15,14,13,12,11,10,9,8) Lowest

7. Parity on the SCSI bus is normally enabled by a jumper on the devices. All currently supported system devices support parity generation. If any new device is added on a SCSI bus which does not generate parity, all devices on that bus must be set to ignore parity or this device must be on it's own dedicated SCSI bus.

SCSI Cables

The information in this section is common to all types of SCSI busses.

1. The cable length used to connect the SCSI devices plus ANY cable length internal to the device must not exceed the appropriate limits as previously stated.

2. Minimize the SCSI bus length but do not use cables shorter than 0.5m external.

3. Because cable impedance and construction affect bus signal quality, only HP cables are recommended.

4. While the high-density SCSI connectors on the HP-PB Host Adapters support both thumbscrew and squeeze latch cables, only the thumbscrew type are recommended because of reliability and RFI concerns with the squeeze-latch cables.

Cable Characteristics

Single-Ended and Differential, 50 and 68 conductor flat cables or 25 and 34 single twisted pair cables with a characteristic impedance of 90 to 140 ohms must be used for our application. (All Hewlett Packard supplied cables meet this requirement.)

Voltages / Current

Single-Ended

Output Characteristics - Either open collector or tristate drivers.

Signal True (low) = 0.0 to 0.5 Vdc.
Signal False (high) = 2.25 to 5.25 Vdc.

Input Characteristics - Device powered on including drivers and passive receivers.

Signal True (low) = 0.0 to 0.8 Vdc.
Current = -0.4 to 0.0 mA @ 0.5 Vdc.
Signal False (high) = 2.0 to 5.25 Vdc.
Current = 0.0 to 0.1 mA @ 2.7 Vdc.

Differential

Output Characteristics:

V ol (Low-Level output voltage) = 1.7V max. at I ol (Low-Level output current) = 55 mA.
V oh (High-Level output voltage) = 2.7V min. at I hl (High-Level output current) = -55 mA.
V od (Differential output voltage) = 1.0V min. with common mode voltage ranges from -7 to +12 Vdc.

Input Characteristics:

I i (Input Current on either input) = +/- 2.0 mA. with input voltages between -7 and +12 Vdc. with power on or off an with hysteresis = 35 mV min.

Table 8-1 lists the pin call-outs for the 50 pin SCSI cable, and Table 8-2 lists the pin call-outs for the 68 pin SCSI cable.

NOTE

Cable Conductor Number list is for flat cables. Connector Contact Number list is for Shielded, Twisted Pair cables.

Table 8-1 50 Pin SCSI Cable

Signal Name	Connector Contact Number	Cable Conductor Number		Connector Contact Number	Signal Name
Ground	1	1	2	26	-DB (0)
Ground	2	3	4	27	-DB (1)
Ground	3	5	6	28	-DB (2)
Ground	4	7	8	29	-DB (3)
Ground	5	9	10	30	-DB (4)
Ground	6	11	12	31	-DB (5)
Ground	7	13	14	32	-DB (6)
Ground	8	15	16	33	-DB (7)
Ground	9	17	18	34	-DB (parity)
Ground	10	19	20	35	Ground
Ground	11	21	22	36	Ground
Reserved	12	23	24	37	Reserved
Open	13	25	26	38	TermPwr
Reserved	14	27	28	39	Reserved
Ground	15	29	30	40	Ground
Ground	16	31	32	41	- ATN
Ground	17	33	34	42	Ground
Ground	18	35	36	43	- BSY
Ground	19	37	38	44	- ACK
Ground	20	39	40	45	-RST
Ground	21	41	42	46	- MSG
Ground	22	43	44	47	- SEL
Ground	23	45	46	48	- C/D
Ground	24	47	48	49	- REQ
Ground	25	49	50	50	- I/O

Table 8-2 68 Pin SCSI Cable

Signal Name	Connector Contact Number	Cable Conductor Number		Connector Contact Number	Signal Name
+DB(12)	1	1	2	35	-DB(12)
+DB(13)	2	3	4	36	-DB(13)
+DB(14)	3	5	6	37	-DB(14)
+DB(15)	4	7	8	38	-DB(15)
+DB(P1)	5	9	10	39	-DB(P1)
Ground	6	11	12	40	Ground
+DB(0)	7	13	14	41	-DB(0)
+DB(1)	8	15	16	42	-DB(1)
+DB(2)	9	17	18	43	-DB(2)
+DB(3)	10	19	20	44	-DB(3)
+DB(4)	11	21	22	45	-DB(4)
+DB(5)	12	23	24	46	-DB(5)
+DB(6)	13	25	26	47	-DB(6)
+DB(7)	14	27	28	48	-DB(7)
+DB(P)	15	29	30	49	-DB(P)
DIFFSENS	16	31	32	50	Ground
TermPwr	17	33	34	51	TermPwr
TermPwr	18	35	36	52	TermPwr
Reserved	19	37	38	53	Reserved
+ATN	20	39	40	54	-ATN
Ground	21	41	42	55	Ground
+BSY	22	43	44	56	-BSY
+ACK	23	45	46	57	-ACK
+RST	24	47	48	58	-RST
+MSG	25	49	50	59	-MSG
+SEL	26	51	52	60	-SEL
+C/D	27	53	54	61	-C/D
+REQ	28	55	56	62	-REQ
+I/O	29	57	58	63	-I/O
Ground	30	59	60	64	Ground
+DB(8)	31	61	62	65	-DB(8)
+DB(9)	32	63	64	66	-DB(9)
+DB(10)	33	65	66	67	-DB(10)
+DB(11)	34	67	68	68	-DB(11)

Termination/Term Power

1. The SCSI bus requires termination at both ends of the bus. The host adapters generally supply on board terminators and should be located at one end of the bus. The multifunction I/O host bus adapters are the current exception since they are designed to reside in the middle of the SCSI bus. Therefore, buses associated to these multifunction I/O adapters are terminated on the two ends of the associated internal and external buses. Since an external connection may not be present, insure that the ACTIVE terminators supplied with the product are installed on the external connection at the back of the system.

2. When possible, put devices that supply termination power at both ends of the bus. The host adapters will always supply termination power which is required for proper bus operation. However, noise immunity can be improved by placing another source of termination power at the other end of the bus. Most peripheral devices are optionally capable of supply termination power. (See the appropriate peripheral descriptions in this section.)

Termination Characteristics and Power

Terminator power will be supplied by the Initiators and may be supplied by any or all connected devices. HP recommends that terminator power be supplied by the Host Bus Adapter (HBA) Initiator and the last device on the SCSI Bus to help decrease interface error rates and provide better balance to the TERMPWR contacts. Recommended current limiting is 1.5 amps. with a maximum of 5 amps. (The limiting device may be fused or resetable.)

Single-Ended

TERMPWR = 4.25 to 5.25 vdc. with 900 ma source drive capability for the 50 pin Cable, and 1500 ma source drive capability for the 68 pin cable.

Differential

TERMPWR = 4.25 to 5.25 vdc. with 600 ma source drive capability for the 50 pin cable, and 1000 ma source drive capability for the 68 pin cable.

Normal Operation

1. Do not connect or disconnect a device on an active SCSI bus or to any bus that has devices supplying termination power. Shut down the system and turn off all external SCSI devices before connection or disconnecting products.

2. Do not power on or off a device on an ACTIVE SCSI bus.

   WHY?

   a. Noise can be injected which may cause devices on the bus to be reset or cause the system to reset the bus do to detection of an error. A reset interrupts the normal operation of the bus and can affect system performance.

   b. The action can cause data corruption.

   c. Some devices do not meet the specified standards when doing power on (C1512A and 7980S)

Common Problems

Common Problems in the Field:

- Maximum cable length exceeded.
- Improper Termination
- More than 1 device at the same address
- Damaged connector pins on High-Density cables.

Cable and Terminator Part Numbers

Tables 8-3 through 8-9 list all associated cables and terminators.

Table 8-3 50 Pin Low Density

Part Number	Product Number	Description
8120-5158	92222A	Bail to Bail (M/M) 0.5 m
8120-4998	92222B	Bail to Bail (M/M) 1.0 m
8120-5159	92222C	Bail to Bail (M/M) 2.0 m
5063-1212	C2927A	Bail to Bail (M/M) 3.0 m
5063-1213	C2928A	Bail to Bail (M/M) 5.0 m
8120-5160	92222D	Bail to Bail (M/F) 1.0 m
8120-5519	C2900A	Bail to Bail (M/F) 3.0 m
8120-5520	C2901A	Bail to Bail (M/F) 5.0 m
8120-5521	C2902A	Bail to Bail (M/F) 10.0 m
8120-5522	C2903A	Bail to Bail (M/F) 20.0 m
8120-5363	K2284	Bail to Thumb Screw 1.0 m
8120-5647	K2283	Bail to Thumb Screw 1.5 m
013045-005	K2207	Thumb Screw to Thumb Screw 0.5 m
013045-010	K2208	Thumb Screw to Thumb Screw 2.4 m
013045-009	K2209	Thumb Screw to Thumb Screw 1.5 m
013045-004	K2210	Thumb Screw to Thumb Screw 0.9 m
013045-011	K2211	Thumb Screw to Thumb Screw 3.0 m

Table 8-4 50 Pin Low Density to High Density

Part Number	Product Number	Description
5062-3384		Bail to Thumb Screw 0.5 m
5062-3383	K2296	Bail to Thumb Screw 1.0 m
5062-3388	K2297	Bail to Thumb Screw 1.5 m
5062-3386		Bail to Thumb Screw 2.0 m
5063-1218		Bail to Thumb Screw 2.5 m

Table 8-4 50 Pin Low Density to High Density

Part Number	Product Number	Description
5062-3385		Bail to Latch/Clip 0.5 m
5062-3370		Bail to Latch/Clip 1.0 m
5062-3389		Bail to Latch/Clip 1.5 m
5062-3387		Bail to Latch/Clip 2.0 m
A1630-62034	K2294	Thumb Screw to Thumb Screw 0.9 m
A1630-62035	K2295	Thumb Screw to Thumb Screw 1.5 m
A1630-62036		Thumb Screw to Thumb Screw 2.5 m
A1630-62019		Thumb Screw to Latch/Clip 0.9 m
A1630-62026		Thumb Screw to Latch/Clip 1.5 m
A1630-62038		Thumb Screw to Latch/Clip 2.5 m

Table 8-5 50 Pin High Density to High Density

Part Number	Product Number	Description
8120-5547		Thumb Screw to Thumb Screw 0.5 m
8120-5548	C2908A	Thumb Screw to Thumb Screw 1.0 m
8120-5549		Thumb Screw to Thumb Screw 1.5 m
8120-5550		Thumb Screw to Thumb Screw 2.0 m
8120-5551		Thumb Screw to Thumb Screw 5.0 m
8120-5552		Thumb Screw to Thumb Screw 10.0 m

Table 8-6 50 Pin Low Density to 68 Pin High Density

Part Number	Product Number	Description
5063-1214	C2915A	Bail to Thumb Screw 1.0 m

Table 8-7 50 Pin High Density to 68 Pin High Density

Part Number	Product Number	Description
5181-7704		Thumb Screw to Thumb Screw 0.5 m
5181-7705		Thumb Screw to Thumb Screw 1.0 m
5181-7706		Thumb Screw to Thumb Screw 1.5 m
5181-7707	C2906A	Thumb Screw to Thumb Screw 2.0 m
5181-7708	C2907A	Thumb Screw to Thumb Screw 5.0 m
5181-7714		Thumb Screw to Thumb Screw 10.0 m
5181-7737	C2916A	Thumb Screw to Thumb Screw 20.0 m

Table 8-8 68 Pin High Density to 68 Pin High Density

Part Number	Product Number	Description
8120-6147		Thumb Screw to Thumb Screw 0.5 m
A1658-62018	C2911A	Thumb Screw to Thumb Screw 0.9 m
A1658-62019		Thumb Screw to Thumb Screw 1.5 m
A1658-62020	C2924A	Thumb Screw to Thumb Screw 2.5 m
A1658-62021		Thumb Screw to Thumb Screw 5.0 m
A1658-62022	C2925A	Thumb Screw to Thumb Screw 10.0 m
A1658-62023	C2926A	Thumb Screw to Thumb Screw 20.0 m

Table 8-9 Terminators

Part Number	Product Number	Description
1252-3920	K2291	Active Low Density 50 pin (nonmolded)
A1658-62002	K2290	Active Low Density 50 Pin (molded)
A1658-62016	C2904A	Active High Density 50 Pin (molded)
1252-3251		Passive Low Density 50 Pin (nonmolded)
1252-3932		Passive High Density 50 Pin (nonmolded)
A1658-62024	C2905A	Differential High Density 68 Pin (molded)

Status Returns

Hardware status byte 0: (error sense)	70 Current error
	71 Deferred error

NOTE

Values from 70 through FF are valid but may be vendor product defined.

Hardware status byte 02:	7	6	5	4	3 to 0
	FM	EOM	ILI	Reserved	Sense Key

FM: If one, indicates that the current command has read an FM (file mark) or set a file mark

EOM: If one, indicates that an end-of-medium condition (end-of-partition, beginning-of-partition, out-of-paper, etc.) exists.

ILI: If one, indicates that the requested logical block length did not match the logical length of the medium.

Sense Key:
0 - No sense. No error, or filemark, EOM or ILI bits is set.
1 - Recovered Error.
2 - Not ready
3 - Medium Error
4 - Hardware Error
5 - Illegal Request
6 - Unit Attention
7 - Data Protect
8 - Blank Check. Write Once media encountered a blank medium
9 - Vendor Specific Sense Key [1]
A- Copy Aborted
B- Aborted Command
C- EQUAL. Indicates that a search command has satisfied an equal comparison.
D- Volume Overflow.
E- Miscompare
F - Reserved

[1] Seagate (HPA3058A) - 9 - Firmware Error

Table 8-10 provides the description for Hardware status byte 12: (ASC - Additional Sense Code) and Hardware status byte 13: (ASCQ - Additional Sense Code Qualifier)

Table 8-10 Hardware Status Bytes 12 and 13

ASC	ASCQ	Description	Notes
00	00	No additional sense information	
00	00	Lengths did not Match on Read (Sense Key 0)	5
00	00	Undetermined Hardware Error (Sense Key 4)	5
00	01	File Mark detected	
00	02	End of partition / medium detected	
00	03	Setmark detected	
00	04	Beginning of Partition Detected	
00	05	End of data Detected	
00	05	Write Mode and Read or Verify was Issued (sense key 5)	5
00	06	I/O Process Terminated	6
00	11	Audio Play Operation in Progress	
00	12	Audio Play Operation Paused	6
00	13	Audio Play Operation Successfully Completed	6
00	14	Audio Play Operation Stopped Due to Error	6
00	15	No Current Audio Status to Return	6
01	00	No index/Sector signal	
02	00	No seek complete	
03	00	Write fault	
03	01	No Write Current	4
03	02	Excessive Write Errors (sense key 3)	4, 5
04	00	Drive not ready	
04	01	Drive in process of becoming ready	
04	02	Drive not ready, initializing command required	
04	03	Drive not ready, manual intervention required	
04	04	Logical Unit Not Ready, Format in Progress	1
05	00	Logical Unit (LUN) does not respond to selection	
07	00	Multiple peripheral devices selected	
08	00	Logical unit communication Failure	
08	01	Logical Unit Communication Time-Out (sense key 4)	1, 5
08	02	Logical Unit Communication Parity Error (sense key 4)	1, 5
09	00	Track Following Error	
09	01	Tracking Servo Failure	6
09	02	Focus Servo Failure	6
09	03	Spindle Servo Failure	6
0C	00	Write Error	2, 4

Table 8-10 Hardware Status Bytes 12 and 13

ASC	ASCQ	Description	Notes
0C	00	LBOT Failure - Unable to write Tape mark Tracks (Sense Key 3)	5
0C	00	Hardware Failure - Head Sync Error during Write (Sense Key 4)	5
0C	01	Write Error Recovered with Auto-Reallocation	1
0A	00	Error log overflow	
10	00	ID CRC or ECC error	
10	00	Compression Integrity Check Failed (sense key B)	5
11	00	Unrecovered Read error of data blocks	
11	00	Uncorrectable Block during Read, Space, Locate (Sense Key 3)	5
11	00	Hardware Error during Read (Sense Key 4)	5
11	01	Read Retries Exhausted	1, 4
11	01	An Uncorrectable Block was Encountered during a Read (sense key 3)	5
11	02	Error Too Long to Correct	1
11	02	Read Decompression CRC failed (sense key 4)	5
11	03	Too many permanent rad errors, can’t sync (sense key 11)	5
11	03	Multiple Read Errors	4
11	04	Physical End of Medium Encountered	4
11	05	LEC Uncorrectable Error	6
11	06	CIRC Unrecovered Error	6
11	0A	Miscorrected Error	4
12	00	Address Mark Not Found For ID Field	1
14	00	No record found	
14	00	Sector Not Found	1
14	00	A Medium Error was Detected during a Read, Space, Locate (sense key 3)	5
14	01	Record Not Found	1, 4
14	02	Filemark not Found	4
14	03	End of Data NOT Found	4
14	03	End of data found	
14	04	Block Sequencer Error	4
15	00	Seek position error	
15	00	Mechanical Positioning Error	2
15	00	No Information at this position on Tape, Cannot do Space Operation (sense key 3)	5
15	00	Random Positioning Error	6
15	01	Mechanical Positioning Error	1
15	01	Servo Hardware Failure	5
15	02	Positioning Error Detected by Read of Medium (sense key 9)	1, 4, 5
16	00	Data Synchronization Mark Error	1
17	00	Recovered Read data with retries (not with ECC)	
17	01	Recovered Data with retries	

Table 8-10 Hardware Status Bytes 12 and 13

ASC	ASCQ	Description	Notes
17	02	Recovered Data Using Positive Offset	1, 4
17	03	Recovered Data Using Negative Offset	1, 4
17	04	Recovered Data with Retries and /or CIRC Applied	6
17	05	Recovered Data using Previous Sector ID	6
17	06	Recovered Data Without ECC - Data Auto Reallocated	1
18	00	Recovered Read data with ECC (not with retries)	
18	01	Recovered Data with ECC and Retries Applied	1
18	02	Recovered Data with ECC and/or Retries, Data Auto-Reallocated	1
18	03	Recovered Data with CIRC	6
18	04	Recovered Data with LEC	6
18	05	Recovered Data - Recommend Reassignment	6
19	00	Defect List error	
19	01	Defect List Not Available	1
19	02	Defect List Error in Primary List	1
1A	00	Parameter Overrun	
1A	00	Illegal Transfer Length in the CDB (sense key 5)	5
1B	00	Synchronous data transfer error	
1C	00	Defect List not Found	1
1C	01	Primary Defect List not Found	1
1D	00	Compare errors	
1D	00	Miscompare During Verify Operation	1
20	00	invalid Command Operation Code	
21	00	illegal Logical Block Address	
21	01	Invalid Element Address	2
24	00	Illegal field in Command Descriptor Block (CDB)	
25	00	Invalid Logical Unit Number (LUN)	
26	00	Invalid filed in Parameter List	
26	01	Invalid element address	
26	01	Parameter not Supported by the Devices Boot Code (sense key 3)	5
26	01	Parameter not Supported	6
26	02	Invalid transport element	
26	02	Parameter Value Invalid	1
26	02	Write Buffer Parameter Invalid	5
26	03	Invalid source element	
26	03	Invalid Field Parameter - Threshold Parameter	1
26	04	Invalid destination element	
26	05	Invalid second destination element	
26	06	Illegal function	

Table 8-10 Hardware Status Bytes 12 and 13

ASC	ASCQ	Description	Notes
26	07	Transport full	
26	08	Destination full	
26	09	Source full	
26	0A	Exchange first destination full	
26	0B	Exchange first second destination full	
26	98	Invalid Field Parameter - Check Sum	1
26	99	Invalid Field Parameter - Firmware Tag	1
27	00	Write protected	
28	00	Not ready to ready transition/medium changed	
28	01	Import/Export Element Accessed	2
29	00	Power On or Reset or Bus device reset occurred	
29	80	Power On or Reset or Bus device reset occurred and selftest failed	
2A	00	Mode select Parameters changed	
2A	00	Parameters Changed (Mode Select)	1
2A	01	Mode Parameters Changed	
2A	01	MODE SELECT Parameters changed by another Initiator	4
2A	02	Log Parameters Changed (sense key 7)	1, 4, 5
2B	00	Copy can't execute since host can't disconnect	2
2C	00	Command Sequence Error	3
2F	00	Commands Cleared by another Initiator	3
2F	00	Tagged Commands Changed by another Initiator	1
30	00	Incompatible medium installed	
30	01	Cannot Read Medium - Unknown Format	4
30	01	Tape format is incompatible with the CXB-8505 (sense key 3)	5
30	02	Cannot read media, Incompatible format	
30	03	Cleaning Cartridge Installed	2
31	00	Media Format Error Occurred	
31	01	Format Failed	1
31	01	The format partition operation failed (sense key 3)	5
32	00	No defect spare location available	
33	00	Spare Operation Failed	
33	00	Tape Length Error	2
37	00	Parameter Rounded	1, 4
39	00	Saving Parameters Not Supported	4
3A	00	Medium not present	
3B	00	Tape positioning error	
3B	00	Sequential Positioning Error	2, 4
3B	01	Tape position error at Beginning Of Medium	

Table 8-10 Hardware Status Bytes 12 and 13

ASC	ASCQ	Description	Notes
3B	02	Tape Position Error at End of Medium	4
3B	08	Reposition Error	4
3B	0D	Medium Destination Element Full	2
3B	0E	Medium Source Element Empty	2
3D	00	Invalid bits in IDENTIFY message	
3E	00	Invalid Microcode	3
3E	00	Logical Unit has not Self Configured Yet	2
3F	00	Target operating conditions have changed	
3F	01	Microcode has changed	
3F	02	Changed Operating Definition	1
3F	03	INQUIRY data has changed	
40	00	Diagnostic or RAM failure	
40	01	DRAM Parity Error	1
40	XX	Diagnostic Failure (XX = FRU)	2
40	80	Power on Diagnostic failure	
40	80	Diagnostic Failure (Vendor Specific)	6
40	81	Diagnostic Failure on Memories	6
40	82	Diagnostic Failure on CD-ROM ECC Circuit	6
40	83	Diagnostic Failure on Gate-Array	6
40	84	Diagnostic Failure on Internal SCSI Controller	6
41	00	Data path diagnostic failure	
42	00	Power-On diagnostic failure	
43	00	Message Error	
44	00	Internal Controller/Target Error	
44	00	Internal Software failure	5
45	00	Select/Reselect failed	
46	00	Unsuccessful Soft Reset	
47	00	SCSI Interface parity error	
48	00	Initiator detected error	
49	00	Inappropriate/Illegal message	
4A	00	Command Phase Error	2, 4
4B	00	Data Phase Error	
4C	00	Microcode Programing Failed	3
4C	00	Logical Unit Failed Self-Configuration	6
4E	00	Overlapped commands attempted	
50	00	Write Append Error	2, 4
50	01	Write Append Position Error (sense key 3)	4
50	01	Write append position error, or illegal position to format partition (sense key 3)	5

Table 8-10 Hardware Status Bytes 12 and 13

ASC	ASCQ	Description	Notes
50	01	Write Failure after Retry Limit Reached	5
51	00	Erase Failure	2, 4
52	00	Cartridge Fault	2, 4
53	00	Media Load/Eject Failed	2, 4
53	01	Unload Tape Failure	4
53	02	Medium Removal Prevented	2, 4
57	00	Unable to Recover Table-Of-Contents	6
5A	00	Operator Request or State Change Input (Unspecified)	6
5A	01	Operator Requested Media Removal	5
5B	00	Log Exception (Segate Factory Installed Option)	1
5B	01	Threshold Condition Met (Segate Factory Installed Option)	1
5B	01	Log Threshold Met (sense key 6)	5
5B	02	Log counter At Maximum (Segate Factory Installed Option)	1
5B	02	Log Parameter Overflow (sense key 1)	5
5B	03	Log List Codes EXAUSTED (Segate Factory Installed Option)	1
5C	00	RPL Status Change	1
63	00	End of User Area Encountered on This Track	6
64	00	Illegal Mode for this Track	6
70	XX	Vendor Specified (See Appropriate Product Documentation)	
80	00	General Firmware Error Qualifier	1
81	00	Mode Mismatch Fixed/Variable (sense key 5)	5
82	00	No Tape Required but Tape Loaded (SEND DIAGNOSTIC) (sense key 5)	5
82	80	Humidity too High	
82	81	Dryness, Humidity falls to a level that permits access	
82	82	Device Requires Cleaning	2
82	83	Bad Microcode Detected	2
84	00	Could not Change Mode Parameters since tape not at LBOT or LBOP (sense key 5)	5

1 = HP A3058A 1Gbyte Disk
2 = HP DDS Products (All)
3 = HP F/W SCSI Disks (HP A3145A)
4 = Wangtek 1.2 Gbyte QIC Tape Drive (HPA2944A)
5 = Exabyte 8 mm Tape (HP A3024A)
6 = CD-ROM (HP A3086A & HP A3184A)

NOTE

Even Though the listed Additional Sense Codes and Qualifiers are sometimes listed as associated to a particular device, other devices may return the same values with the same meaning. Some devices may also have vendor unique codes which are not listed.

Internal Peripherals

This section of Chapter 8 provides the identification, specification, and configuration information for the peripherals supported in the system cabinet. It also provides troubleshooting, maintenance, and diagnostic information for the products listed:

- **A3629A SCSI Disk Drive**
- **A3353A SCSI Disk Drive (source 1)**
- **A3353A SCSI Disk Drive (source 2)**
- **C3145A SCSI Disk Drive**
- **A3351A SCSI Disk Drive (source 1)**
- **A3351A SCSI Disk Drive (source 2)**
- **A3058A SCSI Disk Drive (source 1)**
- **A3058A SCSI Disk Drive (source 2)**
- **A3350A SCSI Disk Drive**
- **2478SZ (C1504B) DDS Tape Drive**
- **A3183A DDS-2 Tape Drive**
-
- **A3542A 12GB DDS-3 Tape Drive**
- **A3024A 8mm Tape Drive**
- **A3086A CD-ROM Drive**
- **A3184A CD-ROM Drive**
- **A3416A CD-ROM Drive**
- **A3715A CD-ROM Drive**

HP A3629A SCSI Disk Drive

Figure 8-2 shows the HP A3629A 9 Gbyte F/W SCSI Disk Drive.

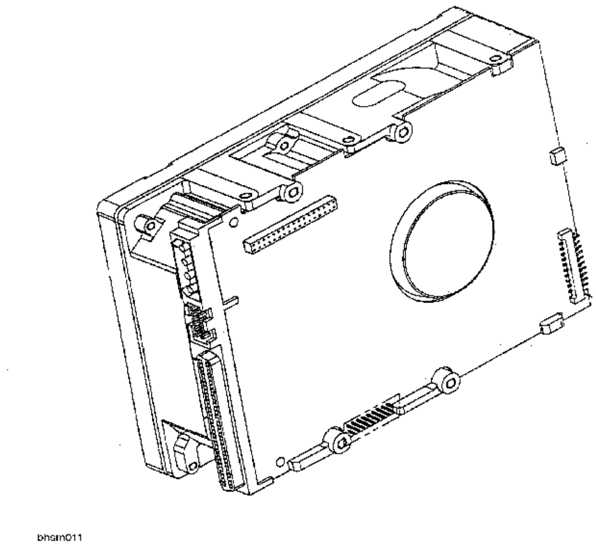


Figure 8-2. HP A3629A Disk Drive.

Specifications

- Integrated F/W SCSI-2 Differential Controller
- Synchronous and Asynchronous data protocol
- Synchronous data transfer rate up to 10 Mbytes/sec.
- Downloadable Firmware
- Selectable sector sizes from 180 to 4096 bytes/sector
- 96-bit Reed-Solomon ECC for error detection and correction
- Sealed Head/Disk Assembly
- Dedicated head landing zone
- Automatic shipping lock engaged at power off
- Self -Test performed at power on
- Synchronous spindle capability
- 512 Kbyte data buffer
- Formatted data capacity = 9,100 Mbytes
- Eight spare sectors per cylinder
- 2 cylinders reserved for logs and maintenance information
- 7200 RPM Spindle Speed
- Average latency = 4.17 ms.
- 1,000,000 hour MTBF
- No preventative maintenance or adjustments required
- Inquiry Vendor Identification String = SEAGATE
- Inquiry Product Identification String = ST19171W
- Inquiry Product Revision Level string = HPM2 or greater

Jumpering

Table 8-11, “A3629A (ST19171WD) J2 Pin-set,” on page 8-19 describes the options settings available on pin-set J2. Table 8-12, “A3629A (ST19171WD) J6 Pin-set,” on page 8-20 describes the J6 pin-set.

Drive options are selected on pin-set J2. The SCSI address is set on pin-set J6 (see Figure 8-3 on page 8-21).

A pin pair shorted or ON when a jumper is installed. A pin pair open or OFF when a jumper is absent.

Table 8-11 A3629A (ST19171WD) J2 Pin-set

Jumpers		**Description**
TP2 (Pins 3-4)	**TP1** (Pins 1-2)	
Off	Off	No terminator power is connected to the drive terminators or the SCSI bus I/O cable.
On	Off	Drive supplies its own terminator power only. (Default)
Off	On	Drive supplies power to the SCSI bus I/O cable but not to the internal terminators. When drives have differential I/O circuits (WD drives), a jumper on the **TP1** position may be needed to power external terminators (see system documentation).
On	On	Drive supplies terminator power to itself (internal connection) and to the SCSI bus I/O cable.
TP Position A (pins 2-4)		
On		Not applicable to WD I/O.
Off		
RES (pins 5-6)		Reserved
PD (pins 7-8)		
On		SCSI parity checking and parity error reporting by the drive is disabled.
Off		Drive checks for parity and reports the results of parity checking to host. (Default)
WP (pins 9-10)		
On		Drive is write-protected.
Off		Drive is not write-protected. (Default)
DS (pins 13-14)	**ME** (pins-11-12)	
Off	Off	Spindle starts immediately after power up. (Default)
Off	On	Spindle does not start until a Start Unit command is received from the host.
On	Off	Startup is delayed by SCSI ID times 12 seconds after power is applied; for example, drive with SCSI ID of 0 starts the spindle immediately when DC power connected, drive with SCSI ID of 1 starts after a 12-second delay, drive with SCSI ID of 2 starts after 24-second delay, etc. Tolerance is plus 3 seconds, minus 0 seconds.
On	On	Spindle starts when the host sends a Start Unit command. Delayed start feature is overridden and does not apply when the **ME** jumper is installed.
TE (pins 15-16)		
On		On-board (nonremovable) terminator circuits are enabled. (Default)
Off		On-board (nonremovable) terminator circuits are disabled.

Table 8-12 A3629A (ST19171WD) J6 Pin-set

Jumper				Description
Pins 5-6	Pins 5-6	Pins 3-4	Pins 1-2	
				SCSI ID 0 (Default)
			ON	SCSI ID 1
		ON		SCSI ID 2
		ON	ON	SCSI ID 3
	ON			SCSI ID 4
	ON		ON	SCSI ID 5
	ON	ON		SCSI ID 6
	ON	ON	ON	SCSI ID 7
ON				SCSI ID 8
ON			ON	SCSI ID 9
ON		ON		SCSI ID 10
ON		ON	ON	SCSI ID 11
ON	ON			SCSI ID 12
ON	ON		ON	SCSI ID 13
ON	ON	ON		SCSI ID 14
ON	ON	ON	ON	SCSI ID 15
Pins 9-10				Reserved
Pins 11-12				Activity LED (see Figure 8-3 on page 8-21)
Pins 13-20				Reserved

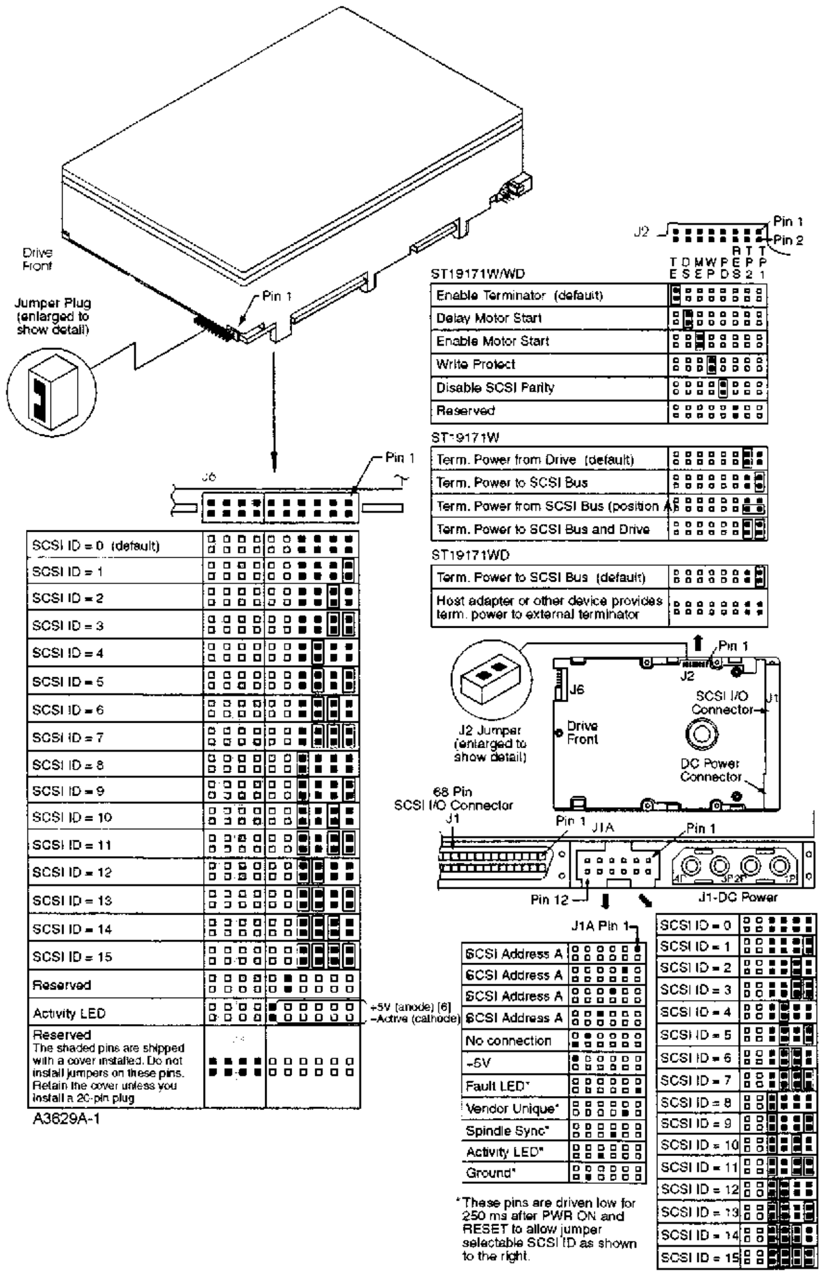


Figure 8-3. A3629A (ST19171WD) J2 and J6 Jumper Settings

Preventative Maintenance

There is no preventative maintenance reuqired for this product.

Troubleshooting

This hard disk drive should be replaced as a complete assembly. It is assumed the customer maintains a regular data back schedule, so if the disk drive fails and must be replace, customer data can be restored to the new disk drive.

To troubleshoot the disk drive, check the following:

- Drive Busy light (flashing=activity, off = no activity)
- Internal drive logs (See SCSIDSK2 Interactive section)

Exchange Part Number

The exchange part number is A3629-69001

Diagnostics

- SCSIDSK2
- IOMAP
- SYSMAP

HP A3353A SCSI Disk Drive (Source 1)

Figure 8-2 shows the HP A3353A 4 Gbyte F/W SCSI Disk Drive.

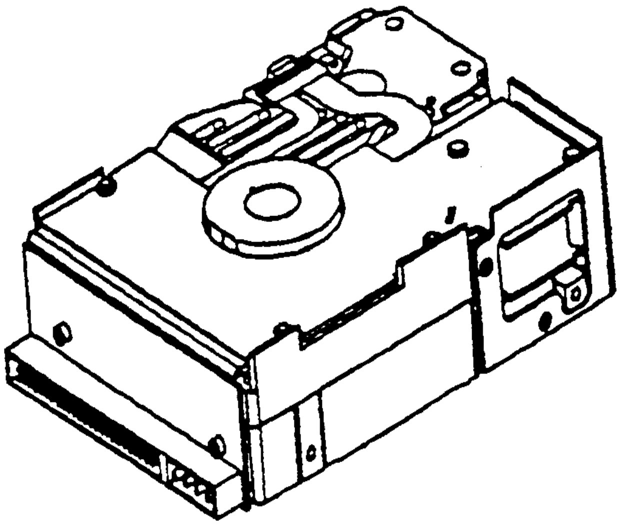


Figure 8-4. HP A3353A Disk Drive.

Specifications

- Integrated F/W SCSI-2 Differential Controller
- Synchronous and Asynchronous data protocol
- Synchronous data transfer rate up to 10 Mbytes/sec.
- Downloadable Firmware
- Selectable sector sizes (Default 512 bytes/sector)
- 96-bit Reed-Solomon ECC for error detection and correction
- Sealed Head/Disk Assembly
- Dedicated head landing zone
- Automatic shipping lock engaged at power off
- Self -Test performed at power on
- Synchronous spindle capability
- 954 Kbyte data buffer
- Formatted data capacity = 4,294 Mbytes
- Nine spare sectors per cylinder
- 2 cylinders reserved for logs and maintenance information
- 7200 RPM Spindle Speed
- Average latency = 4.17 ms.
- 800,000 hour MTBF
- No preventative maintenance or adjustments required
- Inquiry Vendor Identification String = SEAGATE
- Inquiry Product Identification String = ST5150WD
- Inquiry Product Revision Level string = HP06 or greater

Jumpering

Figure 8-5 shows a bottom view of the drive for purposes of showing the jumper positions.

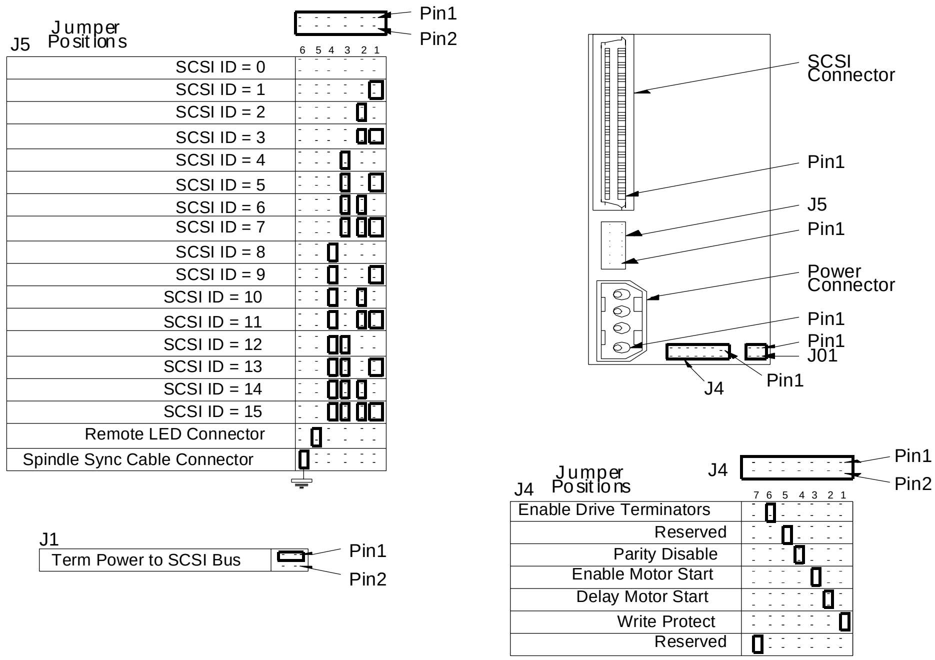


Figure 8-5. HP A3353A Jumper Diagram

Table 8-11 provides the definitions and default settings for jumpers J01, J4 and J5.

Table 8-13 HP A3353A J01, J4 and J5 Jumper Positions

Position/Pins			Jumper Function Descriptions
J01	B[1]	1&2	Terminator Power supplied by Drive.
	2[1]	2&4	Terminator Power supplied from SCSI BUS.
	1	1&3	Terminator Power supplied to SCSI BUS (Default)
	1&2	1&3 2&4	Terminator Power supplied to SCSI BUS and Drive.
J4	01	1&2	Write Protect, jumper installed protects the entire disc drive. Default is NO jumper.
	02	3&4	Delayed Motor Start option. Default is NO jumper. Jumper installed, the spindle motor start delay is 10 times the Target ID plus a maximum power up delay of 3 sec.
	03	5&6	Enable Motor Start. Default is NO jumper. Jumper installed will cause the Target to wait for the START UNIT COMMAND from the SCSI HOST. No jumper installed causes the unit to look at position #02.
	04	7&8	Parity Disable. Default is NO jumper. Jumper installed causes parity checking and error reporting to be disabled.
	05	9&10	Reserved for factory use, default is no jumper.
	06	11&12	Enable SCSI Signle-Ended Terminator. Jumper installed will enable the SCSI Terminator. Jumper removed will disable the SCSI Terminator (default).
	07	13&14	Reserved.
J5	01	1&2	SCSI Target ID 0. No jumper installed=0, jumper installed=1.
	02	3&4	SCSI Target ID 1. No jumper installed=0, jumper installed=1.
	03	5&6	SCSI Target ID 2. No jumper installed=0, jumper installed=1.
	04	7&8	SCSI Target ID 3. No jumper installed=0, jumper installed=1.
	05	9&10	Remote LED connector. Pin 9 is cathode (neg), Pin 10 is anode (pos). Pin 10 is current limited through a 1K , 1/10W resistor.
	06	11&12	Spindle Sync cable connector. Pin 11 is the SSREF+ or refernce Index signal, Pin 12 is Gnd.

1. Valid for single-ended drives only.

Preventative Maintenance

There is no preventative maintenance reuqired for this product.

Troubleshooting

This hard disk drive should be replaced as a complete assembly. It is assumed the customer maintains a regular data back schedule, so if the disk drive fails and must be replace, customer data can be restored to the new disk drive.

To troubleshoot the disk drive, check the following:

- Drive Busy light (flashing=activity, off = no activity)
- Internal drive logs (See SCSIDSK2 Interactive section)

Exchange Part Number

The exchange part number is A3353-69001

Diagnostics

- SCSIDSK2
- IOMAP
- SYSMAP

HP A3353A SCSI Disk Drive (Source 2)

Figure 8-6 shows the HP A3353A 4 Gbyte F/W SCSI Disk Drive.

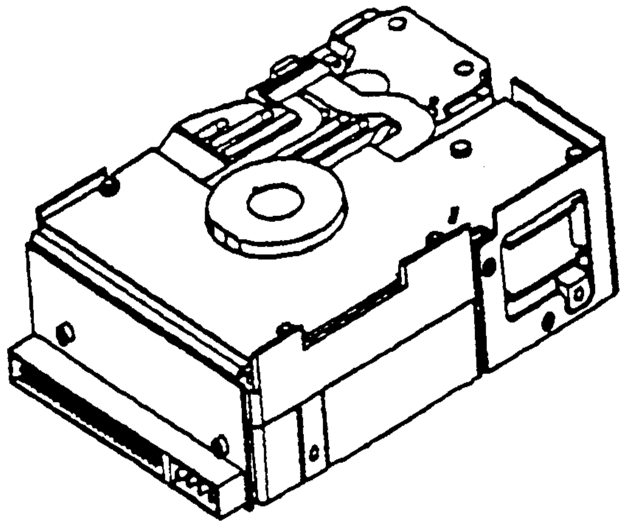


Figure 8-6. HP A3353A Disk Drive.

Specifications

- Integrated F/W SCSI-2 Differential Controller
- Synchronous and Asynchronous data protocol
- Synchronous data transfer rate up to 10 Mbytes/sec.
- Downloadable Firmware
- Selectable sector sizes from 180 to 4096 bytes/sector
- 96-bit Reed-Solomon ECC for error detection and correction
- Sealed Head/Disk Assembly
- Dedicated head landing zone
- Automatic shipping lock engaged at power off
- Self -Test performed at power on
- Synchronous spindle capability
- 512 Kbyte data buffer
- Formatted data capacity = 4,340 Mbytes
- Eight spare sectors per cylinder
- 2 cylinders reserved for logs and maintenance information
- 7200 RPM Spindle Speed
- Average latency = 4.17 ms.
- 1,000,000 hour MTBF
- No preventative maintenance or adjustments required
- Inquiry Vendor Identification String = QUANTUM
- Inquiry Product Identification String = XP34550D
- Inquiry Product Revision Level string = HPM2 or greater

Jumpering

The drive options and SCSI address are set on J3 (see Figure 8-7). Table 8-14 on page 8-28 shows the pin-sets for the available options.

The SCSI address can also be set on the option connector located next to the SCSI cable connector and the power connector (see) .

Table 8-14   J3 Option Jumpers

Pin-set	Function	Configuration
1-2	SCSI ID 3	SCSI ID bit 3. Open = O, Jumpered = 1
3-4	SCSI ID 2	SCSI ID bit 2. Open = O, Jumpered = 1
5-6	SCSI ID 1	SCSI ID bit 1. Open = O, Jumpered = 1
7-8	SCSI ID 0	SCSI ID bit 0. Open = O, Jumpered = 1
9-10	FLT LED/Blank	Active low connection for cathode of fault status LED (used with pin 18)
11-12	GND/Delay Spin	Jumpered = Spin Delay is enabled
13-14	Not supported	-
15-16	SPINDLE_SYNC_REFL	Provides connection for Spindle Sync REF signal
17-18	+5 VDC OUT	Pin 17: +5VDC out.
		Pin 18: Active low connection for cathode of busy LED .
19-20	Write Protect	Jumpered = Write Protect is enabled
21-22	Stagger Spin	Jumper - Staggered Spin is enabled
23-24	Enable Narrow Mode	-
25-26	Not supported	-
27-28	Not supported	-
29-30	Not supported	-
31-32	Not supported	-

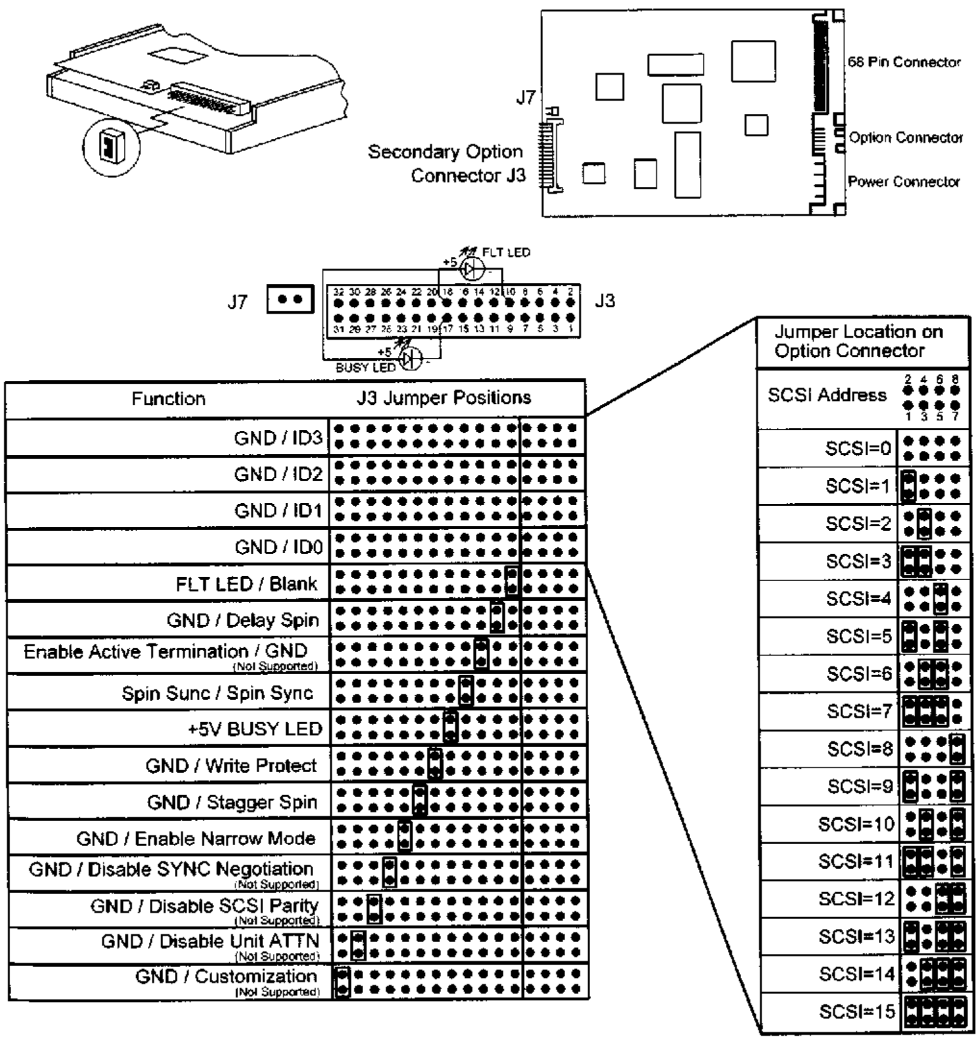


Figure 8-7. A3353A (source 2) J3 Jumper Positions

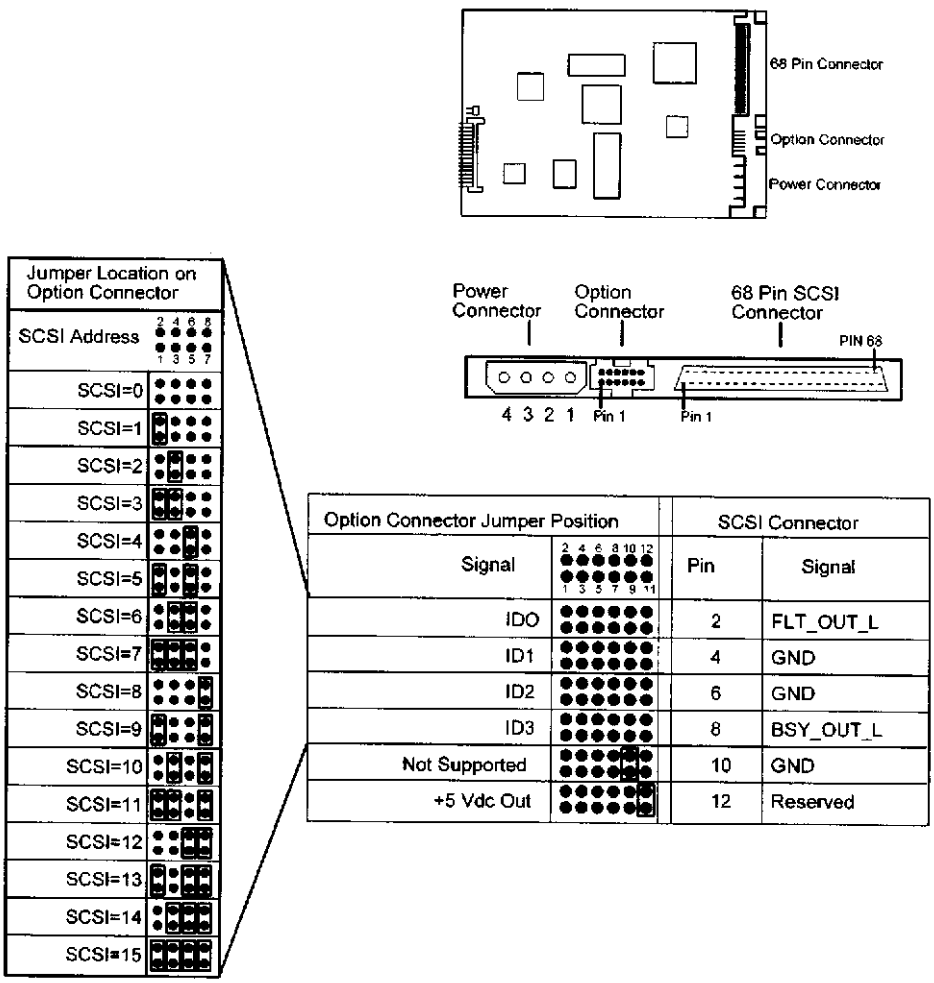


Figure 8-8. A3353A (source 2) Option Connector Jumper Positions

Preventative Maintenance

There is no preventative maintenance reuqired for this product.

Troubleshooting

This hard disk drive should be replaced as a complete assembly. It is assumed the customer maintains a regular data back schedule, so if the disk drive fails and must be replace, customer data can be restored to the new disk drive.

To troubleshoot the disk drive, check the following:

- Drive Busy light (flashing=activity, off = no activity)
- Internal drive logs (See SCSIDSK2 Interactive section)

Exchange Part Number

The exchange part number is A3353-69001

Diagnostics

- SCSIDSK2
- IOMAP
- SYSMAP

HP C3145A SCSI Disk Drive

Figure 8-9 shows the HP C3145A Half Height 2 Gbyte F/W SCSI Disk Drive.

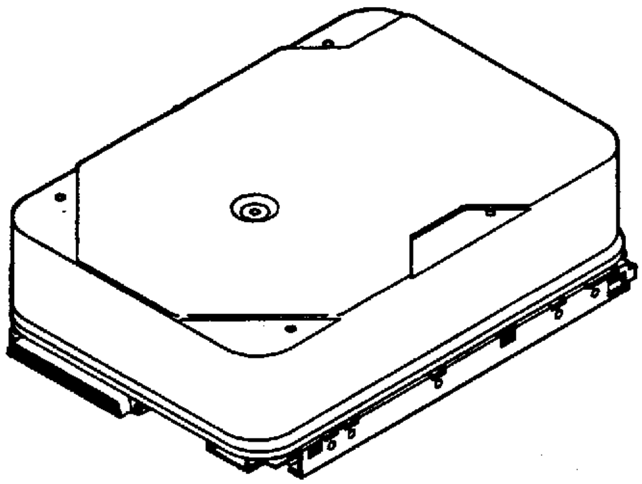


Figure 8-9. HP C3145A SCSI Disk Drive

Specifications

- Integrated F/W SCSI-2 Differential Controller
- 16 bit parallel data transfers
- Asynchronous data transfer rate 5 Mbytes/sec.
- Synchronous data transfer rate 20 Mbytes/sec.
- Downloadable Firmware
- Programmable sector sizes (Default 512 bytes/sector)
- Uses both ECC and CRC for error detection and correction
- Sealed Head/Disk Assembly
- Dedicated head landing zone
- Automatic shipping lock engaged at power off
- Self -Test performed at power on
- Synchronous spindle capability
- 256 Kbyte dual port data buffer
- Formatted data capacity = 2132.62 Mbytes
- 44 spare cylinders per drive
- 2 cylinders reserved for logs and maintenance information
- 6400 RPM Spindle Speed
- Average latency = 4.69 ms.
- 500,000 hour MTBF
- No preventative maintenance or adjustments required
- Inquiry Vendor Identification String = HP
- Inquiry Product Identification String = C2490WD
- Inquiry Product Revision Level string = 3343

NOTE

The *Inquiry Product Revision Level String* is subject to change due to newer firmware revisions.

Jumpering

Figure 8-10 shows a bottom view of the drive for purposes of showing the position and description of the SCSI Connector, Power Connector, optional connectors J2 and J3, and the location of the drive LED.

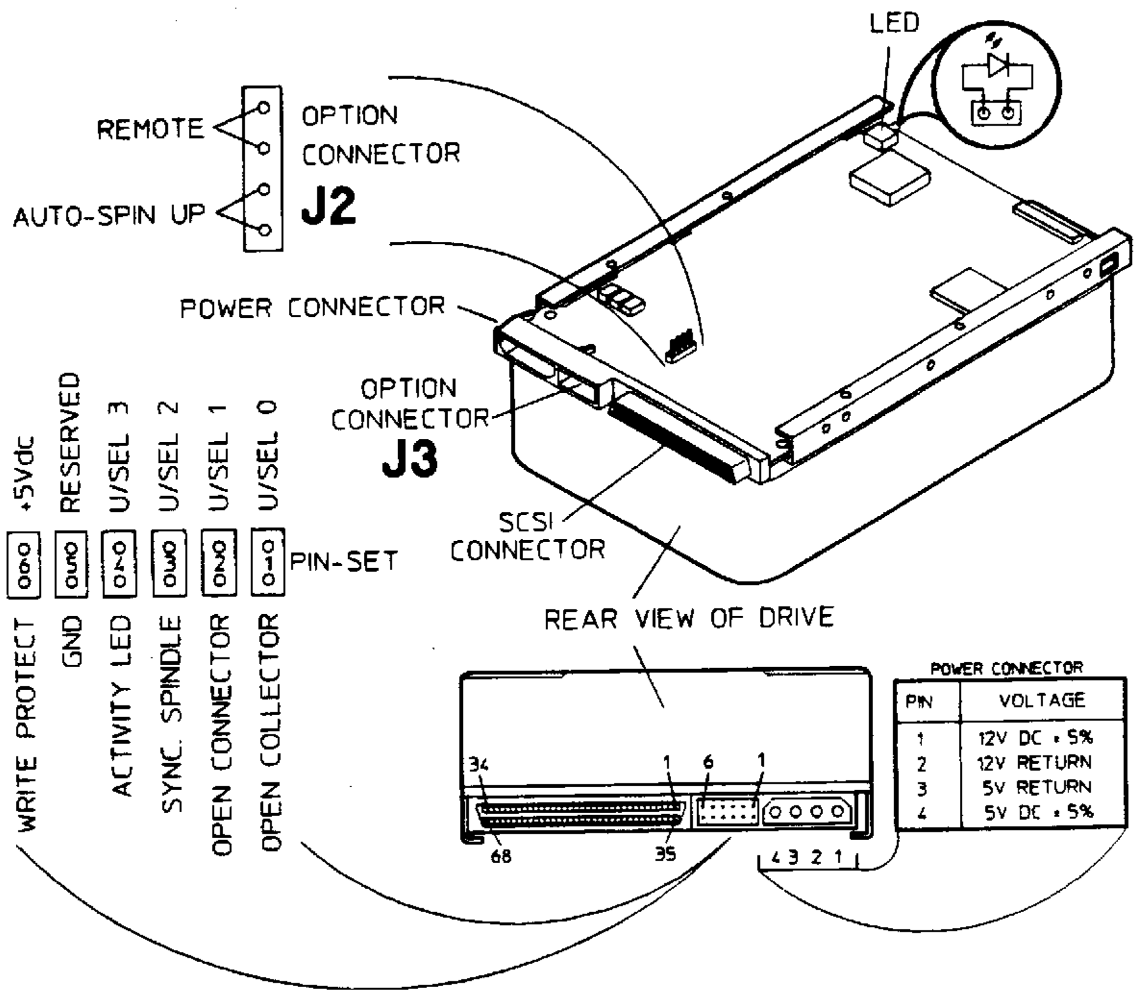


Figure 8-10. HP C3145A Jumper Diagram

Tables 8-12, 8-13, and 8-14 provide the descriptions of the jumpering of the optional connector J2 and J3 for the condition of the interface addressing and configuration options.

Table 8-15 J2 Option Connector

REMOTE	
Open	Drive will operate as a *Stand Alone Device*. Jumpers should be used to select SCSI ID.
Shorted	Drive will operate as a *Remote Device*. The SCSI ID is set by applying remote logic (low true) to the Unit Select pin sets.
AUTO SPIN-UP	
Open	Disabled, drive will not spin up until initiator sends Start Unit Command. (With auto spin-up disabled, the drive will return "not ready" to all commands except REQUEST SENSE, INQUIRY, RESERVE, RELEASE, and START UNIT until the drive is ready for access.)
Shorted	Enabled, the drive will spin-up automatically at power on.

Table 8-16 J3 Option Connector Pin Definitions

Pinset	Upper Pin	Lower Pin
1	SCSI Unit Select 0: input, negative true	Open collector output: pulled high if Remote pinset is shorted; pulled low if Remote pinset is open
2	SCSI Unit Select 1: input, negative true	Open collector output: pulled high if Remote pinset is shorted; pulled low if Remote pinset is open
3	SCSI Unit Select 2: input negative true	Sync spindle output if Remote is shorted; pulled low if Remote pinset is open
4	SCSI Unit Select 3: input negative true	Activity LED open collector output for external drive activity LED; pulled low during initialization for address selection
5	Reserved, must be open	Ground
6	+5Vdc output: may be used to power external LED (there is a 261 Ohm current limiting resistor in series with this pin)	Write Protect: Open: the drive looks at Mode Page Header and responds accordingly; default = NOT write protected. Shorted: drive is forced into the Write protect mode.

Table 8-17 J3 U/Sel SCSI Address Settings

SCSI Address	U/Sel 3	U/Sel 2	U/Sel 1	U/Sel 0
0	O	O	O	O
1	O	O	O	S
2	O	O	S	O
3	O	O	S	S
4	O	S	O	O
5	O	S	O	S
6	O	S	S	O
7	O	S	S	S
8	S	O	O	O
9	S	O	O	S
10	S	O	S	O
11	S	O	S	S
12	S	S	O	O
13	S	S	O	S
14	S	S	S	0
15	S	S	S	S
O = Open (or false), S = Shorted (or true)				

The Default jumper settings are:

J2: Remote = open
Auto Spin-up = shorted
J3: Pin sets 1 through 4 = Address dependent
Pin sets 5 and 6 = open

Preventative Maintenance

There is no preventative maintenance required for this product.

Troubleshooting

Front Panel LED Indicator

The light emitting diode (LED) on the front of the disk drive is an activity light that indicates the operational status of the drive from power-on, through the self -test diagnostics, and into normal operation.

ON	At Power-On, the LED turns on until the power-on sequence is completed and then turns off. If Auto-Spin Up is enabled, the Power-On sequence includes execution of the Spin Up sequence, calibrating the head positioning electronics, and testing of the read/write systems. (DEFAULT setting) If Auto-Spin Up is not enabled, the Power-On sequence includes the execution of the Spin Up sequence only.
FLASHING	A flashing LED (approximately 1 Hz) indicates that the controller has failed all or a portion of the internal diagnostic tests.
INTERMITTENT	After power-on diagnostics have completed, the LED functions as an activity light and will go on any time the disk drive is executing a command, reading, or writing. If the LED is off, the drive is idle.

Exchange part number

The exchange part number is: C2490-69375

Diagnostics

- SCSIDISK2
- SYSMAP
- IOMAP

HP A3351A SCSI Disk Drive (Source 1)

Figure 8-11 shows the HP A3351A low profile, 2 Gbyte, F/W SCSI disk drive.

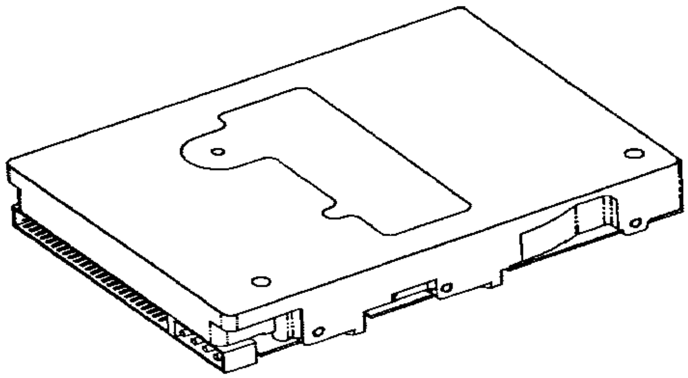


Figure 8-11. HP 3351A SCSI Disk Drive

> **NOTE**
>
> The HP A3351A product is provided from two sources. Because of the physical and jumpering differences between the two sources, they are listed in this manual as **Source 1** and **Source 2**. Be aware of the difference to determine which jumpering scheme to follow.

Specifications

- Integrated F/W SCSI Differential Controller
- 16 bit parallel data transfers
- Asynchronous and Synchronous Data transfer protocol
- Downloadable Firmware
- Selectable sector sizes (Default 512 bytes/sector)
- 96 bit Reed-Solomon error correcting code
- Sealed Head/Disk Assembly
- Dedicated head landing zone
- Automatic shipping lock
- Automatic thermal compensation
- Self-Test performed at power on
- Synchronous spindle capability
- 480 K byte data buffer
- Formatted data capacity 2,147.4 Mbyte
- Nine spare sectors per cylinder
- 7200 RPM Spindle Speed
- Average latency = 4.17 ms
- Command Queuing of up to 64 commands per initiator
- 800,000 hour MTBF
- No preventative maintenance or adjustments required
- Low power consumption
- Inquiry Vendor Identification string = SEAGATE
- Inquiry Product Identification string = ST32550WD
- Inquiry Product Revision Level string = HP06 or newer

Jumpering

Figure 8-12 shows the jumpers for the HP A3351A drive.

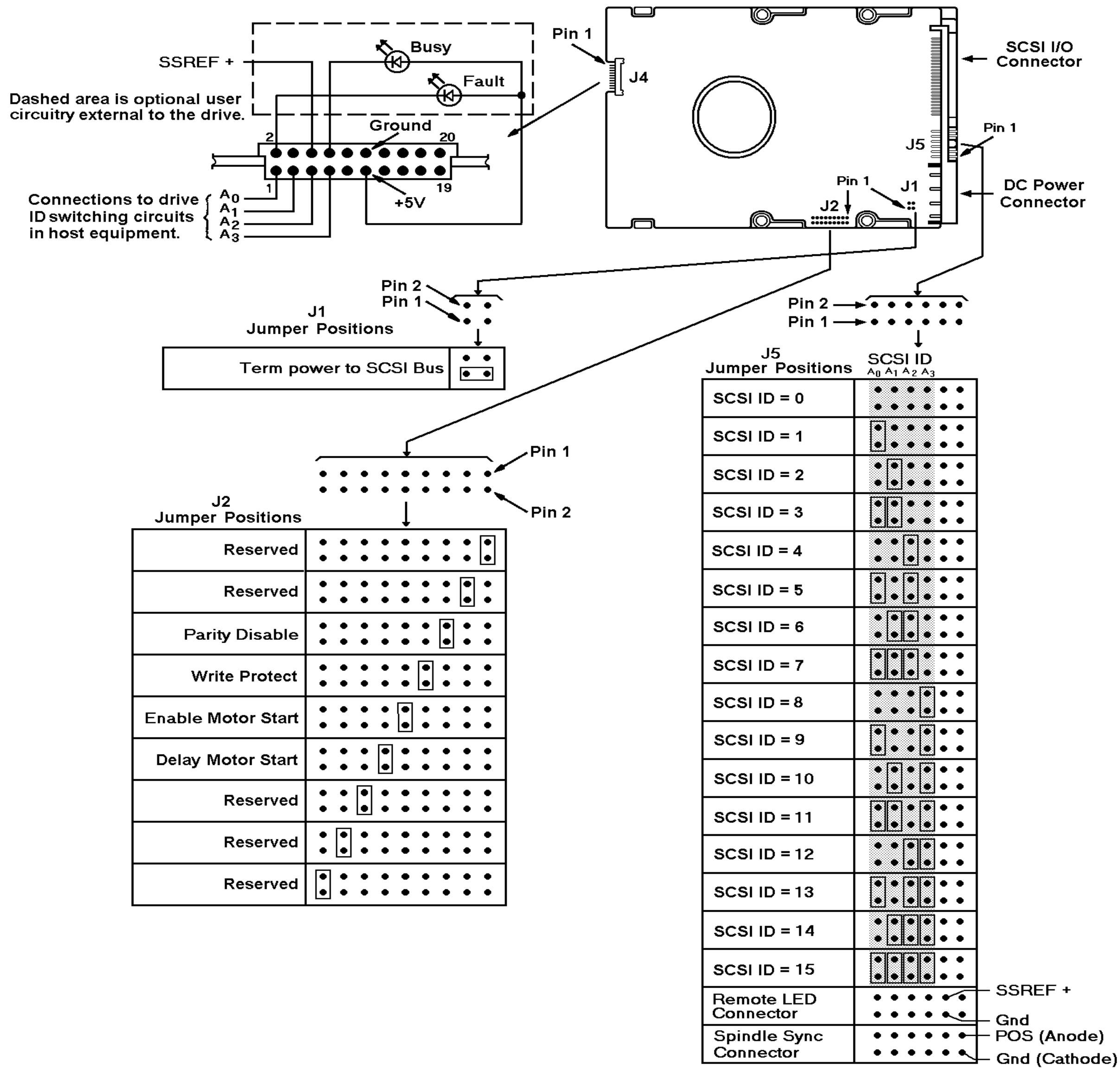


Figure 8-12. HP A3351A 2 Gbyte disk drive jumpering

Table 8-15 provides descriptions of the jumper functions.

Table 8-18 A3351A Configuration Jumper Descriptions

Connector/ Pin Set		Function	Function Description
J1	1-3	TermPower to SCSI Bus	**Open:** Drive does not supply term power to SCSI bus pin 26. **Jumpered:** Drive supplies termination power to SCSI bus pin 26. (Default)
J2	1-2	Reserved	Leave open.
	3-4	Reserved	Leave open.
	5-6	Parity Disable	**Open:**Parity checking and reporting by the drive enabled. (Default) **Jumpered:** Drive does not report the results of pairyt checking to the host.
	7-8	Write Protect	**Open:** Drive is not protected (Default) . **Jumpered:** Drive is write-protected.
	9-10	Enable Motor Start	**Open:**Spindle start immediately after power-up. (Default) **Jumpered:** Drive spindle does not start until Start Command is received from the host.
	11-12	Delay Motor Start	**Open:**Motor start is controlled by Enable Motor Start setting. (Default) **Jumpered:** Spindle startup is delayed by SCSI ID times 12 after power is applied.
	13-14	Reserved	Leave open.
	15-16	Reserved	Leave open.
	17-18	Reserved	Leave open.
J4	1	SCSI ID 0	Provides connerction (with Gnd, pin10) for remote SCSI ID 0 select. Open=0.
	2	Fault LED	Provides output for fault LED signal.
	3	SCSI ID 1	Provide connection (with Gnd, pin 10) for remote SCSI ID 1 select. Open=0.
	4	Vendor unique	Not used.
	5	SCSI ID 2	Provide connection (with Gnd, pin 10) for remote SCSI ID 2 select. Open=0.
	6	Spindle Sync	Provides spindle sync signal SSREF oputput.
	7	SCSI ID 3	Provide connection (with Gnd, pin 10) for remote SCSI ID 3 select. Open=0.
	8	Unit Active LED	Provides output (neg) for drive action LED
	9	Enable Term.	Not used on differential drives.
	10	Ground	Provides signal for signal ground.
	11	(+) 5 Volts	Provides connection for +5 volts.
	12	No connection	
	13-20	Reserved	

Table 8-18 A3351A Configuration Jumper Descriptions

Connector/ Pin Set		Function	Function Description
J5	1-2	SCSI ID 0	**Open:** SCSI address bit 0 set to 0. **Jumpered:** SCSI address bit 0 set to 1.
	3-4	SCSI ID 1	**Open:** SCSI address bit 1 set to 0. **Jumpered:** SCSI address bit 0 set to 1.
	5-6	SCSI ID 2	**Open:** SCSI address bit 2 set to 0. **Jumpered:** SCSI address bit 0 set to 1.
	7-8	SCSI ID 3	**Open:** SCSI address bit 3 set to 0. **Jumpered:** SCSI address bit 0 set to 1.
	9-10	Unit Active LED	Provides connection for drive action LED. Pin 9=cathode, pin 10=anode.
	11-12	Spindle Sync	Provides connection for spindle sync. Pin 11 = SSREF, Pin 12 = gnd.

Preventive Maintenance

There is no preventative maintenance required for this product.

Troubleshooting

This hard disk drive should be replaced as a complete assembly. It is assumed the customer maintains a regular data back schedule, so if the disk drive fails and must be replace, customer data can be restored to the new disk drive.

To troubleshoot the disk drive, check the following:

- Drive Busy light (flashing=activity, off = no activity)
- Internal drive logs (See SCSIDSK2 Interactive section)

Exchange Part Number

The exchange part number is A3351-69001

Diagnostics

- SCSIDSK2
- IOMAP
- SYSMAP

HP A3351A SCSI Disk Drve (Source 2)

Figure 8-13 shows the HP A3351A, low profile, 2 Gbyte, F/W SCSI disk drive

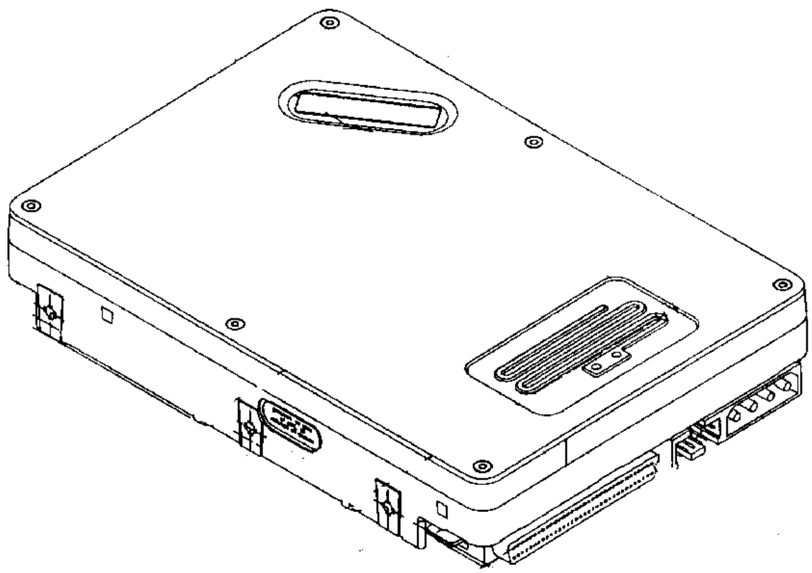


Figure 8-13. HP 3351A 2 Gbyte Disk Drive (Source 2)

Specifications

- Integrated F/W SCSI Differential Controller
- 16 bit parallel data transfers
- Asynchronous and Synchronous Data transfer protocol
- Downloadable Firmware
- Selectable sector sizes (Default 512 bytes/sector)
- 198 bit Reed-Solomon error correcting code
- Sealed Head/Disk Assembly
- Dedicated head landing zone
- Automatic shipping lock
- Automatic thermal compensation
- Self-Test performed at power on
- Synchronous spindle capability
- 1 MByte data buffer
- Formatted data capacity 2,147.4 Mbyte
- 10 spare sectors per cylinder
- 7200 RPM Spindle Speed
- Average latency = 4.17 ms
- Command Queuing of up to 64 commands per initiator
- 800,000 hour MTBF
- No preventative maintenance or adjustments required
- Low power consumption
- Inquiry Vendor Identification string = DEC
- Inquiry Product Identification string = VP32150SW
- Inquiry Product Revision Level string = HP01 or greater

Jumpers

This section descirbes jumper configurations for:

- TERMPWR
- SCSI ID
- Spindle Synchronization
- Write Protection
- Spin Delay
- Remote LED Displays

TERMPWR

TERMPWR is configured by installing the shunt jumper as shown in Figure 8-14 .

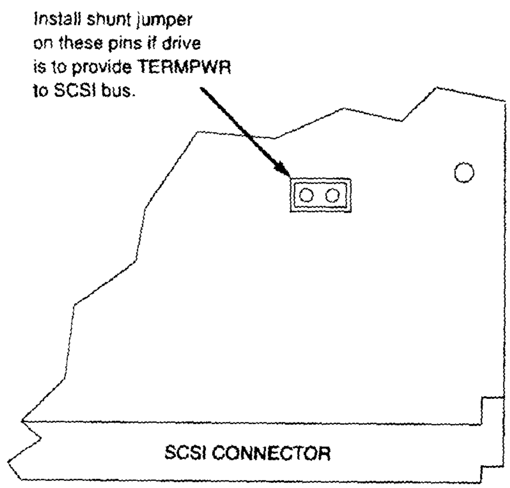


Figure 8-14. TERMPWR

Active Termination

The drive can be configured to provide active termination. Note the following considerations:

Drive Location on the SCSI Bus	Active Termination Configuration.
Drive installed at the end of the bus.	If there is no separate bus terminator at the SCSI bus end containing the drive, configure the drive **to** provide active termination.
Drive installed at the end of the bus.	If a separator bus terminator is used at the SCSI bus end containing the drive, configure the drive to **not** provide activer termination.
Drive not installed at the end of the bus.	Configure the drive to **not** provide active termination.

To configure the drive to provide active termination, install the jumper as shown in Figure 8-14 and across pins 9-10 as shown in Figure 8-15.

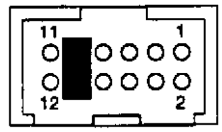


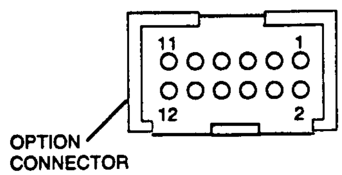
Figure 8-15. Active Termination

To configure the drive to not provide active termination, make sure the jumper is removed.

SCSI ID

Each SCSI device on the bus must have a unique SCSI ID assigned to it. The drive can be configured for ID numbers ranging from 0 through 15. Set the SCSI ID for the drive at the 12-pin Option connector.

Figure 8-16 shows the ID jumper configurations.



SCSI ID	JUMPER LOCATION			
	PINS 7-8	PINS 5-6	PINS 3-4	PINS 1-2
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1
10	1	0	1	0
11	1	0	1	1
12	1	1	0	0
13	1	1	0	1
14	1	1	1	0
15	1	1	1	1

0 = JUMPER NOT INSTALLED
1 = JUMPER INSTALLED

Figure 8-16. SCSI ID Pin Assignments

Spindle Synchronization

Spindle synchronization is set at the Option connector pins 5-6 as shown in Figure 8-17.

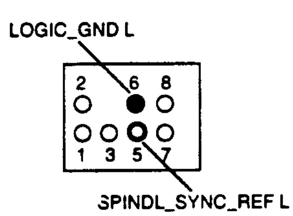


Figure 8-17. Spindle Synchronization

Write Protection

To configure the drive for write protection, install the jumper across secondary Option connector pins 7-8 as shown in Figure 8-18. To disable write protection, remove the jumper.

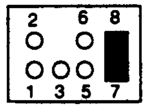


Figure 8-18. Write Protection

Delayed Spin-Up

To have the drive spin-up at power on, install the jumper across pins 1 and 2 of the secondary Option connector, as shown in Figure 8-19.

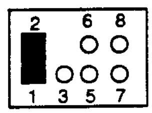


Figure 8-19. Delayed Spin-Up.

Remote Busy and Fault LEDs

Busy and Fault status can be monitored remotely by connecting a remote (external) Busy and remote Fault display LED to the 12-pin Option connector.

- **Remote Busy LED:** Connect the cathode side of the remote Busy LED to pin 8, BSY_OUT L. Connect the anode side of the LED to pin 11, +5VDC OUT.
- **Remote Fault LED:** Connect the cathode side of the remote Fault LED to pin 2, FLT_OUT L. Connect the anode side of the LED to pin 11, +5VDC OUT.

These pin positions are shown in Figure 8-20.

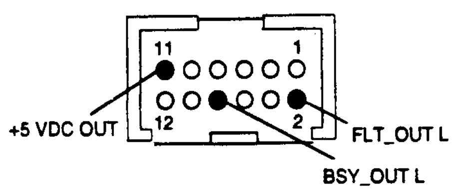


Figure 8-20. Remote Busy and Fault Display Connections.

Troubleshooting

FAULT LED - Signifies a fault has occurred during self test or when the drive is active.

Exchange Part Number

The Exchange Part Number is A3351-69001

Diagnostics

- SCSIDSK2
- IOMAP
- SYSMAP

HP A3058A SCSI Disk Drive (Source 1)

Figure 8-21 shows the HP A3058A Low Profile, 1 Gbyte, F/W SCSI Disk Drive.

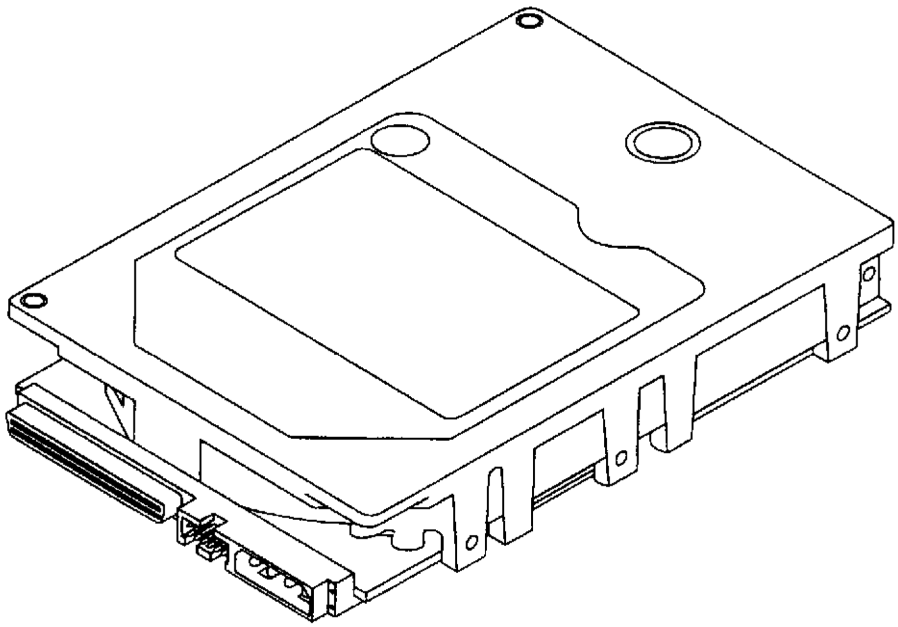


Figure 8-21. HP A3058A SCSI Disk Drive

> **NOTE**
>
> The HP A3058A product is provided from two sources. Because of the physical and jumpering differences between the two sources, they are listed in this manual as **Source 1** and **Source 2**. Be aware of the difference to determine which jumpering scheme to follow.

Specifications

- Integrated F/W SCSI Differential Controller
- 16 bit parallel data transfers
- Asynchronous and Synchronous Data transfer protocol
- Downloadable Firmware
- Selectable sector sizes (Default 512 bytes/sector)
- 96 bit Reed-Solomon error correcting code
- Sealed Head/Disk Assembly
- Dedicated head landing zone
- Automatic shipping lock
- Automatic thermal compensation
- Self-Test performed at power on
- Synchronous spindle capability
- 256 K byte data buffer
- Formatted data capacity limited to the same as the HP A2445A = 1052.09 Mbyte
  (Actual vendor formatted data capacity = 1055.28 Mbyte)
- Nine spare sectors per cylinder
- 5411 RPM Spindle Speed
- Average latency = 5.54 ms
- Command Queuing of up to 64 commands per initiator
- 500,000 hour MTBF
- No preventative maintenance or adjustments required
- Low power consumption
- Inquiry Vendor Identification string = SEAGATE
- Inquiry Product Identification string = ST31200W
- Inquiry Product Revision Level string = HPM0 Multiuser first release
  (8718 Workstation first release not supported)

Jumpering

Figure 8-22 shows a bottom view of the drive for purposes of showing the device ID Jumper J6, configuration jumper connector J2 and the location of the J1 connectors.

NOTE

Use J1-Auxiliary connector for ID. If bothJ1 and J6 are used, the unit takes the OR of both as the SCSI ID.

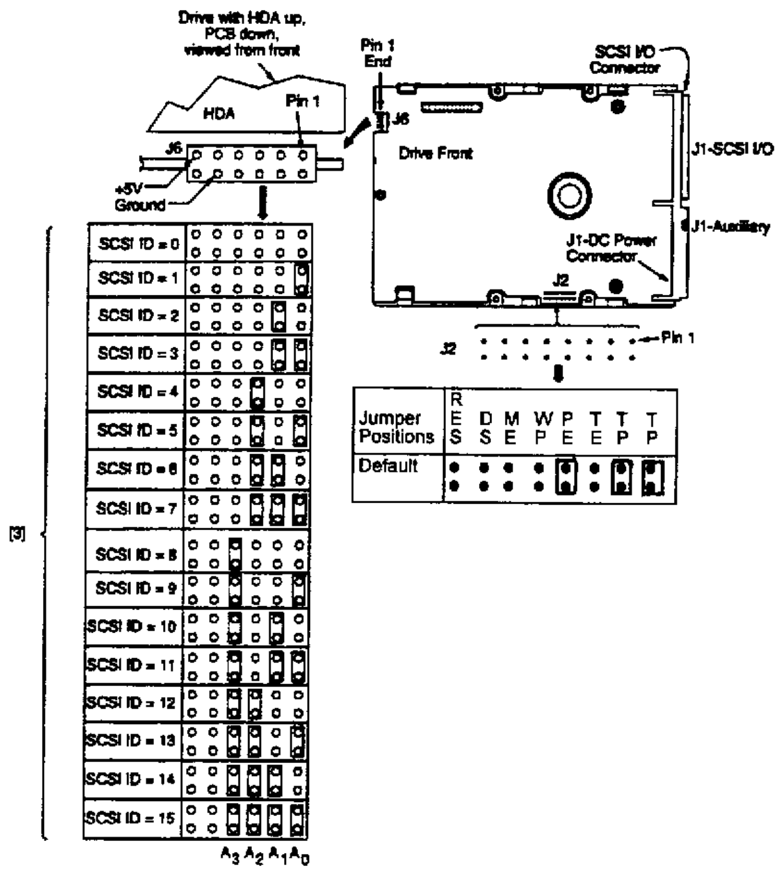


Figure 8-22. HP A3058A Jumper Diagram

Figure8-23 shows a rear view of the J1 SCSI I/O, Auxiliary, and DC power connectors.

NOTE
Use the JI position for setting the SCSI ID.

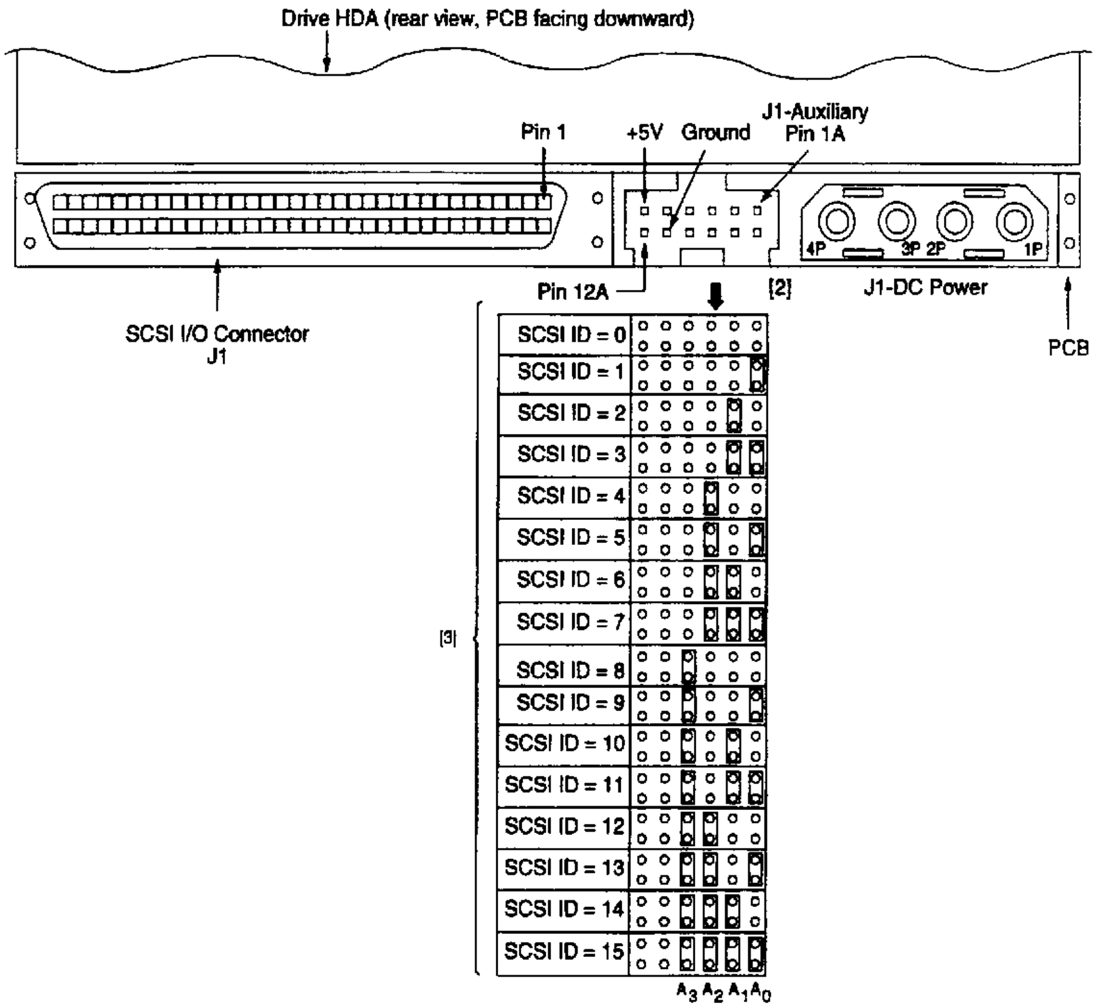


Figure 8-23. HP A3058A Rear View

Notes for Figure 8-22 and 8-23:

[1] Notes explaining the functions of the various jumpers on jumper header connectors J2, J1 -auxiliary and J6 are given below in left to right order of jumper position. The term "**default**" means as standard OEM units are configured when shipped from factory. "Off" means no jumper is installed; "On" means a jumper is installed. "Off" or "On" underlined is factory **default** condition.

[3] Either jumper plugs in one of the patterns shown or external circuitry can be used to establish Drive I D. The drive uses headers J6 or J1 -auxiliary for drive ID determination only during a 250 ms initialization period following power-on or after a drive reset. During this initialization period, the drive control logic checks the logic state of pins 1, 3, 5 and 7. A ground on a pin indicates an asserted low state, while an open circuit, high impedance or +5 V indicates a negated high state. The drive user can install jumper plugs to connect pins 2, 4, 6 and 8 to pins 1, 3, 5 and 7, respectively, in the desired ID pattern. See Figures 8-5 and 8-6. The drive only connects ground to pins 2, 4, 6 and 8 during the 250 ms initialization period. The user may install a cable on J6 or J1-auxiliary in order to connect the drive ID pattern to pins 1, 3, 5 and 7 through some external switching circuit. The drive ID should be applied for at least the 50 ms period. During the remaining operational time of the drive, the drive does not poll pins 1, 3, 5 and 7 for drive ID, unless a reset occurs.

Table 8-16 provides the definitions and default setting for the J2, J1-Auxiliary, and J6 positions.

Table 8-19 J2, J1, and J6 Descriptions

J2	**Jumper Function Description**
RES	
Off / On	Reserved. Default is no jumper installed.
DS ME	
Off Off	Spindle starts immediately after power up - **Default** setting.
Off On	Drive spindle does not start until Start Unit command received from host.
On Off	Spindle Start-up is delayed by SCSI ID times 12 seconds after power is applied, i.e., drive 0 Spindle starts immediately when power is applied, drive 1 starts 12 seconds later, etc.
On On	Drive spindle starts when Start Unit command received from host. Delayed start feature is overridden when the **ME** jumper is installed.
WP	
On	Entire drive is write protected.
Off	Drive is not write protected. (**Default** setting)
PE	
On	Parity checking and parity error reporting by the drive is enabled. (**Default** setting)
Off	Drive does not report result of parity checking to host.
TE	
On	On-board (non-removable) terminator circuits are enabled.
Off	Terminator circuits not enabled. (**Default** setting)
TP TP	
Off Off	No terminator power is connected to drive terminators or SCSI bus pin 26.
On Off	Drive supplies terminator power to internal terminator circuits only.
Off On	Drive supplies power to SCSI bus pin 26, none to internal circuits.
On On	Drive supplies terminator power to SCSI bus pin 26 and internal circuits. (**Default** setting)
J1-Auxiliary;J6	**Jumper Function Description**
A3,A2,Al,A0	Drive ID on SCSI Bus (J1-auxiliary or J6 may be used, as the ID circuits are wired in parallel). The drive ID is binary coded positionwise i.e., A3 = ID8, A2 = ID4, Al= ID2, A0 = ID1.
SSP	Not used in this application.

Underlined (On or Off) indicates the HP default setting.

Preventative Maintenance

There is no preventative maintenance required for this product

Troubleshooting

This hard disk drive should be replaced as a complete assembly. It is assumed the customer maintains a regular data backup schedule, so if the disk drive fails and must be replaced, customer data can be restored to the new disk drive.

To troubleshoot the disk drive, check the following:

- Drive Busy light (flashing = activity, off = no activity)
- Internal drive logs (See SCSIDSK2 Interactive section)

Exchange Part number

The exchange part number is: A3058-69001

Disk Diagnostics

The diagnostics that will be used to gather information for troubleshooting purposes are:

- SCSIDSK2
- IOMAP
- SYSMAP

HP A3058A SCSI Disk Drive (Source 2)

Figure 8-24 shows the HP A3058A Low Profile 1 Gbyte F/W SCSI Disk Drive.

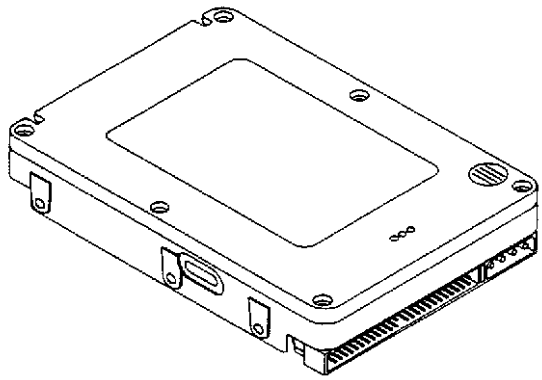


Figure 8-24. HP A3058A Disk Drive

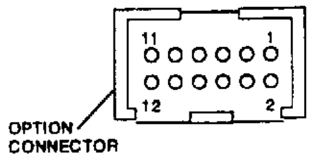
> **NOTE**
>
> The HP A3058A product is provided from two sources. Because of the physical and jumpering differences between the two sources, they are listed in this manual as **Source 1** and **Source 2**. Be aware of the difference to determine which jumpering scheme to follow.

Specifications

- Integrated F/W SCSI Differential Controller
- 16 bit parallel data transfers
- Asynchronous and Synchronous Data transfer protocol
- Downloadable Firmware
- Selectable sector sizes (Default 512 bytes/sector)
- 264-bit ECC (Error Correcting Code) allowing for correction of up to 15 byte per block.
- Protected against data corruption from power off and unrecoverable data during block relocations.
- Sealed Head/Disk Assembly
- Dedicated head landing zone
- Automatic shipping lock
- Automatic thermal compensation
- Self-Test performed at power on
- Synchronous spindle capability
- 512 K byte data buffer
- Formatted data capacity limited to the same as the HP C2247A = 1052.09 Mbyte
  (Actual vendor formatted data capacity = 1070 Mbyte)
- Eight spare sectors per cylinder
- 5400 RPM Spindle Speed
- Average latency = 5.6 ms
- 500,000 hour MTBF
- No preventative maintenance or adjustments required
- Low power consumption
- Inquiry Vendor Identification string = DEC
- Inquiry Product Identification string = DSP3170LSW
- Inquiry Product Revision Level string = HPMO (Multiuser first release)
  (441I Workstation first release not supported)

Jumpering

Figure 8-25 shows the Option connector for device ID.



SCSI ID	JUMPER LOCATION			
	Pins 7-8	Pins 5-6	Pins 3-4	Pins 1-2
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1
10	1	0	1	0
11	1	0	1	1
12	1	1	0	0
13	1	1	0	1
14	1	1	1	0
15	1	1	1	1

0 = Jumper not installed
1 = jumper installed

Figure 8-25. HP A3058A Jumper Diagram

Figure 8-26 shows the location of the FAULT LED and the secondary option connector. The default jumper configuration is no jumpers installed.

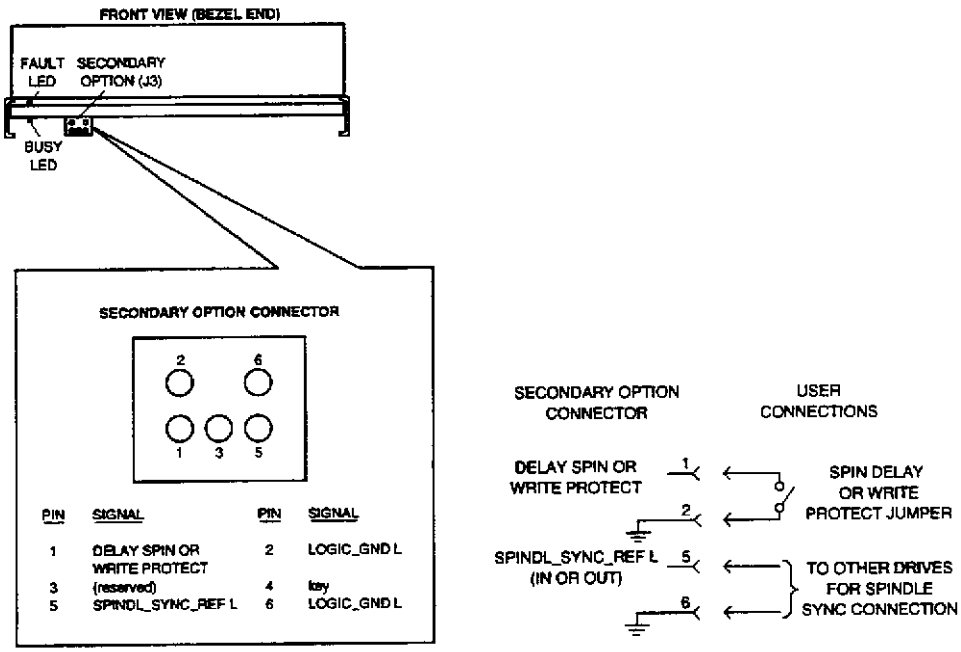


Figure 8-26. HP A3058A Fault LED and Secondary Jumper Diagram

Figure 8-27 shows the termpower jumper block on the bottom of the drive controller. The default configuration is jumper installed. No on board termination is available on this disk drive.

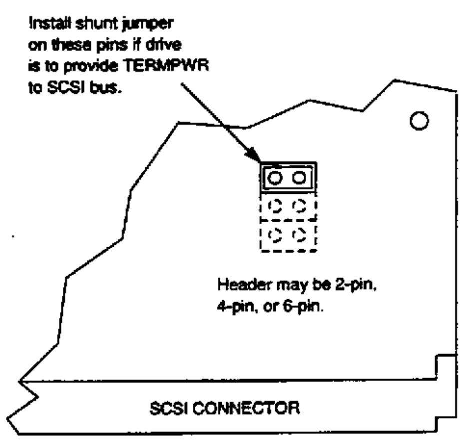


Figure 8-27. HP A3058A Terminator Power Jumper Diagram

The default jumper settings are; Terminator Power Jumper installed, all others open. SCSI ID as needed.

Preventative Maintenance

There is no preventative maintenance required for this product

Troubleshooting

FAULT LED - Signifies a fault has occurred during self test or when the drive is active.

Exchange Part Number

The exchange part number is: A3058-69001

Diagnostics

SCSIDISK2
IOMAP
SYSMAP

HP A3350A SCSI Disk Drive

Figure 8-28 shows the HP A3350A low profile, 1 Gbyte, F/W SCSI disk drive..

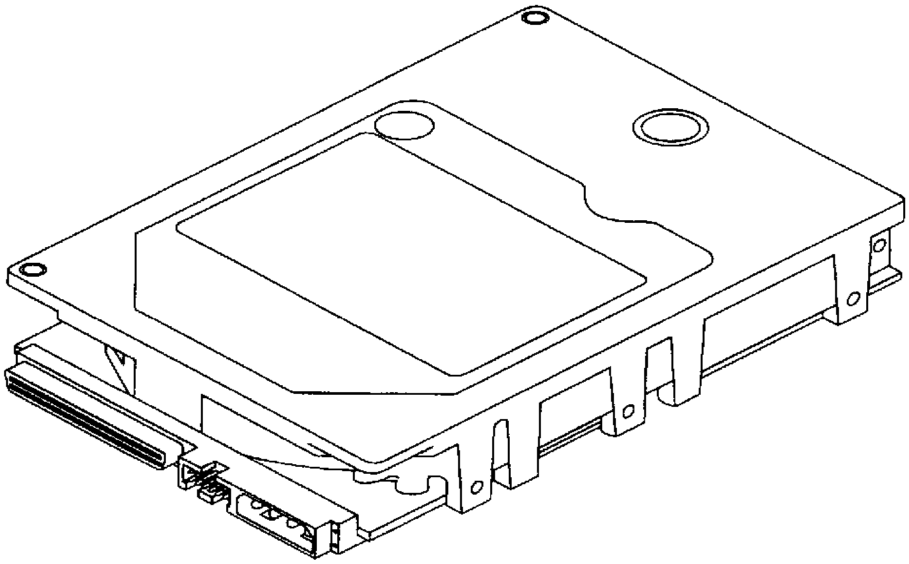


Figure 8-28. HP A3350A SCSI Disk Drive

Specifications

- Integrated F/W SCSI Differential Controller
- 16 bit parallel data transfers
- Asynchronous and Synchronous Data transfer protocol
- Downloadable Firmware
- Selectable sector sizes (Default 512 bytes/sector)
- 96 bit Reed-Solomon error correcting code
- Sealed Head/Disk Assembly
- Dedicated head landing zone
- Automatic shipping lock
- Automatic thermal compensation
- Self-Test performed at power on
- Synchronous spindle capability
- 512 K byte data buffer
- Formatted data capacity 1,060 Mbyte
- Eight spare sectors per cylinder, two spare cylinders
- 5411 RPM Spindle Speed
- Average latency = 5.54 ms
- Command Queuing of up to 64 commands per initiator
- 800,000 hour MTBF
- No preventative maintenance or adjustments required
- Low power consumption
- Inquiry Vendor Identification string = SEAGATE
- Inquiry Product Identification string = ST31230W
- Inquiry Product Revision Level string = HPM4 or greater.

Jumpering

The configuration option settings are shown in Figure 8-29 and Figure 8-30. Figure 8-29 shows the Drive ID and Option Header (Connectors J2 and J6).

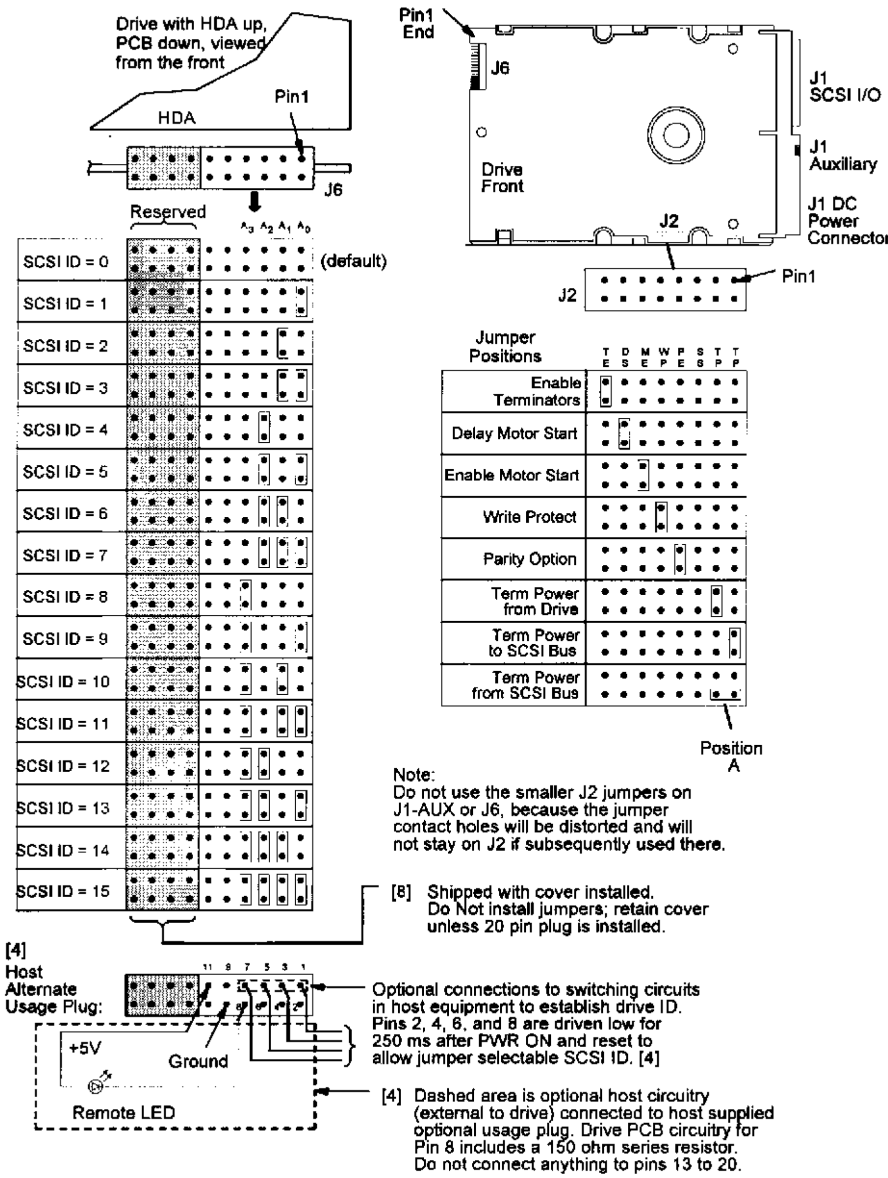


Figure 8-29. A3350A Drive Connectors J2 and J6

Figure 8-30 shows the A3350A Drive ID and Option Header (Connector J1).

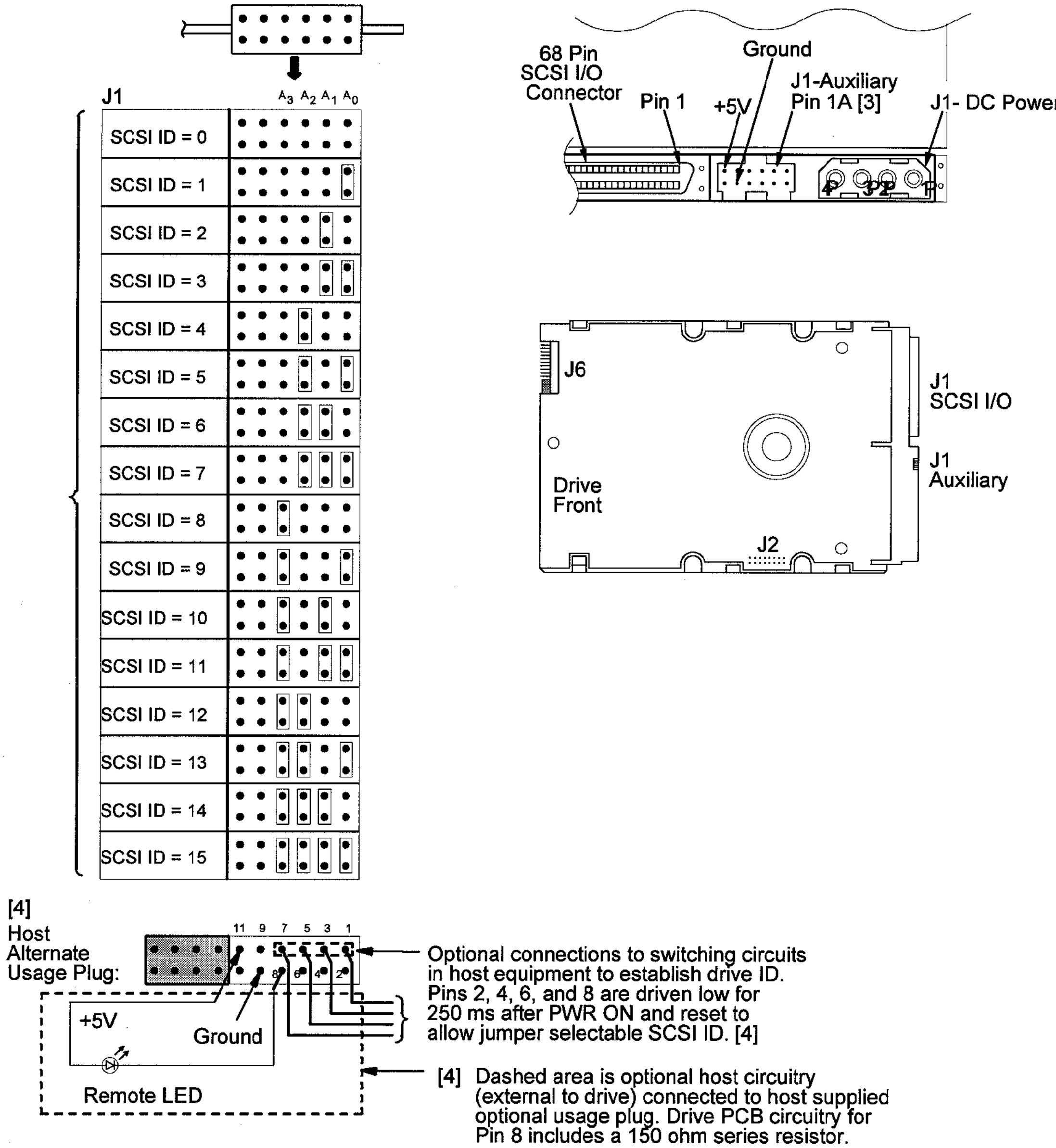


Figure 8-30. A3350A Drive J1 Connector

Jumper Descriptions

Table 8-20 A3350 J2 Jumper Function Description

Jumper		Jumper Function Description
TP	**TP**	
(Pins 3-4)	(Pins 1-2)	
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, no power to internal terminators.(Default)
On	On	Drive supplies terminator power to itself (internal connection) and to I/O pin 26 of SCSI bus. This is a legal jumper setting.
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 termnators (for single-ended I/O only).
Off		See above explanations for **TP** jumpers.(Default)
PE		
On		Parity checking and parity error reporting by the drive is enabled.(Default)
Off		Drive checks parity, but does not report result of parity checking to host.
WP		
On		Entire drive is write-protected.
Off		Drive is not write-protected.(Default)
DS	**ME**	
Off	Off	Spindle startes immediately after power-up.(Default)
Off	On	Drive spindle does not start until Start Unit command is received from the host.
On	Off	Spindle startup is delayed by SCSI ID times 12 seconds after power is applied, that is, drove 0 spindle starts immediately when DC power is connected, drive 1 starts after a 12-second delay, drive 2 after s 24-second delay, and so forth.
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.
SS		
Off		Reserved jumper position. No jumper is installed.

Table 8-18 shows the pin-sets for the options available with the HP A3350A disk drive. A pin-set is either shorted (with a jumper installed) or open (without a jumper).

Table 8-21 A3350A Option Jumpers

Function	Connector	Pin-set	Default
Term Power from SCSI Bus	**J2**	2-4	Open
Term Power to SCSI Bus		1-2	Open
Term Power from Drive		3-4	Jumpered
Reserved		5-6	Open
Parity Option		7-8	Jumpered
Write Protect		9-10	Open
Enable Motor Start		11-12	Jumpered
Delay Motor Start		13-14	Open
Enable Terminators		15-16	Open
SCSI ID	**J1**	1-2, 3-4, 5-6, 7-8	
Reserved		9	
Ground (Shared with ID A3)		8	
LED		11	

Preventive Maintenance

There is no preventative maintenance reuqired for this product.

Troubleshooting

This hard disk drive should be replaced as a complete assembly. It is assumed the customer maintains a regular data back schedule, so if the disk drive fails and must be replace, customer data can be restored to the new disk drive.

To troubleshoot the disk drive, check the following:

- Drive Busy light (flashing=activity, off = no activity)
- Internal drive logs (See SCSIDSK2 Interactive section)

Exchange Part Number

The exchange part number is A3350-69001

Diagnostics

- SCSIDSK2
- IOMAP
- SYSMAP

HP C2478SZ (C1504B) DDS Tape Drives

Figure 8-31 shows the C2478SZ DDS tape drive.

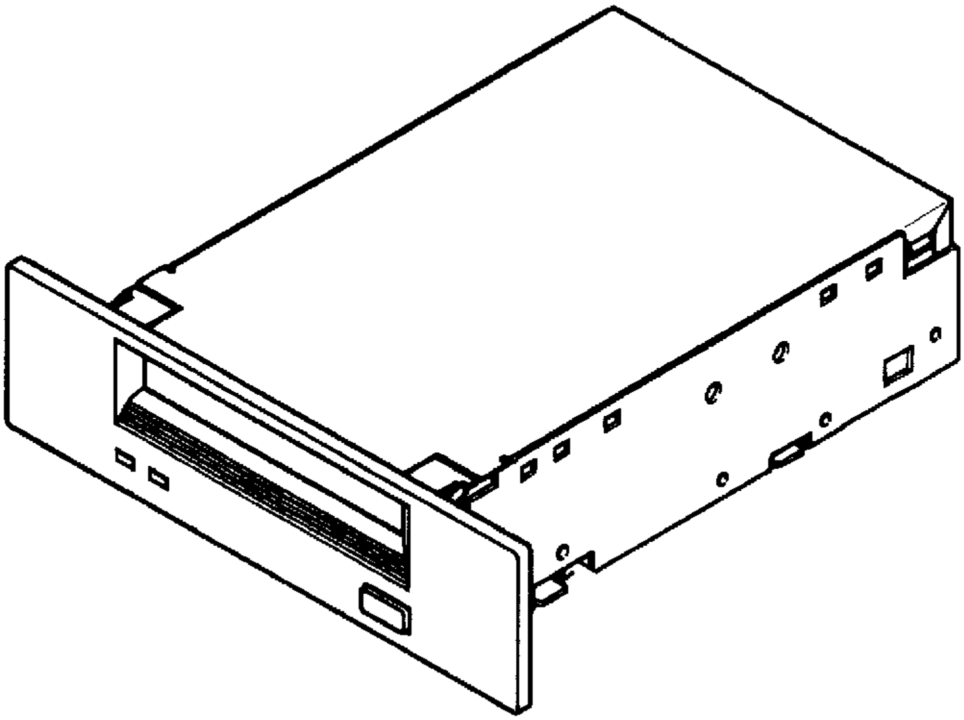


Figure 8-31. HP C2478SZ Tape Drive

Specifications

- Integrated Single-ended SCSI-2 interface
- Data capacities per media length:
  60 meter tape - DDS-1 = 1.3 Gbytes
  90 meter tape - DDS-1 = 2.0 Gbytes
  With Data Compression enabled, the above capacities will increase from 2 to 4 times the non compressed capacities. The average data compression factor is 2 to 1.
- 1 Mbyte Data Buffer
- Switch or program selectable on-board DCLZ data compression
- Automatic Error correction and detection
- Downloadable firmware
- Asynchronous burst data transfer rate = 1.5 Mbytes/sec.
- Synchronous burst transfer rate maximum = 5.0 Mbytes/sec.
- MTBF = 50,000 power on hours at a 12% duty cycle
- Executes self-test at power on
- Inquiry Vendor Identification String = HP
- Inquiry Product Identification String = C2478SZ (C1504B)
- Inquiry Product Revision Level String = 1009

Jumpering

Setting the SCSI ID. Figure 8-32 shows the rear view of the C2478SZ.

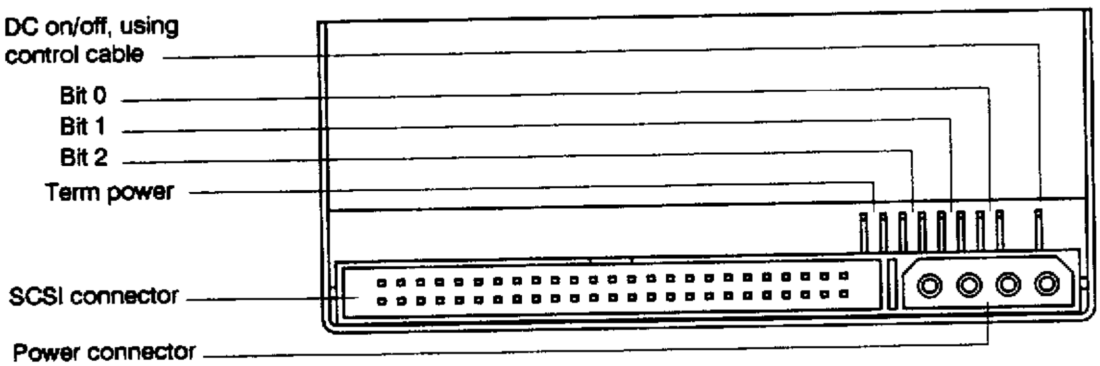


Figure 8-32. C2478SZ Jumper Diagram

There are three significant bits in the ID, giving an ID range of 0 to 7 inclusive as shown:

SCSI ID	Bit 2	Bit 1	Bit 0
0	0	0	0
1	0	0	1
2	0	1	0
3	0	1	1
4	1	0	0
5	1	0	1
6	1	1	0
7	1	1	1

1 = shorted
0 = open

The C2478SZ reads the SCSI ID at power up and during selftest in order to determine the selected target ID of the tape drive on the interface bus. The C2478SZ will provide termination power for the SCSI termination resistors if a jumper is set across the two pins marked **Term power** in Figure 8-32.

Default Jumper Settings = Term Power Disabled (no jumper)

Configuration Switches

Figure 8-33 shows the configuration switches located on the bottom of the C2478SZ in their default positions.

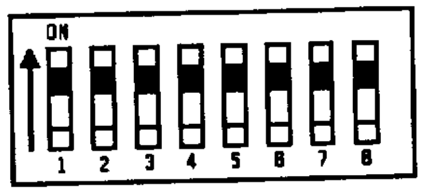


Figure 8-33. C2478SZ Switch Diagram

Switches 1 and 2 are used to configure the data compression operation mode for C2478SZ. The following list shows the available options.

Switch 1	Switch 2	Meaning
Off	Off	Compression disabled, no host control
Off	On	Compression disabled, host is allowed to control compression
On	Off	Compression enabled, no host control
On	On	Compression enabled, with host control

Note that with switch 1 on, data written to the tape will be compressed without the knowledge of the host. Switch 3 is used to configure the drive to respond to DDS media recognition system tapes.

Switch 3	Meaning
On	The media recognition system is disabled. This is the default. All DDS tapes will be treated the same, whether they posses the media recognition stripes or not.
Off	The media recognition system is active. Non-media recognition system tapes are treated as if they are write protected.

Switches 4 through 8 are used to specify drive connectivity and functionality according to host or customer requirements. The default setting is all switches on.

Preventative Maintenance

Cleaning

Regular cleaning of the tape heads is essential to maintain the reliable operation and performance of the tape drive. This procedure in NO WAY damages or shortens the life of either the drive mechanism or the tape heads. The recommended cleaning frequency is every 25 hours of tape pulling time. You are advised not to wait for the Media wear/caution signal to appear on the front panel before implementing the cleaning procedure. By the time the indicator is present, the performance of the drive may already have been impacted.

Head Cleaning Procedure

1. Cleaning Cartridge Product Number = HP 92283K.
2. Insert the cleaning cartridge into the drive.
3. The drive automatically cleans the drive heads and ejects the cartridge after approximately 30 seconds.
4. If the cleaning cartridge ejects after only 14 seconds, the cartridge has reached the end of its useful life. (About 25 cleaning cycles.)
5. If the cycle is successful, remove the cleaning cartridge and record the use count on the label supplied with the cartridge.

Table 8-19 is a cleaning frequency guideline.

Table 8-22 Recommended Cleaning frequency

Cartridge Use Per Day	Cleaning Interval
1	Weekly
2 or 3	Every other day
4 or more	Daily

Firmware Updates

Firmware updates can be done in 2 ways:

1. Download new firmware files provided with the software or as patches. This method requires the availability of a diagnostic or utility which allows for software controlled downloading of firmware.

2. Update the firmware by way of a firmware upgrade tape available as an orderable part. The part numbers for these tapes change on each new version release. These changes will be made available by way of service note notifications.

Firmware Upgrade Tape Procedure:

- Shut down the operating system.

> **NOTE**
>
> There can be no activity on the SCSI bus and no interruption of power during this procedure. Either event can cause the device to become unusable (DEAD DRIVE) and will require the device to be replaced.

- Clean the drive with the cleaning cartridge.

- Insert the firmware update tape. The drive will now take over the activity and accomplish the update.

- WAIT UNTIL ALL ACTIVITY HAS FINISHED before removing the update tape from the drive. This is approximately 2 to 3 minutes.

Firmware Upgrade Failures:

- Wrong firmware tape - The tape will be ejected within 1/2 to 1 minute of activity and no update will have been done. (Match tape part number to product model number.)

- Firmware tape used up - The tape will automatically be re-formatted by the drive as a normal data tape and will no longer react as a firmware tape (This will occur after 200 passes).

- Firmware tape write protected - The tape will be ejected and no update will be done.

- Process interrupted at crucial point - If a power interruption occurs or activity on the SCSI bus interferes, a DEAD DRIVE will be created.

Verify the upgrade by using appropriate diagnostic or utility. (SCSIDDS Interactive command REVision)

Troubleshooting

The C2478SZ DDS tape Units are replaced as a single FRU.

Front Panel Status Display

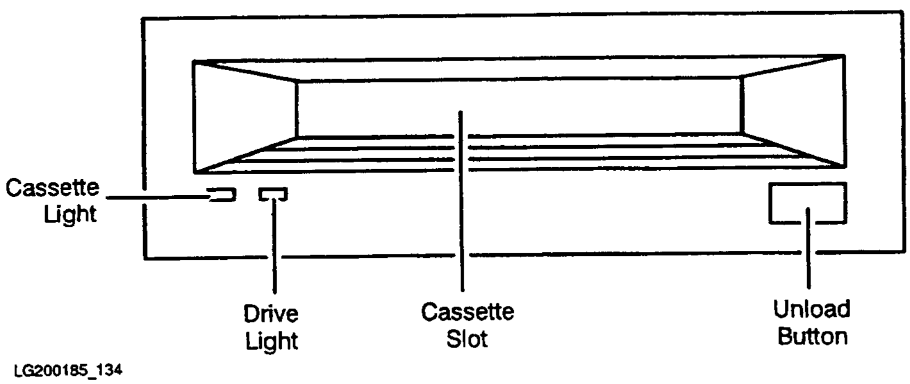


Figure 8-34. C2478SZ Front Panel

The front panel of the C2478SZ is used for inserting and removing cassette tapes, and displaying drive and cassette status. The front panel has two bi-color lights (LEDs). The green is used to indicate normal operation. Amber is used to imply warning conditions. Pulsing indicates activity between the drive and the SCSI bus. If the Cassette light shows steady amber, this indicates that the cassette is write protected. If the Drive light shows steady amber, this indicates a fault condition. Refer to Figure 8-35 for a list of indicator combinations and definitions.

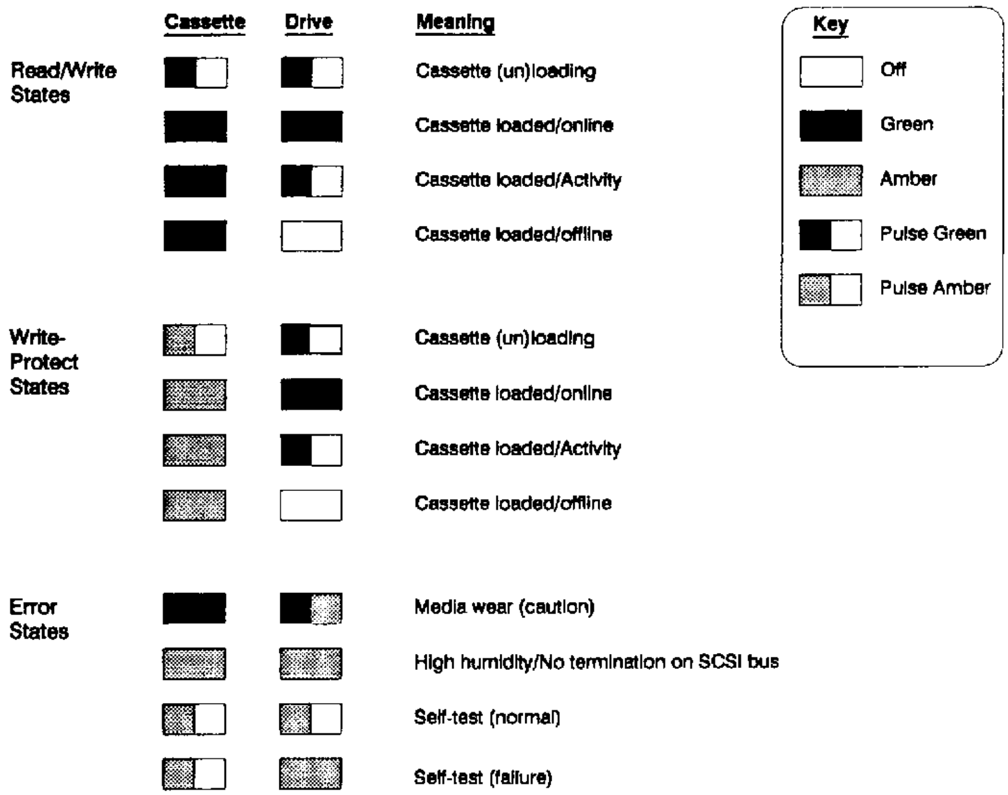


Figure 8-35. Cassette and Drive Light Definitions

Media wear (caution) - indicates head cleaning is needed. This is an indication of an excessive number of Read-After-Write (RAW) or third level error correction (C3 ECC) errors. This condition can be caused by dirty heads or by a cartridge approaching the end of its life. If the flashing light reoccurs after the initial cleaning, the data cartridge involved should be removed from use by reading the data from the tape and copying that data to a new tape. The indication is only cleared by completing a cleaning cycle, no matter what the cause is, however, the indication does not stop the activity of the tape unit.

Self-Test - During power-on, the drive executes a self test diagnostic sequence. This is shown by both the drive and cassette lights flashing yellow. If the self-test fails, the right Drive light shows a steady yellow condition while the cassette light flashes yellow.

Forced Eject

There are some situations where the user's depression of the eject button may not cause a cartridge to be ejected within an acceptable time. For instance, the media surface may be badly damaged and the drive is having trouble recovering data. Or, the cartridge may be of poor quality and has jammed one of its reels which prevents it from turning. In these and many similar situations, the drive will usually invoke a series of error recovery actions in an attempt to carry out the task it was given before the eject button was pressed. As the normal eject request is queued by the drive until it has completed any pending operations (i.e. flushing data from the buffer to tape, writing EOD, rewinding, etc.) some users may become frustrated at the apparent lack of response to their depression of the eject button. For this reason, the Forced Eject feature is provided. This allows the user to request the drive to immediately eject the cartridge regardless of any operations outstanding or error recovery actions in progress.

Triggering a Forced Eject

The first eject button press with a tape present in the drive will always trigger a normal eject. After this first press, the following actions by the user will trigger a forced eject:

- Two more momentary presses within 5 minutes of the first press, or
- Three momentary presses in any subsequent 5 minute period, or
- One long press where the button is held down for at least 5 seconds.

Note also that for the purposes of triggering a forced eject, a SCSI unload command may be taken to be functionally equivalent to pressing the eject button for the first time. When the drive is self-configuring after a power cycle or a SCSI hard reset, the eject button is ignored for a period of about 5 seconds. This happens because the drive is running kernel diagnostics and the main firmware has not yet started to run. During this time eject button presses will not register and will not contribute towards the forced eject trigger criteria.

Forced Eject Action

Once a forced eject has been triggered, the drive will wait for a period of approximately 35 seconds from the time of the first press (the one that attempted to start the normal eject). Once this time-out, or period of grace, has passed the drive will carry out a forced eject. This will cause the tape to be immediately unthreaded and ejected regardless of any operation that the drive may be carrying out. Once the tape has been ejected a firmware reset will be carried out as if the drive had been power cycled.

Consequences of a Forced Eject

The drive can be doing literally any action at the time a forced eject is carried out. There is a possibility that during a write, data may be lost and an invalid format tape could be created (as EOD may not be written correctly). It is for this reason that the drive allows itself the 35 second grace period in which to attempt a normal eject. If the normal eject succeeds within the 35 second period, then any pending forced eject will be cancelled.

Be aware also that as the firmware is fully reset at the end of the forced eject sequence, the drive will re-instate its default setup and will lose any special features that may have been enabled using a prior mode select command. The drives internal trace logs will also be cleared. A forced eject will also override any *Prevent Medium Removal* status that may have been previously setup by the host system.

The forced eject feature is factory configured and cannot be defeated.

Manual Cartridge Removal

If a tape cartridge becomes jammed in the tape drive, it can be extracted by performing the following steps:

NOTE
Read these instructions fully before starting the procedure.

1. Remove the tape drive from the SPU cabinet. Refer to the Peripheral Bay removal procedure in Chapter 7.
2. Remove the tape drive mounting brackets.
3. Remove the tape drive top cover.
4. See Figure 8-36. Insert a size 00 cross head screwdriver through the emergency eject access hole. (Some early revisions of the mechanism have single slots in the end of the worm gear, use a flat blade screwdriver in this case.)

5. Watch the tip of the screwdriver from the left hand side of the tape drive and angle the screwdriver down into the slotted head of the worm gear.
6. Turn the screwdriver counter clockwise and watch the worm gear to make sure it is rotating. Continue until the cartridge is unloaded (this could take approximately 1,000 turns).
7. Remove the cartridge by hand, carefully. Pay particular attention to the loop of tape outside the cartridge, avoid snagging or tearing. (HINT, use pencil point to guide the tape over any projections.)
8. To retract the tape loop, hold the tape flap of the cartridge fully open, and use the blunt end of a pencil to wind up the slack tape (an eraser end of a pencil is ideal)

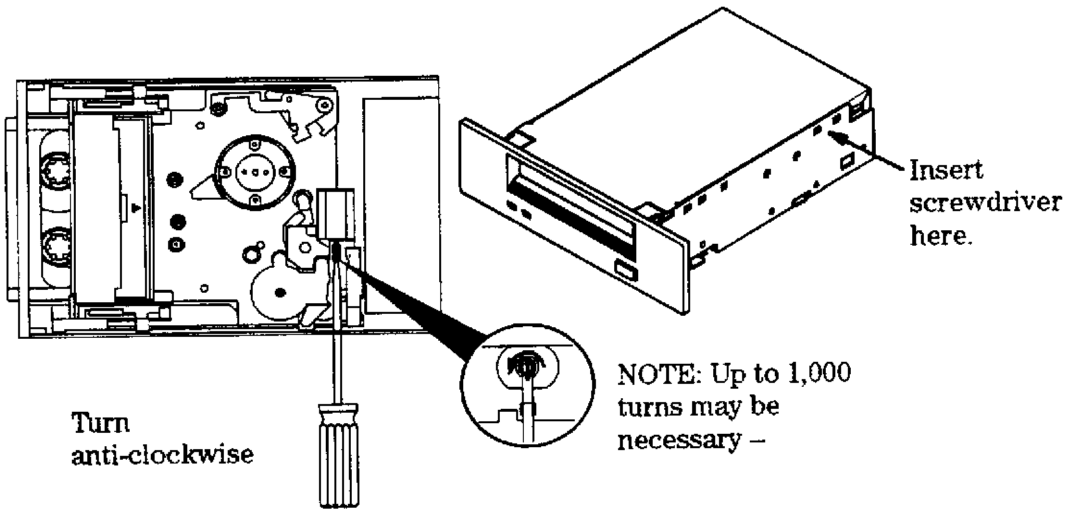


Figure 8-36. Manual Cartridge Removal

Alternate Method

Tools required;
- electric screwdriver
- T8 or T9 Torx bit
- ball point pen (with plastic ink tube)
- scissors or knife blade

NOTE
This procedure does destroy the ink pen

1. Remove the plastic ink tube from the ink pen.
2. Cut off approximately 50mm (2 inches) of ***empty*** ink tube from the pen.
3. Force one end of the ink tube over the torx bit (on the electric screwdriver).
4. Push the other end over the slotted end of the worm gear. This forms a flexible coupling to the electric screwdriver.
5. Place the electric screwdriver in the unscrew (counter clockwise) position and turn on.

Exchange part Number

The exchange part number is:

C2478SZ = C1504-69201

Diagnostics

- SCSIDDS
- SYSMAP
- IOMAP

HP A3183A DDS-2 Tape Drive

Figure 8-37 shows the front of an HP A3183A DDS-2 tape drive.

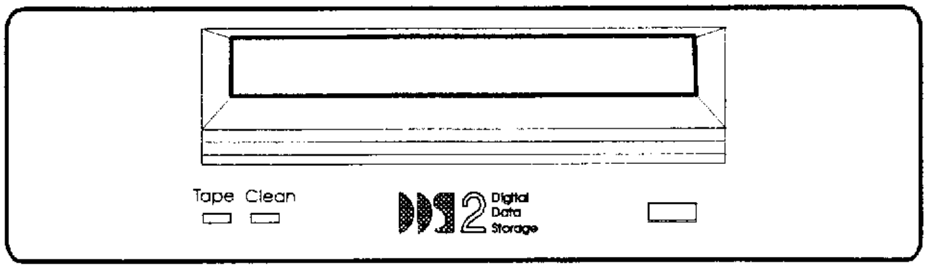


Figure 8-37. HP A3183A DDS-2 Tape Drive

Specifications

- Integrated Single-ended SCSI-2 interface
- Reads and Writes DDS-1 and DDS-2 formats dependent on the mounted tape dimension.
  60 meter tape - DDS-1 = 1.3 Gbytes
  90 meter tape - DDS-1 = 2.0 Gbytes
  120 meter tape - DDS-2 = 4.0 Gbytes
  With Data Compression enabled, the above capacities will increase from 2 to 4 times the non compressed capacities. The average data compression factor is 2 to 1.
- 1 Mbyte Data Buffer
- Switch or program selectable on-board DCLZ data compression
- Automatic Error correction and detection
- Downloadable firmware
- Asynchronous burst data transfer rate = 3.0 Mbytes/sec.
- Synchronous burst transfer rate maximum = 7.5 Mbytes/sec.
- MTBF = 200,000 power on hours at a 12% duty cycle
- Executes self-test at power on
- Inquiry Vendor Identification String = HP
- Inquiry Product Identification String = C1533A
- Inquiry Product Revision Level String = HPE0

Jumpering

Setting the SCSI ID

Figure 8-38 shows the rear view of the A3183A

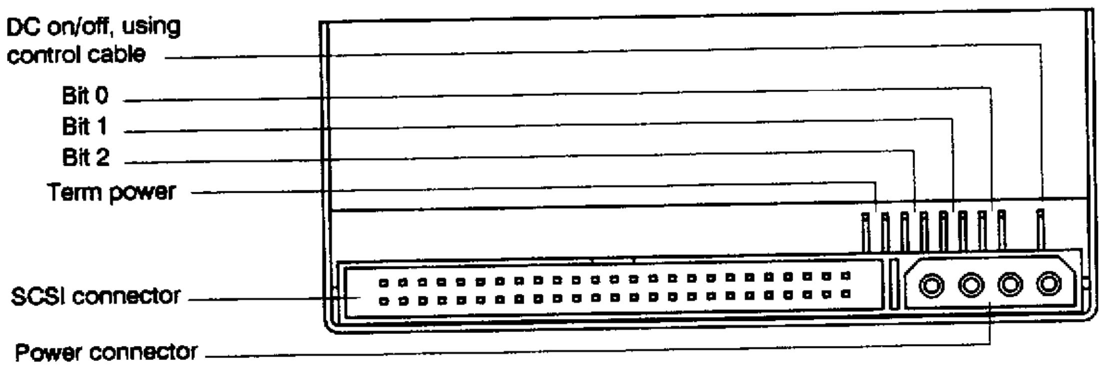


Figure 8-38. A3183A Jumper Diagram

There are three significant bits in the ID, giving an ID range of 0 to 7 inclusive as shown:

SCSI ID	Bit 2	Bit 1	Bit 0
0	0	0	0
1	0	0	1
2	0	1	0
3	0	1	1
4	1	0	0
5	1	0	1
6	1	1	0
7	1	1	1

1 = shorted
0 = open

The HP A3183A reads the SCSI ID at power up and during selftest in order to determine the selected target ID of the tape drive on the interface bus. Data Compression Control is not used in this system application. Terminator Power - When jumper is installed, the device will supply termination power to pin 26 of the SCSI bus. (NOTE, this device has no on board termination capability.)

Default Jumper Settings = Term Power Disabled (no jumper)

Configuration Switches

Figure 8-39 shows the configuration switches located on the bottom of the A3183A in their default positions.

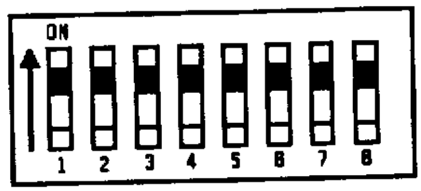


Figure 8-39. A3183A Switch Settings

Switches 1 and 2 are used to configure the data compression operation mode. The following list shows the available options.

Switch 1	**Switch 2**	**Meaning**
On	On	Compression enabled at power on, with host control
On	Off	Compression enabled at power on, no host control
Off	On	Compression disabled at power on, the host is allowed to control compression
Off	Off	Compression disabled at power on, no host control

Note that with switch 1 on, data written to the tape will be compressed without the knowledge of the host. Switch 3 is used to configure the drive to respond to DDS media recognition system tapes.

Switch 3	**Meaning**
On	The media recognition system is disabled. This is the default. All DDS tapes will be treated the same, whether they posses the media recognition stripes or not.
Off	The media recognition system is active. Non-media recognition system tapes are treated as if they are write protected.

Switches 4 through 8 are used to specify drive connectivity and functionality according to host or customer requirements. The default setting is all switches on.

Default switch setting = Switch 1 Off, all others On.

Preventative Maintenance

Regular cleaning of the tape heads is essential to maintain the reliable operation and performance of the tape drive. This procedure in NO WAY damages or shortens the life of either the drive mechanism or the tape heads. The recommended cleaning frequency is every 25 hours of tape pulling time. You are advised not to wait for the Cleaning Needed signal to appear on the front panel before implementing the cleaning procedure. By the time the indicator is present, the performance of the drive may already have been impacted.

Head Cleaning Procedure

1. Cleaning Cartridge Product Number = HP 92283K.
2. Insert the cleaning cartridge into the drive.
3. The drive automatically cleans the drive heads and ejects the cartridge after approximately 30 seconds.
4. If the cleaning cartridge ejects after only 14 seconds, the cartridge has reached the end of its useful life. (About 25 cleaning cycles.)
5. If the cycle is successful, remove the cleaning cartridge and record the use count on the label supplied with the cartridge.

Table 8-23 Recommended Cleaning frequency

Cartridge Use Per Day	Cleaning Interval
1	Weekly
2 or 3	Every other day
4 or more	Daily

Firmware Updates

Firmware updates can be done in 2 ways:

1. Download new firmware files provided with the software or as patches. This method requires the availability of a diagnostic or utility which allows for software controlled downloading of firmware.

2. Update the firmware by way of a firmware upgrade tape available as an orderable part. The part numbers for these tapes change on each new version release and will be made available by way of service notes.

Firmware Upgrade Tape Procedure:

- Shut down the operating system.

NOTE

There can be no activity on the SCSI bus and no interruption of power during this procedure. Either event can cause the device to become unusable (DEAD DRIVE) and will require the device to be replaced.

- Clean the drive with the cleaning cartridge.

- Insert the firmware update tape. The drive will now take over the activity and accomplish the update.

- WAIT UNTIL ALL ACTIVITY HAS FINISHED before removing the update tape from the drive. This is approximately 2 to 3 minutes.

Firmware Upgrade Failures:

- Wrong firmware tape - The tape will be ejected within 1/2 to 1 minute of activity and no update will have been done. (Match tape part number to product model number.)
- Firmware tape used up - The tape will automatically be re-formatted by the drive as a normal data tape and will no longer react as a firmware tape (This will occur after 200 passes).
- Firmware tape write protected - The tape will be ejected and no update will be done.
- Process interrupted at crucial point - If a power interruption occurs or activity on the SCSI bus interferes, a DEAD DRIVE will be created.

Verify the upgrade by using appropriate diagnostic or utility. (SCSIDDS Interactive command REVision)

Troubleshooting

The A3183A DDS-2 tape Unit is replaced as a single FRU.

Front Panel Status Display

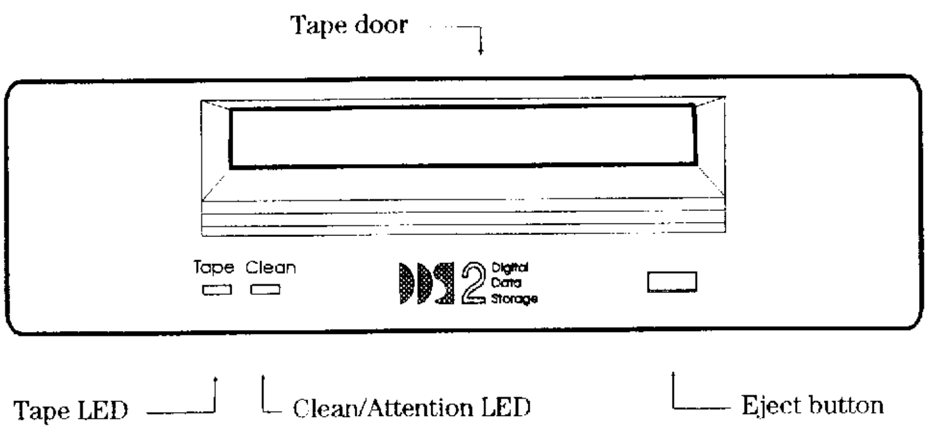


Figure 8-40. A3183A Front Panel

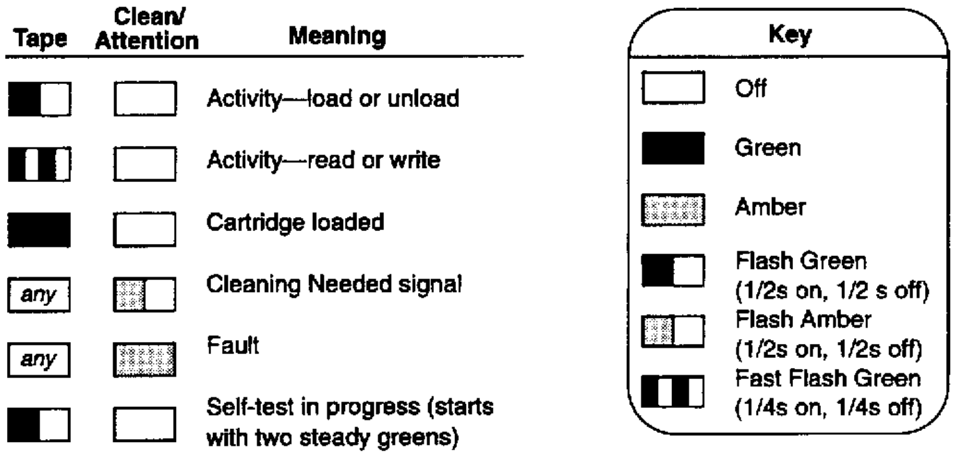


Figure 8-41. A3183A Indicator Descriptions

Cartridge Light - Flashes green to show activity, loading, unloading, reading, and writing. It shows steady green to indicate a cartridge is loaded and the unit is ready.

Clean/Attention Light - Flashes Amber to indicate head cleaning is needed. This is an indication of an excessive number of Read-After-Write (RAW) or third level error correction (C3 ECC) errors. This condition can be caused by dirty heads or by a cartridge approaching the end of its life. If the flashing light reoccurs after the initial cleaning, the data cartridge involved should be removed from use by reading the data from the tape and copying that data to a new tape. The cleaning needed indication is only cleared by completing a cleaning cycle, no matter what the cause is, however, the indication does not stop the activity of the tape unit.

Self-Test - During power-on, the drive executes a self test diagnostic sequence. This is shown by the left tape /cartridge light flashing green at a rate of 1 cycle per second. If the self-test fails, the right clean/ attention light shows a steady amber condition.

Forced Eject

There are some situations where the user’s depression of the eject button may not cause a cartridge to be ejected within an acceptable time. For instance, the media surface may be badly damaged and the drive is having trouble recovering data. Or, the cartridge may be of poor quality and has jammed one of its reels which prevents it turning. In these and many similar situations, the drive will usually invoke a series of error recovery actions in an attempt to carry out the task it was given before the eject button was pressed. As the normal eject request is queued by the drive until it has completed any pending operations (i.e. flushing data from the buffer to tape, writing EOD, rewinding, etc.) some users may become frustrated at the apparent lack of response to their depression of the eject button. For this reason, the Forced Eject feature is provided. This allows the user to request the drive to immediately eject the cartridge regardless of any operations outstanding or error recovery actions in progress.

Triggering a Forced Eject

The first eject button press with a tape present in the drive will always trigger a normal eject. After this first press, the following actions by the user will trigger a forced eject:

- Two more momentary presses within 5 minutes of the first press, or
- Three momentary presses in any subsequent 5 minute period, or
- One long press where the button is held down for at least 5 seconds.

Note also that for the purposes of triggering a forced eject, a SCSI unload command may be taken to be functionally equivalent to pressing the eject button for the first time. When the drive is self-configuring after a power cycle or a SCSI had reset, the eject button is ignored for a period of about 5 seconds. This happens because the drive is running kernel diagnostics and the main firmware has not yet started to run. During this time eject button presses will not register and will not contribute towards the forced eject trigger criteria.

Forced Eject Action

Once a forced eject has been triggered, the drive will wait for a period of approximately 35 seconds from the time of the first press (the one that attempted to start the normal eject). Once this time-out, or period of grace, has passed the drive will carry out a forced eject. This will cause the tape to be immediately unthreaded and ejected regardless of any operation that the drive may be carrying out. Once the tape has been ejected a firmware reset will be carried out as if the drive had been power cycled.

Consequences of a Forced Eject

The drive can be doing literally any action at the time a forced eject is carried out. There is a possibility that during a write, data may be lost and an invalid format tape could be created (as EOD may not be written correctly). It is for this reason that the drive allows itself the 35 second grace period in which to attempt a normal eject. If the normal eject succeeds within the 35 second period, then any pending forced eject will be cancelled.

Beware also that as the firmware is fully reset at the end of the forced eject sequence, the drive will re-instate its default setup and will lose any special features that may have been enabled using a prior mode select command. The drives internal trace logs will also be cleared. A forced eject will also override any *Prevent Medium Removal* status that may have been previously setup by the host system. The forced eject feature is factory configured and cannot be defeated.

Manual Cartridge Removal

If a tape cartridge becomes jammed in the tape drive, it can be extracted by performing the following steps:

NOTE

Read these instructions fully before starting the procedure.

1. Remove the tape drive from the SPU cabinet. Refer to the Peripheral Bay removal procedure in Chapter 7.
2. Remove the tape drive mounting brackets.
3. Remove the tape drive top cover.
4. See Figure 8-42. Insert a size 00 cross head screwdriver through the emergency eject access hole. (Some early revisions of the mechanism have single slots in the end of the worm gear, use a flat blade screwdriver in this case.)
5. Watch the tip of the screwdriver from the left hand side of the tape drive and angle the screwdriver down into the slotted head of the worm gear.
6. Turn the screwdriver counter clockwise and watch the worm gear to make sure it is rotating. Continue until the cartridge is unloaded (this could take approximately 1,000 turns).

7. Remove the cartridge by hand, carefully. Pay particular attention to the loop of tape outside the cartridge, avoid snagging or tearing. (HINT, use pencil point to guide the tape over any projections.)
8. To retract the tape loop, hold the tape flap of the cartridge fully open, and use the blunt end of a pencil to wind up the slack tape (an eraser end of a pencil is ideal)

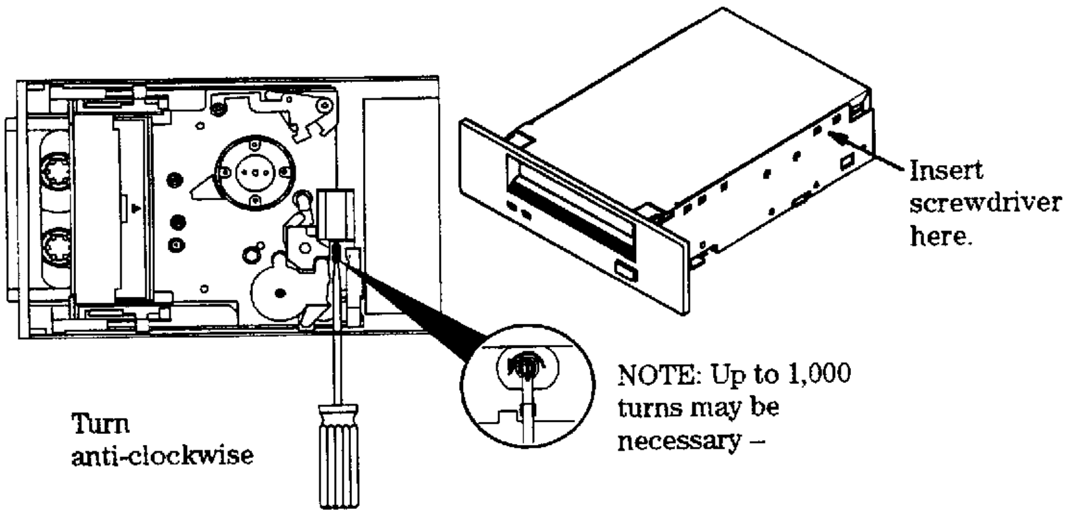


Figure 8-42. Manual Cartridge Removal

Alternate Method

Tools required;

- electric screwdriver
- T8 or T9 Torx bit
- ball point pen (with plastic ink tube)
- scissors or knife blade

NOTE
This procedure does destroy the ink pen

1. Remove the plastic ink tube from the ink pen.
2. Cut off approximately 50mm (2 inches) of ***empty*** ink tube from the pen.
3. Force one end of the ink tube over the torx bit.
4. Push the other end over the slotted end of the worm gear. This forms a flexible coupling to the electric screwdriver.
5. Place the electric screwdriver in the unscrew (counter clockwise) position and turn on.

Exchange Part Number

The exchange part number is: C1533-69203

Diagnostics

- SCSIDDS
- SYSMAP
- IOMAP

HP A3024A 8 mm Tape Drive

Figure 8-43 shows an HP A3024A 8 mm, half height, tape drive.

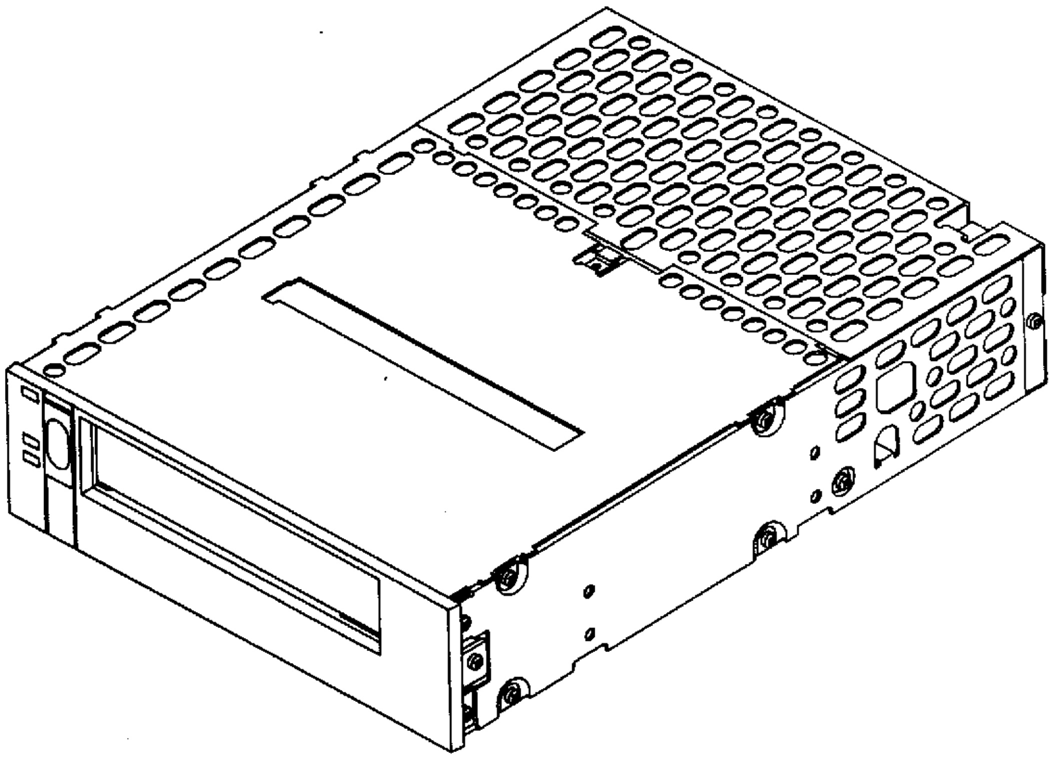


Figure 8-43. HP A3024A 8 mm Tape Drive

Specifications

- Integrated Single-ended SCSI controller
- Native data capacity 5 Gbytes
- Compressed data capacity 10 Gbytes average
- Supports 4 data formats:
  EXB-8500c (compressed format)
  EXB-8500
  EXB-8200c (compressed format)
  EXB-8200
- Asynchronous burst transfer rate = 1.5 Mbytes/sec.
- Synchronous burst transfer rate = 4.0 Mbytes/sec.
- 1 Mbyte data buffer
- Downloadable Firmware
- MTBF 80,000 hrs (at 10% duty cycle)
- Inquiry Vendor Identification String = EXABYTE
- Inquiry Product Identification String = EXB-8505HPQANXB1
- Inquiry Product Revision Level string = 05N0
- Inquiry Vendor Specific String = HPA3024A

Jumpering

Figure 8-44 shows a rear view of the HP A3024A tape drive.

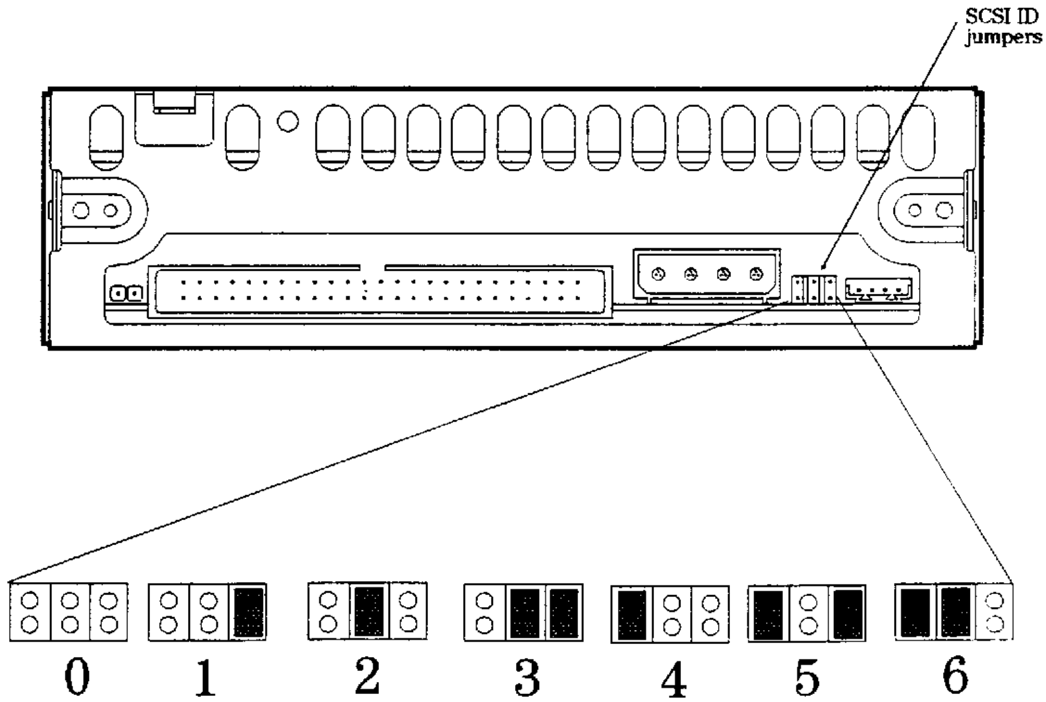


Figure 8-44. HP A3024A Jumper Diagram

Preventative Maintenance

Tape Drive Cleaning

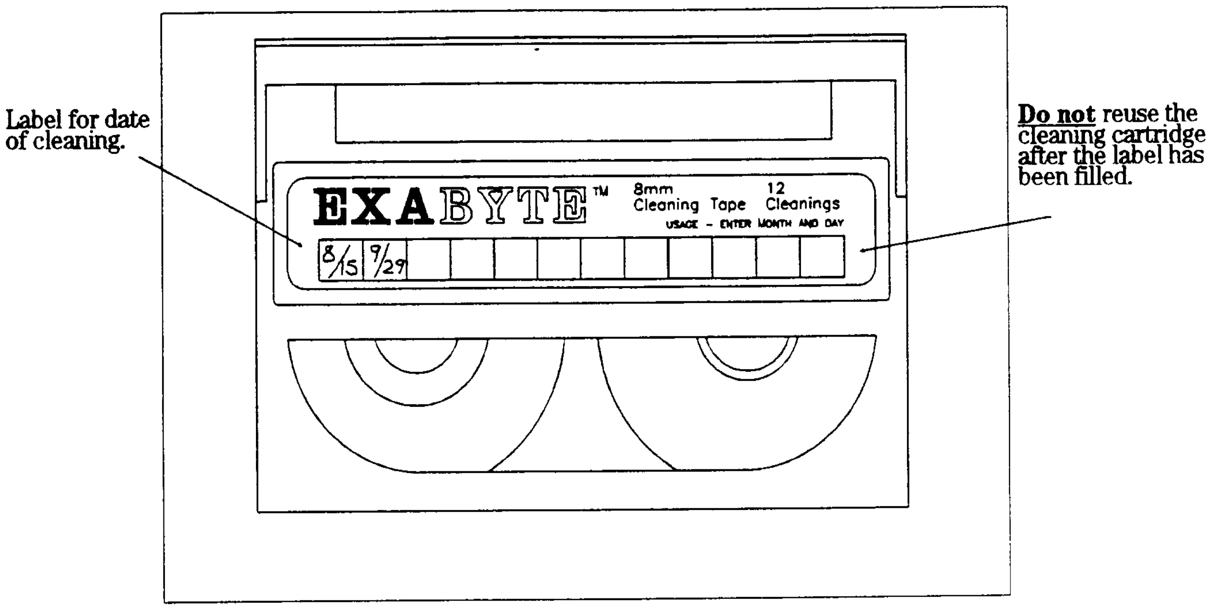


Figure 8-45. 8 mm Cleaning Cartridge

The cleaning cartridge part number is 9164-0392. Clean the tape drive heads at the following times:

- After every 30 hours of tape drive use.
- When the top and bottom LEDs flash rapidly.

CAUTION

Only use Exabyte or Exabyte certified cleaning cartridge to clean the tape heads. Do not use swabs or other means of cleaning the tape heads.

The tape drive keeps track of tape motion and indicates cleaning is needed via the LEDs. Request Sense information may be logged (No Check Condition is generated).

Firmware Updating

Firmware Code Load Tape Procedure:

- Shut down the operating system.

NOTE

There can be no activity on the SCSI bus and no interruption of power during this procedure. Either event can cause the device to become unusable (DEAD DRIVE) and will require the device to be replaced.

- Clean the drive with the cleaning cartridge.

- Insert the firmware update tape. The drive will now take over the activity and accomplish the update.

- WAIT UNTIL ALL ACTIVITY HAS FINISHED before removing the update tape from the drive. This is approximately 2 to 3 minutes.

Firmware Upgrade Failures:

- Firmware tape write protected - The tape will be ejected and no update will be done.

- Process interrupted at crucial point - If a power interruption occurs or activity on the SCSI bus interferes, a DEAD DRIVE will be created.

Verify the upgrade by using appropriate diagnostic or utility. (SCSI8MM Interactive command REVision)

Troubleshooting

This unit is considered a single FRU.

Drive Status Light

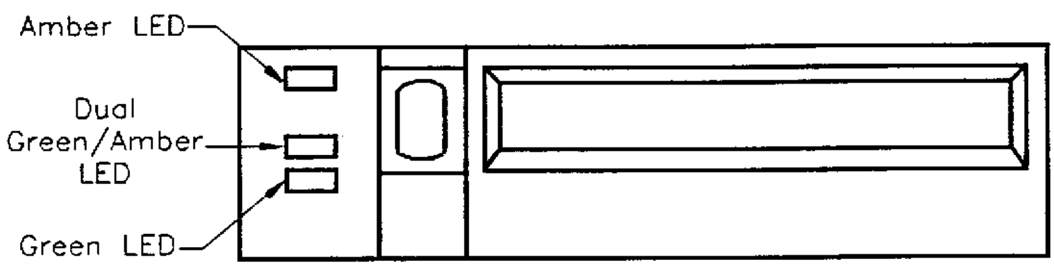


Figure 8-46. HP A3024A LED Indicators

The LED combinations can be used to determine the tape drives operating state as follows:

- When the top LED is on or flashing, the tape drive either has an error or the tape drive needs to be cleaned.
- When the middle LED is on or flashing, SCSI activity is occurring. The middle LED can be green or amber as follows:

  When this LED is amber, the tape loaded in the tape drive is in compressed format.
  When this LED is green, the tape loaded in the tape drive is in uncompressed format.

- When the bottom LED is on or flashing, normal tape motion is occurring.

Also refer to Figure 8-47 for all the LED definitions.

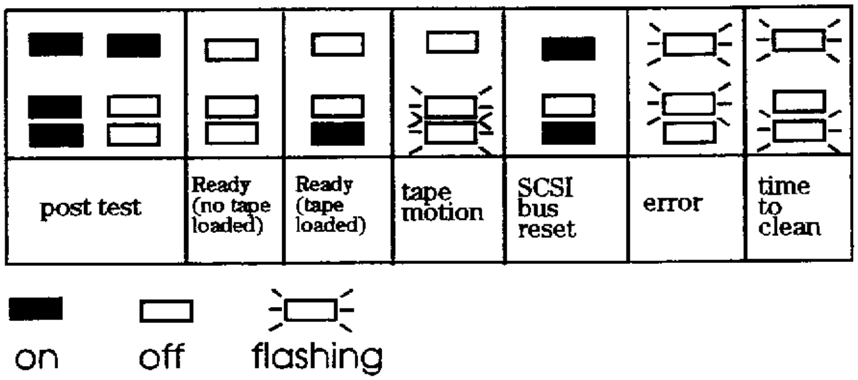


Figure 8-47. HP A3024A LED Definitions

Drive Logs

WRITE ERROR COUNTERS LOG	
INTERRUPTED DATA:	
Number of Blocks Re-written due to errors	= 0
Number of Blocks could not be written due to errors	= 0
Number of Bytes written successfully	= 0
READ ERROR COUNTERS LOG	
INTERRUPTED DATA:	
Number of Blocks Re-read due to errors	= 0
Number of Blocks Recovered	= 0
Number of Blocks Recovered with ECC alone	= 0
Number of Blocks could not be read due to errors	= 0
Number of Bytes read successfully	= 0

The drive logs are available through the SCSI8MM diagnostic Interactive section.

Exchange Part Number

The exchange part number is: A3024-69001

Diagnostics

- SCSI8MM
- XSTM
- CSTM
- SYSMAP

HP A3542A DDS-3 Tape Drive

Figure 8-48 shows the front of an HP A3542A DDS-3 tape drive.

Figure 8-48. HP A3542A DDS-3 Tape Drive

Specifications

- Integrated Single-ended SCSI-2 interface
- Reads and Writes DDS-1, DDS-2, and DDS-3 formats dependent on the mounted tape dimension:
- 60 meter tape - DDS-1 = 1.3 Gbytes
- 90 meter tape - DDS-1 = 2.0 Gbytes
- 120 meter tape - DDS-2 = 4.0 Gbytes With Data Compression enabled.
- The above capacities will increase from 2 to 4 times the non-compressed capacities. The average data compression factor is 2 to 1.
- 1 Mbyte Data Buffer
- Switch or program selectable on-board DCLZ data compression
- Automatic Error correction and detection
- Downloadable firmware
- Asynchronous burst data transfer rate = 3.0 Mbytes/sec.
- Synchronous burst transfer rate maximum = 7.5 Mbytes/sec.
- MTBF = 200,000 power on hours at a 12% duty cycle
- Executes self-test at power on
- Inquiry Vendor Identification String = HP
- Inquiry Product Identification String = C1533A
- Inquiry Product Revision Level String = HP00

Jumpering

Setting the SCSI ID

Figure 8-49 shows the rear view of the A3542A

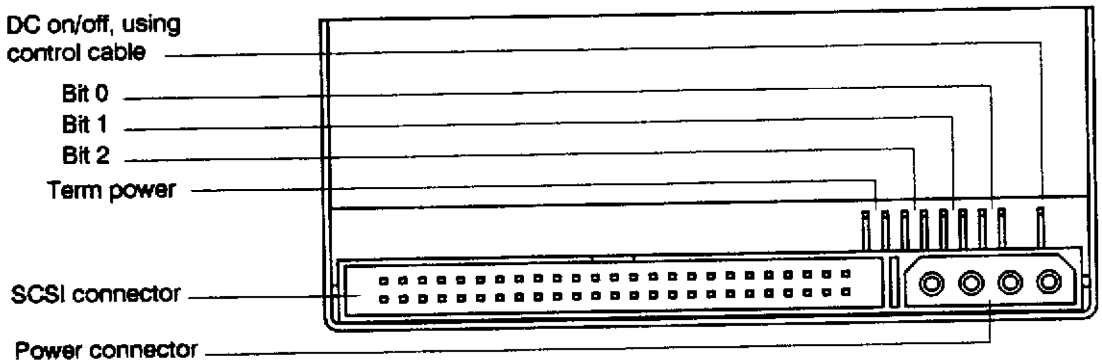


Figure 8-49. A3542A Rear View

There are three significant bits in the ID, giving an ID range of 0 to 7 inclusive as shown:

Table 8-24 SCSI ID

SCSI ID	Bit 2	Bit 1	Bit 0
0	0	0	0
1	0	0	1
2	0	1	0
3	0	1	1
4	1	0	0
5	1	0	1
6	1	1	0
7	1	1	1

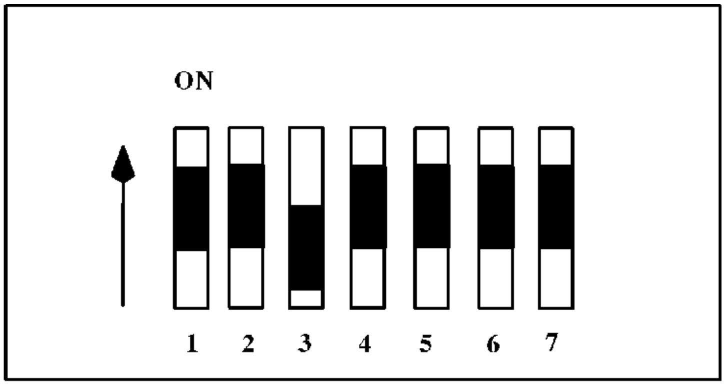
1 = shorted, 0 = open

The HP A3542A reads the SCSI ID at power up and during selftest in order to determine the selected target ID of the tape drive on the interface bus. Data Compression Control is not used in this system application. Terminator Power - When jumper is installed, the device will supply termination power to pin 26 of the SCSI bus. (Note, this device has no on board termination capability.)

Default Jumper Settings = Term Power Disabled (no jumper)

Configuration Switches

Figure 8-50 shows the configuration switches located on the bottom of the A3542A in their default positions.



dds2swb.tif

Figure 8-50. A3542A Switch Settings

Table 8-25 Configuration Switches (For Data Compression DD-3 Tape Drives)

Switch 1	Switch 2	Meaning
Off	Off	Compression disabled, no host control
Off	On	Compression disabled, the host is allowed to control compression
On	Off	Compression enabled, no host control
On	On	Compression enabled, with host control

Table 8-26 Configuration Switch 3 (For Media Recognition System)

Switch 3	Meaning
On	Media Recognition System is disabled. All DDS tapes will be treated the same, whether they posses the media recognition stripes or not.
Off	Media Recognition System is enabled. Non-media recognition system tapes are treated as if they are write protected (Default setting).

Switches 4 through 8 are used to specify drive connectivity and functionality according to host or customer requirements (not used on this system).

Default switch setting = Switch 3 Off, all others On.

Preventative Maintenance

Regular cleaning of the tape heads is essential to maintain the reliable operation and performance of the tape drive. This procedure in NO WAY damages or shortens the life of either the drive mechanism or the tape heads. The recommended cleaning frequency is every 25 hours of tape pulling time. You are advised not to wait for the Cleaning Needed signal to appear on the front panel before implementing the cleaning procedure. By the time the indicator is present, the performance of the drive may already have been impacted.

Head Cleaning Procedure

Cleaning Cartridge Product Number = HP 92283K.

1. Insert the cleaning cartridge into the drive.
2. The drive automatically cleans the drive heads and ejects the cartridge after approximately 30 seconds.
3. If the cleaning cartridge ejects after only 14 seconds, the cartridge has reached the end of its useful life. (About 25 cleaning cycles.)
4. If the cycle is successful, remove the cleaning cartridge and record the use count on the label supplied with the cartridge.

Table 8-27 Recommended Cleaning frequency

Cartridge Use Per Day	**Cleaning Interval**
1	Weekly
2 or 3	Every other day
4 or more	Daily

Firmware Updates

Firmware updates can be done in two ways:

1. Download new firmware files provided with the software or as patches. This method requires the availability of a diagnostic or utility which allows for software controlled downloading of firmware.
2. Update the firmware by way of a firmware upgrade tape available as an orderable part. The part numbers for these tapes change on each new version release and will be made available by way of service notes.

Firmware Upgrade Tape Procedure:

- Shut down the operating system.

> **Note**
>
> There can be no activity on the SCSI bus and no interruption of power during this procedure. Either event can cause the device to become unusable (DEAD DRIVE) and will require the device to be replaced.

- Clean the drive with the cleaning cartridge.
- Insert the firmware update tape. The drive will now take over the activity and accomplish the update.
- WAIT UNTIL ALL ACTIVITY HAS FINISHED before removing the update tape from the drive. This is approximately two to three minutes.

Firmware Upgrade Failures:

- Wrong firmware tape - The tape will be ejected within 1/2 to one minute of activity and no update will have been done. (Match tape part number to product model number.)
- Firmware tape used up - The tape will automatically be re-formatted by the drive as a normal data tape and will no longer react as a firmware tape (This will occur after 200 passes).
- Firmware tape write protected - The tape will be ejected and no update will be done.
- Process interrupted at crucial point - If a power interruption occurs or activity on the SCSI bus interferes, a DEAD DRIVE will be created.

Verify the upgrade by using appropriate diagnostic or utility. (SCSIDDS Interactive command REVision)

Troubleshooting

The A3542A DDS-3 tape Unit is replaced as a single FRU.

Front Panel Status Display

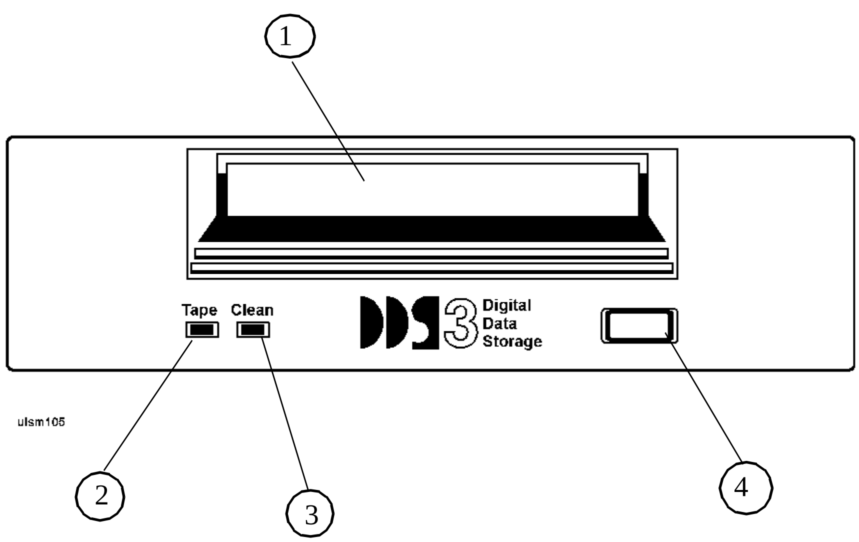


Figure 8-51. A3542A Front Panel

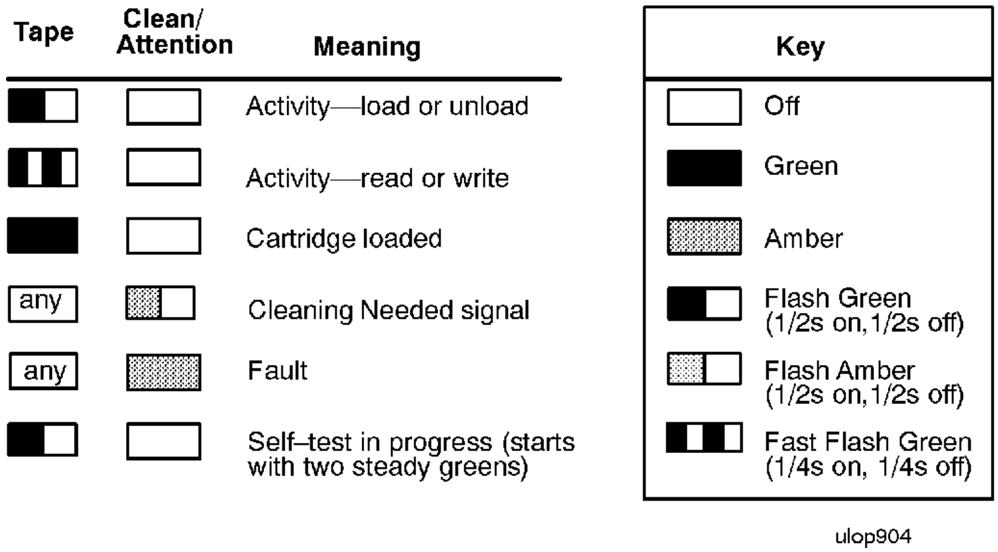


Figure 8-52. A3542A Indicator Descriptions

Cartridge Light - Flashes green to show activity, loading, unloading, reading, and writing. It shows steady green to indicate a cartridge is loaded and the unit is ready.

Clean/Attention Light - Flashes Amber to indicate head cleaning is needed. This is an indication of an excessive number of Read-After-Write (RAW) or third level error correction (C3 ECC) errors. This condition can be caused by dirty heads or by a cartridge approaching the end of its life. If the flashing light reoccurs after the initial cleaning, the data cartridge involved should be removed from use by reading the data from the tape and copying that data to a new tape. The cleaning needed indication is only cleared by completing a cleaning cycle, no matter what the cause is, however, the indication does not stop the activity of the tape unit.

Self-Test - During power-on, the drive executes a self test diagnostic sequence. This is shown by the left tape /cartridge light flashing green at a rate of one cycle per second. If the self-test fails, the right clean/ attention light shows a steady amber condition.

Forced Eject

There are some situations where the user's depression of the eject button may not cause a cartridge to be ejected within an acceptable time. For instance, the media surface may be badly damaged and the drive is having trouble recovering data. Or, the cartridge may be of poor quality and has jammed one of its reels which prevents it turning. In these and many similar situations, the drive will usually invoke a series of error recovery actions in an attempt to carry out the task it was given before the eject button was pressed. As the normal eject request is queued by the drive until it has completed any pending operations (i.e. flushing data from the buffer to tape, writing EOD, rewinding, etc.) some users may become frustrated at the apparent lack of response to their depression of the eject button. For this reason, the Forced Eject feature is provided. This allows the user to request the drive to immediately eject the cartridge regardless of any operations outstanding or error recovery actions in progress.

Triggering a Forced Eject

The first eject button press with a tape present in the drive will always trigger a normal eject. After this first press, the following actions by the user will trigger a forced eject:

- Two more momentary presses within 5 minutes of the first press, or
- Three momentary presses in any subsequent 5 minute period, or
- One long press where the button is held down for at least 5 seconds.

Note also that, for the purposes of triggering a forced eject, a SCSI unload command may be taken to be functionally equivalent to pressing the eject button for the first time. When the drive is self-configuring after a power cycle or a SCSI hard reset, the eject button is ignored for a period of about five seconds. This happens because the drive is running kernel diagnostics and the main firmware has not yet started to run. During this time eject button presses will not register and will not contribute towards the forced eject trigger criteria.

Forced Eject Action

Once a forced eject has been triggered, the drive will wait for a period of approximately 35 seconds from the time of the first press (the one that attempted to start the normal eject). Once this time-out, or period of grace, has passed the drive will carry out a forced eject. This will cause the tape to be immediately unthreaded and ejected regardless of any operation that the drive may be carrying out. Once the tape has been ejected a firmware reset will be carried out as if the drive had been power cycled.

Consequences of a Forced Eject

The drive can be performing any action at the time a forced eject is executed. There is a possibility that during a write, data may be lost and an invalid format tape could be created (as EOD may not be written correctly). It is for this reason that the drive allows itself the 35 second grace period in which to attempt a normal eject. If the normal eject succeeds within the 35 second period, then any pending forced eject will be cancelled.
Beware also that as the firmware is fully reset at the end of the forced eject sequence, the drive will re-instate its default setup and will lose any special features that may have been enabled by a prior mode select command. The drive’s internal trace logs will also be cleared. A forced eject will override any Prevent Medium Removal status that may have been previously ordered by the host system. The forced eject feature is factory configured and cannot be defeated.

Manual Cartridge Removal

If a tape cartridge becomes jammed in the tape drive, it can be extracted by performing the following steps:

Note
Read these instructions fully before starting the procedure.

1. Remove the tape drive from the SPU cabinet. Refer to the Peripheral Bay removal procedure in Chapter 7.
2. Remove the tape drive mounting brackets.
3. Remove the tape drive top cover.
4. See Figure 8-53. Insert a size 00 cross head screwdriver through the emergency eject access hole. (Some early revisions of the mechanism have single slots in the end of the worm gear, use a flat blade screwdriver in this case.)
5. Watch the tip of the screwdriver from the left hand side of the tape drive and angle the screwdriver

down into the slotted head of the worm gear.

6. Turn the screwdriver counter clockwise and watch the worm gear to make sure it is rotating. Continue until the cartridge is unloaded (this could take approximately 1,000 turns).
7. Remove the cartridge by hand, carefully. Pay particular attention to the loop of tape outside the cartridge, avoid snagging or tearing. (HINT, use pencil point to guide the tape over any projections.)
8. To retract the tape loop, hold the tape flap of the cartridge fully open, and use the blunt end of a pencil to wind up the slack tape (an eraser end of a pencil is ideal)

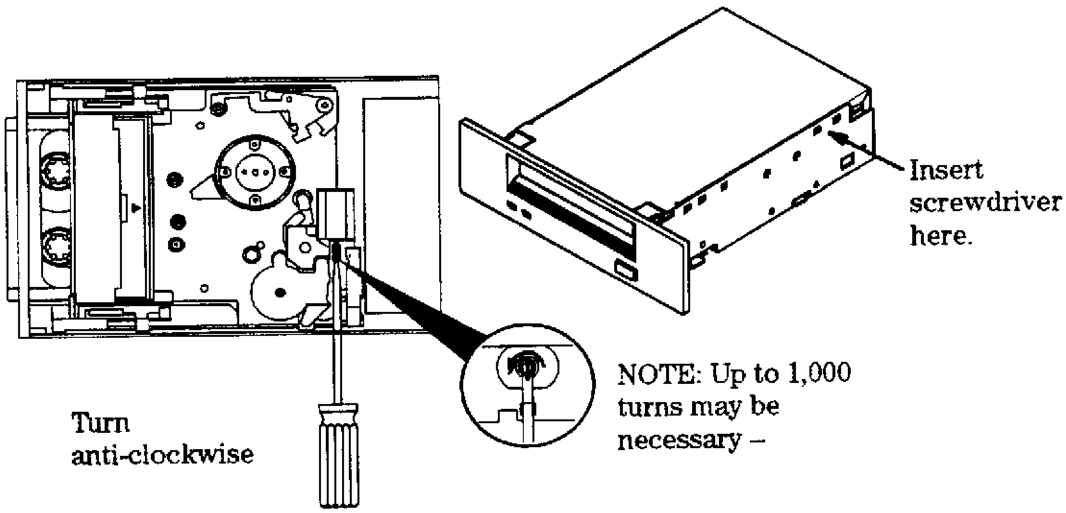


Figure 8-53. Manual Cartridge Removal

Alternate Method

Tools required:

- electric screwdriver
- T8 or T9 Torx bit
- ball point pen (with plastic ink tube)
- scissors or knife blade

Note
This procedure does destroy the ink pen.

1. Remove the plastic ink tube from the ink pen.
2. Cut off approximately 50mm (2 inches) of empty ink tube from the pen.
3. Force one end of the ink tube over the torx bit.
4. Push the other end over the slotted end of the worm gear. This forms a flexible coupling to the electric screwdriver.
5. Place the electric screwdriver in the unscrew (counter clockwise) position and turn on.

Exchange Part Number

The exchange part number is: **C1537-69201**

Diagnostics

CSTM
SCSIDDS
SYSMAP
IOMAP

HP A3086A CD-ROM Drive

Figure 8-54 shows an HP A3086A Half Height, CD-ROM Drive.

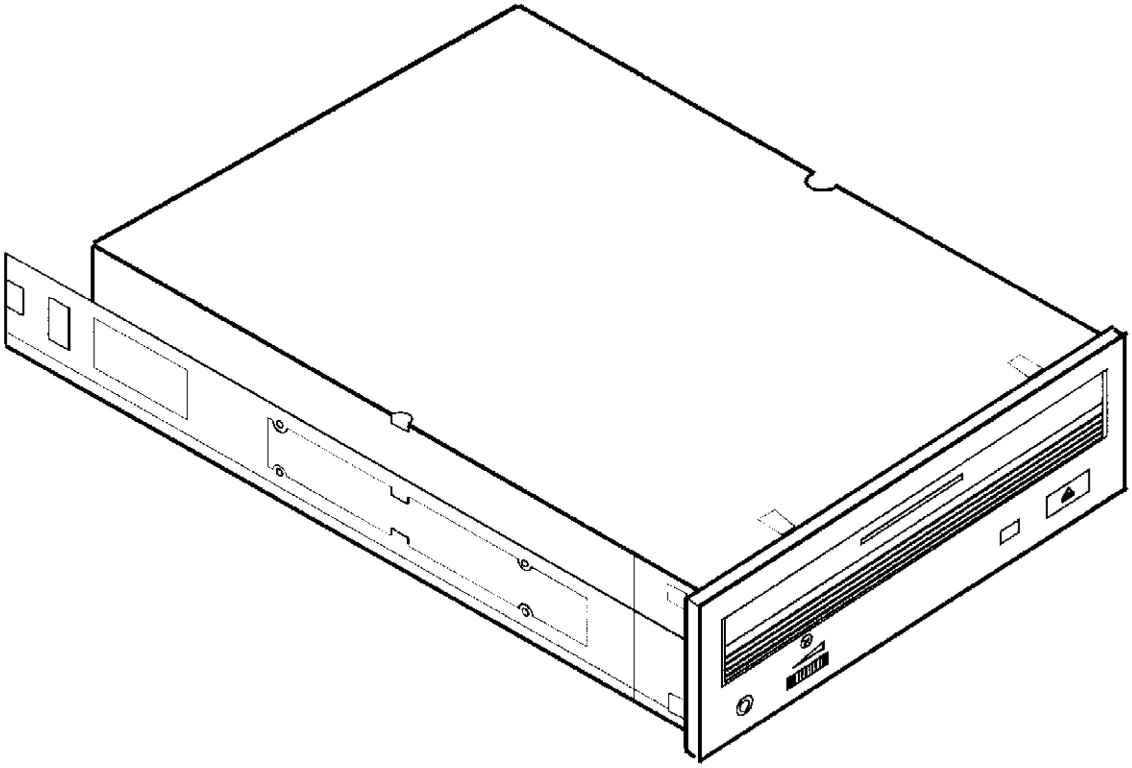


Figure 8-54. A3086A CD-ROM Drive

Specifications

- Integrated Single-Ended SCSI controller.
- Available Data formats: Red-Book, Yellow-Book, CD-ROM XA, Photo-CD, CD-Bridge, CD-I ready.
- Data Capacity:
  Mode 1 = 2048 bytes/sec. (Data plus ECC)
  Mode 2 = 2336 bytes/sec. (EDC, Audio Info.)
  (CD-ROM XA type embedded ECC in addition to standard type ECC)
- Rotational Speed:
  1X = 200 to 530 rpm. (fixed for audio, selectable for other)
  2X = 400 to 1060 rpm.
  2X mode (2.2X) = 440 to 1170 rpm
- Data Transfer Rates on SCSI bus:
  Burst Asynchronous = 1.5 Mbytes/sec.
  Burst Synchronous = 4.2 Mbytes/sec.
- Average Access time:
  1X = 310 msec.
  2X mode = 200 msec.
- Data Capacity = 600 Mbyte read only
- Data Buffer Capacity = 256 Kbytes
- 50,000 Power On Hours MTBF
- Automatic lens cleaner
- Emergency eject feature
- Sealed enclosure and closed door protection against contamination
- Built in termination (if enabled)
- Self-Test performed at power on
- No preventative maintenance required.
- Inquiry Vendor Identification String = TOSHIBA
- Inquiry Product Identification String = CD-ROM XM-3401TA
- Inquiry Product Revision Level String = 1094

Front Panel

The HP A3086A CD-ROM drive front panel has the following features:

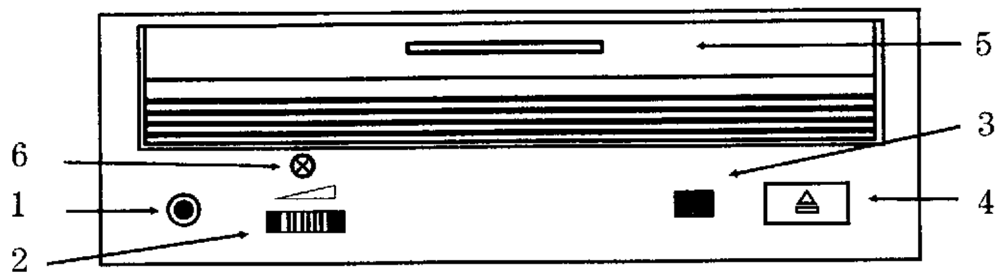


Figure 8-55. HP A3086A Front Panel

1. **Headphone jack -** headphone connection for listening to an audio CD.
2. **Volume control -** Used to adjust the audio volume.
3. **Drive status LED -** Used to indicate selftest, drive activity, or a drive problem.
4. **Eject button -** Pres this button to eject a CD. The CD ejects within 5 seconds. This button does not work if there is no power or if the software application has disabled its operation.
5. **Drive door -** Pull the door down to insert a CD caddy into the drive.
6. **Emergency eject access hole -** This hole contains a screw which, when removed, allows you to eject a CD caddy that is jammed in the drive. (Use a straightened out paper clip inserted into the hole and push until the CD caddy is ejected.)

Jumpering

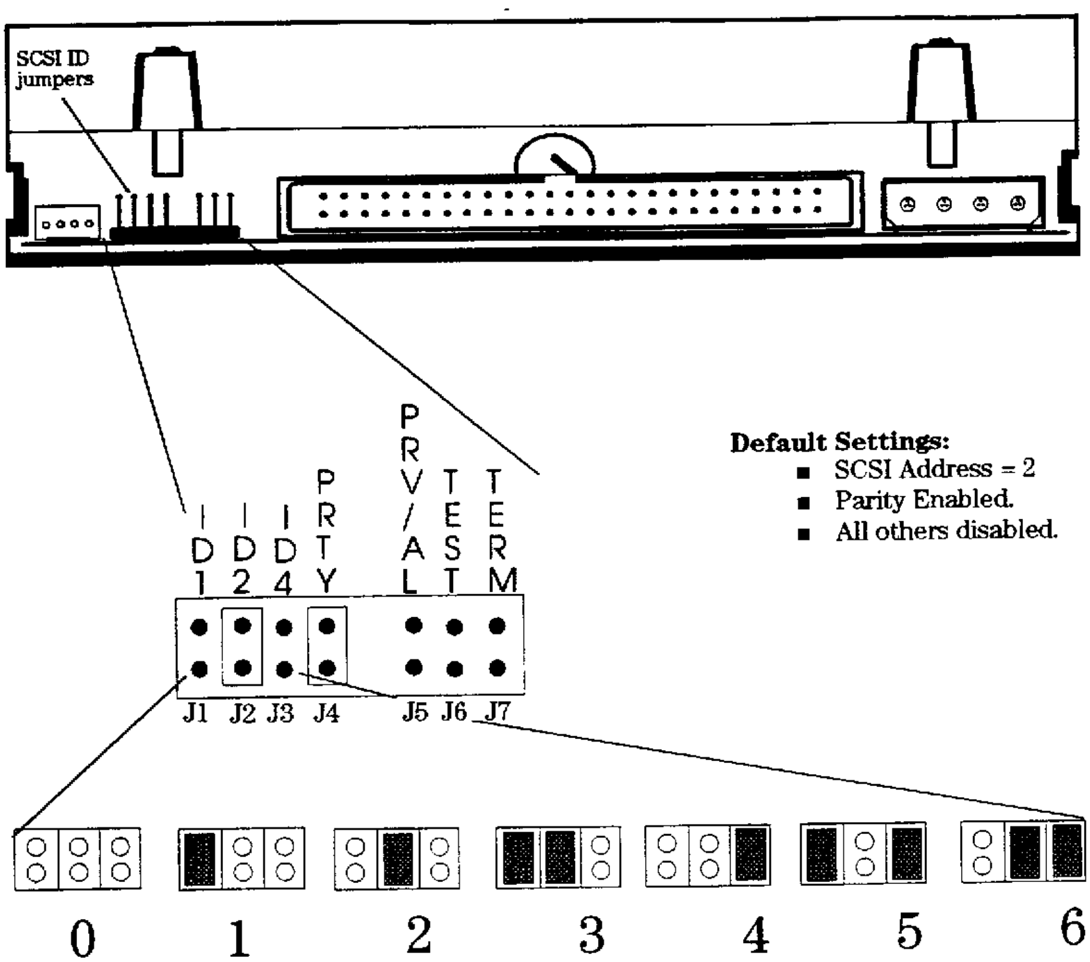


Figure 8-56. HP A3086A CD-ROM Jumper Diagram

There are three significant bits in the SCSI ID, giving a range of 0 to 7 inclusive. The jumpers may be positioned as shown, according to the desired address.

NOTE
Do not use SCSI ID 7, that address is reserved for the host.

J4 Parity - Installed jumper enables parity. (Default = installed)
J5 Prevent/Allow Removal of CD - Installed jumper prevents removal of the CD. Eject button is ignored. (Default = not installed)
J6 Test - Installed jumper allows playing of audio CD. (Default = not installed)
J7 Terminator Power - Installed jumper supplies terminator power to SCSI Bus pin 26. (Default = not installed)

Preventative Maintenance

There is no preventative maintenance required for this product

Troubleshooting

This product is considered a single FRU and is replaced as a complete assembly.

Drive Status Light

1. After Drawer is closed:
   Light OFF after short blinking sequence = Drive Ready or Stand-by.
   Light ON = No disk present.
   Light Blinking at 3.2 second interval = Cleaning of disk or optics required.

2. While Playing an Audio Track:
   Light Blinking at 1.6 second interval

3. When Accessing Data:
   Light Blinking at 0.2 second interval.

Internal Drive Logs

Available from interactive section of diagnostic.

Exchange Part Number

The exchange part number is: A1658-69002

Diagnostics

- SCSICD
- IOMAP
- SYSMAP

Parts and Accessories

CD-ROM Caddy = C2293-8000

HP A3184A CD-ROM Drive

Figure 8-57 shows the HP A3184A 1 inch Height CD-ROM.

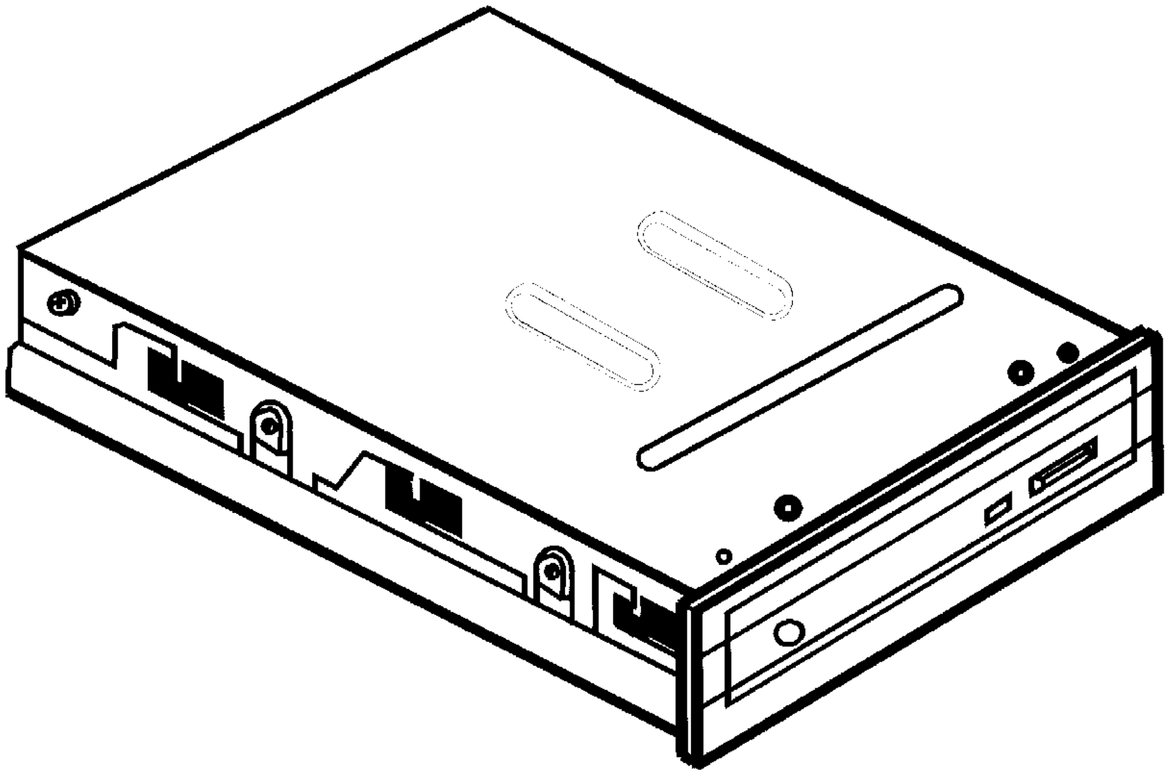


Figure 8-57. A3184A CD-ROM Drive

Specifications

- Integrated Single-Ended SCSI controller.
- Available Data formats: Red-Book, Yellow-Book, CD-ROM XA, Photo-CD, CD-Bridge, CD-I ready.
- Data Capacity:
  Mode 1 = 2048 bytes/sec. (Data plus ECC)
  Mode 2 = 2336 bytes/sec. (EDC, Audio Info.)
  (CD-ROM XA type embedded ECC in addition to standard type ECC)
- Rotational Speed:
  1X = 200 to 530 rpm. (fixed for audio, selectable for other)
  2X = 400 to 1060 rpm.
- Data Transfer Rates on SCSI bus: Burst Asynchronous = 1.5 Mbytes/sec.
- Average Random Access time:
  1X = 385 msec.
  2X mode = 385 msec.
- Data Capacity = 600 Mbyte read only
- Data Buffer Capacity = 64 Kbytes
- 45,000 Power On Hours MTBF
- Self-Test performed at power on
- Does not require a CD-ROM Caddy
- No preventative maintenance required.
- Inquiry Vendor Identification String = TOSHIBA
- Inquiry Product Identification String = CD-ROM XM-4101TA
- Inquiry Product Revision Level String = 1084

Front Panel

The HP A3184A CD-ROM drive front panel has the following features:

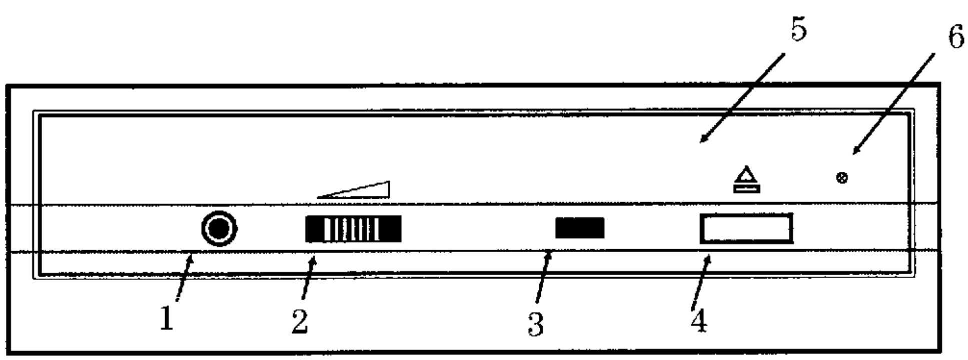


Figure 8-58. HP A3184A Front Panel

1. **Headphone jack -** headphone connection for listening to an audio CD.
2. **Volume control -** Used to adjust the audio volume.
3. **Drive status LED -** Used to indicate selftest, drive activity, or a drive problem.
4. **Eject button -** Pres this button to eject a CD. The CD ejects within 5 seconds. This button does not work if there is no power or if the software application has disabled its operation.
5. **Drive door -** The drive door slide out so you can insert a CD into the drive tray.
6. **Emergency eject access hole -** A paper clip (straightened) can be inserted here to cause the CD tray to open.

Jumpering

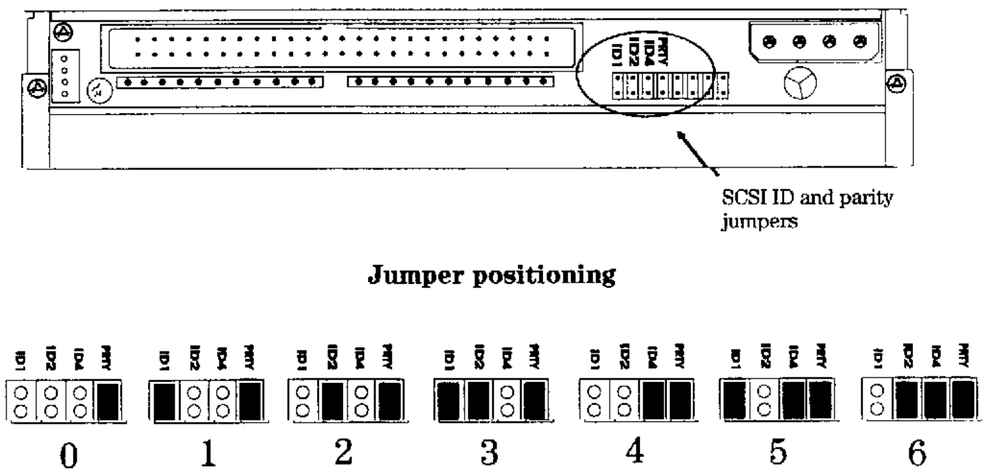


Figure 8-59. HP A3184A CD-ROM Jumper Diagram

Default Jumper Settings = Parity enabled. SCSI ID as needed.

There are three significant bits in the SCSI ID, giving a range of 0 to 7 inclusive. The jumpers may be positioned as shown, according to the desired address. The parity jumper should always be installed.

NOTE
Do not use SCSI ID 7, that address is reserved for the host.

Preventative Maintenance

There is no preventative maintenance required for this product

Troubleshooting

This product is considered a single FRU and is replaced as a complete assembly.

Drive Status Light

1. After Drawer is closed:
   Light OFF after short blinking sequence = Drive Ready or Stand-by.
   Light ON = No disk present.
   Light Blinking at 3.2 second interval = Cleaning of disk or optics required.

2. While Playing an Audio Track:
   Light Blinking at 1.6 second interval

3. When Accessing Data:
   Light Blinking at 0.2 second interval.

Internal Drive Logs

Available from interactive section of diagnostic.

Exchange Part Number

The exchange part number is: A3184-69001

Diagnostics

- SCSICD
- IOMAP
- SYSMAP

HP A3416A CD-ROM Drive

Figure 8-60 shows the HP A3416A 1.6 inch CD-ROM.

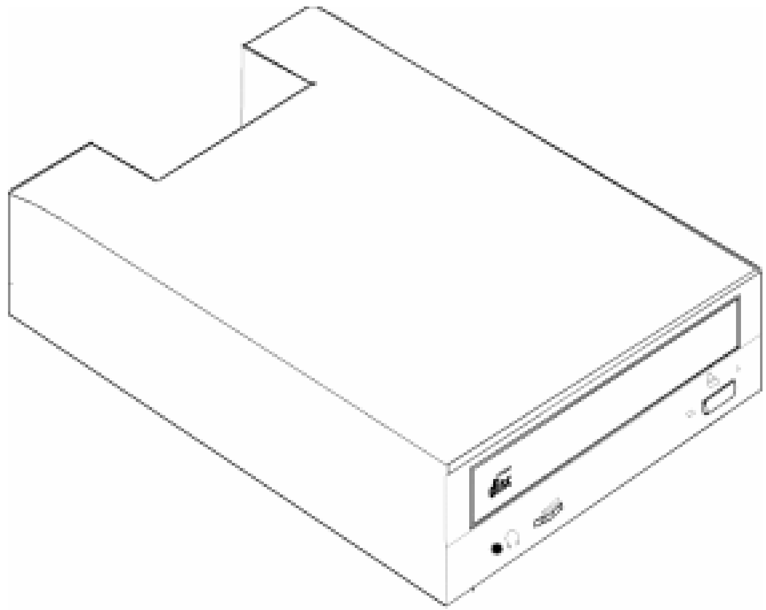


Figure 8-60. HP A3416A CD-ROM Drive

Specifications

- Built-in SCSI2 interface controller.
- Available Data formats: Red-Book, Yellow-Book, CD-ROM XA, Photo-CD, CD-Bridge, CD-I, CD-I Ready, CD-G and Multisession.
- Data Capacity:
  Mode 1 = 2048 bytes/block (Data plus ECC)
  Mode 2 = 2336 bytes/block (EDC, Audio Info.)
  (CD-ROM XA type embedded ECC in addition to standard type ECC)
- Rotational Speed:
  1X = 200 to 530 rpm. (fixed for audio, selectable for other)
  2X = 400 to 1060 rpm.
  4X = 800 to 2120 rpm.
- Data Transfer Rates on SCSI bus: Burst Asynchronous = 1.5 Mbytes/sec.
- Average Random Access time:
  1X = 320 msec.
  2X = 230 msec.
  4X = 190 msec.
- Data Buffer Capacity = 256 Kbytes
- 80,000 Power On Hours MTBF
- Self-Test performed at power on
- No preventative maintenance required.
- Inquiry Vendor Identification String = TOSHIBA
- Inquiry Product Identification String = CD-ROM XM-5401TA
- Inquiry Product Revision Level String = 3115

Front Panel

The HP A3416A CD-ROM drive front panel is shown in Figure 8-61:

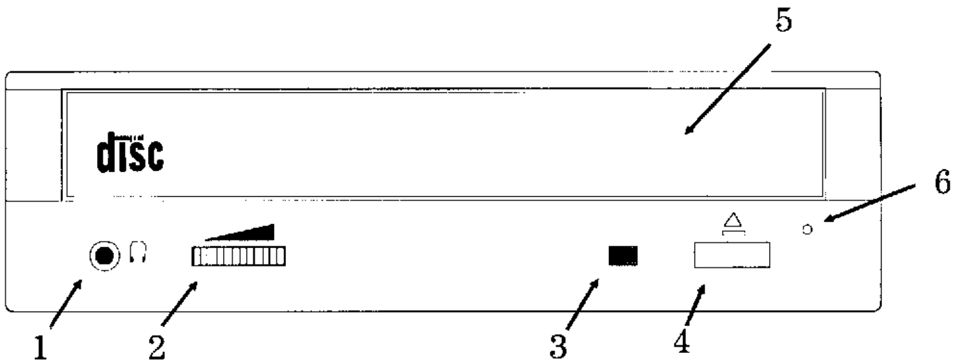


Figure 8-61. Front Panel Features

CD-ROM Front Panel Features

1. Headphone Jack	2. Volume control knob	3. Drive status LED
4. Eject Button	5. Drive door	6. Emergency eject access hole

Jumpering

Figure 8-62 shows the location of the jumper and the possible settings for the three-bit SCSI ID configurations. The SCSI ID can range from 0 to 6, depending on which pins are jumpered. SCSI address 7 is reserved for the host. Note that the parity jumper must be in place in all settings.

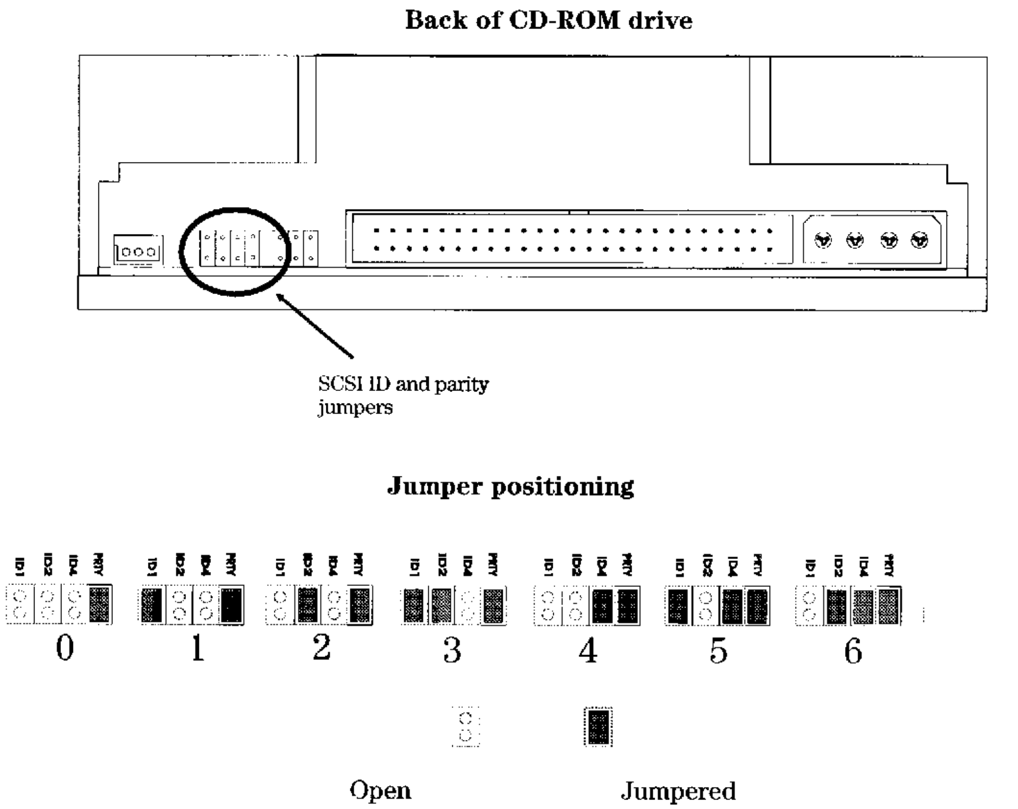
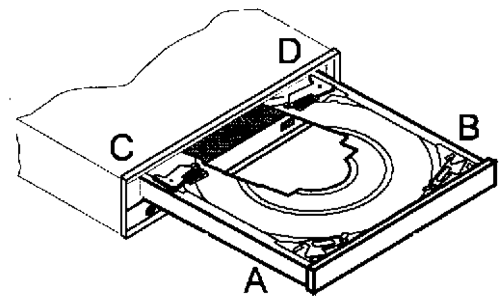
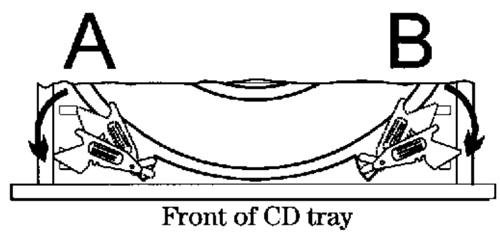
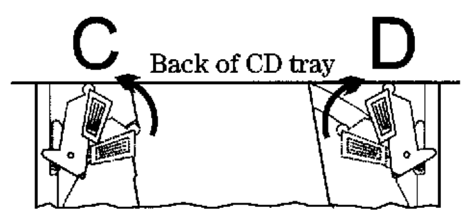
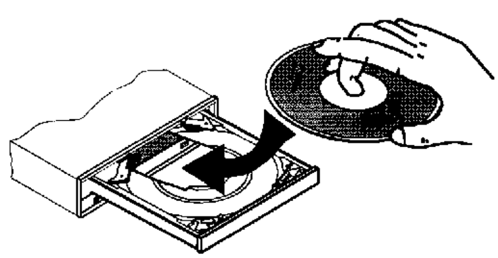


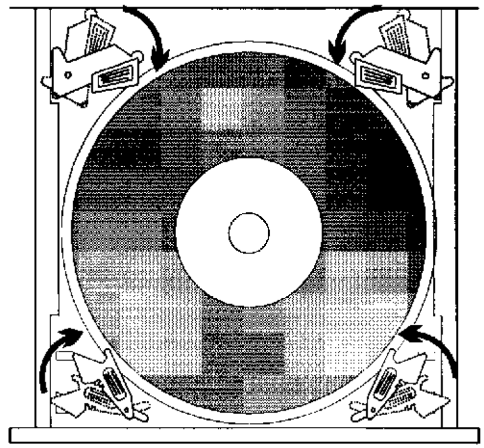
Figure 8-62. HP A3416A SCSI ID Jumpers

CD Loading Procedures

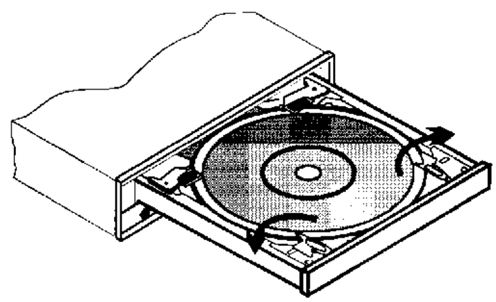
The procedure for loading and unloading CDs in the HP3416A drive depends on whether the drive has been mounted horizontally or vertically.

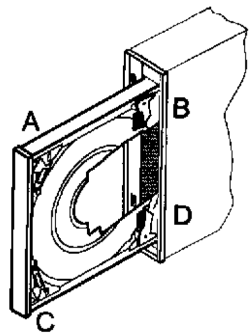
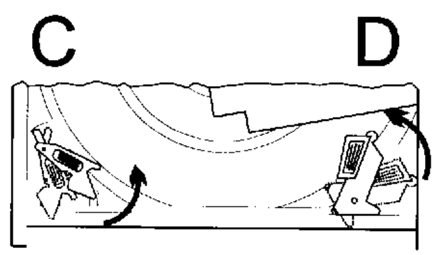
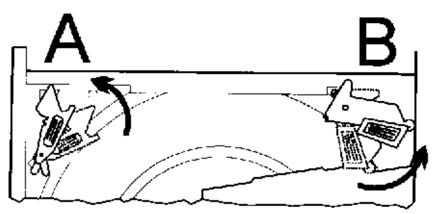
CD Loading/Unloading in the Horizontal Mount Position	
Horizontal Mount Loading	
1. Press the Eject Button (refer to Figure 8-61). The CD tray will slide out of the drive. Note the position of the front retaining tabs (A, B) and rear retaining tabs (C,D)	
2. Snap the front retaining tabls (A, B) toward the front of the CD tray.	
3. Snap the rear retaining tabs (C,D) toward the rear of the CD tray.	
4. Place the CD in the CD tray.	

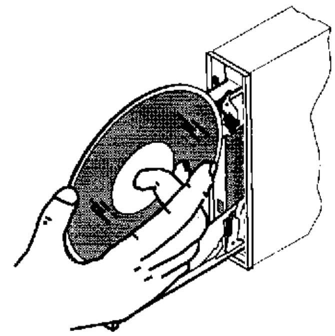
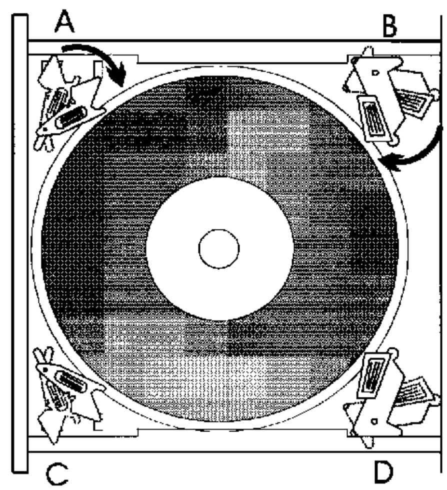
<table>
<tr><th colspan="2">CD Loading/Unloading in the Horizontal Mount Position</th></tr>
<tr><td>5. Snap the four retaining tabs over the CD.

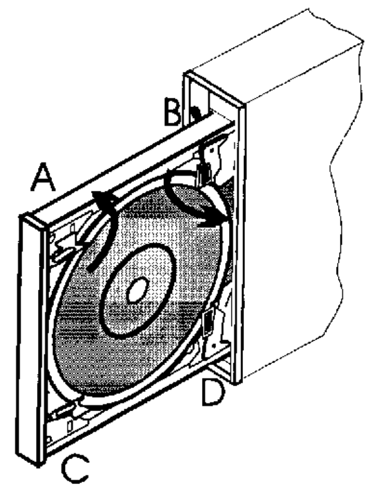
6. Push the CD tray back into the CD drive.. The Drive Status LED will light while the drive reads the CD, then turn off.</td><td></td></tr>
<tr><th colspan="2">Horizontal Mount Unloading</th></tr>
<tr><td>1. Wait for the CD-ROM drive activity to stop.

2. Press the Eject Button (see Figure 8-61).

3. Snap the front retaining tabs away from the CD and remove the CD from its tray.</td><td></td></tr>
</table>

CD Loading/Unloading in the Vertical Mount Position	
Vertical Mount Loading	
1. Press the Eject Button (refer to Figure 8-61). The CD will slide out of the tray. Note the position of the top retaining tabs (A, B) and bottom retaining tabs (C, D).	
2. Snap the bottom retaining tabs (C, D) toward the center of the tray to prevent the CD from slipping out.	
3. Snap the top retaining tabs (A, B) away from the center of the CD tray.	

CD Loading/Unloading in the Vertical Mount Position	
4. Place the CD in the tray so that it is held by the bottom retaining tabs. Be sure the printing on the CD is facing to the **right**.	
5. Snap the top retaining tabs (A, B) into place over the top of the CD. 6. Push the CD tray back into the CD drive. The Drive Status LED will light while the drive reads the CD, then turn off.	

CD Loading/Unloading in the Vertical Mount Position	
Vertical Mount Unloading	
1. Wait for CD ROM activity to stop. 2. Press the Eject Button (see Figure 8-61). The CD tray will slide out. 3. Snap the top retaining tabs (A, B) away from the top of the CD. 4. Remove the CD from the tray.	

Preventative Maintenance

There is no preventative maintenance required for this product

Troubleshooting

This product is considered a single FRU and is replaced as a complete assembly.

Drive Status Light

1. After Drawer is closed:
   Light OFF after short blinking sequence = Drive Ready or Stand-by.
   Light ON = No disk present.
   Light Blinking at 3.2 second interval = Cleaning of disk or optics required.

2. While Playing an Audio Track:
   Light Blinking at 1.6 second interval

3. When Accessing Data:
   Light Steady.

Internal Drive Logs

Available from interactive section of diagnostic.

Exchange Part Number

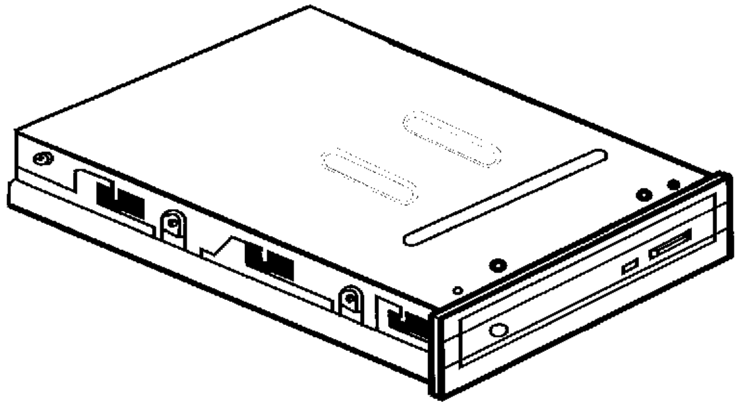
There is no exchange part number for this product.

Diagnostics

- SCSICD
- IOMAP
- SYSMAP

HP A3715A CD-ROM Drive

Figure 8-63 shows the HP A3715A 1 inch Height CD-ROM.



4101c.tif

Figure 8-63. A3715A CD-ROM Drive

Specifications

- Integrated Single-Ended SCSI controller.
- Available Data formats: Red-Book, Yellow-Book, CD-ROM XA, Photo-CD, CD-Bridge, CD-I ready.
- Data Capacity:
  Mode 1 = 2048 bytes/sec. (Data plus ECC)
  Mode 2 = 2336 bytes/sec. (EDC, Audio Info.)
  (CD-ROM XA type embedded ECC in addition to standard type ECC)
- Rotational Speed:
  1X = 200 to 530 rpm. (fixed for audio, selectable for other)
  2X = 400 to 1060 rpm.
- Data Transfer Rates on SCSI bus: Burst Asynchronous = 1.5 Mbytes/sec.
- Average Random Access time:
  1X = 385 msec.
  2X mode = 385 msec.
- Data Capacity = 600 Mbyte read only
- Data Buffer Capacity = 64 Kbytes
- 45,000 Power On Hours MTBF
- Self-Test performed at power on
- Does not require a CD-ROM Caddy
- No preventative maintenance required.
- Inquiry Vendor Identification String = TOSHIBA
- Inquiry Product Identification String = CD-ROM XM-4101TA
- Inquiry Product Revision Level String = 1084

Front Panel

The HP A3715A CD-ROM drive front panel has the following features:

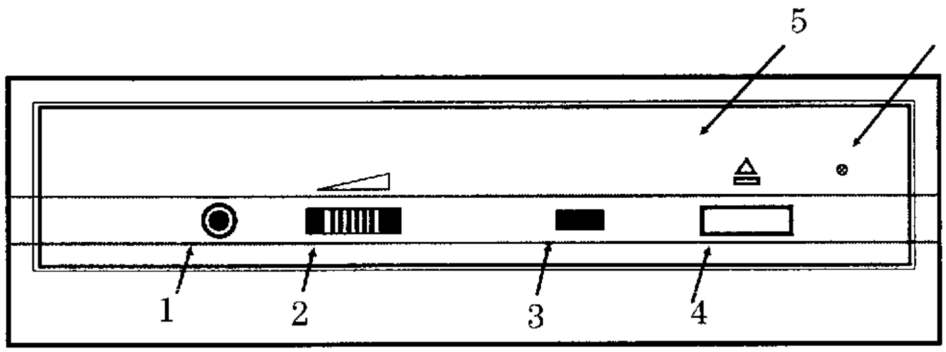


Figure 8-64. HP A3715A Front Panel

1. Headphone jack - headphone connection for listening to an audio CD.
2. Volume control - Used to adjust the audio volume.
3. Drive status LED - Used to indicate selftest, drive activity, or a drive problem.
4. Eject button - Press this button to eject a CD. The CD ejects within 5 seconds. This button does not work if there is no power or if the software application has disabled its operation.
5. Drive door - The drive door slides out so you can insert a CD into the drive tray.
6. Emergency eject access hole - A paper clip (straightened) can be inserted here to cause the CD tray to open.

Jumpering

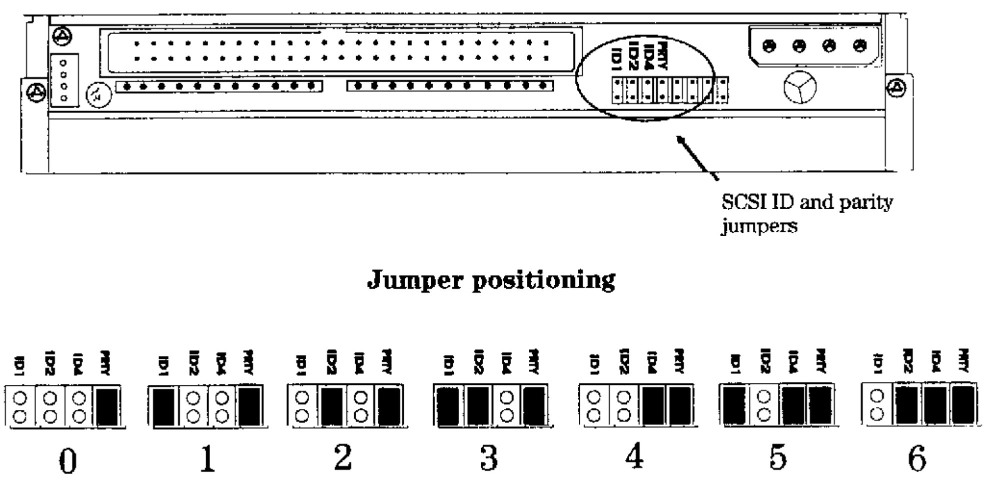


Figure 8-65. HP A3715A CD-ROM Jumper Diagram

Default Jumper Settings = Parity enabled. SCSI ID as needed.

There are three significant bits in the SCSI ID, giving a range of 0 to 7 inclusive. The jumpers may be positioned as shown, according to the desired address. The parity jumper should always be installed.

Note

Do not use SCSI ID 7, that address is reserved for the host.

Preventative Maintenance

There is no preventative maintenance required for this product.

Troubleshooting

This product is considered a single FRU and is replaced as a complete assembly.

Drive Status Light

1. After Drawer is closed:
   Light OFF after short blinking sequence = Drive Ready or Stand-by.
   Light ON = No disk present.
   Light Blinking at 3.2 second interval = Cleaning of disk or optics required.

2. While Playing an Audio Track:
   Light Blinking at 1.6 second interval

3. When Accessing Data:
   Light Blinking at 0.2 second interval.

Internal Drive Logs

Available from interactive section of diagnostic.

Replacement Part Number

The exchange part number is: A1658-60018

Diagnostics

CSTM
SCSICD
IOMAP
SYSMAP
.

A

System Specifications

This appendix contains the environmental, electrical, and physical specifications for the HP3000 and HP 9000 systems. Changes to the specifications for the HP9000 Kx50/Kx60/Kx70/Kx80 and HP3000/979KS are noted in the table.

Table A-1. Environmental Specifications, HP 3000 and HP 9000

Description	Specification
Operating Temperature	5° to 40° C (41° to 104° F)
HP9000/Kx80 only	5° to 35° C (41° to 91° F)
Non-operating Temperature	-40° to 65° C (-40° to 149° F) (with no internal tape media device) -40° to 45° C (-40° to 113° F) (with internal tape media device)
Temperature Rate of Change	20° C (36° F)/hr. (with no internal tape media device) 10° C (18° F)/hr. (with internal tape media device)
Over Temperature First Warning	35° C (95° F) Internal
Over Temperature Second Warning with OS Shutdown	40° C (104° F) Internal
Over Temperature Hardware Shutdown	43° C (109° F) Internal
Operating Humidity	15% to 80% RH non-condensing, max wet bulb (at 26° C (79° F) with internal tape media device)
Non-operating Humidity	5% to 90% RH non-condensing (at 65° C/149° F) rate of change, 30% RH/hr.
HP 9000 Kx50/Kx60/Kx70/Kx80 and HP3000 979KS	5% to 80% RH non-condensing (at 65° C/149° F) rate of change, 30% RH/hr.
Operating Altitude	0 to 3.0 KM (0 to 10,000 ft) above sea level
Non-operating Altitude	0 to 4.5 KM (0 to 15,000 ft) above sea level
Heat Dissipation (maximum load)	4263 BTU/hr.
HP 9000 Kx50/Kx60/Kx70/Kx80 and HP3000 979KS	5846 BTU/hr.

Table A-1. Environmental Specifications, HP 3000 and HP 9000 (Continued)

Description	Specification
Acoustics	Deskside (LwA) = <4.7 Bel at <31° C (<88° F) <5.1 Bel at >31° C (>88° F) Operator Post = 45 dB-LpA, no prominent tone Racked System (LwA) = <5.5 Bel at <31° C (<88° F) <6.0 Bel at >31° C (>88° F)
Safety	UL Listed to UL1950 CSA Certified to CSA C22-2 No. 950 TUV GS Mark, compliant with EN60950, and EN41003

Table A-2. Electrical Specifications, HP 3000 and HP 9000

Description	Specification
AC Input Voltage Range[1]	100 to 127 VAC or 200 to 240 VAC
HP 9000 Kx50/Kx60/Kx70/Kx80 and HP3000 979KS	90 to 143 VAC or 180 to 269 VAC
AC Input Line frequency[1]	50 to 60 Hz
AC Input Current	12.5 A (max load at 100 VAC) 10.5 A (max load at 120 VAC) 6.0 A (max load at 200 VAC)
HP 9000 Kx50/Kx60/Kx70/Kx80 and HP3000 979KS	19.5 A (max load at 100 VAC) 16.0 A (max load at 120 VAC) 10.0 A (max load at 200 VAC)
AC Inrush Current	16 A peak, one cycle
HP 9000 Kx50/Kx60/Kx70/Kx80 and HP3000 979KS	48.65 A peak @ 140 VAC/60Hz
AC Input Power	1250 watts maximum, 525 watts typical [2]
HP 9000 Kx50/Kx60/Kx70/Kx80 and HP3000 979KS	1700 VA maximum
Power Supply Output Rating	925 watts DC continuous
HP 9000 Kx50/Kx60/Kx70/Kx80 and HP3000 979KS	1200 watts DC continuous
Holdup without system reset	25ms at 50/60Hz (1 cycle, or 500ms)
HP 9000 Kx50/Kx60/Kx70/Kx80 and HP3000 979KS	20ms at 50/60Hz (1 cycle, or 500ms)
Battery Backup Time	15 minutes (with optional external PowerTrust UPS, without optional UPS there is no battery backup)

[1]The power supply auto-ranges to the AC voltage and frequency. It does not have to be reconfigured to operate over its rated operating ranges.

[2]The typical AC Input Power rating is based on a configuration of 3 CPUs, 3 internal disks, 1 memory controller, 288Mb of memory, 2 HP-HSC cards, 1 HP-HSC expansion card, 1 HP-PB FDDI and 1 F/W SCSI card.

Table A-3. DC Voltage Specifications, HP 3000 and HP 9000

Nominal Voltage	Minimum Voltage	Maximum Voltage	Minimum Current	Maximum Current	Peak to Peak Ripple
+3.3V	+3.3V	+3.4V	0.0A	20A	50mV
+5V	+5.1V	+5.25V	22A	110A	50mV
+4.4V	+4.4V	+4.53V	0.0A	27.0A	50mV
+12V	+11.64V	+12.6V	0.0A	15.0A	100mV
-12V	-11.64V	-12.6V	0.0A	4.0A	100mV

Table A-4. Electromagnetic and Electrostatic Specifications, HP 3000 and HP 9000

Description	Specification
Radiated Field Immunity	3V/meter, 27MHz to 1 GHz
Magnetic Field Immunity	1 gauss, 47.5Hz to 198Hz
Electrostatic Discharge Immunity	15kV (maximum, with no loss of function) 25kV (maximum, with no component damage)
Electrostatic Contact Discharge	3kV, no effect

Table A-5. Physical specifications, HP 3000 and HP 9000

Description	Specification
Height	63.50cm (25in)
Width	43.18cm (17in)
Depth	58.42cm (23in)[1]
Weight	77.28kg (170.37lb)[2]

1. Depth is 69.85 cm (27.5 in) for HP 9000 Kx50/Kx60/Kx70/Kx80 and HP 3000 979KS
2. The maximum weight varies according to model and configuration. The weight shown in the table is for an maximum-configured HP9000 K460. A racked chassis will add approximately 30 pounds to this number.

B

Support Information

This chapter contains block diagrams from the training package and additional reference information that may be needed while troubleshooting a system.

HP 9x9KS Block Diagram

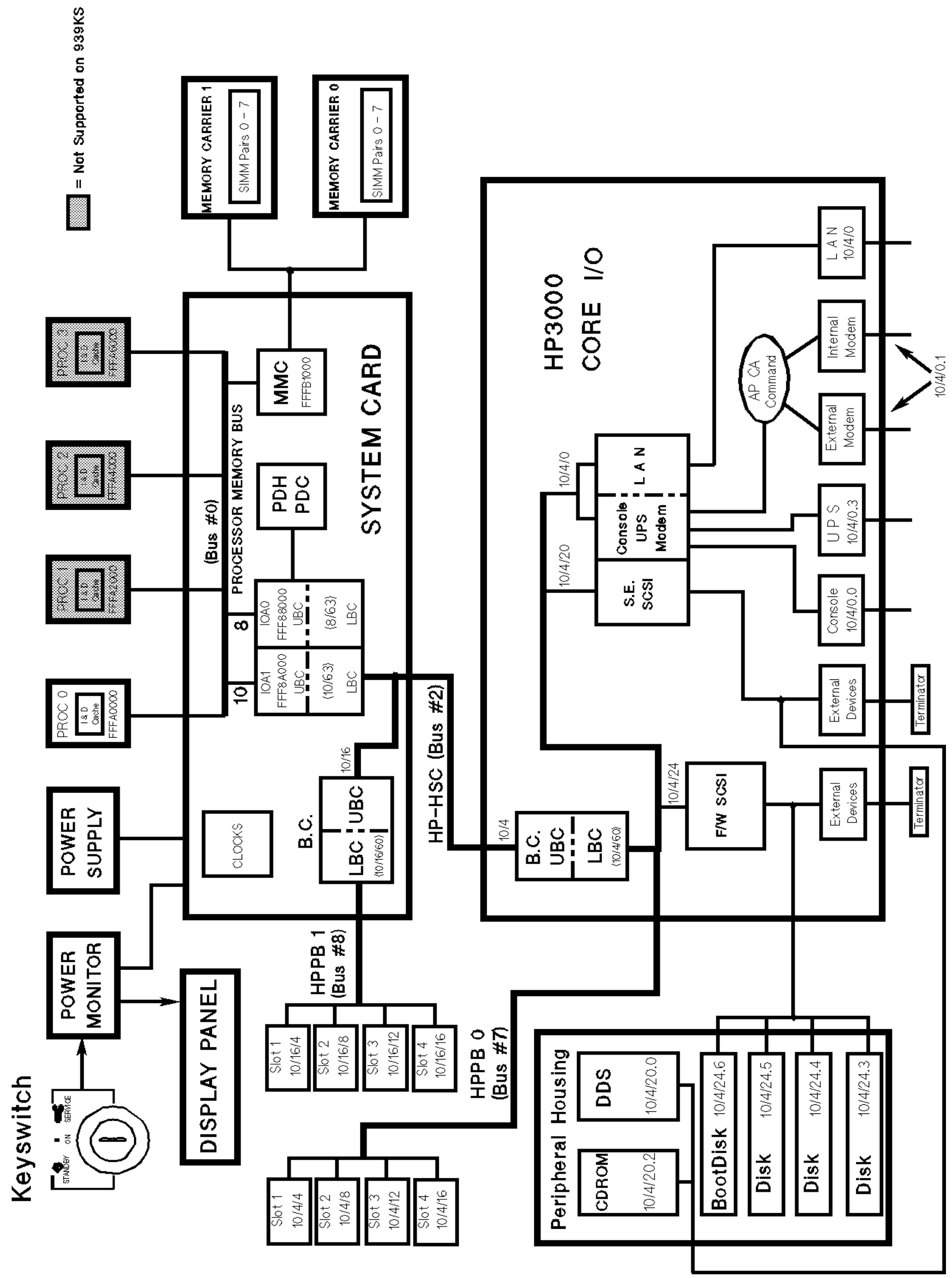


Figure B-1. HP 3000 9x9KS Block Diagram

HP K100 Block Diagram

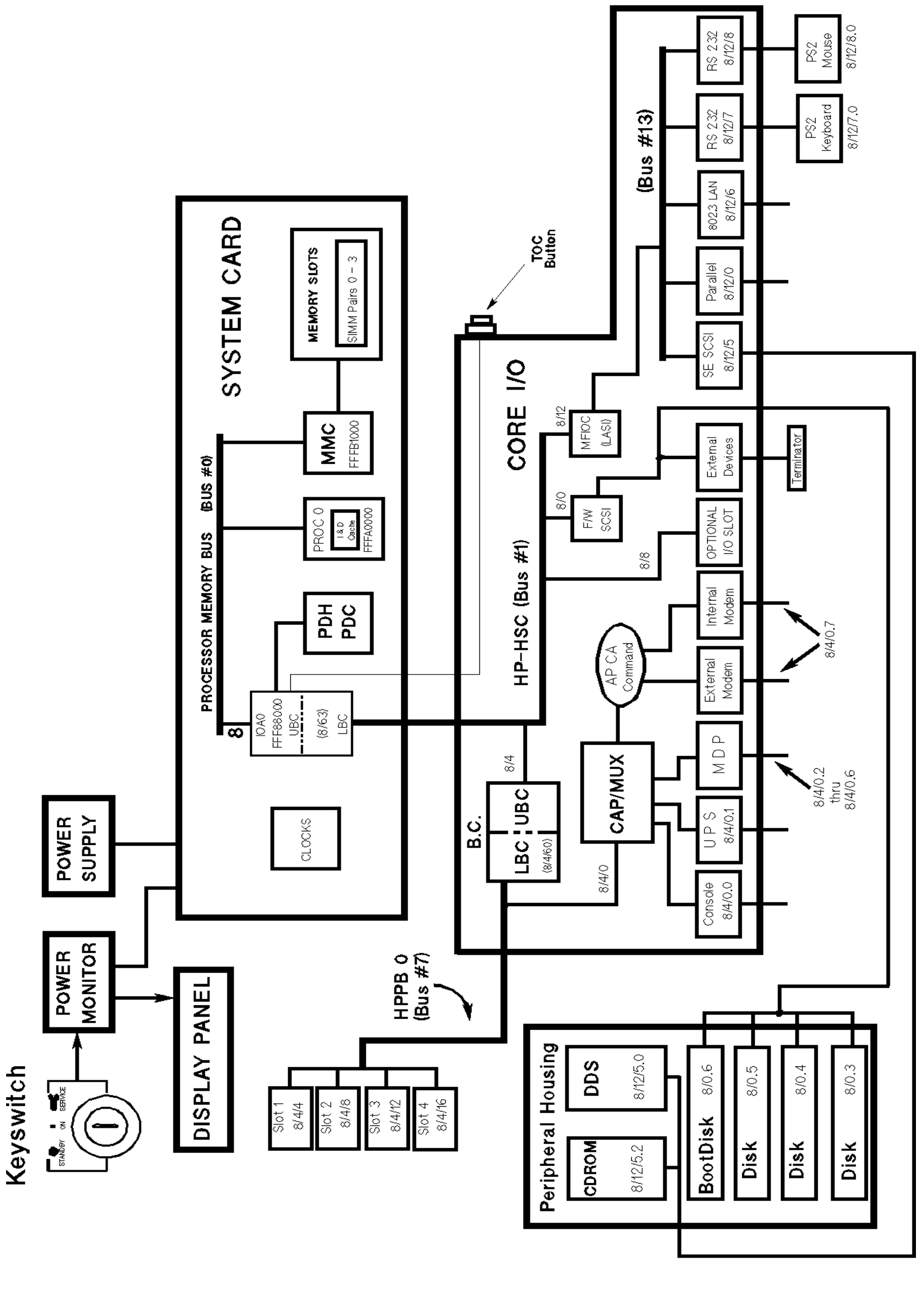


Figure B-2. HP 9000 K100 Block Diagram

HP K2x0/K4x0 Block Diagram

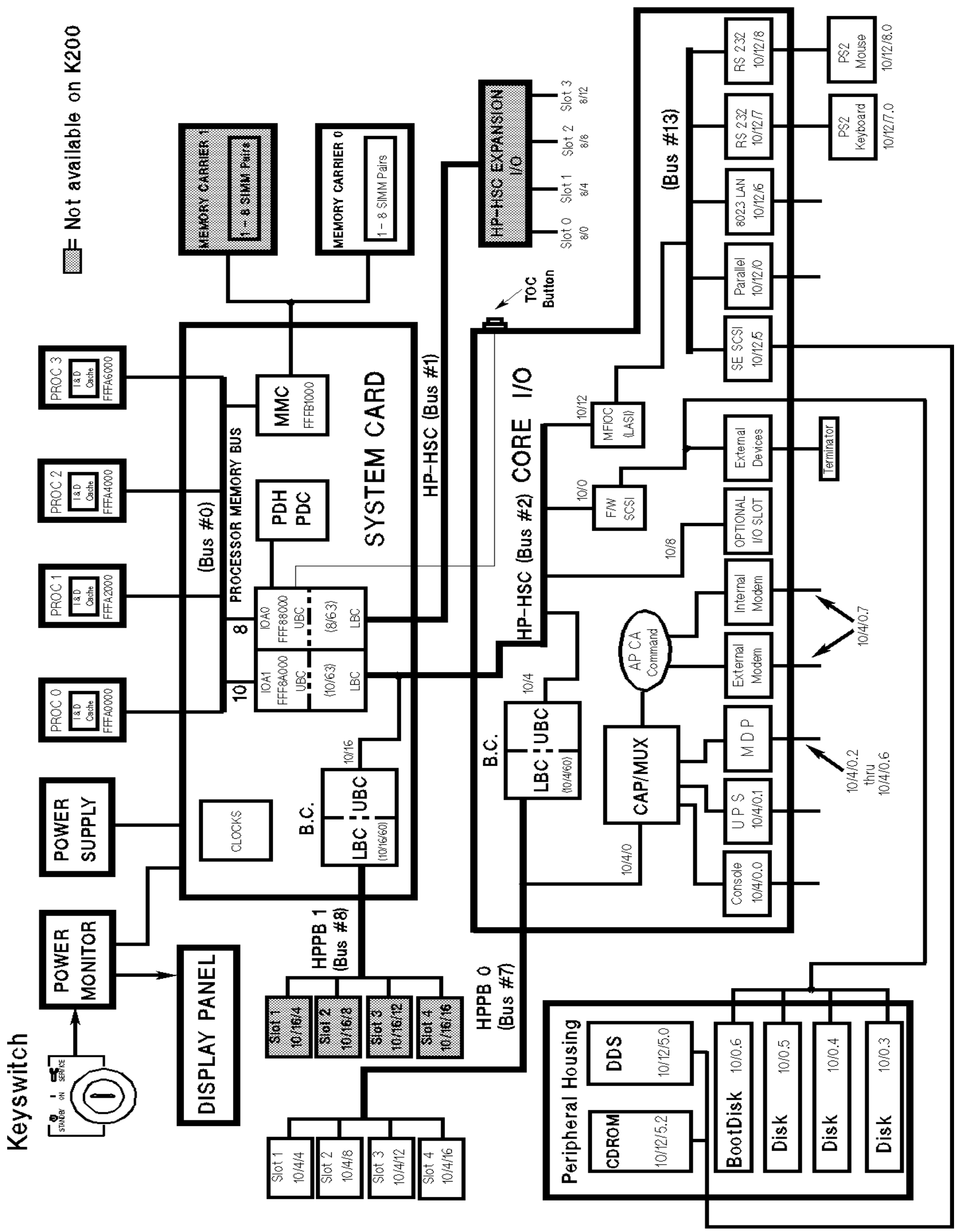


Figure B-3. HP 9000 K2x0/K4x0 Block Diagram

Kx70/Kx80 Block Diagram

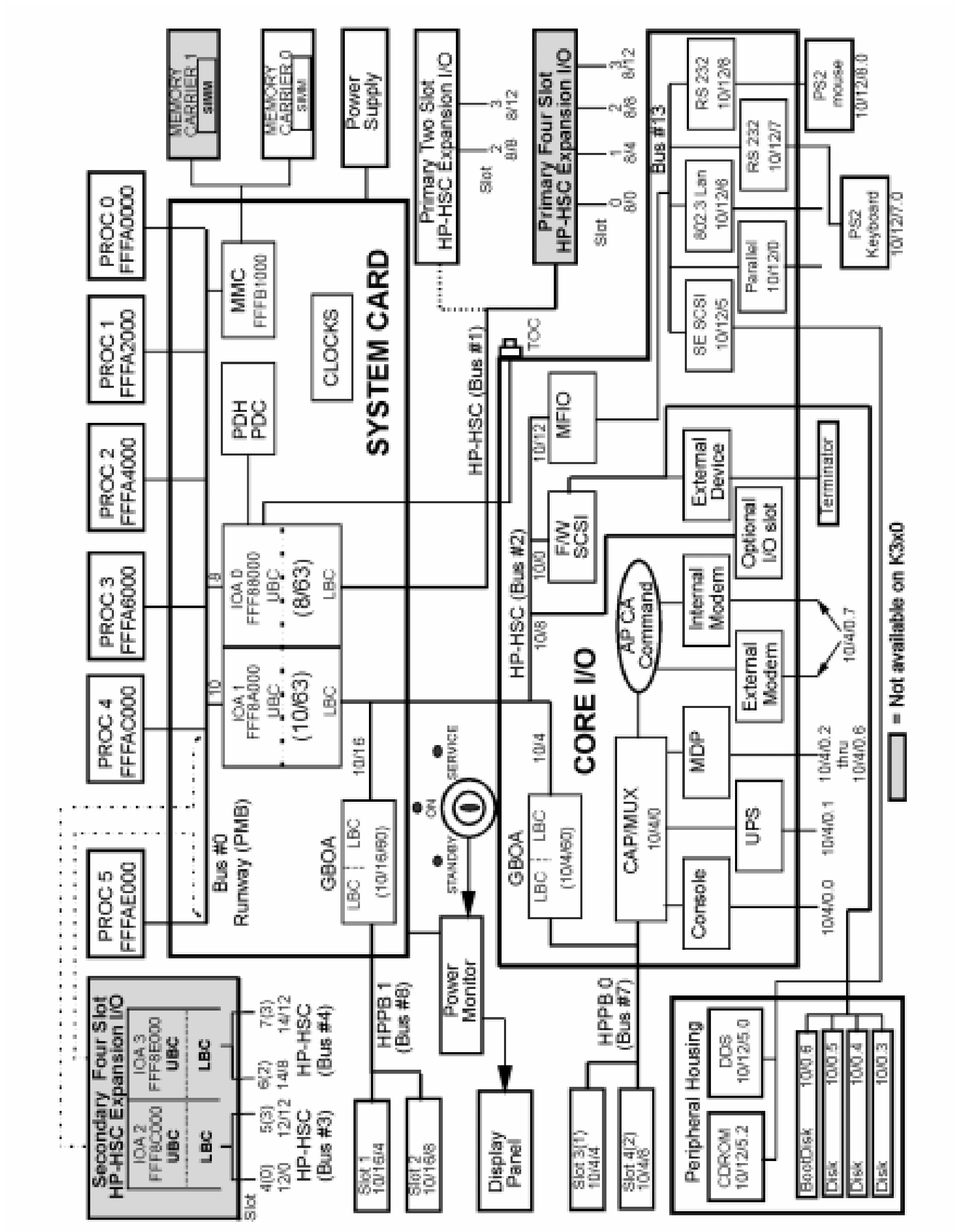


Figure B-4. HP9000/Kx70 Block Diagram

Access Port Commands

Access to the Access Port (AP) commands is via the ***ctrl + B*** function, with the SPU key switch in the *SERVICE* position.

Table B-1. Access Port Commands

Command	**Description**	**Remarks**
CA	Configure command for the Access Port	Internal/external modem port, system identification, bit rate, protocol, and: 3000 only - Allows autoanswer to be ON or OFF 9000 only - Allows selection of HP or Non-HP console
CO	Enter console mode	
CS	Copy screen from local to remote console terminal	
DI	Disconnect line to remote console terminal	
DR	Disable access by a remote console terminal	Enable session mode access
DS	Disable display of system status line	
ER	Enable access by a remote console terminal	Disable session mode access
ES	Enable display of system status line	
HE	Display AP commands	
LR	Lock remote	Disable modem access
MS	Displays modem status	Hit return to stop
RS *	Reset system, initiates SPU selftest, stops processing	Starts software load from load device if autoboot enabled. Does not reset AP
SE	Transfers remote terminal from console/control to session mode	
SL	Displays last 50 chassis codes	
SO	Sets the security level	Requires a *PASSWORD* (Call the Response Center for the password).
TA	Initiates ap selftest	
TC *	Transfer of control	Retains memory status
TE	Sends message between the remote and local consoles	
UR	Unlock remote	Enable modem access

CAUTION

* These commands RESET the system. Be very careful using them, it could result in lost data and it will crash all users on the system.

ISL Commands

From PDC the BOOT command loads the Initial System Loader (ISL) from the boot device. It is at ISL that the operating system or stand-alone utilities can be loaded from the boot device. The HELP command at ISL displays the available options.

Table B-2. ISL Commands

Command	Description	Remarks
?/HELP	Help facility	
LISTF	List ISL utilities	
LS	List ISL utilities	
AUTOBOOT	Set or clear autoboot flag	Changed in stable storage
AUTOSEARCH	Set or clear autosearch flag	Changed in stable storage
PRIMPATH	Modify primary boot path	Changed in stable storage
ALTPATH	Modify alternate boot path	Changed in stable storage
CONSPATH	Modify system console path	Changed in stable storage
DISPLAY	Display boot/console paths	
FASTSIZE	Set or display FASTSIZE	
LSAUTOFL	List autoboot file	
LISTAUTOFL	List autoboot file	
700SUPPORT	Boot from the S700 support device	
800SUPPORT	Boot from the S800 support device	
READNVM	Displays nvm contents	One word at a time
READSS	Displays stable storage	One word at a time
LSBATCH	List contents of batch file	
LISTBATCH	List contents of batch file	
BATCH	Execute commands in batch	
LSEST	List contents of EST	Extended selftest file
LISTEST	LIst Contents Of EST	Extended selftest file
EST	Execute commands in EST	Extended selftest file

PDC Menus and Commands

This section provides an example of the Menus within PDC and the available commands. To enter PDC you must stop the boot process or stop all current applications, log-off all users, stop the OS and reset the computer (TOC) then stop the boot process. This will display the PDC Main Menu.

> **Note**
>
> PDC Menus shown in the examples in this Appendix are for HP9000/K250/K260/K460 systems. Menus on earlier versions will be slightly different.

Within the PDC menus, a command or menu can be entered in abbreviated form using the capitalized letters of the command or menu displayed on the console. For example, to go to the *INFORMATION* menu, type **in** as opposed to typing the entire word information, as shown:

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

Main Menu

```
---- Main Menu ---------------------------------------------------------------
     Command                          Description
     -------                          -----------
     BOot [PRI|ALT|<path>]            Boot from specified path
     PAth [PRI|ALT|CON|KEY] [<path>]  Display or modify a path
     SEArch [DIsplay|IPL] [<path>]    Search for boot devices
     COnfiguration menu               Displays or sets boot values
     INformation menu                 Displays hardware information
     SERvice menu                     Displays service commands
     DIsplay                          Redisplay the current menu
     HElp [<menu>|<command>]          Display help for menu or command
     RESET                            Restart the system
----
Main Menu: Enter command or menu >
```

Configuration menu

```
---- Configuration Menu ------------------------------------------------------
     Command                           Description
     -------                           -----------
     AUto [BOot|SEArch|STart] [ON|OFF] Display or set specified flag
     BootID [<proc>] [<bootid>]        Display or set Boot Identifier
     BootINfo                          Display boot-related information
     BootTimer [0 - 200]               Seconds allowed for boot attempt
     CPUconfig [<proc>] [ON|OFF]       Config/Deconfig processor
     DEfault                           Set the system to predefined values
     FAn [HI|NORmal]                   Display or change fan speed
     FastBoot [ON|OFF]                 Display or set boot tests execution
     IPRefetch [ON|OFF]                Display or set instruction cache prefetch
     MOnitor [LIst | <path> <type>]    Display or set monitor type in EEPROM
     PAth [PRI|ALT] [<path>]           Display or modify a path
     SEArch [DIsplay|IPL] [<path>]     Search for boot devices
     SECure [ON|OFF]                   Display or set SECURE flag
     TIme [c:y:m:d:h:m:[s]]            Read or set the real time clock in GMT
     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
----
   Configuration Menu: Enter command >
```

Information Menu

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

     Command                           Description
     -------                           -----------
     ALL                               Display all system information
     BootINfo                          Display boot-related information
     CAche                             Display cache information
     ChipRevisions                     Display revisions of major VLSI
     COprocessor                       Display coprocessor information
     FwrVersion                        Display firmware version
     IO                                Display I/O interface information
     IPRefetch                         Display Instruction pre-fetch setting
     LanAddress                        Display Core LAN station address
     MEmory                            Display memory information
     MOnitor                           Display monitor type in EEPROM
     PRocessor                         Display processor information
     WArnings                          Display selftest warning messages
     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 >
```

Service Menu

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

     Command                           Description
     -------                           -----------
     ChassisCodes [<proc>]             Display chassis codes
     CLEARPIM                          Clear (zero) the contents of PIM
     MemRead <address> [<len>]         Read memory and I/O locations
     PDT [CLEAR]                       Display or clear the PDT
     PIM [<proc>] [HPMC|LPMC|TOC]      Display PIM information
     SELftests [ON|OFF]                Enable/disable self test execution

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

PDC Update Procedures

This section documents the methods that are used for distributing Processor Dependent Code (PDC) updates for the HP 3000 9x9 and HP 9000 K class computers. Also included in this section are procedures for creating a PDC update tape, verifying your current version of PDC, and a PDC update procedure.

The topics described in this section are in the following order:

1. Current version verification

- With on-line diagnostics
- With boot console handler (BCH)

2. PDC distribution

- HP Electronic Support Center (HPESC) access
- Support Media

3. Creating a FIRMWARE/PDC update tape

- From HPESC
- From the Support Media

4. PDC update procedure

- Updating from a tape created using HPESC files
- Updating from a tape created using Support Media

Current Version Verification

With On-line Diagnostics

The current version of PDC can be determined using on-line diagnostics. If on-line diagnostics are not present on your system, use the boot console handler procedure to verify the current version.

For Operating Systems prior to HPUX 10.20 IPR9707, both the Sysdiag and MSTM Procedures may be followed. For Operating Systems HPUX 10.20 IPR9707 and later, Sysdiag is no longer available, therefore the MSTM Procedure must be followed.

Sysdiag Procedure

Use the following procedure to determine the firmware version:

1. At the system prompt, enter **`sysdiag`**
2. At the sysdiag prompt, enter **`sysmap`**
3. At the sysmap prompt, enter **`cpumap`**
4. The output of cpumap will display the current PDC revision. Follow the instructions of the `TPPPdddd.text` file (described in the file naming conventions section) to determine if your system requires a PDC update.

MSTM Procedure

Use the following procedure to determine the firmware version:

1. At the system prompt, enter **`mstm`**.
2. Press the **OK** softkey.
3. Press the **device** softkey.
4. Press the **select class** softkey.
5. Select **processor** as Device Type.
6. Select **all** as Qualifier Type.
7. Press the **OK** softkey.
8. Press the **previous menu** softkey.
9. Press the **tools** softkey.
10. Press the **information** softkey.
11. Press the **run** softkey.
12. When ’Last Op Status’ reads "Successful" for the processors, press the **info log** softkey.

The revision of PDC is in the ’PDC Firmware Revision:’ field.

With Boot Console Handler (BCH)

1. Log on as root, and enter “reboot -r”. This command will shutdown the Operating System and reboot the system.
2. If AUTOBOOT is on, you will receive the following message:

   ```
   “Process is starting autoboot process
   To discontinue, press any key within 10 seconds.”
   ```

   Press any key within 10 seconds to interrupt the booting process.
3. The Main Menu is displayed. A prompt will appear as:

   ```
   “MAIN MENU: Enter command or menu>”.
   ```

Enter the command **in**.

4. A prompt will appear as:

```
"Information Menu:  Enter Command>"
```

Enter the command **fv**.

The system will respond with the current firmware revision. If the revision is less than revision 2.2 (36.xx for models K250/K260/K370/K450/K460/K570), your system will require a PDC update.

PDC Distribution

HP Electronic Support Center (HPESC) Access

This method of PDC distribution is treated as if it were a software patch. The process of retrieving and/or downloading a software patch is the same process that is used to get the PDC update files.

The patches are available on HP Electronic Support Center (HPESC) for immediate Internet access. The patches can be downloaded electronically from HPESC via email, the World Wide Web (WWW), or ftp.

The following items are discussed in this section:

- File Naming Convention
- Downloading patches via World Wide Web (WWW)
- Downloading patches via ftp

File Naming Convention

The patch file, which is a shar file, uses the following naming convention for firmware update patch files:

```
PF_TPPPdddd
where:

   PF    - signifies firmware patches (Patch Firmware)
   T     - Firmware Category
              C = CPU
              I = I/O card
              N = Network card
              D = Disk
              T = Tape
   PPP   - Product Description
   dddd  - Datecode or Revision
```

The following is an example of a “shar” patch file name for a PDC update:

```
 PF_CKHK0013
    |\\ /\\  /
    | |  ^------ 0013 = Firmware revision 1.3
    | |--------- KHK =  Kittyhawk
    |-----------   C = CPU firmware update
```

The shar patch file contains other files that are named as follows:

```
TPPPdddd.zzzz
where:

     zzz   - File Extension
               text = readme file
               frm  = firmware update image
```

As an example, the PF_CKHK0013 shar file would contain:

```
CKHK0013.text    - readme file
      and
CKHK0013.frm     - PDC firmware update image
```

Downloading The Patches From HPESC via Email:

Send the following in the text portion of an email message to support@support.mayfield.hp.com (no Subject is required):

```
send PF_TPPPdddd
```

> **Note**
>
> An additional file, **patch_maker**, will be sent. This file will assist you in assembling your patch file.

Downloading The Patches From HPESC via The World Wide Web.

1. Connect to the HPESC World Wide Web service home page at URL:

   `http://us-support.external.hp.com`

2. Under **Support Line**, select the **Patch Database** option.

3. **If you are a previously registered user**:

   A. Click on "Enter as a Registered User" and select your region.
   B. Login, entering your User ID and password. This will take you to the Patch Database Main screen.

   If you are a first-time user:
   A. Click on your geographic region under "Register Now".
   B. Review the "Terms and Conditions" page. At the bottom of the page you may accept the terms and conditions and proceed to the registration page.
   C. Complete the registration information requested.
   D. Once the registration information has been successfully transmitted, the User ID Assigned screen will appear. *Write down the User ID or print the screen for later reference*.
   E. Click on "Begin Using Patch Database Now" to proceed to the Patch Database Main screen.

6. Select the **Firmware Patches** option.

7. Select the **CPU Patches** option and click on "Show Patches".

8. Choose the appropriate patch (for example, PF_CKHK0022). A patch description will appear. Click on **download** to copy the patch to your system.

> **Note**
>
> The selected patch must be downloaded from HPESC onto a system that has HP-UX as the operating system.

9. Follow the instructions in the `README` file to create a bootable tape and to update PDC.

Downloading Patches using FTP.

1. Connect to HPESC via ftp. You must initiate from an open subnet system:

   `ftp us-support.external.hp.com`

(If you do not have an open subnet system, try using **rftp** instead of **ftp**.)

2. Login as "anonymous".

3. Enter your e-mail address as the password at the “Password” prompt.

4. Change to the directory containing the firmware patches:

   ```
   > cd firmware_patches/hp/cpu
   ```

   If desired, review the contents of the directory by using the **ls** command. For each patch, there is an accompanying text file (`patchfilename.txt`). The text file contains the patch description and the instructions for creating the patch tape.

5. Download the appropriate patch file and text file:

   ```
   >get <patchfilename>
   >get <patchfilename>.txt
   ```

6. Disconnect from HPESC:

   ```
   quit
   ```

Using The Support Media to Create a PDC Firmware Update Tape

Future releases of the Support Media will contain firmware image files that are current at the time of the Support Media release. The Support Media Users Manual (p/n 92543-90010) contains all the procedures for creating a firmware update tape.

Several firmware image files are contained on the Support Media. These image files currently provide firmware updates for both multi-user and workstation SPUs.

Creating The Firmware Update Tape

There are two parts to this section. They are:

1. Creating a firmware update tape using files from HPESC.
2. Creating a firmware update tape using the Support Media.

Creating a Firmware Update Tape Using Files From HPESC.

1. After retrieving the patch file from HPESC, you must unshar the patch file as follows:

   ```
   prompt: sh PF_TPPPdddd
   ```

   Two additional files will now be available. These files are TPPPdddd.text and TPPPdddd.frm. The .text file provides specific instructions for that release of firmware. The TPPPdddd.frm file is the actual update image file.

2. Verify the checksum of the TPPPddd.frm file using the "sum" command, as follows:

   ```
   prompt: sum TPPPdddd.frm
   ```

   Results of the command should be equal to the sum field that is documented in the header of the .text file.

3. Use the "dd" command to copy the file "TPPPdddd.frm" to tape, as follows:

   ```
   dd if=TPPPdddd.frm of=/dev/rmt/0m bs=2k
                          ^^^^^^^^^^^
                    (device path dependent)
   ```

Note
Blocksize (bs) must be = 2k

Creating a Firmware Update Tape Using The Support Media

Creating a firmware update tape using the Support Media is documented in the 10.01 version of the Support Media Users Manual. (p/n 92543-90010)

Firmware Update Procedure

Updating From a Tape Created Using HPESC Files

> **Note**
>
> Ensure the system is fully backed up before proceeding with this firmware update.

1. Log on as root, and enter "reboot -r". This command will shutdown the Operating System and reboot the system.
2. If AUTOBOOT is on, you will receive the following message:

```
“Process is starting autoboot process
To discontinue, press any key within 10 seconds.”
```

   Press any key within 10 seconds to interrupt the booting process.

3. Boot from the "Alternate" boot path. (You must boot from the device that contains the firmware update tape you just created.)
4. Interact with IPL (Y or N)?>

```
Respond with “N”.
```

   A series of messages will be displayed. No user intervention is required.

5. A message will be displayed as follows:

```
Current version of FIRMWARE is x.x
New version of FIRMWARE to update to is 2  .2
This process CANNOT be interrupted without
CORRUPTING the ROM!
Continue  ([y]/n)?"
```

   Enter **y**.

```
CAUTION:   FROM THIS POINT FORWARD, THIS PROCESS CANNOT
           BE INTERRUPTED UNTIL COMPLETION.  INTERRUPTING
           THIS PROCESS WILL CAUSE YOUR SYSTEM TO BE
           INOPERATIVE.
```

6. The update should take approximately 30 seconds. After the tape has been read by the update program, a message will be displayed as follows:

```
UPDATING FIRMWARE ...PLEASE WAIT.......
UPDATE OF FIRMWARE COMPLETE
THIS UTILITY WILL NOW RESET THE SYSTEM.....
Press Ctrl-Y or Ctrl-C to Abort reset.
```

7. The system will automatically reset, and the boot process will begin. Boot your system with your normal process.

Updating From a Tape Created Using Support Media

The procedure for performing a firmware update using a tape that was created from the Support Media is the same as the previous procedure, with one exception. Since the tape contains several firmware image files for different system types, you must select the image file which your system type requires.

> **CAUTION**
>
> If an attempt is made to update firmware using the wrong image file, the system will not be operational, and will require replacement of the assembly that contains the firmware.

1. Log on as root, and enter “reboot -r”. This command will shutdown the Operating System and reboot the system.
2. If AUTOBOOT is on, you will receive the following message:

   ```
   “Process is starting autoboot process
   To discontinue, press any key within 10 seconds.”
   ```

   Press any key within 10 seconds to interrupt the booting process.
3. Boot from the “Alternate” boot path. (You must boot from the device that contains the firmware update tape you just created.)
4. Interact with IPL (Y or N)?>

   `Respond with “Y”.`
5. At the “ISL>” prompt, enter the Online Diagnostic Environment (ode) program by typing “ode”.

> **Note**
>
> At this point, there is a “readme” command available which will provide a list of all the FIRMWARE/PDC image files that are present on the tape. This readme file provides a one-line description for each image file.

6. At the “ode>” prompt, enter the command, “update”.

> **CAUTION**
>
> If an attempt is made to update firmware using the wrong image file, the system will not be operational, and will require replacement of the assembly that contains the firmware

7. At the “update>” prompt, enter “image [filename]”

> **CAUTION**
>
> From this point forward, this process CANNOT be interrupted until completion. Interrupting this process will cause the system to be inoperative, and will require replacement of the assembly that contains firmware.

8. At the “update>” prompt, enter “run”
9. A warning message will be issued, followed by

   `Continue ([y]/n)? Enter y`.

10. After the tape has been read by the update program, the “update>” prompt will return. The update should take approximately 30 seconds. Enter “exit”.
11. The system will automatically reset, and the boot process will begin. Boot your system with your normal process.

C

Memory Configuration Guidelines

Memory Configuration and SIMM Installation

Memory in HP 3000 and HP 9000 servers can be added in many different megabyte combinations depending on your model, your use of existing memory, your memory upgrade goals, and what combination of memory modules you install.

> **Note**
>
> Regardless of the availability of SIMM slots, the total amount of memory you can install is dependent on your system model and your operating system. Refer to your system Owner's Guide.

The configuration guidelines presented in this chapter will successfully optimize most combinations of memory modules. It is still possible, however, when adding memory to already-configured memory on two extenders, to meet these guidelines and still generate a warning that your memory is not optimized. If that happens, remove *all* memory modules from both extenders and re-install them following the guidelines provided below.

Before You Begin

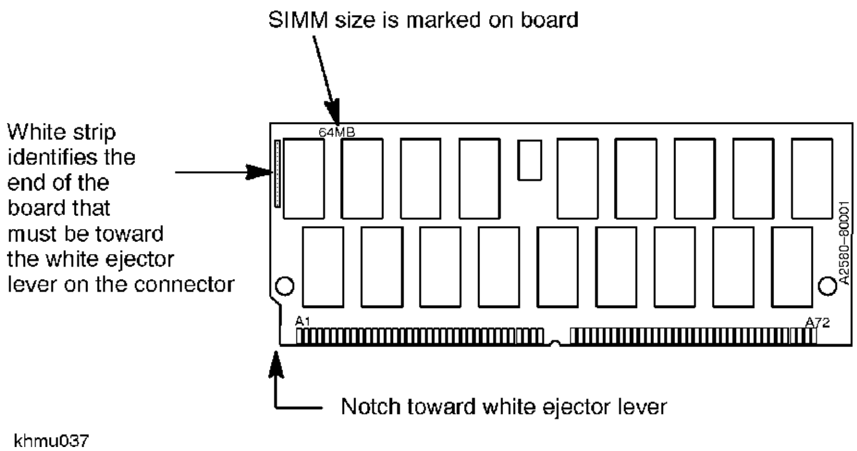
Before you begin, you should understand the following definitions:

A *SIMM* is a single memory Printed Circuit Assembly (PCA) or memory board. SIMMs have memory on one side of the PCA only. All SIMMs have their size marked on the board near the upper left corner.

A *DIMM* is a single memory PCA with memory on both sides of the PCA. All DIMMs have their size marked on the board near the upper left corner, also.

> **Note**
>
> The acronym SIMM is used throughout this document to indicate either SIMM or DIMM

.



A *module* is a pair of SIMMs or DIMMs. Memory for your system is purchased and installed only in modules; **never install just one SIMM**.

A *pair* of modules is four SIMM cards.

256MB SIMM + 256MB SIMM	=	one 512MB module
128MB SIMM + 128MB SIMM	=	one 256MB[a] module
64MB SIMM + 64MB SIMM	=	one 128MB module
32MB SIMM + 32MB SIMM	=	one 64MB[a] module
16MB SIMM + 16MB SIMM	=	one 32MB module
A set of 2 same-size SIMMs	=	1 module
A set of 4 same-size SIMMs	=	1 pair of modules

a. See Table C-1., “OS Support Matrix,” on page C-15.

Configuring Memory for Optimum Performance

For OPTIMUM memory performance, memory must be installed in a particular slot sequence. This section provides an overview and then detailed procedures for both single- and dual-extender systems.

If your memory is not configured for optimum performance, the warning, Memory not optimized for performance, appears when you boot the system. Your memory will still work, but your system’s performance may be degraded.

On HP3000/979KS and HP9000/K250/K260/K450/K460/Kx70/Kx80 systems, non-optimized memory has another impact. The firmware includes a new user-configurable flag called auto start. If the flag is set to OFF and selftest detects aperformance degradation when you boot, it will inhibit autoboot and autosearch. If you’re not sure whether a warning was displayed (i.e., warnings may have scrolled off your console), you can re-display any warning messages. From the Information menu in the user interface, use the WA[rn] command to see any warning messages that came up during the boot.

If you get the warning, Memory not optimized, use the me command in the Information Menu of the user interface (the Boot Console Handler) to check your memory configuration. This command will not directly tell you whether your memory is installed for optimum performance; it will only tell you whether the modules are seated correctly and recognized as part of your system configuration. However, you can review the sequence of memory modules in the memory extenders. The most important memory optimization rule is that all module pairs of each memory size should be installed in lower-numbered slots before any modules pairs (see the procedures and examples on pages C-3 through C-11). If the display of your memory configuration shows any single modules installed before module pairs , you will need to reconfigure your memory using those procedures.

If the warning **`Memory not optimized`** does not appear, your memory is at optimum configuration.

Memory Optimization Procedure for Single Memory Extenders — Overview

CAUTION

To prevent damage to memory boards and system components from electrostatic discharge, always wear a grounded wrist strap when working on or around the system, and when handling printed circuit boards.

Module Installation is a 6-step process

1. Remove any currently installed memory modules.
2. Combine the removed and new memory modules and organize them into four groups:
   - 512MB modules
   - 256MB modules
   - 128MB modules and 64MB modules (combined in the same group)
   - 32MB modules
3. Divide each group into *pairs of modules* (4 SIMMs) and single modules (2 SIMMs), if any.
4. Identify each slot by its slot number and letter (0a, 0b, 1a, 1b, and so on) on the extender.
5. Install any pairs of modules as follows:

   A. Install from largest to smallest memory size.

   B. Install from lowest numbered to highest number slots.
6. When all pairs of modules have been installed, install any remaining old or new modules:

   A. Install from largest to smallest memory size.

   B. Install from lowest numbered available slots to highest number slots.

Notes

Kx70/Kx80 systems with four to six CPUs that use the minimum 256MB memory size **REQUIRE** that the memory consist of at least four SIMMs (two modules).

Performance on Kx70/Kx80 is optimized when at least 8 memory *banks* (8 SIMMs, or four modules) are used . Each module provides two banks of memory, except for the 64MB modules, which are actually 1/2-populated 128MB modules. (Note the example on page C-7, which shows configured memory with only 7 banks: two banks for each of the modules except the 64MB module, which has only 1 bank.)

Procedure for Single Memory Extenders — Detailed

Step 1. Remove any modules pairs from the memory extender.

Step 2. Combine the removed and new memory modules and organize them into four groups:

- 512MB modules
- 256MB modules
- 128MB and 64MB modules (combined in the same group)
- 32MB modules

Note

Even though 128MB modules and 64MB modules are in the same group, the SIMMs for each module size cannot be mixed, i.e., **do not** combine a 64MB SIMM and a 32MB SIMM as one module.

Step 3. From each memory group, create as many pairs of modules (sets of 4 SIMMs) as possible. A 128MB module and a 64MB module can be used as a pair of modules since they are from the same group. Set aside any remaining modules of each size for installation last. Remember, each module consists of 2 same-size SIMMs. Any remaining single SIMMs are "unusable."

Step 4. Locate and identify each available slot by its slot number and letter (e.g., 0a, 0b) on the memory extender. Identify the sequence of available slots from lowest to highest.

Step 5. Install any *pairs of modules* (sets of 2 modules) first.

A. Install pairs of modules in decreasing size: start with the largest memory size and end with the smallest. Within a mixed-group of 128MB and 64MB modules, install the 128MB modules first.

B. Install *pairs of modules* beginning with the lowest available slot number, then the next higher slot number. In an empty extender, for example, the first pair of modules will go in slots 0a/0b and 1a/1b; the next in 2a/2b and 3a/3b, and so on.

Step 6. Install any remaining *modules*, starting with the largest memory size first.

Example — Installing New Memory in an Empty Extender

1.	Four 128MB SIMMs	=	Two 256MB modules (one pair of 256MB modules)
2.	Six 64MB SIMMs and two 32MB SIMMs	=	Three 128MB modules and one 64MB module (2 pairs of 128MB/64MB modules)
3.	Two 16MB SIMMs	=	One 32MB module

Install. Order	Slots	Memory
First pair of modules	0a/0b	256MB module
	1a/1b	256MB module
Second pair of modules	2a/2b	128MB module
	3a/3b	128MB module
Third pair of modules	4a/4b	128MB module
	5a/5b	64MB module
Remaining module	6a/6b	32MB module
	7a/7b	empty
Shaded boxes indicate pairs of modules		

Verifying Memory

To verify the newly-installed memory, reboot the system and interrupt the boot process at the "Press Any Key Within 10 Seconds" prompt. At the Boot Console Handler (BCH) prompt, type **IN[formation]** to get the Information Menu. At the Information Menu, type **ME[mory]** to display the current system memory configuration.

Following is an example of the MEemory command display:

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

MEMORY INFORMATION

                 MEMORY STATUS TABLE

   Carrier     Slot     Size(a+b)     Status
   -------     ----     ---------     ------

      0        0a/b       256MB       Configured
      0        1a/b       128MB       Configured
      1        0a/b       256MB       Configured
      1        0a/b        64MB       Configured

                        ---------
   TOTAL                  704MB


 <Press any key to continue or ‘Q’ to quit>
```

Example — Adding Memory to a Single Extender with Existing Memory

CURRENT MEMORY: (3) 128 MB and (2) 64MB pairs of modules				
TO BE ADDED: (1) 256MB, (1) 128MB, and (1) 32MB pairs of modules				
BEFORE			AFTER	
Slots	Memory Modules	1. Remove the single 64MB module from slot 3a/3b. 2. Combine the removed module and the new modules into groups: one 256MB module one 128MB module and one 64MB module (one pair of modules) one 32MB module 3. Add the largest pair of modules (the only quad is the 128MB/64MB module) to the lowest available slots (4a/4b and 5a/5b. 4. Add the 256MB module to the next slot. 5. Add the 32MB modulemodule to the next slot.	Slots	Memory Modules
0a/0b	128MB		0a/0b	128MB
1a/1b	128MB		1a/1b	128MB
128MB	2a/2b		2a/2b	128MB
3a/3b	64MB		3a/3b	128MB
4a/4b	64MB		4a/4b	64MB
5a/5b	empty		5a/5b	64MB
6a/6b	empty		6a/6b	256MB
7a/7b	empty		7a/7b	32MB
Shaded boxes indicate pairs of modules				

Memory Optimization Procedure for Dual Memory Extenders — Overview

Module installation is a 6-step process:

1. Remove any currently installed pairs of memory modules.
2. Combine the removed and newpairs of memory modules and organize them into four groups:
   - 512MB modules
   - 256MB modules
   - 128MB and 64MB modules (combined in the same group)
   - 32MB modules
3. Divide each group into *pairs of modules* (4 SIMMs) and pairs of modules, if any.
4. Identify each available slot by its slot number and letter (e.g., 0a, 0b, 1a, 1b and so forth) on each memory extender.
5. Install any pairs of modules as follows:
   A. Install from largest to smallest memory size.
   B. Install memory by alternating *pairs of modules* between extenders.
   C. Install from lowest numbered available slots to highest number slots on the extender with the most slots available.

6. Install any remaining modules (2 SIMMs), filling in the lowest-numbered slots on the extender with the most available slots.

Notes

In the examples that follow, the extenders are labeled "first extender" and "second extender." It is also useful to refer to these as "Extender 0" and "Extender 1", corresponding to the lower and upper extender slots in the system memory bay.

Adding A Memory Extender
If you are adding a new memory extender at the same time you are adding memory, you will likely need to remove and re-sequence all the memory modules from your current memory extender. Review these optimization procedures for dual memory extenders to understand the need for balancing pairs of memory modules across the two extenders.

Procedure for Dual Memory Extenders — Detailed

Step 1. You must remove any modules from each memory extender.
If you have only one pair of memory modules in your system, and that pair has been split across the two memory extenders, you will get a "Memory not optimized" warning when you boot your system. Remove the module from one extender and add it to the module on the other extender (see Step 5 below).

Step 2. Combine the removed and new memory modules and organize them into four groups:

- 512MB modules
- 256MB modules
- 128MB and 64MB modules (combined in the same group)
- 32MB modules.

Step 3. From each memory group, create as many pairs of modules (sets of 2 modules, or 4 SIMMs) as possible. A 128MB and 64MB module can be used as a pair of modules since they are from the same group. Set aside any remaining modules of each size for installation last.

Remember, each module consists of 2 same-size SIMMs. Any remaining single SIMMs are "unusable."

Step 4. Locate and identify each available slot by its slot number and letter (e.g., 0a, 0b) on each memory extender. Identify the sequence of slots from lowest to highest

Step 5. Install any *pairs of modules* first as follows:

A. Install modules in decreasing size: start with the largest memory size and end with the smallest. Within a mixed-group of 128MB and 64MB modules, install the 128MB modules first.

B. Install *pairs of modules* beginning with the lowest available slot number on the extender with the most slots open.

If both extenders are empty, the first pair of module would go in slots 0a/0b and 1a/1b on the first extender; the second pair of modules would go in slots 0a/0b and 1a/1b on the second extender; the next pair of modules would go in slots 2a/2b and 3a/3b on the first extender, and so on.

Install all pairs of modules before installing modules.

Step 6. Install any remaining modules, beginning with the largest memory size, filling in the lowest available slot numbers on the extender with the most slots available.

Example - Installing new memory to two empty extenders

1.	14 128MB SIMMs	=	Seven 256MB modules (three pairs of modules and one 256MB module)
2.	6 64MB SIMMs and 2 32MB SIMMs	=	Three 128MB modules and one 64MB module (two pairs of 128MB/64MB modules)
3.	6 16MB SIMMs	=	Three 32MB modules (one pair of 32MB modules and one 32MB module)

1. Start with the pairs of largest memory (three pairs of 256MB modules):
   - First pair in first extender (Extender 0), slots 0a/0b and 1a/1b.
   - Second pair in second extender (Extender 1), slots 0a/0b and 1a/1b.
   - Third pair in first extender, slots 2a/2b and 3a/3b.
2. Now install the pairs of next-largest memory (two pairs of 128MB/64MB modules):
   - First pair in the lowest slots of the extender with the most available slots: Second extender, 2a/2b and 3a/3b.
   - Second pair in the first extender, slots 4a/4b and 5a/5b.
3. Now install the pairs of the next-largest memory (one pair of 32MB modules) in the lowest slots of the extender with the most available slots, then install the largest module (256MB) in the next slot in sequence: first extender, slots 6a/6b.
4. Now install the last module (32MB) in the next slot in sequence: second extender, slots 6a/6b.

First Extender		**Second Extender**	
Install. Order	Slots - Memory	Install. Order	Slots - Memory
1	0a/0b - 256MB modules	2	0a/0b - 256MB module
	1a/1b - 256MB module		1a/1b - 256MB module
3	2a/2b - 256MB module	4	2a/2b - 128MB module
	3a/3b - 256MB module		3a/3b - 128MB module
5	4a/4b - 128MB module	6	4a/4b -32MB module
	5a/5b - 64MB module		5a/5b - 32MB module

First Extender		Second Extender	
7	6a/6b - 256MB module	8	6a/6b - 32MB module
	7a/7b - empty slot		7a/7b - empty slot
Shaded boxes indicate pairs of modules			

Example - Adding Memory to Two Extenders with Existing Memory

Current Memory:	5 256MB modules 4 128MB modules 1 32MB module
Memory to be added:	1 256MB module 1 128MB module 1 64MB module 1 32MB module

	First Extender		Second Extender	
	Slot	Memory	Slot	Memory
BEFORE	0a/0b	256MB modules	0a/0b	256MB module
	1a/1b	256MB module	1a/1b	256MB module
	2a/2b	128MB module	2a/2b	128MB module
	3a/3b	128MB module	3a/3b	128MB module
	4a/4b	256MB module	4a/4b	32MB module
	5a/5b - 7a/7b	empty	5a/5b - 7a/7b	empty
	Shaded boxes indicate pairs of modules			

1. Remove the 128MB modules from the first extender, slots 2a/2b and 3a/3b. Remove the 32MB module from the second extender, slots 4a/4b.
2. Add the removed modules to the new modules to form the following groups:
   - (2) 256MB modules (one pair of modules)
   - (1) 128MB module and (1) 64MB module (one pair of modules)
   - (2) 32MB modules (one pair of modules)
3. Install the largest-size (256MB) pair of modules in the lowest-numbered available slots (2a/2b and 3a/3b) on the extender with the most available slots. Since both extenders have the same available slots, install them on the first extender.
4. Install the 128MB pair in slots 4a/4b and 5a/5b on the first extender.

5. Install the next-largest (mixed 128MB/64MB) pair of modules on slots 4a/4b and 5a/5b of the second extender.
6. Install the remaining (32MB) pair of modules on the first extender in the remaining slots, 6a/6b and 7a/7b.

The final configuration is shown on the page following**.**

	First Extender		Second Extender	
A F T E R	Slot	Memory	Slot	Memory
	0a/0b	256MB modules	0a/0b	256MB module
	1a/1b	256MB module	1a/1b	256MB module
	2a/2b	256MB module	2a/2b	128MB module
	3a/3b	128MB module	3a/3b	128MB module
	4a/4b	128MB module	4a/4b	128MB module
	5a/5b	128MB module	5a/5b	64MB module
	6a/6b	32MB module	6a/6b	empty
	Shaded boxes indicate pairs of modules			

Pages C-11 and C-12 contain blank memory configuration tables that can be used for laying out your own memory configuration changes.

If You Still Get Warning Messages...

The configuration guidelines presented in this chapter will successfully optimize most combinations of memory modules. It is still possible, however, when adding memory to already-configured memory on two extenders, to meet these guidelines and still generate a warning that your memory is not optimized. If that happens, remove all memory modules from both extenders and re-install them following the guidelines provided.

If the **Memory not optimized** warnings persist, contact your HP Support representative if assistance is required.

Blank Memory Configuration Tables

Extender 0		Extender 1	
Slot	Memory	Slot	Memory
0a/0b 1a/1b		0a/0b 1a/1b	
2a/2b 3a/3b		2a/2b 3a/3b	
4a/4b 5a/5b		4a/4b 5a/5b	
6a/6b 7a/7b		6a/6b 7a/7b	

Extender 0		Extender 1	
Slot	Memory	Slot	Memory
0a/0b 1a/1b		0a/0b 1a/1b	
2a/2b 3a/3b		2a/2b 3a/3b	
4a/4b 5a/5b		4a/4b 5a/5b	
6a/6b 7a/7b		6a/6b 7a/7b	

Extender 0		Extender 1	
Slot	Memory	Slot	Memory
0a/0b		0a/0b	
1a/1b		1a/1b	
2a/2b		2a/2b	
3a/3b		3a/3b	
4a/4b		4a/4b	
5a/5b		5a/5b	
6a/6b		6a/6b	
7a/7b		7a/7b	

Extender 0		Extender 1	
Slot	Memory	Slot	Memory
0a/0b		0a/0b	
1a/1b		1a/1b	
2a/2b		2a/2b	
3a/3b		3a/3b	
4a/4b		4a/4b	
5a/5b		5a/5b	
6a/6b		6a/6b	
7a/7b		7a/7b	

OS Requirements for 64MB, 256MB, and 512 MB Modules

Table C-1. OS Support Matrix

Module Size	Models	HP-UX 10.01	HP-UX 10.10	HP-UX 10.20
64MB, 128MB, 256MB, and 512MB	K100, K200, K210, K220, K400, K410, K420	Requires PDC Rev 2.2 or later to run. Requires Patch PHSS 6795 for on-line diagnostic support.	Requires PDC Rev 2.2 or later to run. Requires Patch PHSS 6797 for on-line diagnostic support.	Requires PDC Rev 2.2 or later to run. On-line diagnostic support provided on the OS.
	K250, K260, K450, K460	Os not supported.	OS not supported	Requires PDC Rev 36.25 or later to run. On-line diagnostic support provided on the OS.
	K370, K570	OS not supported.	OS not supported.	Kx70 PDC Rev. 37.49 supports all modules
	K380, K580	OS not supported.	OS not supported.	Kx80 PDC Rev 37.52 with IPR9802 supports all modules
64MB modules and 256MB modules are supported on HP3000/9x9KS systems beginning with MPE/iX Release 5.5 Power Patch 1 (C.55.01)				

D

New System Features and Configuration Issues

This appendix provides a summary of new features with respect to the HP9000 K380 and K580 Enterprise servers.

Hardware Features

Processor Speed

The processor speed for Kx80 servers is 240 MHz.

UPS Power Supply

The 5.5KvA Power Trust UPS is supported for Kx80 Systems.

HP-PB Slot Expansion

Following the initial Kx80 release, a new HP-PB Bus Converter, product number A3669A, will be introduced. Each A3669A will support one A1828A HP-PB I/O module. Initially, the Bus Converter will be supported only in the 2- or 4-slot HSC Expansion I/O modules. The Bus Converter will not be supported in the Dual Bus 4-slot HSC Expansion I/O module.

HVersion Numbers

The HVersion model numbers for the K380 and K580 are 5B7 and 5B6, respectively. Following is the complete table of HVersion model numbers:

HP3000	
959KS/x00 - 582	969KS/x20 - 58D
969KS/x00 - 583	979KS/x00 - 590
HP9000	
K200 - 58B	K380 - 5B7
K210 - 581	K400 - 582
K220 - 58C	K410 - 583
K250 - 5A4	K420 - 58D
K260 - 5AF	K450 - 58F
K260-EG - 5A5	K460/460-EG/460/XP - 590
K360 - 590	K570 - 51B
K370 - 5AE	K580 - 5B6
K380 - 5B7	

Firmware Differences

Expanded ChipRevision Information

In the PDC, the ChipRevision command in the Information Menu has been modified to provide additional information. Following is an example of the new CR command:

```
Main Menu: Enter command or menu > in cr

Module              Revision
------              --------
System Board        1
PA 8200 CPU Module  5.1
PA 8200 CPU Module  5.1
PA 8200 CPU Module  5.1
PA 8200 CPU Module  5.1
PA 8200 CPU Module  5.1
PA 8200 CPU Module  5.1
PDC Firmware        502
Tower               9
Memory Carrier 0    Regular
Memory Carrier 1    Not present
I/O Bus Adapter 0   15
Shrike Board        1
Zalon               2
I/O Bus Adapter 1   15
Core I/O Board      1
Zalon               2
GeckoBoa            Not available
NIO module          0
Lasi                0
GeckoBoa            Not available
HSC 1 (40MHz)
HSC 2 (32MHz)

Main Menu: Enter command or menu >
```

Configuration Issues

Beginning with this edition of the service manual, special configuration issues will be identified in this section:

Memory for HP9000/Kx70/Kx80 Servers:

Kx70/Kx80 systems with four to six CPUs that use the minimum 256MB memory size **REQUIRE** that the memory consist of at least four SIMMs (two modules).

Performance on Kx70/Kx80 is optimized when at least 8 memory *banks* (8 SIMMs, or four modules) are used . Each module provides two banks of memory, except for the 64MB modules, which are actually 1/2-populated 128MB modules. (Note the example on page C-7, which shows configured memory with only 7 banks: two banks for each of the modules except the 64MB module, which has only 1 bank. Memory will not be optimized unless the 64MB module is replaced with a different-sized module, or additional memory is added.)

LASI Lan on HP9000/Kx80 Servers

The existing configuration rule documented on page 2-30 of the HP9000 Enterprise Configuration Guide (May 1997) for LASI LAN states:

"Note: Some system configurations can compete for I/O bus usage with the built-in 802.3 LAN interface on the standard multifunction I/O (Core I/O). The result is a slow down in LAN performance due to an increase in CRC errors (LAN retries). Thus, it is recommended that customers use an add-in 802.3 LAN card as the primary LAN interface when using four or more PA8200 processors with less than 1.5GB of memory or when using the VISUALIZE 2-D graphics card in the optional HP-HSC I/O slot on the multifunction I/O."

For HP9000/Kx80 systems, the following additions and changes apply:

A minimum of 1.5GB of main memory must be configured such that there are eight (8) banks or greater in at least one (1) memory interleave group. Memory module sizes should be limited to 32MB (64MB pair) DIMMS or larger. For best performance, it is recommended that memory is configured over 2 memory carriers.

If a 100BT I/O card (NIO or GSC) is installed then DO NOT USE LASI LAN.

External HP-PB I/O Card Configuration

Figure D-1 shows the card slots and slot numbering scheme at the back of the HP-PB card cage. The HP-PB I/O card guidelines listed in Table D-1. are provided to optimize system performance for HP 9000 systems. Table D-2. contains optimization guidelines for HP 3000 systems.

Configuring the HP-PB I/O Card Cage for 9x9KS/K-Class System Performance

Although the workload of each configuration will be different depending on such factors as the type of application, number of users, etc., there are a few general guidelines for I/O card configurations. These guidelines can be used as a starting point for constructing a reasonable configuration, but your configuration may require more stringent limits or less demanding limits depending on the specific workload characteristics of the system being constructed.

> **Note - HP-PB I/O Card Cage Configuration Restrictions**
>
> - High Performance Cards (FDDI, FW SCSI, and HP-FL): A maximum of five high performance cards are allowed per card cage.
> - Installation Priority: Cards must be installed according to priority (see Table D-1. or Table D-2.) starting with slot 13. High performance cards must be installed first.
> - SCSI Cards: Do not exceed a maximum of three SE SCSI cards and a combined maximum of five F/W SCSI and SE SCSI cards per card cage.
> - HP-FL Cards: Do not configure any SCSI or HP-IB disks in the same card cage with five HP-FL cards.
>
> HP does not recommend putting printers on the same HP-IB card with a system disk. This configuration has been reported to cause some data corruption on the system disk.
>
> HP-IB cards are not supported on 9x9KS servers.

HP-FL Disks

For medium to heavy load applications, configure no more than 5 disks per HP-FL interface card and no more than 5 HP-FL interface cards in a single HP-PB I/O card cage. In this context, an HP-FL disk array in high availability parity protection mode, striped mode, or independent mode, is considered to be a single disk. Therefore, you should configure 3 to 5 disk arrays per HP-FL interface card. However, in the independent mode, each disk mechanism in the array uses one spindle out of the total supported number of spindles, whereas the entire array in high-availability mode or striped mode is seen as one spindle. If you have configured the maximum number of HP-FL cards, do not configure any other HP-IB or SCSI disks in the same card cage.

Single-Ended SCSI Cards

Small Computer System Interface (SCSI) cards let you connect disk and tape peripherals to a computer system. Though each SCSI card has seven available device addresses, most SCSI peripheral devices use only one. However, Optical Disk Library Systems use two-to-five SCSI addresses. A maximum of seven devices can use the SCSI bus. Fast/Wide (F/W) SCSI devices may not be connected to Single-Ended cards.

F/W SCSI Cards

F/W SCSI cards (also known as F/W Differential SCSI cards) support up to 10 F/W SCSI devices per card. Both F/W SCSI discs and F/W SCSI disk arrays can be mixed and matched on the same bus. However, Single-Ended SCSI devices may not be connected to F/W SCSI cards. The card uses differential transceivers that can support devices up to 25 meters away. When considering cable lengths, be sure to include the length of cable from the SPU to the first storage device, the length of the cable within the storage enclosure, and the length of the cable from one storage device to another.

Similar to Single-Ended SCSI cards, F/W SCSI cards let you attach devices to each other in a “daisy-chain” configuration. The first and last devices on the SCSI bus must be terminated properly.

SCSI Disk Drives

Use the following table to determine the number of disks to configure on a SCSI interface card for optimum performance. On a medium-to-heavy load application, optimum performance depends on whether or not the primary application load consists of sequential I/O or random I/O cards.

Max No. of Disks Per SCSI Card for Optimum Performance
Sequential I/O 3
Random I/O 4

SCSI Tapes

Up to seven magnetic tape units may be configured on a single SCSI interface card. However, no high volume I/O devices, such as disks, should be configured on the same SCSI interface card.

SCSI Printers

For medium to heavy printing on a SCSI printer, it is recommended that only one printer be configured to a single SCSI interface card. Further, it is recommended that a SCSI printer not share the same SCSI interface card with any other peripherals.

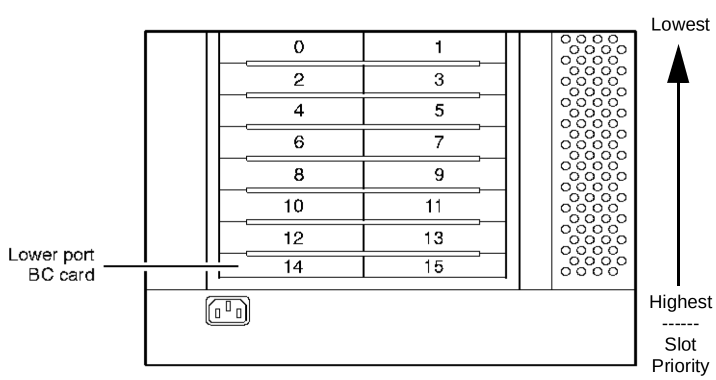


Figure D-1 HP-PB Card Cage Slot Locations and Numbers

CAUTION

Always install I/O cards according to the priorities shown in Table D-1.. Load I/O Cards into the HP-PB I/O Card Cage as follows:

- Bottom slot (slot 13) = highest priority
- Top slot (slot 0) = lowest priority.

Refer to Figure D-1. System operation may be degraded or fail if I/O card installation priorities are not followed.

Table D-1. I/O Card Configuration priorities for HP-PB I/O Card Cages. HP 9000 SYSTEM (K Class)

Priority (Highest)	HP-PB I/O Card	Max I/O Cards per Cage	HP 9000 Prod #	I/O Card Size	Max Devices per I/O Card	Max I/O cards per System
1	FDDI*	2	J2157B	Double	NA	4
2	802.3 Ethernet LAN	4	J2146A	Single	NA	12
2	802.5 Token Ring LAN	2	J2166B	Single	NA	4
2	802.5 Token Ring Interface Card		J2166B	Single		
2	ATM/155 Mbps[a]		J2804A	Single		
2	100Base-T Network Link	2	A3495A	Single	NA	4
3	F/W SCSI-2 Interface*[b]	5	28696A	Double	10	10
3	SCSI-2 Cent Intfc				1	
4	PB-FL (HP-FL)*[c]	5	28615A	Double	5	10
**5	High-Speed X.25 (HP-UX 10.x only)	2	J2792A	Single	NA	4
**5	X.25 Link (HP-UX 9.x only)		36960A	Single	1	
**5	SNAplus Link	2	J2220B	Single	NA	4
**5	8-Port MUX		40299B	Single		
**5	16 Port RS232C direct connect MUX	14	J2092AZ	Single	NA	28
**5	16 Port RS423 direct connect MUX	14	J2093AZ	Single	NA	28
**5	16 Port RS232C modem connect MUX	14	J2094AZ	Single	NA	28
**5	32 Port RS232C direct connect MUX	14	J2096AZ	Double	NA	28
**5	HP-IB		J28650B	Single	1	
**5	Single End SCSI-2[d]	3	28655A	Single	3	6
Priority (Lowest)						

a. Not supported on K-Class.
b. Maximum Of 5 F/W SCSI cards per card cage.
c. Not supported on HP-UX 11.0.
d. Maximum of 3 SE SCSI cards per card cage.

*High Performance Card. Maximum of 5 total per card cage.
**Install in any order after I/O cards with priorities 1 through 4 are seated in designated slots.

Table D-2. I/O Card Configuration priorities for HP-PB I/O Card Cages. HP 3000 SYSTEM (9x9KS)

Priority		Max I/O Cards per Cage Class	Class	HP 3000	I/O Card	Max Devices per	Max I/O Cards per System Class	Class
(Highest)	HP-PB I/O Card	99x	9x9KS	Prod #	Size	I/O Card	99x	9x9KS
1	FDDI*	1	1	J2245A, Opt.UG2	Double	NA	4	4
2	802.3 Ethernet LAN	2	2	36923A, Opt. 002	Single	NA	3	3
2	802.5 Token Ring	1	1	J2167A, Opt. AL4	Single	NA	1	1
2	100VG Network Link		1	B5426AA, Opt 001	Single	NA	2	2
2	100Base-T Network Link		1	B5427AA, Opt 001	Single	NA	2	2
3	F/W SCSI-2 Interface*[a]	5	5	28696A	Double	15	60	14
4	PB-FL (HP-FL)*	5	5	28616A	Double	5	60	10
**5	PSI (NS point-to-point)	NA	8	36922A, Opt. 002	Single	NA	8	8
**5	PSI (SNA/SDLC)			30291A, Opt. 002				
**5	PSI (BSC)			32007A, Opt. 002				

Priority		Max I/O Cards per Cage Class	Class	HP 3000	I/O Card	Max Devices per	Max I/O Cards per System Class	Class
**5	PBA-IB (HP-IB)	2	0	A1747A, Opt. 002	Double	6	16	0
**5	Single End SCSI-2[b]	5	3	28642A	Single	7	60	8
Priority (Lowest)	*High Performance Card. Maximum of 5 total per card cage. **Install in any order after I/O cards with priorities 1 through 4 are seated in designated slots.							

a. Combined maximum Of 5 F/W SCSI cards per card cage.
b. Maximum of 3 SE SCSI cards per card cage.

E

Sources of Information on the Web

In addition to this manual, information regarding the HP3000/9x9KS and HP9000 K Class Enterprise Servers may be found on the Internet. These web pages are accessible by HP sales and field support personnel.

> **Note**
>
> Many of the web sites listed here are accessible only within the HP Intranet firewall.
>
> Note also that these URLs may change without notice, in which case pointers to new locations will be provided by those maintaining the web sites.

http://hprfes.rose.hp.com/fes/	The System Supportability Lab's Field Engineering Support home page. SSL/FES in Roseville, California, has field support responsibility for the HP3000 9x9KS and HP9000 K Class Enterprise Servers. A very wide range of downloadable documentation is available through this site, including the complete set of installation and upgrade documents for HP3000 and HP9000 systems and peripherals. This web page also provides an interactive HPMC analyzer, product familiarization training documentation, and links to related web sites.
http://hpdst41.cup.hp.com/DST.html	The Diagnostics and Support Tools home page. This web page contains in-depth information and tutorials regarding the Support Tools Manager (STM), the Off-line Diagnostic Environment (ODE), Sherlock, and other diagnostic tools.
http://essd.boi.hp.com/tm/	The Enterprise Storage Solutions Division (ESSD) home page. This web page provides detailed product information about HP data storage solutions for enterprise servers.
http://smomvts.rose.hp.com/	The SMO home page. Allows product or part number searches, on-line CE parts list, shows worldwide inventory, and in some cases provides a picture of the part.

http://us-support.external.hp.com/	The HP Electronic Support Center web page provides comprehensive HP support information. (Restricted to registered users, but first-time users may register immediately upon entering the web site.) Through this site you can access and download the latest firmware patches from the Patch Database and obtain a broad range of other support services.
http://www.hp.com/gsy/main.html	The HP9000 Enterprise Servers home page, providing news releases about developments within the HP9000 family of enterprise servers as well as descriptions and specifications about the product line.
http://www.hp.com/csy/main.html	The HP3000 Business Servers home page, containing sales information as well as descriptions and specifications about the HP3000 product line.
http://slick2.atl.hp.com/	Hardware Service and Support Organization Homepage. It contains field organizational info, a CE Homepage, Support Delivery Programs and Project Data Sheets.
http://c2606jda.msr.hp.com/slick/ceworld.html	CE World Homepage. To provide a starting point for HP CE's in their search to find the information necessary to perform their job. CE World will attempt to anticipate the real life situations that CE's are faced with every day and then help with information to resolve and assist.
http://esp.cup.hp.com:4444/cgi-bin/nav/navigate	The Electronic Sales Partner home page provides the latest Configuration and Ordering Guides for both the HP3000 and HP9000 platforms, on-line. The hard copy versions of these guides are published approximately every 6 months. The on-line versions are updated monthly.