HP 3000/930 and 9000/840S Computer Systems

CE Handbook

HEWLETT PACKARD
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The software code printed alongside the date indicates the version level of the software product at the time the manual or update was issued. Many product updates and fixes do not require manual changes and, conversely, manual corrections may be done without accompanying product changes. Therefore, do not expect a one to one correspondence between product updates and manual updates.

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PREFACE

The Customer Engineer Handbook is a reference guide for the Customer Engineer (CE). It provides specifications, procedures, replaceable parts list, troubleshooting data, and applicable reference information. This handbook is divided into sections to logically arrange data into subject groups.

The Product Information section contains functional block diagrams (HP 3000 Series 900 Model 930 and HP 9000 Series 800 Model 840S), system specifications, system orientation, control panel information, and power system information.

The Environmental, Installation, and Preventive Maintenance (PM) section provides reference to applicable manuals for installation procedures, as well as describes environmental requirements and preventive maintenance procedures.

The Configuration section provides hardware data required to operate a standard configuration of the HP 3000 Series 900 Model 930 and HP 9000 Series 800 Model 840S Computer Systems.

The Troubleshooting section contains information on LED status indicators, Expansion Bay Module LED status indicators, system display status codes, error descriptions, flowcharts for SPU troubleshooting and selftest as a troubleshooting tool. Information on Access Port troubleshooting and Remote Maintenance is also included.

The Diagnostic Section provides information pertaining to the diagnostics used for the HP-UX and MPE-XL operating systems. Reference material for detailed diagnostic procedures is also provided.

The Adjustments section contains procedures required to remove/replace the system power supply.

The Peripherals section contains default device configuration information supported on the HP 3000 Series 900 Model 930 and HP 9000 Series 800 Model 840S Computer Systems.

The Replaceable Parts section contains a Replaceable Parts Catalog that provides illustrations and parts lists to assist with parts replacement procedure.

The Diagrams section contains selected hardware drawings to aid the CE in isolating system faults.

The Reference section contains conversion charts and acronyms to aid the CE in troubleshooting.

The Service Note section is a depository for special procedures and troubleshooting data developed in the field.

The information which refers specifically to HP-UX or MPE-XL is cited, all other information applies to both.

REFERENCE DOCUMENTS

The hardware documentation supporting the HP 3000/930 and HP 9000/840S Computer Systems is listed below. Reference these manuals when additional information is required.

Hardware Support Manual, Part Number 09740-90011.

Site Preparation and Requirements Guide, Part Number 09740-90018.

Installation and Configuration Guide, Part Number 09740-90019.

Online Diagnostics Subsystem Manual, Part Number 09740-90020.

Online Diagnostics Subsystem Utilities Manual, Part Number 09740-90021.

System Support Log, Part Number 09740-90013.

HP Precision Architecture and Instruction Reference Manual, Part Number 09740-90014.

Precision Architecture Procedure Calling Conventions Reference Manual, Part Number 09740-90015.

HP 19744A Add-on Channel Installation Guide, Part Number 19744-90001.

HP 19748A Add-on Memory Installation and Configuration Guide, Part Number 19748-90001.

HP 19749A Cable Management System Installation Guide, Part Number 19749-90001.

Interface and Networking Cards Manual, Part Number 09740-64011.

Peripherals and Accessories Manual, Part Number 09740-90012.

HP 9000/840S System Administrators Manual, Part Number 92453-90004.

HP 7937 Operating and Installation Manual, Part Number 07937-90902.

HP 7936/37 Hardware Support Manual, Part Number 07937-90903

HP 27111A Fiber Optic Link Interface for the Channel I/O Bus Installation and Service Manual, Part Number 27111-90001.

Expansion Bay/Module Support Manual, Part Number 32480-90001.

Expansion Bay/Module Installation and Configuration Guide, Part Number 32480-90003.

PRODUCT INFORMATION

SECTION 1

This section provides an overview for the HP 3000/930 and 9000/840S computer systems functional block diagrams, system specifications, system orientation, and system status display panel information.

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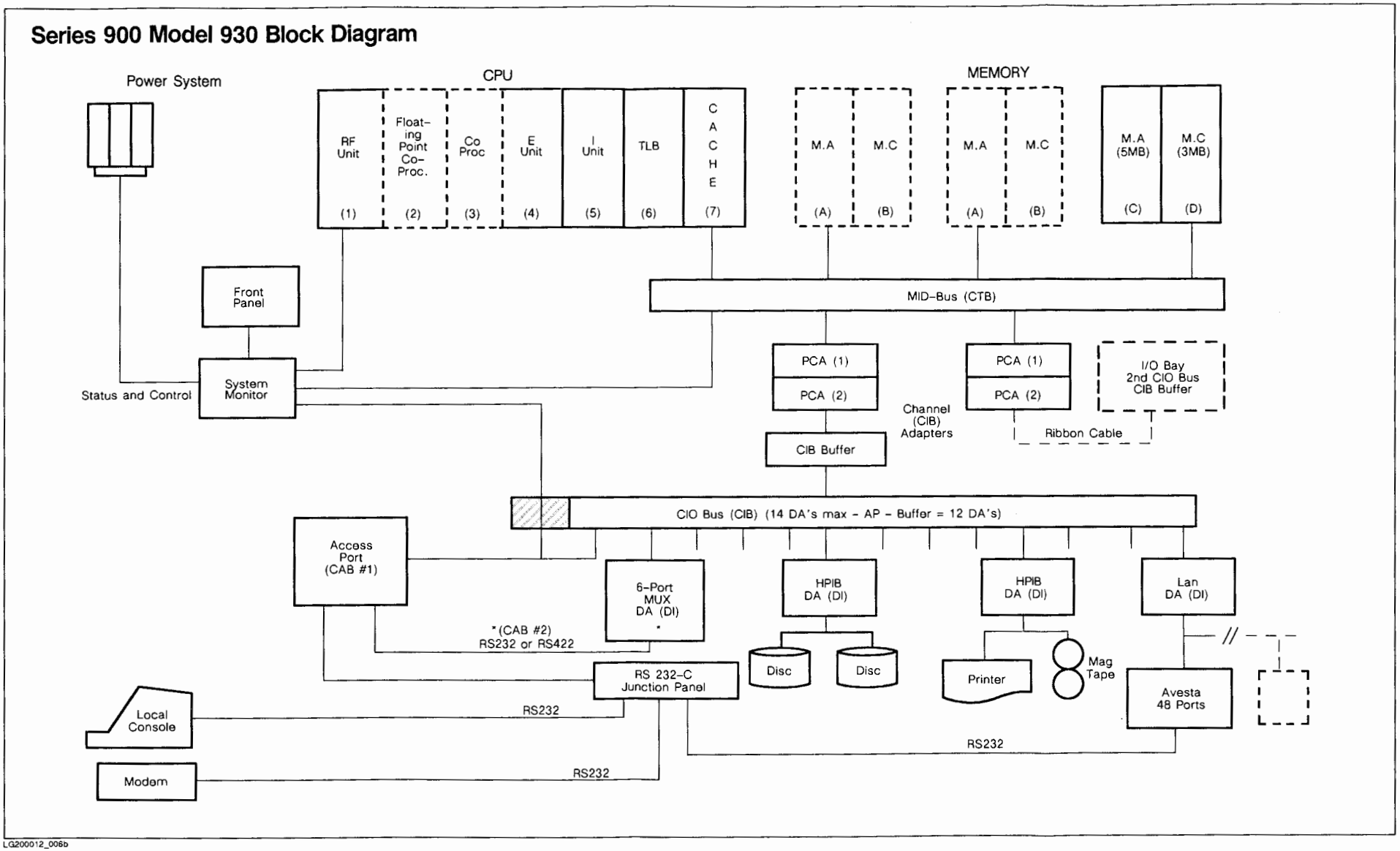
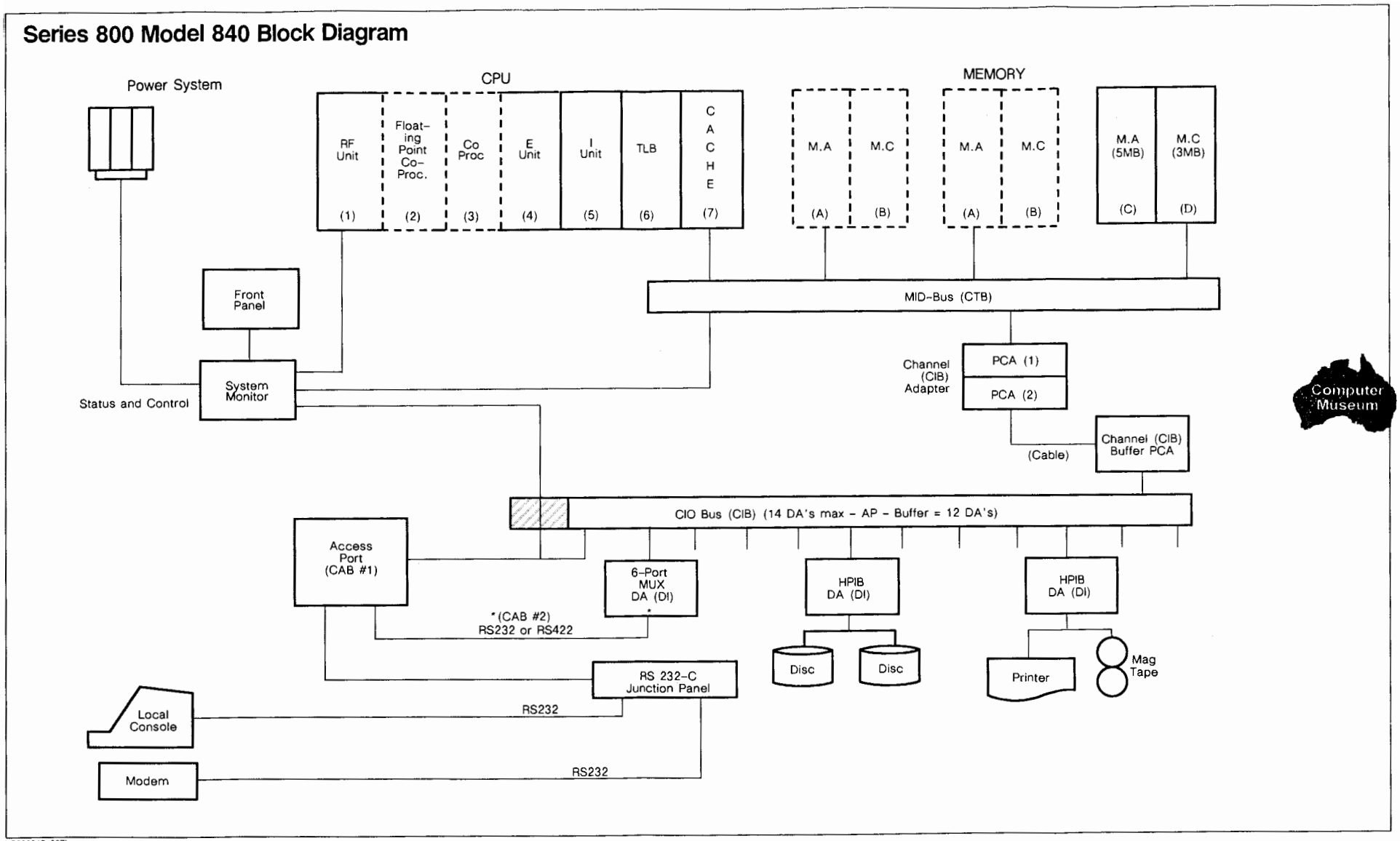


Figure 1-1. HP 3000/930 Functional Diagram



LG200012_007b

Figure 1-2. HP 9000/840 Functional Diagram

SYSTEM SPECIFICATIONS

HP Precision Architecture Computer Systems share a common architecture and instruction set. The instruction set is hardwired to speed up instruction decoding operations. See Figures 1-1 and 1-2 for the HP 3000/930 and HP 9000/840S functional block diagrams. The processor uses a TTL processing unit technology. The following is a listing of general System Processor Unit (SPU) specifications.

Central Processing Unit (CPU)

Table 1-1. CPU Specifications

Word Length	32 bits
Virtual Memory Address Space	48 bits
Physical Memory Address Space	27 bits (128 Mbytes)
Instruction Set (with Floating Point Coprocessor)	127 instructions (167 instructions)
Cycle Time	125 nanoseconds
Mid-Bus Bandwidth	32 Mb per second (raw) 15 - 20 Mb per second (typical)

System Monitor Card

Table 1-2. System Monitor Specifications

Lithium Battery Service Life	10 years

System Capacity

Table 1-3. CPU and Mid-Bus Card Cage Capacity

Processor Boards (RF, EU+, IU, TLB, CA+)	5
Coprocessor Boards	2
CIO Channel Adapter (two cards per channel) (See NOTE)	3 sets
Mid-Bus Cards (See NOTE)	5
Memory Boards (3 Memory Controllers and 3 Memory Arrays)	6

NOTE

The total sum of the CIO Channel Adapter Cards (with two cards per channel) plus general purpose Mid-Bus Cards in the CPU Card Cage cannot be greater than seven cards.

Table 1-4. Channel I/O Card Cage Capacity

CIO Cards	12
Access Port (dedicated slot) - Console Attachment Board #1	1
Channel Buffer Card (CIB Attachment Board)	1

System Color Code Organization

Table 1-5. System Color Code

Functional Area (Card Slot Qty.)	Color Code
CIO (14)	Orange
Mid-Bus (7)	Blue
Memory (6)	Pink
CPU (7)	Purple
System Monitor Module	Mustard
Power Supply Module - 3 ea.	White

SYSTEM ORIENTATION

Provided in Figure 1-3 and 1-4 are front and rear views of the SPU. Figure 1-5, 1-6, and 1-7 are views of the Expansion Bay.

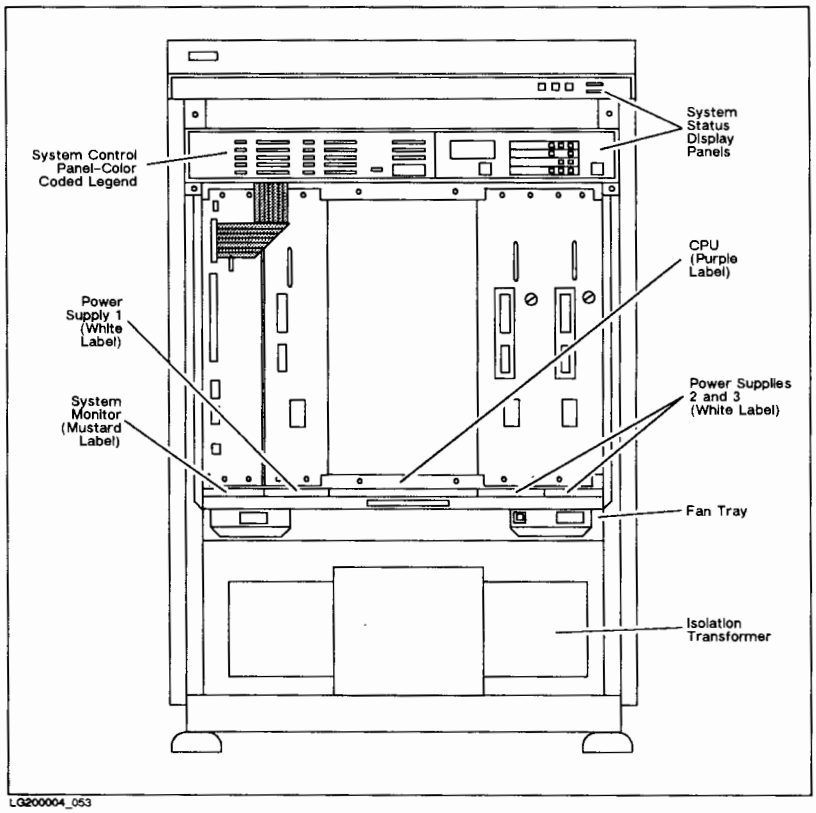


Figure 1-3. Cabinet, Front View (Door and Card Cage Covers Removed)

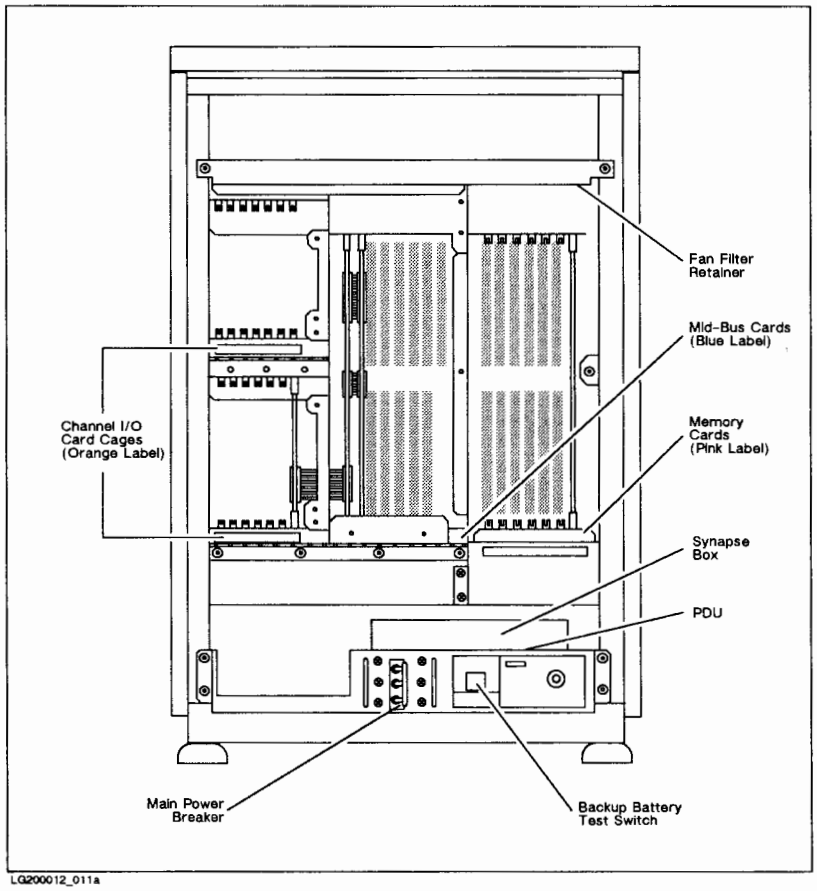


Figure 1-4. Cabinet, Rear View (Door and Card Cage Covers Removed)

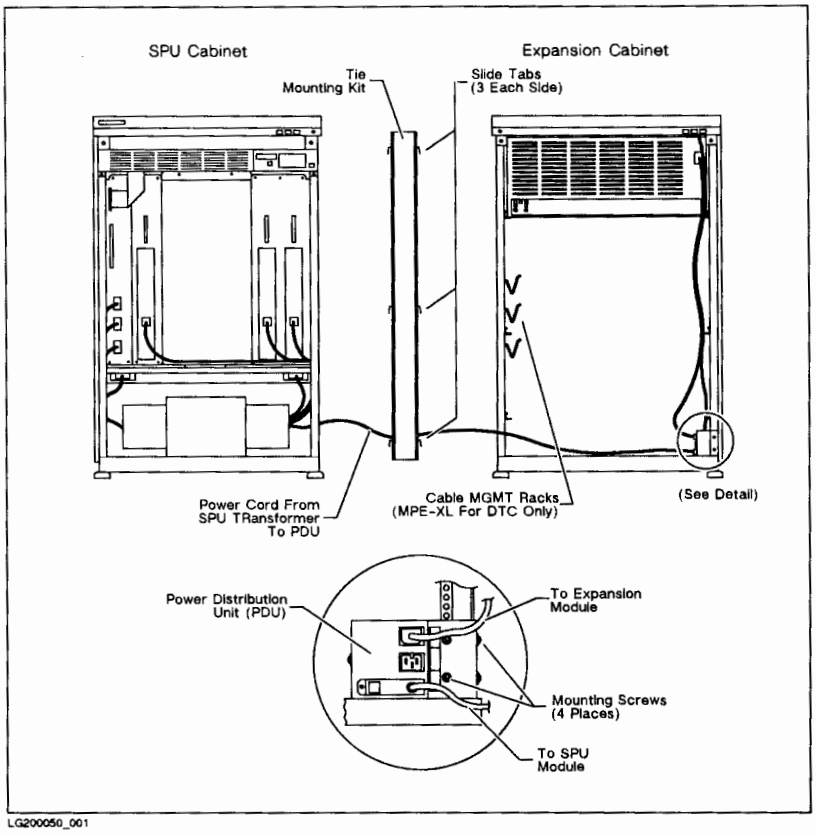


Figure 1-5. SPU and Expansion Bay, Front View

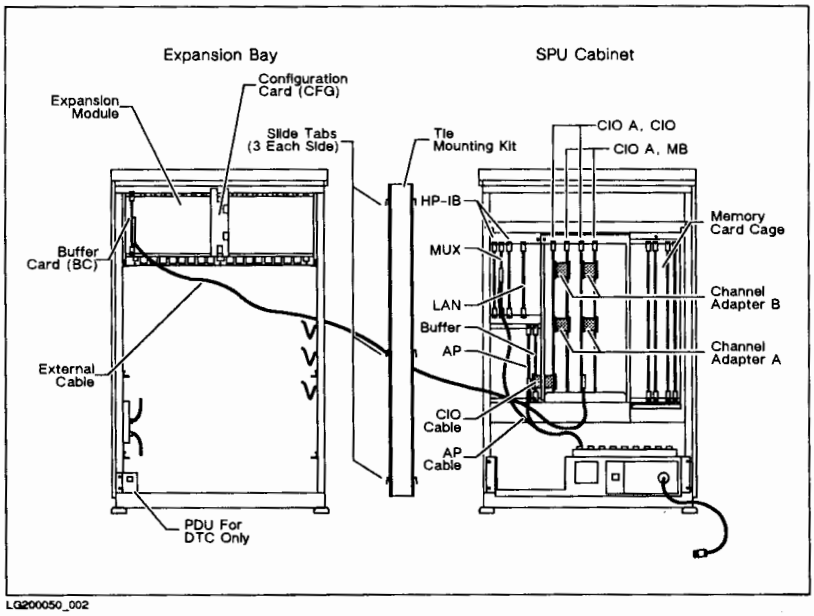


Figure 1-6. SPU and Expansion Bay, Rear View

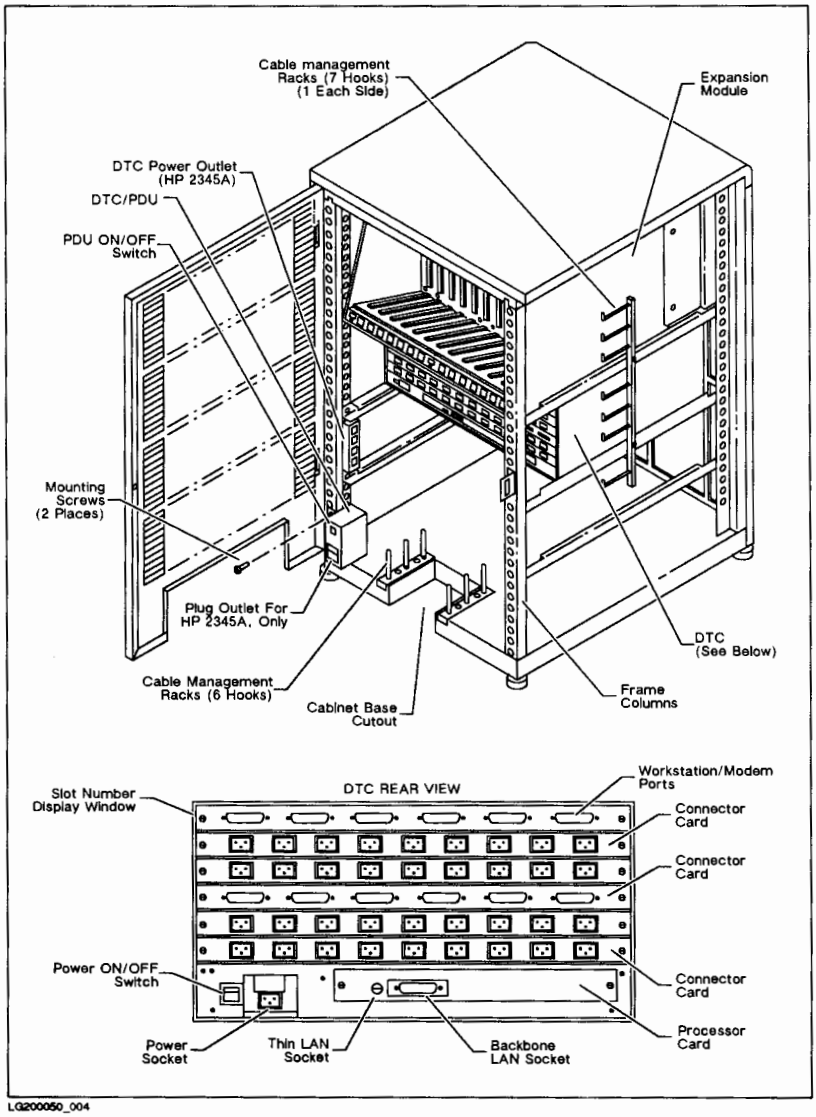


Figure 1-7. DTC (Rear View) with Cable Management Racks

SYSTEM STATUS DISPLAY PANELS

The external and internal system status display panels are illustrated in Figure 1-8. Refer to Troubleshooting in Section 4 for Indicator/Status description information.

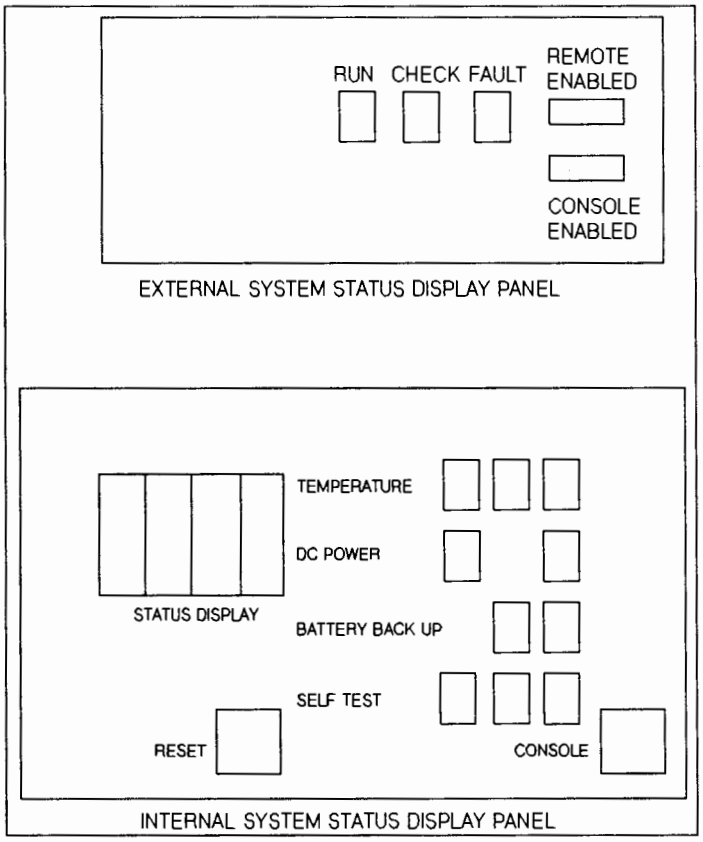


Figure 1-8. External and Internal System Status Display Panels

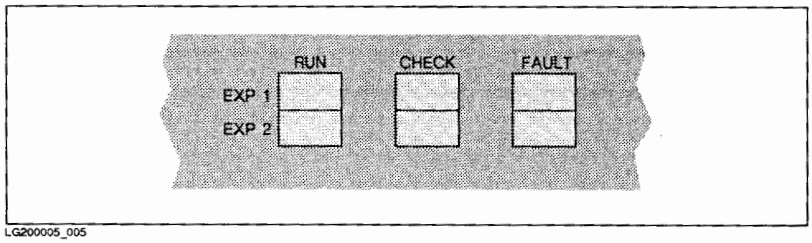


Figure 1-9. Expansion Bay External Display Panel

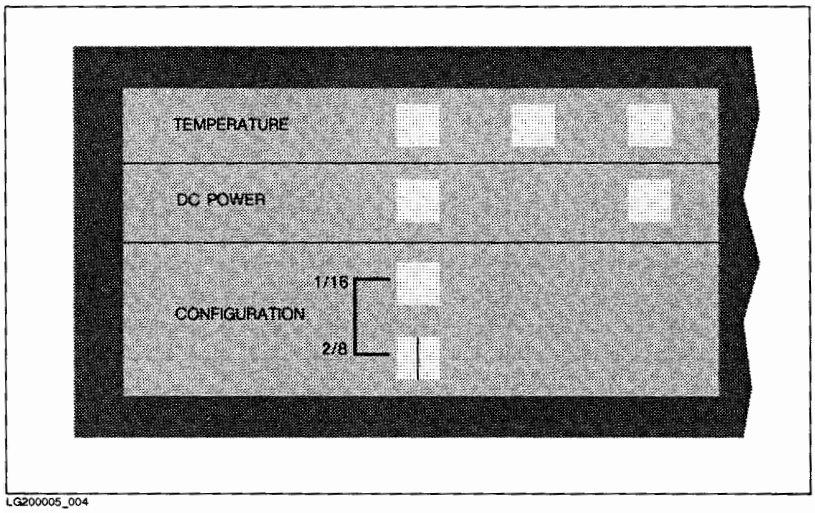


Figure 1-10. Expansion Bay Internal Display Panel

POWER DISTRIBUTION SYSTEM

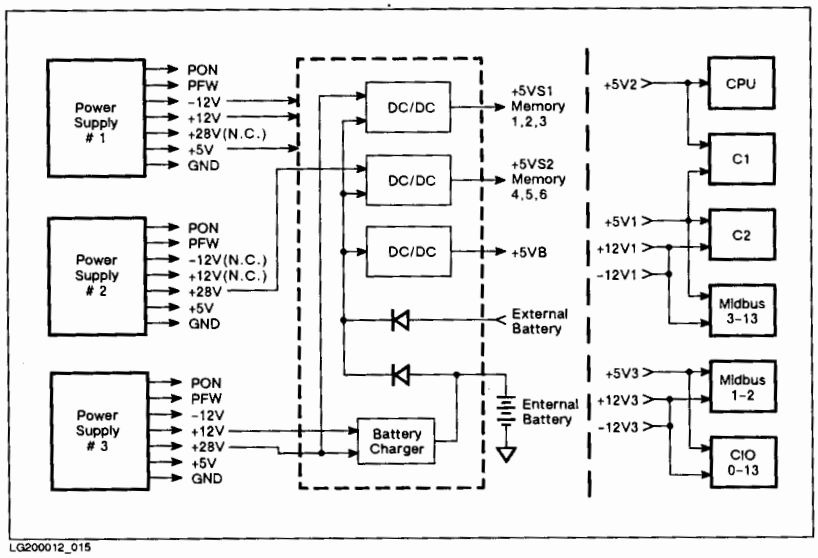


Figure 1-11. HP 3000/930 and HP 9000/840S DC Power Distribution System

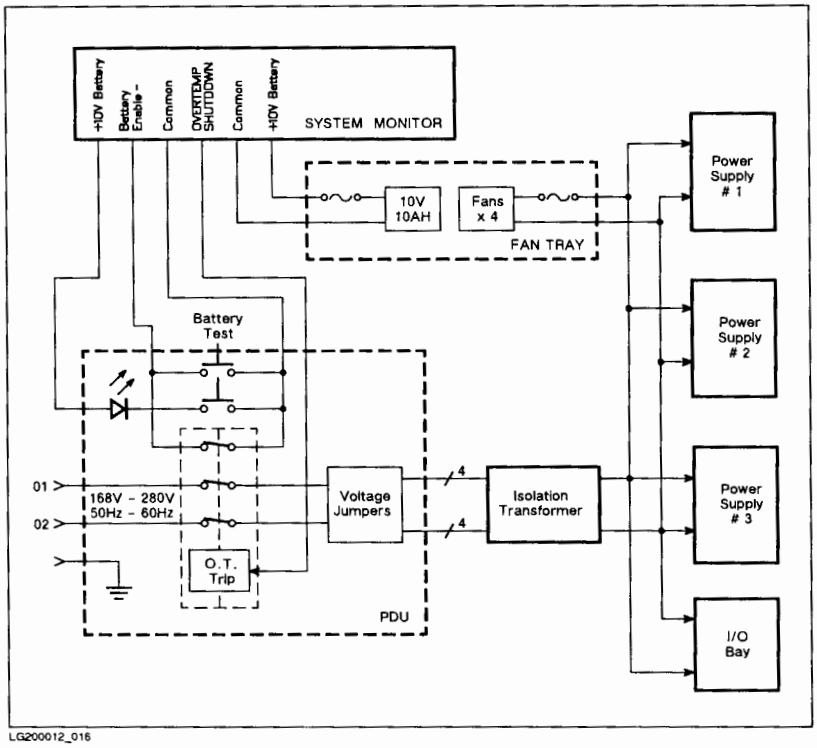


Figure 1-12. HP 3000/930 and HP 9000/840S AC Power Distribution System

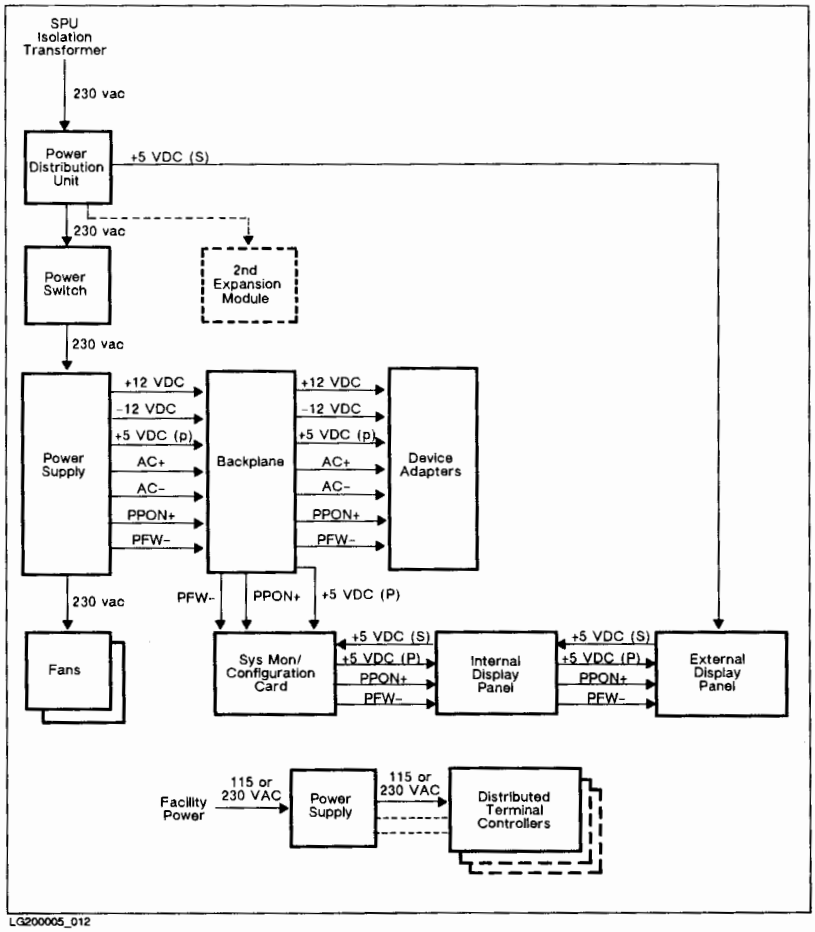


Figure 1-13. Expansion Bay Power Distribution Diagram

ENVIRONMENTAL/INSTALLATION/ PREVENTIVE MAINTENANCE

SECTION 2

This section contains information on environmental specifications, installation, and preventive maintenance.

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Preventive Maintenance 2-7

SPU SPECIFICATIONS

Table 2-1. SPU Specifications

Description	Specification	
	3000/930 SPU Only	9000/840S SPU Only
Operating temperature	0 to 55 degrees C	0 to 55 degrees C
Storage temperature	-40 to 70 degrees C	-40 to 70 degrees C
Operating temp rate of change	0.3 degrees C/min. 20 degrees C/hr.	0.3 degrees C/min. 20 degrees C/hr.
Recommended operating temp	20-30 degrees C (68-86 degrees F)	20-30 degrees C (68-86 degrees F)
Operating humidity	5 to 95% RH @ 40 degrees C	5 to 95% RH @ 40 degrees C
Non-operating humidity	90% RH @ 65 degrees C	90% RH @ 65 degrees C
Humidity condensation recovery	15 minutes	15 minutes
Altitude, operating	15,000 ft temp derated -1.1 deg C/1000 ft, above 7000 ft	15,000 ft temp derated -1.1 deg C/1000 ft, above 7000 ft
Altitude, non-operating	50,000 ft.	50,000 ft.
Nominal AC line input	200, 208, 220, 230 or 240VAC (single phase)	200, 208, 220, 230 or 240VAC (single phase)
Operating tolerance range	+ 15% of selected nominal input voltage	+ 15% of selected nominal input voltage
Input frequency	50 to 60Hz (-5% to +10%, 47.5 to 66Hz)	50 to 60Hz (-5% to +10%, 47.5 to 66Hz)
Max steady state current	13A	13A
Surge Current	110A max	110A max
Power dissapation	2000 Watts	1685 Watts (2000 Watts with Expansion Bay)
Power factor	0.7	0.7
Max heat dissipation	6900 BTU/hr.	5745 BTU/hr. (6900 BTU/hr. with Expansion Bay)

Table 2-1. SPU Specifications (Cont.)

Description	Specification	
	3000/930 SPU Only	9000/840S SPU Only
Min battery backup power	15 minutes (SPU only, no backup on the expansion bay)	15 minutes
Power fail carry through	one cycle minimum	one cycle minimum
Power line transients	IEEE 587, category B	IEEE 587, category B
Total harmonic distortion	< 10%	< 10%
Magnetic emissions operating non-operating	 < 5 gauss p-p < 5.25 milligauss at 4.6 meters	 < 5 gauss p-p < 5.25 milligauss at 4.6 meters
Magnetic field immunity	1 gauss	1 gauss
ESD immunity	0 to 15KV, no effect; 15 to 25KV, no hardware failures	0 to 15KV, no effect; 15 to 25KV, no hardware failures
Electric field immunity radiated: 10Khz to 1GHz 146Hz to 174MHz and 406Hz to 512MHz	 5V/m 10V/m	 5V/m 10V/m
Electric field immunity conducted: 30Hz to 400Mhz	 3V rms	 3V rms
Physical dimensions	height: 1 meter (39 in.) width: 1.2 meters (46.8 in.) * depth: 0.8 meters (31.2 in.) weight: 574 lbs. (261 kg) *	height: 1 meter (39 in.) width: 0.6 meters (23.4 in.) depth: 0.8 meters (31.2 in.) weight: 357 lbs. (162 kg)
Safety	UL listed, CSA certified compliant to IEC 380, 435	UL listed, CSA certified compliant to IEC 380, 435
Electromagnetic Interference	Complies with FCC rules for Class A computing device. FTZ licensed to VDE level A. VCCI registered.	Complies with FCC rules for Class A computing device. FTZ licensed to VDE level A. VCCI registered.
Accoustics	6.6 Bels (A) sound power	6.6 Bels (A) sound power

Table 2-2. Expansion Bay Specifications

The HP 19746B Expansion Bay/Module configures to the 9000/840S computer. It consists of the HP 19746A Expansion Module which is contained within the HP 19747A Expansion Bay.

The Expansion Bay/Module that configures to the 3000/930 computer consists of the HP 19746A Expansion Module and the HP 2345A Distributed Terminal Controller (DTC) which are both contained within the HP 19747B Expansion Bay.

The specifications listed in Table 2-2 are for the HP 19746A Expansion Module. Refer to the DTC documentation to obtain the DTC specifications.

HP 19746A Expansion Module Specifications

PARAMETERS	SPECIFICATIONS
Shock Requirements:	
End use handling:	4 inch free fall drop (45 degrees each edge)
Transportation:	1/2 sine drop
Susceptability Requirements:	
Electrostatic Discharge	0 to 15 KV no effect 15 to 25 KV no damage
Input power Requirements:	
Voltage	168 to 280 VAC
Frequency:	47 to 67 Hz
Current:	1.3 Amps maximum
Power Consumption:	330 Watts miximum
Display Requirements:	
Voltage	+5VS
Current:	200ma
Power:	1 Watt
Height:	11 inches (268 mm)
Width:	17 inches (425 mm)
Depth:	20 inches (500 mm)
Weight:	31 pounds (14 kg)
Expansion Bay Cabinet:	
Height:	39 inches (1000 mm)
Width:	23.4 inches (600 mm)
Depth:	31.2 inches (800 mm)
Weight:	33 pounds (15 kg)

Table 2-2. Expansion Bay Specifications (Cont.)

PARAMETERS	SPECIFICATIONS
Ambient Temperature Requirements:	
Operating:	0 to 55 degrees C
Maximum operating rate of change:	20 degrees C per hour
Non-operating:	-40 to +70 degrees C
Humidity Requirements:	
Operating:	5 to 95% relative humidity at 40 degrees C
Non-operating: (24 hours with no visible effect)	90% relative humidity at 65 degrees C
Altitude Requirements:	
Maximum operating:	15,000 feet (derate maximum temperature by - 1.1 degrees C per 1000 feet above 7,500 feet)
Maximum non-operating:	50,000 feet
Vibration Requirements:	
Sinusoidal Sweep:	5 to 5000 Hz at 0.5 g RMS
Sinusoidal dwell:	0.5 g RMS for 5 minutes at the four lowest resonant frequencies
Random operational:	5 Hz, 0.002 g per Hz 5 - 15 Hz, -1.5 dB per octave 15 Hz, 0.0015 g per Hz 15 - 170 Hz, -6.0 dB per octave 170 - 350 Hz, 0.00013 g per Hz 350 - 500 Hz, -6.0 dB per octave 500 Hz, 0.000067 dB per octave
Random non-operational:	5 - 100 Hz, 0.015 g per Hz 100 - 137 Hz, -6.0 dB per octave 137 - 350 Hz, 0.0008 g per Hz 350 - 500 Hz, -6.0 dB per octave 500 Hz, 0.0039 g per Hz

INSTALLATION

System installation procedures for the CE are not provided in this manual due to their level of detail. Refer to the Installation and Configuration Guide, P/N 09740-90019, for installation procedures which apply to the Hardware Installation Checklist provided below. For installation procedures regarding the Expansion Bay/Module, refer to the Expansion Bay Installation and Configuration Guide. P/N 32480-90003.

Hardware Installation Checklist

- Install I/O Extender Bay (Optional).
- Install Floating Point Coprocessor (Optional).
- Install System Cables.
- Install System Console.
- Install Disc Drive.
- Install Peripheral Devices.
- Check Power Supply Voltages.
- Run Computer Selftest.
- Backup System.
- Run System Verification.
- Check Power Fail Recovery System.

Operating System Installation

The SPU is ready for installation of the operating system software after the system hardware has been installed. During installation, the eight dip switches (labeled Diagnostic Switch) that are located on the front of the System Monitor Module (see Figure 4-10) are in the CLOSED (toggled left) position. For installation of MPE-XL, refer to System Administrator Series; System Startup and Shutdown Manual, P/N 32650-90034. Installation of HP-UX is found in the System Administrator Manual, P/N 92433-90004.

Device Adapters

Device adapters provide an interface between peripheral devices and the CIO bus. The supported device adapters are:

- HP 27113A Commercial HP-IB Device Adapter.
- HP 27110B Technical HP-IB Card.
- HP 27112A General Purpose I/O (GPIO) Card.
- OEM Programmable Serial Interface Card.
- Programmable Serial Interface, Remote Job Entry.
- HP 27140A Six-Channel Multiplexer for terminals.
- HP 27125A (IEEE 802.3) Local Area Network Interface Card (LANIC).
- HP 27114A Asynchronous FIFO Interface (AFI) Card.
- HP 27111A Fiber Optic Link Interface (HP-FL) Card.

Refer to Table 3-4 in the Configuration Section for HP 27110B/27113A switch configurations.

PREVENTIVE MAINTENANCE

Preventive Maintenance (PM) is performed periodically to ensure the system will operate continuously without failures. Refer to the Hardware Support Manual (P/N 09740-90011) for detailed procedure information concerning Preventive Maintenance (Chapter 4) or Removal and Replacement (Chapter 6). For preventative Maintenance regarding the Expansion Bay, refer to the Expansion Bay/Module Hardware Support Manual.

The following maintenance schedule is recommended for sustained performance of the computer system.

NOTE

Before maintenance on the system is started, verify that the System Operator has backed-up all files, users are logged off, and an operating system shutdown was performed before powering down system.

Table 2-3. Preventive Maintenance Schedule

SCHEDULE ASSEMBLY	EVERY 12 MONTHS
Fans (4) (P/N 3160-0478)	Check fan operation, replace as necessary.
Air Filter (P/N 3150-0504)	Replace.
System Control Panel LEDs	Press and hold RESET button on System Control Panel. Observe all LEDs are ON. If any LEDs are not ON, replace System Control Panel Display Card.
DC Power Supply	Verify voltages at System Monitor Card test points. Refer to Table 4-8 (Troubleshooting, Section 4). Replace power supply if not within normal specification.
Backup Battery - lead acid (P/N 09740-60007)	Test power fail and replace battery as necessary.
System Monitor Module Batteries (2) - lithium (P/N 1420-0341)	Test both batteries and replace as necessary.
Memory	Check single bit errors

WARNING

Observe all WARNING - HAZARDOUS VOLTAGE labels. Hazardous voltages are present inside the computer mainframe. Refer to Hardware Support Manual (P/N 09740-90011) for detailed information on handling assemblies.

CONFIGURATION

SECTION 3

This section provides hardware data required to operate a standard configuration of the HP 3000/930 and 9000/840S Computer Systems.

CPU Card Cage Configuration Assignment 3-6
CIO Card Cage Configuration Assignment. 3-7
Memory Card Cage Configuration Assignment. 3-9
Midbus Card Cage Configuration Assignment 3-10
Expansion Bay Configuration Examples 3-11
Configuration Switch Definitions 3-15
Selftest Configuration Switch Definitions 3-15
System Console Configuration 3-16
MPE-XL/HP-UX System Console. 3-16
Access Port Configuration. 3-16
Power Distribution Chart 3-17
Expansion Bay Power Distribution Chart 3-19

The minimum hardware configuration that is required to support the HP 3000/930 (MPE-XL) or HP 9000/840S (HP-UX) Computer Systems is provided in Table 3-1 and Table 4-7.

Table 3-1. Minimum Hardware Configuration (All Systems)

Quantity (MPE-XL)	Quantity (HP-UX)	HP Product#	Description
1	1	9740A	SPU (HP-UX is HP Product # 9741A)
1	1	19742A	Floating Point Coprocessor (optional)
2	1	19744A	Channel Set (3 cards each set)
1	X	19746A	Expansion Module
1	X	19747A	Expansion Bay
4	1	19748A	8M Byte Memory
1	1	30192A	Access Port
X	X	I/O Cards	CIO Interface Cards (Quantity to support peripherals)

The minimum peripheral hardware needed to support either an MPE-XL or HP-UX operating system is:

- One CS80 Disc Drive (HP 7935).
- One System Console (HP 2392A).
- One Mag Tape (HP 7978).
- One Line Printer (HP 2563/2566) - optional.

The maximum number of peripheral hardware devices allowed for system configuration of the MPE-XL or HP-UX operating system is listed in Table 3-2. For specific default device configuration information, refer to Tables 7-1 and 7-2 in Section 7.

Table 3-2. Maximum Peripheral Devices for System Configuration

Peripheral Device	Maximum Quantity (MPE-XL)	Maximum Quantity (HP-UX)
Devices allowed on HP-IB device adapter.	*6	6
HP-IB device adapter allowed on one channel adapter.	4	4
LAN cards allowed on channel adapter.	2	1
LAN cards allowed per system.	2	1
Disc drives allowed on one HP-IB device adapter.	4	4
Disc spindles allowed per system.	24	8
Line printers allowed per system.	8	3
Page printers allowed per system.	4	-
Total printers allowed per system.	12	3
Tape drives allowed per system.	8	5
DTCs allowed per system.	16	n/a
Port muxes (6) allowed per system.	**1	6
Channel adapter sets allowed per system.	3	1

* Maximum of 4 disc drives per HP-IB adapter

** 1 mux port active only for system console

Table 3-3. System Card Cage Configuration

SLOT#	CARD CAGE	BOARD NAME
		- - CPU Card Cage - -
1	CPU	Register File (RF) unit
2	CPU	Floating Point Coprocessor (C1)
3	CPU	Reserved for Coprocessor
4	CPU	Execution Unit (EU)
5	CPU	Instruction Unit (IU)
6	CPU	Translation Lookaside Buffer (TL) Unit
7	CPU	Cache (CA) Unit
		- - Midbus/Memory Module - -
1	Midbus	Channel Adapter CIO - C2
2	Midbus	Channel Adapter Midbus - C1
3	Midbus	Empty (HP-UX); Channel Adapter CIO - C2 (MPE-XL)
4	Midbus	Empty (HP-UX); Channel Adapter Midbus - C1 MPE-XL)
5	Midbus	Open for Add-On Channel Installation
6	Midbus	Open for Add-On Channel Installation
7	Midbus	Empty
**8	Memory	Memory Array (MA) - 5Mb
**9	Memory	Memory Controller (MC) - 3Mb
**A	Memory	Memory Array (MA) - 5Mb
**B	Memory	Memory Controller (MC) - 3Mb
**C	Memory	Memory Array (MA) - 5Mb
**D	Memory	Memory Controller (MC) - 3Mb
		- - CIO Card Cage - -
*0-11	CIO CC	CIO Device Adapters (up to 12, maximum)
12	CIO CC	Access Port (AP) Card
13	CIO CC	CIO Buffer Card

* Lower slot numbers have higher priority. Use these lower numbered slots for high speed peripheral devices. HP-FL cards should be installed in the highest priority slots.

** Any combination of card sets can be supported as long as the largest memory card sets are sorted from the higher number slots down. (If an 8Mb and 32Mb are mixed, then the 32Mb should go in the higher numbered slot.)

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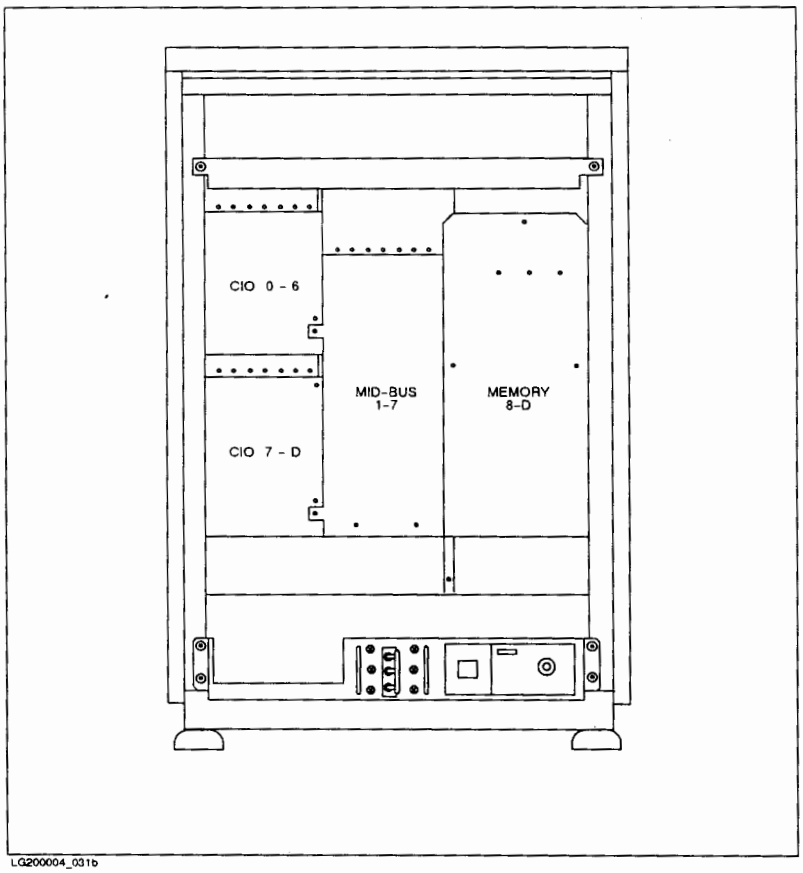

Figure 3-1. System Card Cage Location

CPU Card Cage Configuration Assignment

Each Central Processor Unit (CPU) Card has an assigned slot location in the CPU Card Cage. The CPU Card Cage is located between the power supplies (behind a cover plate), inside the front door of the computer cabinet. Refer to Table 3-3 for CPU card slot definitions.

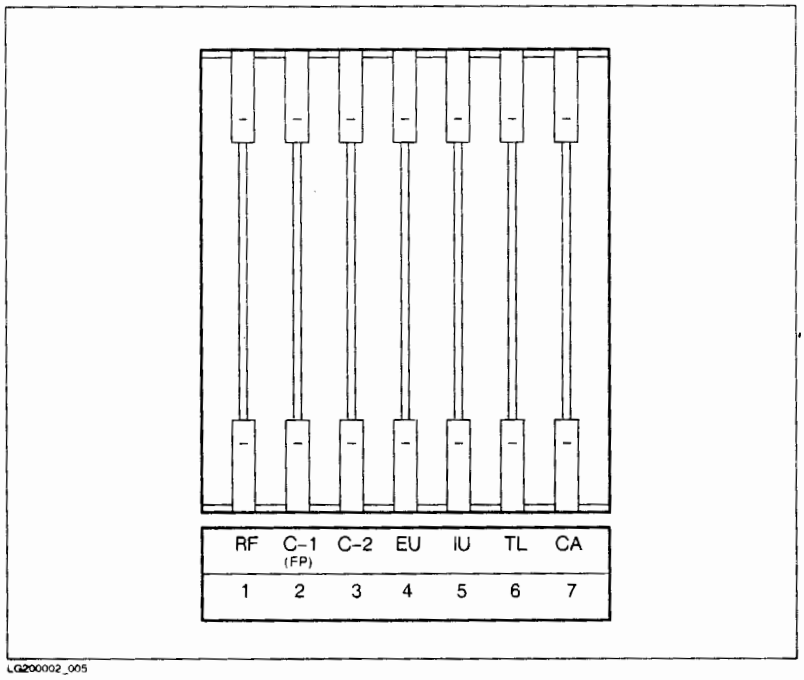

Figure 3-2. CPU Card Slot Assignments

CIO Card Cage Configuration Assignment

Each peripheral device in the system is connected to the computer through a Channel I/O (CIO) card, installed in the CIO Card Cage. The two CIO Card Cages (one upper and one lower) are located to the left of the Midbus (inside the rear door of the computer cabinet). (See Figure 3-1.)

A standard MPE-XL operating system includes two channel adapter sets, with a third channel adapter set available as an option. The standard HP-UX operating system consists of one channel adapter set, with two more channel adapter sets available for an optional Expansion Bay. To facilitate maximum system hardware requirements, there are some device adapter cards that are required to be installed in specific CIO card slots. If the system has an Expansion Bay, the required cards must be installed in the main SPU bay. They must NOT be installed in the Expansion Bay. The CIO service priority system is the same for each channel adapter: the service priority of a particular device adapter is determined exclusively by its CIO slot assignment (lower CIO slot assignments have higher service priority). Refer to Section 9 for the overall front/rear cabinet PCAs configuration diagrams of the HP 3000/930 and 9000/840S Computer Systems.

REQUIRED CARDS AND CIO SLOTS

MPE-XL
- CIO slot #0, HP-IB for the System Disc
- CIO slot #1, MUX (6 port) for the System Console
- CIO slot #4, LANIC for the DTC
- CIO slot #12, Access Port Device Adapter
- CIO slot #13, first CIO Buffer Card
- Expansion Bay CIO slot #B1, second CIO Buffer Card, configure 2x8 or 1x16
- Expansion Bay CIO slot #4, Mag Tape & Printer

HP-UX
- CIO slot #0, HP-IB/HP-FL* for the System Disc
- CIO slot #1, MUX (6 port) for the System Console
- CIO slot #2, HP-IB/HP-FL* for the Mag Tape
- CIO slot #7, HP-IB/HP-FL* for printer
- CIO slot #12, Access Port Device Adapter
- CIO slot #13, CIO Buffer Card

* HP-FL cards should be installed in the highest priority slots (lowest slot numbers).

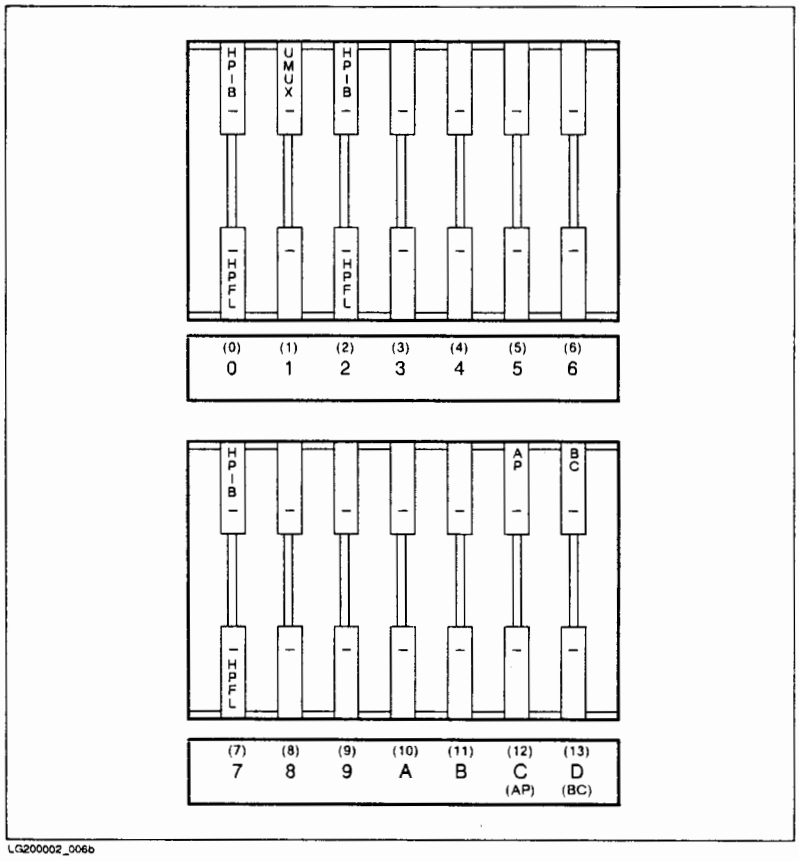

Figure 3-3. Channel I/O Card Slot Assignments for HP-UX Configuration

(See Figure 3-7 for MPE-XL Configuration)

Memory Card Cage Configuration Assignment

Memory configuration consists of combinations of 3 Mbyte Memory Controller (MC) Cards and 5 Mbyte Memory Array (MA) Cards, and 12 Mbyte Memory Controller Cards and 20 Mbyte Memory Array cards. All are installed in the Memory Card Cage, located to the right of the Midbus, inside the rear door of the computer cabinet. Any combination of card sets can be supported as long as the largest memory card sets are sorted from the highest numbered slots down. (If an 8MB and 32 MB are mixed, the 32 MB should go in the highest numbered slot.) See Figure 3-1 for card cage location and Figure 3-4 for slot assignments.

Support of the MPE-XL System Software:

- Minimum memory required is 32 Mbytes.
- Maximum memory allowed is 96 Mbytes.

Support of the HP-UX System Software:

- Minimum memory required is 8 Mbytes.
- Maximum memory allowed is 96 Mbytes.

NOTE

Supported memory configurations are 8, 16, 24, 32, 64, and 96 Mbytes.

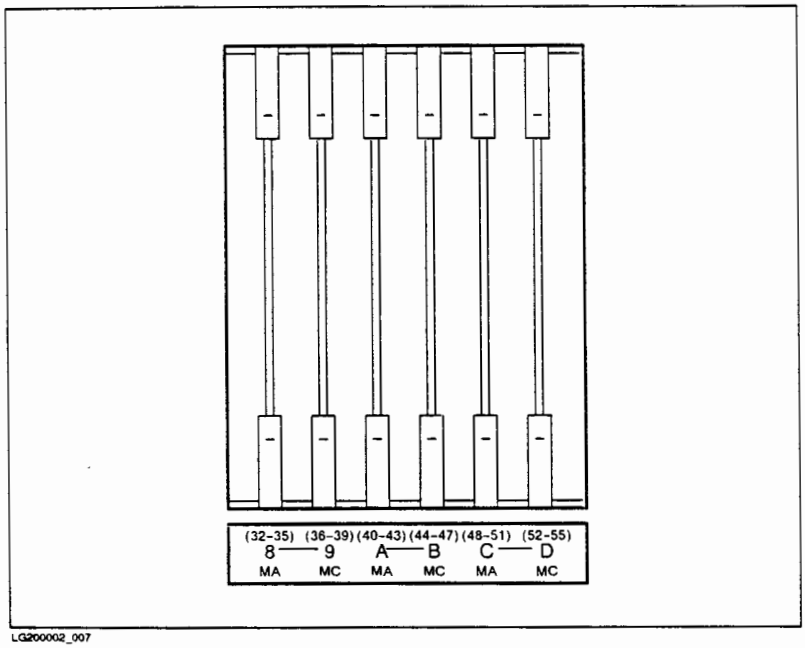

Figure 3-4. Memory Array and Memory Controller Slot Assignments

Midbus Card Cage Configuration Assignment

Midbus configuration consists of a Channel Adapter CIO (CA CIO) Card and a Channel Adapter Midbus (CA MID) Card. These two cards interface with each other inside the Midbus Card Cage, located to the left of the Memory Card Cage. (See Figure 3-1 for card cage location and Figure 3-5 for slot assignments.) Both cards then interface with the CIO Buffer Card (CA BC), located in the CIO Card Cage. (See Figure 3-3.) The three cards form the SPU Channel Adapter that interface the Midbus to the CIO bus.

Standard configuration (higher slot assignment has higher service priority) for MPE-XL is two Channel Adapter sets; standard configuration for HP-UX is one Channel Adapter set. HP-UX also has the option of adding two more Channel Adapter sets to accommodate the Expansion Bay. The Expansion Bay can be configured as one 16-slot card cage with a second Channel Adapter set, or two 8-slot card cages with a second and third Channel Adapter set. The second and third CIO Buffer Cards are located in the Expansion Bay CIO Card Cages.

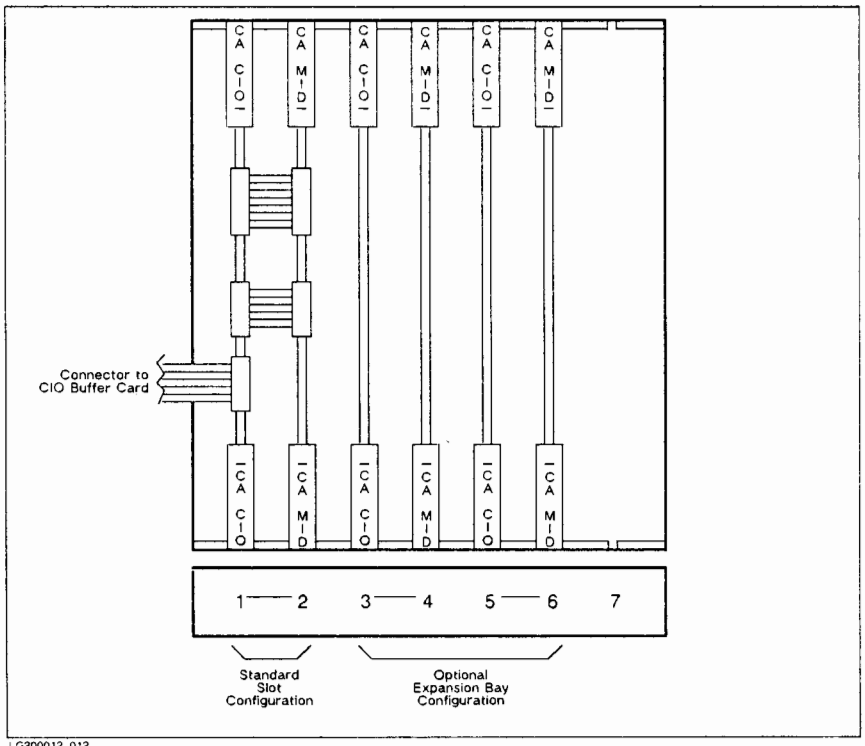

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Figure 3-5. Midbus Card Slot Assignments

Expansion Bay Configuration (HP-UX)

The HP-UX system (3000/840S) will support an optional Expansion Bay containing an Expansion Module that accomodates another CIO card cage. The Expansion Module can be configured as one 16-slot CIO card cage or two 8-slot CIO card cages. For additional information regarding the Expansion Bay, refer to the Expansion Bay Installation and Configuration Guide (32480-90003).

Figure 3-6, Expansion Bay Configuration Example, shows how the CIO slots might be configured to support the 16-slot configuration or the two 8-slot configurations.

16-Slot Installation Example

1. The 16-slot module has two Channel Adapters, one for the main bay and one for the Expansion Bay. Each Channel Adapter is a three-card set consisting of a Channel Adapter CIO card, a Channel Adapter Mid-Bus card, and a Channel Buffer card. To configure the Expansion Bay to operate as one 16-slot module, insert the configuration card in slot A2 of the Expansion Module backplane. The second CIO Buffer card is inserted in Expansion Module slot B1, while the second Channel Adapter CIO card and Channel Adapter Mid-Bus card are inserted in Mid-Bus card cage slots 3 and 4.

2. Install the system disc, 6 port Mux, mag tape, and printer device adapters in the main bay CIO slots 0, 1, and 2, respectively. These assignments are mandatory for the first power up and operating system download. After the initial download, the printer and mag tape (slot 2) position can be changed with the UXGEN utility.

3. The 16-slot module example has 16 discs (including the system disc) requiring four device adapters to connect the system. One of these device adapters is assigned to the next available CIO slot (6) in the main bay. The other two have been assigned to the highest priority slots (0 and 1) in the Expansion Module. This enables the high speed disc memory load to be evenly distributed between the two Channel Adapters.

4. The two tape drives and two printers can all operate off one device adapter, which should be inserted in CIO slot 2 of the main CIO bay.

5. The LAN device adapter for the terminals is inserted in the Expansion Module to evenly balance the load.

Two 8-Slot Installation Example

1. The two 8-slot module has three Channel Adapters. One Channel Adapter is for the main bay, and the other two Channel Adapters are for the Expansion Module. To configure the Expansion Bay to operate as two 8-slot modules, insert the configuration card in slot A1. The second and third CIO Buffer cards are inserted in slots B1 and B2. The second and third Channel Adapter CIO cards and Channel Adapter MId-Bus cards are inserted in the Mid-Bus card cage slots 3-6.

2. The system disc, 6 port Mux, and tape/printer device adapters have been assigned to the main bay CIO slots 0, 1, and 2, respectively. These assignments are mandatory (without regard to the number of channel adapters employed) for the first power up and operating system download. After the initial download, the printer and mag tape (slot 2) position can be changed with the UXGEN utility.

3. The two 8-slot installation example has 24 discs (including the system disc). One of these is assigned to the next available CIO slot (6) in the main bay along with the required system disc in slot #1. The other four have been divided evenly between the highest priority slots (0 and 1) in each of the 8-slot busses. This enables the high speed disc memory load to be evenly distributed across the three Channel Adapters.

4. The four tape drives and six printers have been assigned a higher priority than any of the terminals (in this installation), so they are divided evenly between the tape/printer device adapter inserted inserted in CIO slot 2 in the main bay and a second in CIO slot 2 in the Expansion Module.

5. Two Lan device adapters are now required, one to support the terminals and a second to handle the network devices. They are split between the two CIO devices in the Expansion Module to balance the traffic load. This creates an unavoidable load imbalance in CIO 2; however, imbalance here or on CIO 3 is preferable to overloading the main bay.

Expansion Bay Configuration (MPE-XL)

The MPE-XL system (3000/930) is shipped with an Expansion Bay containing an Expansion Module configured as one 16-slot CIO card cage. It can also be configured as two 8-slot card cages. For additional information regarding the Expansion Bay, refer to the Expansion Bay Installation and Configuration Guide (32480-90003).

The MPE-XL Configuration Example (Figure 3-7), shows how the CIO slots are configured to support the 16-slot configuration and the two 8-slot configuration.

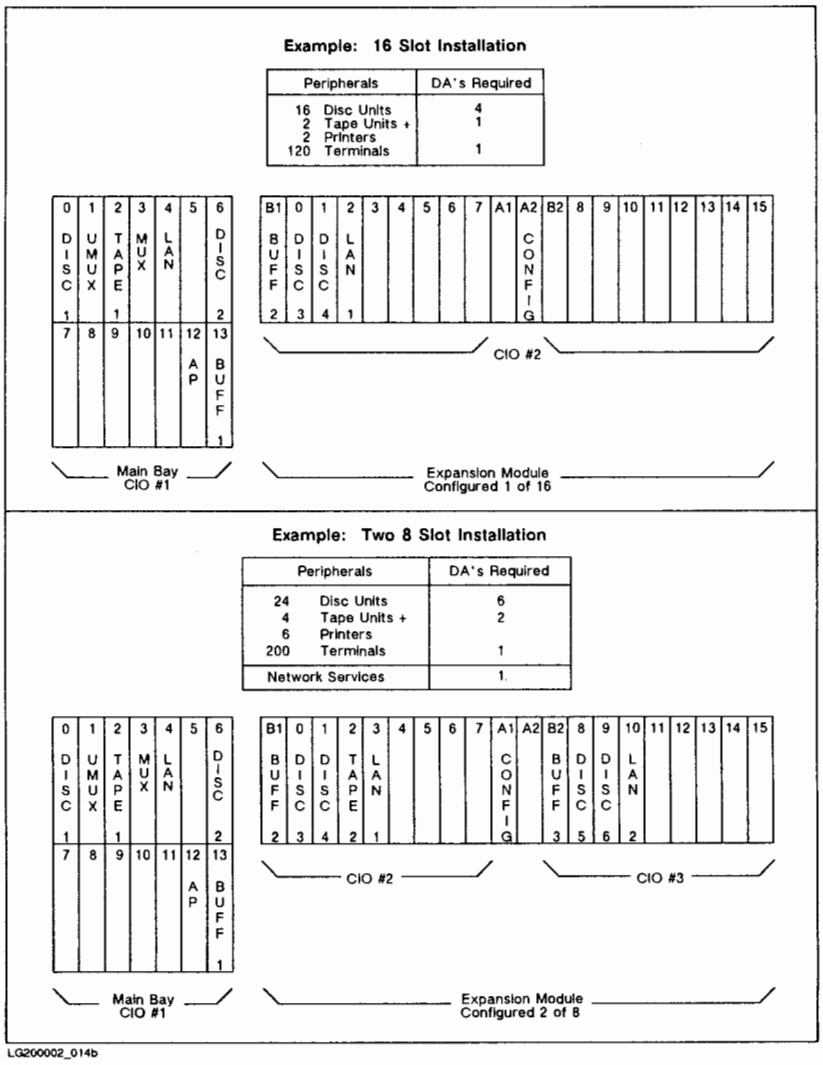

Figure 3-6. HP-UX Expansion Bay Configuration Example

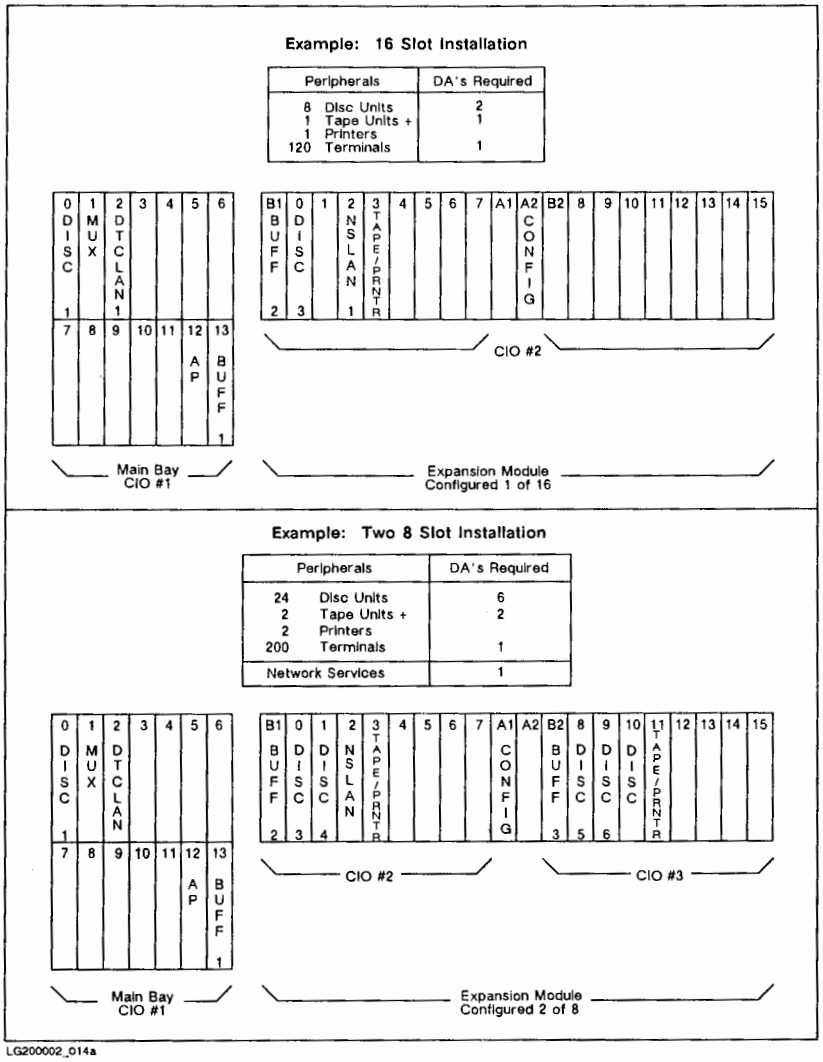

Figure 3-7. MPE-XL Expansion Bay Configuration Example

Configuration Switch Definitions

The HP 27110B and HP 27113A device adapters use specific switch settings. These definitions are represented in Table 3-4.

Table 3-4. Configuration Switch Definitions (HP 27110B/27113A)

SWITCH	FUNCTION	SETTINGS
S1(8)	Not Used	
S1(7)	Data Setting Time Selection	UP =Medium/Slow-Speed DOWN =High-Speed
S1(6)	System Controller Selection	UP =System Controller DOWN =Not System Controller
S1(1)-S1(5)	HP-IB Address Selection (When not the Controller-In-Charge)	S1(5) =MSB S1(1) =LSB UP =Logic One = Open DOWN =Logic Zero = Closed

The factory settings for the configuration switches are as follows:

S1(1)	S1(2)	S1(3)	S1(4)	S1(5)	S1(6)	S1(7)	S1(8)
--	--	--	--	--	--	--	--
DOWN	UP	UP	UP	UP	UP	DOWN	Don't Care

Selftest Configuration Switch Definitions

Eight Dip switches located on the front of the System Monitor Module control the execution of selftest. Normal position for all switches is the CLOSED position. See Figure 4-5 for illustration of the System Monitor Module and refer to Table 4-10 for definitions of switch settings in the OPEN position.

System Console Configuration

The configuration for the System Console and Remote Console is the same for both MPE-XL and HP-UX. The datacomm and terminal configuration parameters can be set to any value and do not affect the operation of the Access Port Card or the system. The menus are as follows:

DATACOMM CONFIGURATION MENU:

Parity/Databits = none/8
Chk Parity = NO
EnqAck = YES
CS (CB) Xmit = NO
RecvPace = Xon/Xoff
XmitPace = Xon/Xoff

TERMINAL CONFIGURATION MENU:

Local/Echo = OFF
SPOW(B) = NO
Line/Page(D) = LINE (necessary during control mode.)
ReturnDef = <CR>

MPE-XL/HP-UX System Console

The System Console is configured into the default configuration files supplied with the operating system. The System Console is connected to Port 0 of the Mux (6 port) card, located in slot #1 of the CIO bus. The connection of the System Console is through the SPU RS-232C Junction Panel, labeled, "Console Terminal" to the Mux (6 port) card via the split cable. The MPE-XL and HP-UX default device configuration information can be found in Peripherals, Section 7. Normal Access Port configuration and troubleshooting procedures can be found in Troubleshooting, Section 4.

Access Port Configuration

Any terminal connected to the computer system through the Access Port (AP) card must be configured into the default configuration files supplied with the operating system, in the same manner as the System Console. The MPE-XL and HP-UX default device configuration information can be found in Peripherals, Section 7.

POWER DISTRIBUTION CHART

POWER SUPPLY #1

+5V	Mid-bus slots 3-13
+12V	Mid-bus slots 3-13, C2, SM
-12V	Mid-bus slots 3-13, C1, C2, SM
+28V	Not Used
25KHz	Not Used
PFW-	Power Fail Warning Status Signal
PON+	Power On Status Signal

POWER SUPPLY #2

+5V	RF, EU+, C1, IU, TLB, CA+
+12V	Not Used
-12V	Not Used
+28V	SM (+5VS1)
25KHz	Not used
PFW-	Power Fail Warning Status Signal
PON+	Power On Status Signal

POWER SUPPLY #3

+5V	Mid-bus slots 1-2, CIO slots 0-13
+12V	Mid-bus slots 1-2, CIO slots 0-13
-12V	Mid-bus slots 1-2, CIO slots 0-13
+28V	SM (+5VS2)
25KHz	Not Used
PFW-	Power Fail Warning Status Signal
PON+	Power On Status Signal

A separate +5S (+5 secondary) voltage is provided from a regulator on the System Monitor Module used to sustain memory.

A power distribution matrix for card slots of the HP 3000/930 and HP 9000/840S Computer Systems is illustrated in Figure 3-8. The PDU Transformer Strapping diagram is shown in Figure 4-4. See Figure 4-5 for the System Monitor test points, if applicable.

	POWER SUPPLY 1	POWER SUPPLY 2	POWER SUPPLY 3	SYSTEM MONITOR CARD	INTERNAL BATTERY	EXTERNAL BATTERY
+5 VOLTS	MID-BUS SLOTS 3-13	RF, C1, EU, IU, TLB, CA	MID-BUS 1 and 2 CIO 0-13			
+5S * VOLTS				CIO 12, CA, IU, MID-BUS 8-13		
+10 VOLTS					SYSTEM MONITOR CARD	
+12 VOLTS	MID-BUS 3-13, C2, SYSTEM MONITOR		MID-BUS 1 and 2 CIO 0-13			SYSTEM MONITOR CARD
-12 VOLTS	MID-BUS 3-13, C1 (FPP), C2, SYSTEM MONITOR		MID-BUS 1 and 2 CIO 0-13			
+28 VOLTS		SYSTEM MONITOR CARD	SYSTEM MONITOR CARD			

* 5 VOLTS, SECONDARY IS GENERATED BY THE SYSTEM MONITOR CARD.

Figure 3-8. Power Distribution Matrix for Card Slots

EXPANSION BAY POWER DISTRIBUTION CHART

POWER SUPPLY (300 W)

+5V(DC)	To Backplane, SM/Configuration Card, Int./Ext. Display Panels, Device Adapters
+12V(DC)	To Backplane, Device Adapters
-12V(DC)	To Backplane, Device Adapters
AC+	To Backplane, Device Adapters
AC-	To Backplane, Device Adapters
PPON+	Primary Power On Status Signal
PFW-	Power Fail Warning Status Signal

Facility Power to three Distributed Terminal Controllers (DTCs).

Refer to Diagrams, Section 9 for illustrations of the Expansion Bay/Module Block Diagram and the Expansion Bay Power Distribution System. Refer to Expansion Bay Configuration, Section 3, for configuration examples.

TROUBLESHOOTING

SECTION 4

This section contains troubleshooting data that is designed to assist the CE with repair and diagnostic functions associated with the HP 3000/930 and 9000/840S Computer Systems.

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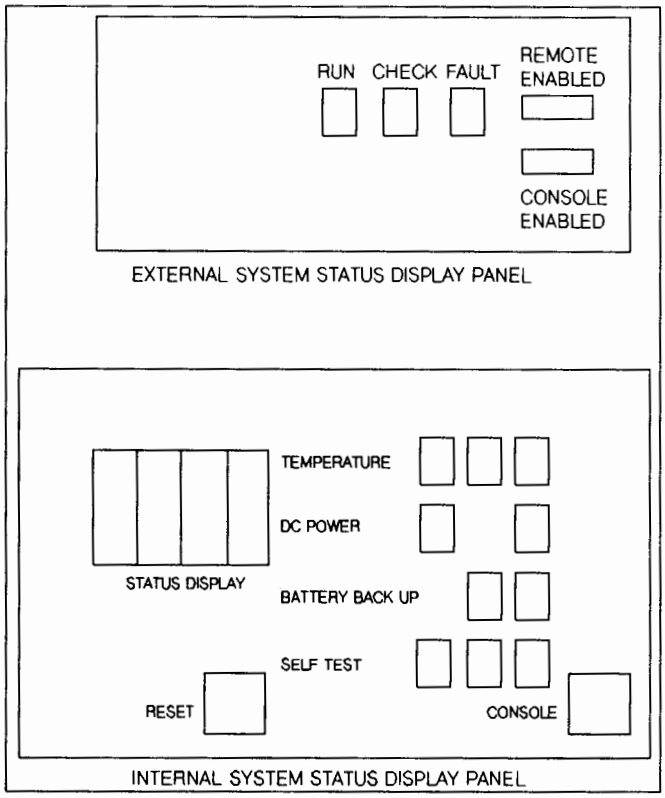


Figure 4-1. External and Internal System Status Display Panels

NOTE

Tables 4-1 and 4-2 provide LED status information to be used as an aid for troubleshooting.

Table 4-1. External System Control Panel

Indicator	Status
RUN (LED is Green)	All of the following: • Selftest passed. • ISL Program Module (OS, DIAG, or UTIL) is loaded. • Power supplies are within voltage specification. • Battery backup is charged. • Temperature is normal. • Battery charging (Green and Yellow LEDs light simultaneously).
CHECK (LED is Yellow)	One or more of the following: • Selftest in progress. • Initialization in progress. • Software initiated shutdown. • Non-fatal error has occurred in selftest. • Battery backup is charging. • System temperature is marginal. • Battery charging (Green and Yellow LEDs light simultaneously).
FAULT (LED is Red)	One or more of the following: • Selftest in progress. • Initialization in progress. • Fatal error. • One or more power supplies out of voltage spec. • Battery backup in use. • Overtemp. System about to shutdown.
REMOTE ENABLED (On)	System "open" to remote access. (AP Link enabled.)
CONSOLE ENABLED (On)	System "open" to System Console access. See CONSOLE button on Internal Control Panel. (Mechanical Enable.)

NOTE

The red FAULT LED on the External Display will light whenever any red LED on the Internal Display is lighted. The yellow CHECK LED on the External Display lights whenever a yellow LED on the Internal Display is lighted. The green RUN LED on the External Display will light when all green LEDs on the Internal Display are lighted. The one exception is that

during battery backup, the green RUN LED and the yellow CHECK LED will light simultaneously as the battery is charging. The red FAULT LED will light when the battery is discharging. At system shutdown, all lights are OFF.

Table 4-2. Internal System Control Panel

Indicator	Status
TEMPERATURE	Green - Temperature within normal specification. Yellow - System temperature is marginal. Red - Overtemp.
DC POWER	Green - Power supplies within normal voltage specification. Red - One or more power supplies out of voltage specification.
BATTERY BACKUP	Yellow - Battery backup is charging. Red - Battery backup in use.
SELF TEST	Green - Selftest passed. Yellow - Selftest in progress. - Non-fatal error has occurred in Selftest. - Initialization is in progress. - Software initiated shutdown. Red - Selftest in progress. - Initialization in progress.

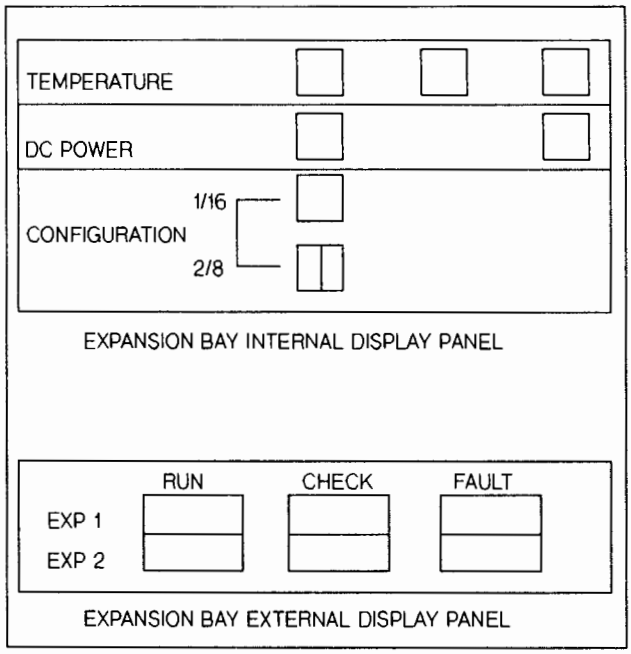


Figure 4-2. Expansion Bay Module System Status Display Panels

NOTE

The LEDs located in the first column of the internal/external display panels are always color coded Green, second column LEDs are color coded Yellow, and the third column LEDs are always color coded Red.

NOTE

Tables 4-3 and 4-4 provide indicator/status information for the Expansion Bay Module internal/external system status display panels.

Table 4-3. Expansion Module Internal Display Panel

Indicator	Status
TEMPERATURE	Green LED - System temperature is normal. Yellow LED - System temperature is marginal. Red LED - Overtemp. System shutdown.
DC POWER	Green LED - System temperature is normal. Red LED - Overtemp. System shutdown (either manually or automatically). - DC Power out of spec.
CONFIGURATION	1/16 (Green LED) - System Monitor/Configuration Card inserted (Slot A2). 2/8 (Split Green LED) - System Monitor/Configuration Card inserted (Slot A1).

NOTE

The System Monitor/Configuration Card inserted in Slot A2 defines the backplane as being a single 16-slot bus; the System Monitor/Configuration Card inserted in Slot A1 defines the backplane as being two, mutually independent 8-slot busses.

Table 4-4. Expansion Module External Display Panel

Indicator	Status
RUN (Green LED) (EXP 1 and EXP 2)	• Power supply voltages within normal specification. • Temperature inside module is normal.
CHECK (Yellow LED) (EXP 1 and EXP 2)	• Temperature inside module is high. • System operable, but cooling system needs checking.
FAULT (Red LED) (EXP 1 and EXP 2)	• Overtemp. System shutdown (either manually or automatically). • One or more power supplies not within normal voltage specification.

NOTE

The External Display Panel is split in two horizontally, providing status indications for a single installed Expansion Module (EXP 1) and also for a second module (EXP 2), as applicable. The row of indicators associated with EXP 2 will remain off at all times if the second module is not present in the cabinet.

SYSTEM DISPLAY STATUS CODES

Tables 4-5 and 4-6 provide the detailed format of the hexadecimal display panel shown in Figure 4-3. High Priority Machine Checks may be associated with any of these class errors. For detailed descriptions on all error numbers generated by selftest, PDC/IODC, and ISL refer to Selftest Error Messages in this section.

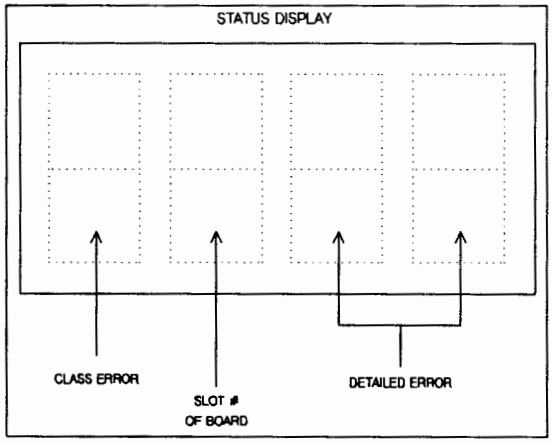


Figure 4-3. Hexadecimal Display Panel

HPMC Error List

The twelve types of High Priority Machine Checks (HPMCs) are described below. These are the detailed errors from the hexadecimal display. See Figures 4-16 thru 4-18 for flowcharts that describe how to troubleshoot them. The HPMC error list is also included in Selftest Error Messages in this section.

1. XXF1 - Instruction TLB parity error.
2. XXF2 - Data TLB parity error.
3. XXF3 - Midbus address parity error / No slave response.
4. XXF4 - Midbus read data parity error.
5. XXF5 - Multiple bit memory read error.
6. XXF6 - Midbus write data parity error.
7. XXF7 - Midbus CMD or EIR data parity error / Midbus timeout.
8. XXF8 - Cache tag parity error.
9. XXF9 - D cache read parity error.
10. XXFA - Floating Point Instruction parity error.
11. XXFB - Instruction parity error.
12. XXFC through FF - Undefined HPMC.

(XX represents the first two symbols of an error message.)

Table 4-5. Class Error Descriptions

Class Errors	Description of Error Condition
0XXX	Catastophic Failure.
1XXX	Processor Hardware Failure.
2XXX	Cache (CA+) or Translation Lookaside Buffer (TLB) Hardware Failure.
3XXX	Processor Dependent Hardware/System Monitor Failure.
4XXX	Coprocessor Hardware Failure.
5XXX	Bus Protocol Error.
6XXX	Reserved.
7XXX	Memory Hardware Failure.
8XXX	I/O Hardware Failure.
9XXX	Console Device Failure.
AXXX	Boot Device Failure.
BXXX	Operating System Software.
CXXX	Initialization Failure.
EXXX	OS or Environmental Warning.
FXXX	Run Time Messages.

Table 4-6. Selftest Error Codes

Class Error#	Slot # with Detailed Error	Description	Action
1	11XX	Processor Failure - RF Unit.	Replace Faulty Board.
1	14XX	Processor Failure - E Unit.	Replace Faulty Board.
1	15XX	Processor Failure - I Unit.	Replace Faulty Board.
2	26XX	TLB/CA Failure - TLB Unit.	Replace Faulty Board.
2	27XX	TLB/CA Failure - Cache Board.	Replace Faulty Board.
3	30XX	Processor Dependent Hardware Failure (System Monitor Card Failure 30).	Replace Faulty Board.
4	4ZXX*	Coprocessor Failure.	Replace Faulty Board.
5	5ZXX*	Bus Protocol Failure.	Replace Faulty Board.
6	6XXX*	Architecturally Reserved.	Replace Faulty Board.
7	7ZXX*	Memory Hardware Failure.	Replace Faulty Board.
8	8ZXX*	I/O Channel Adapter Test.	Replace Faulty Board.
	XXF0-XXFF	HPMC Console Device Path Test. Boot Device Path Test.	Replace Faulty Board.
9	9ZXX*	Operating System Failure.	Replace Faulty Board.
A	AZXX*	Initialization: Power Fail.	Replace Faulty Board.
B	BZXX*	Initialization: Transfer of Control.	Replace Faulty Board.
C	CAXX	Initialization: Initial System Load Code.	Replace Faulty Board.
C	CBXX	Loader Error: Parallel Card.	Replace Faulty Board.
C	CEXX		Replace Faulty Board.
	05XX		Replace Faulty Board.

* Z = Slot dependent value.

** See HPMC Error Messages in Chapter 8 of the Hardware Support Manual, P/N 09740-90011.

NOTE

The detailed error code is reflected by the last two digits on the System Display Panel. Detailed error descriptions are provided in this section.

SELFTEST ERROR MESSAGES

The following list contains the detailed error numbers generated by selftest, PDC/IODC, and ISL program code. (** signifies the same error number is repeated.)

1. Class **ERROR 1**: Processor failure; Register File, error code = 11XX

Error Numbers	Description of error condition
1100	Undefined error occurred at start of test of this board.
1101	Failure while testing GR's 1, 2, and 31.
**	Second possible cause of error is E_unit.
**	Third possible cause of error is I_unit.
1102	Failure while testing general registers.
**	Second possible cause of error is E_unit.
**	Third possible cause of error is I_unit.
1103	Failure while testing RC, or EIEM.
**	Second possible cause of error is E_unit.
**	Third possible cause of error is I_unit.
1104	Failure while testing temporary control registers.
**	Second possible cause of error is E_unit.
**	Third possible cause of error is I_unit.
1105 and 1106	Reserved.
1107	Crosstalk between general registers.
1108	Crosstalk between general registers and the temporary registers.
1109	Reserved.
110A	X and B bus bypass testing.
110B	GR0 bypassed.
110C	GR0 bypassed on a nullify.
110D	Failure while verifying trap with Interval Timer.
110E through 110F	Reserved.
1110	Interval Timer does not get incremented.
**	Second possible cause of error is I_unit.
**	Third possible cause of error is E_unit.
1111	Interval Timer does not cause trap. (Cannot force external interrupt trap.)
**	Second possible cause of error is I_unit.
**	Third possible cause of error is TLB.

1112	Recovery Counter doesn't cause trap.
**	Second possible cause of error is 1_unit.
**	Third possible cause of error is TLB.
1113 through 1114	Reserved.
1115	Load to general register zero modified that register.
1116	Nullified instruction stored to register file.
1117	Failure while verifying address calculation for load word and modify (LDWM).
1118	Failure while verifying address calculation for load word indexed and modify (LDWX, M).
1119	Failure while verifying address calculation for load byte indexed and modify (LDBX, U, M).
111A	Failure while verifying address calculation for load half word indexed and modify (LDHX, U, M).
111B	Failure while verifying address calculation for load word indexed and modify (LDWX, U, M).
111C through 111F	Reserved.
1120	Failure while verifying operation of Register File interlocks.
1121	Failure while verifying address calculation for load word and modify after (LDW, MA).
1122	Failure while verifying address calculation for load word and modify before (LDW, MB).
1123	Failure while verifying operation of move to Control register (MTCTL) after load word (LDW).
1124 through 1129	Reserved.
112A	Nullified instruction after data trap stored to Register File.
112B	Failure while verifying address calculation of load and modify which cause data trap.
112C	Failure while verifying ripple through the counters of recovery counter.
112D	Could not force overflow trap.
112E	Failure while verifying back up operation on recovery counter.

112F	Failure while verifying late nullify on recovery counter.
1131 ** **	Unexpected recovery counter trap was taken. Second possible cause of error is I_unit. Third possible cause of error is TLB taken.
1132 ** **	Unexpected external interrupt trap was taken. Second possible cause of error is I_unit. Third possible cause of error is TLB.
1140	Failure while testing EIR register with zero.
1141	Failure while verifying value of GR1 after ADDIL instruction.
1142	Failure while verifying calculation of return address with BLE instruction.
1143	Register File does not zero unused portion of target register for LDH instruction.
1144	Register File does not zero unused portion of target register for LDB instruction.
1145	Cannot distinguish between different bank of general registers.
1146	Failure while verifying Recovery Counter operation (RC cannot count up).
1147	Failure while verifying Recovery Counter operation with nullify instruction.
1148	Failure while verifying Recovery Counter operation with late nullify instruction.
1149	Failure while verifying Recovery Counter operation with late nullify instruction caused by data trap.
114A	Failure while verifying Recovery Counter trap.
114B	Failure while verifying operation of Recovery Counter trap immediately after data trap.
114C	Cannot verify External Interrupt Enable Mask.
114D	Cannot verify External Interrupt Request Register.
114E	Failure while verifying operation of External Interrupt.
114F	Cannot verify current privilege level after execution of gate way instruction.
1150	Failure while verifying timing on RF board.
1151	Failure while verifying EIRR with HPMC (EIRR bit get set on HPMC).
11F0 through 11FE	High Priority Machine Check (Refer to list 19 for detailed error messages.)

2. **Class ERROR 1**: Processor failure; Execution unit, error code = 14XX

Error Numbers	Description of error condition
1400	Undefined error occurred at start of test of this board.
1401	Data path through barrel shifter.
1402	Shift by 0, 1, 2, 4, 6, 8, 16, or 31 bits failed.
1403	Pattern test of 3/4 bit hardware boundaries failed.
1404	Pre-shift by 0 for MOVB failed.
1405	Extract sign/unsigned failed for some bit field.
1406	Failure of timing critical path of instruction mix MTCTL & VEXTRS.
1407	Failure while verifying shift amount register.
1408 and 1409	Reserved.
140A	Arithmetic/Logical conditions failed.
140B	Failure while testing unit conditions.
140C	Failure while testing Extract/Logical conditions.
140D **	Failure while testing PSW C/B bit. Second possible cause of error is Register File.
140E through 140F	Reserved.
1410	Failure while verifying condition on shift and add.
1411	Cannot verify shift one and add.
1412	Cannot verify shift two and add.
1413	Cannot verify shift three and add.
1414	Failure while verifying load byte short with odd. index
1415	Failure while verifying operation of PSWs C/B bits with Decimal Correct (DCOR) instruction.
1416	Failure while verifying PSWs C/B bit with logical shift operation (C/B gets updated).
1417	Cannot verify operation of logical add.
1418	Failure while verifying PSWs C/B bit with logical add operation (C/B gets updated).

1419	Addition of two negative numbers caused overflow trap.
1420	Failure while verifying overflow conditions with logical ADD instruction.
1421	Failure while verifying overflow conditions with EXTRU logical instruction.
1422	Failure while verifying operation of extract signed instruction.
141A	Cannot verify addition of two negative numbers.
141B through 141F	Reserved.
14F0 through 14FE	High Priority Machine Check (Refer to list 19 for detailed error messages.)

3. **Class ERROR 1**: Processor failure; Instruction unit, error code = 15XX

Error Numbers	Description of error condition
1500	Undefined error occurred at start of test of this board.
1501	Condition branch test failed.
**	Second possible cause of error is E_unit.
**	Third possible cause of error is Register File.
1502	Condition add with no overflow failed.
**	Second possible cause of error is E_unit.
**	Third possible cause of error is Register File.
1503	Odd condition failed.
**	Second possible cause of error is E_unit.
**	Third possible cause of error is Register File.
1504	Test unit true condition failed.
**	Second possible cause of error is E_unit.
**	Third possible cause of error is Register File.
1505	Test ext/dep true condition failed.
**	Second possible cause of error is E_unit.
**	Third possible cause of error is Register File.
1506 and 1507	Reserved.
1508	Branch and Link instruction cannot calculate return address.
**	Second possible cause of error is E_unit.
**	Third possible cause of error is Register File.
1509	Branch and Vector instruction cannot return to the given address.
**	Second possible cause of error is E_unit.
**	Third possible cause of error is Register File.

150A	Failure while verifying System mask portion of PSW.
**	Second possible cause of error is E_unit.
**	Third possible cause of error is Register File.
150B	Failure while verifying Co_Processor Configuration register.
**	Second possible cause of error is E_unit.
150C	Failure while verifying Interruption Vector Address or PC Offset Queue.
**	Second possible cause of error is E_unit.
150D	Failure while verifying Interruption Processor Status word.
**	Second possible cause of error is E_unit.
510E	Failure while verifying operation of PCOQ. (cannot verify functionality of PSWs Q bit).
**	Second possible cause of error is TLB.
150F	I_unit cannot force trap.
**	Second possible cause of error is Register File.
1510 through 1515	Reserved.
1516	PCOQ does not hold correct address after trap.
15117	IPSW does not get value of PSW after trap.
1518	IIR does not get value of instruction which cause trap.
1519	Failure while verifying forced Break Instruction trap.
1520	Failure while verifying forced Illegal Instruction trap.
1521	Failure while verifying forced Over Flow trap.
1522	Failure while verifying forced Conditional trap.
1523	Failure while verifying forced Branch Taken trap (cannot verify functionality of PSW'S T bit).
1524	Cannot verify functionality of PSWs B bit
1525	Cannot enable High Priority Machine Check with PSWs M bit.
1526	Cannot disable High Priority Machine Check with PSWs M bit.
1527	Cannot verify change of privilege with Branch External (BE) instruction.
1528	Cannot verify change of privilege with Branch and Link External (BLE) instruction.
1529	Cannot verify change of privilege with Branch Vector (BV) instruction.

152A	Failure while verifying functionality of Privilege Register trap.
152B	Failure while verifying functionality of Privilege Operation trap.
152C	Failure while verifying functionality of Lower Privilege Transfer trap.
152D	Failure while verifying functionality of Higher Privilege Transfer trap.
152C through 152F	Reserved.
1531	Unexpected High Priority Machine Check trap was taken.
**	Second possible cause of error is Register File.
**	Third possible cause of error is TLB.
1532	Unexpected low parity machine check trap was taken.
**	Second possible cause of error is Register File
**	Third possible cause of error is TLB.
1533	Unexpected illegal instruction trap was taken.
**	Second possible cause of error is Register File.
**	Third possible cause of error is TLB.
1534	Unexpected break instruction trap was taken.
**	Second possible cause of error is Register File.
**	Third possible cause of error is TLB.
1535	Unexpected privileged operation trap was taken.
**	Second possible cause of error is Register File.
**	Third possible cause of error is TLB.
1536	Unexpected privileged register trap was taken.
**	Second possible cause of error is Register File.
**	Third possible cause of error is TLB.
1537	Unexpected overflow trap was taken.
**	Second possible cause of error is Register File.
**	Third possible cause of error is TLB.
1538	Unexpected condition trap was taken.
**	Second possible cause of error is Register File.
**	Third possible cause of error is TLB.
1539	Unexpected assist emulation trap was taken.
**	Second possible cause of error is Register File.
**	Third possible cause of error is TLB.
153A	Unexpected privilege transfer trap was taken.
**	Second possible cause of error is Register File.
**	Third possible cause of error is TLB.
153B	Unexpected low privilege transfer trap was taken.
**	Second possible cause of error is Register File.
**	Third possible cause of error is TLB.

153C	Unexpected Taken Branch Trap was taken.
**	Second possible cause of error is Register File.
**	Third possible cause of error is TLB.
153D	Un-implemented trap was taken.
**	Second possible cause of error is Register File.
**	Third possible cause of error is TLB.
1540	Failure while verifying TOC/soft reset.
1541	Unexpected HPMC was found during forced TOC/soft reset.
1542	Could not verify PCQ front after RFI with Q bit off.
1543	Could not verify Assist Emulation trap (or could not verify bit zero of CCR).
1544	Could not verify Co_Processor Configuration Register by forcing Assist Emulation trap.
1545	Could not verify overflow trap with ADDIO instruction.
1546	Unexpected overflow trap was taken when it should not.
1547	Could not verify index other than zero with BLR instruction.
1548	Could not verify index other than zero with BV instruction.
1549	Could not verify System Mask (of PSW) with MTSM instruction.
154A through 154D	Reserved.
154E	Could not verify functionality of PSWs N bit (N bit does not get set for nullified instruction when taken branch trap is taken).
154F	Could not verify functionality of PSWs N bit (When N bit is set RFI target does not get nullified).
1550	Reserved.
1551	Could not verify functionality of PSWs X bit (Cannot prevent Data memory break trap by setting X bit).
1552	Failure while verifying PSWs V bit (could not verify remainder of divide step).
1553	Failure while verifying PSWs C bit.
1554	Failure while verifying IPSW in virtual mode.
1555	Failure while verifying PCQ in high virtual address.
1556	Failure while verifying small displacement in high virtual address.
1557	Failure while verifying PSW when HPMC was forced by TLB parity error.

1558	Could not force HPMC in virtual mode.
1559	Failure while verifying IPSW in virtual mode.
15F0 through 15FE	High Priority Machine Check (Refer to list 19 for detailed error messages.)

4. **Class ERROR 2:** Translation Lookaside Buffer/Cache failure; (TLB), error code = 26XX

Error Numbers	Description of error condition
2600	Undefined error occurred at start of test of this board.
2601	Failure while verifying Read and Write operation on Space registers via Space ID.
2602	Failure while verifying Read and Write operation on Space registers via MTSP.
2603	Reserved.
2604	Failure while verifying Read or Write access to a page with proper protection and access right.
**	Second possible cause of error is Cache.
2605	Failure while verifying operation of Write Disable bit.
**	Second possible cause of error is Cache.
2606	Failure while verifying operation of Public Access.
**	Second possible cause of error is Cache.
2607	Failure while verifying operation of PSW P__bit.
**	Second possible cause of error is Cache.
**	Third possible cause of error is I__unit.
2608	Failure while verifying operation of Data TLB miss. trap
**	Second possible cause of error is I__unit.
2609	Failure while verifying operation of Non__Access Data TLB miss trap.
**	Second possible cause of error is I__unit.
260A	Failure while verifying operation of Debug trap.
**	Second possible cause of error is I__unit.
260B	Failure while verifying operation of Dirty bit trap.
**	Second possible cause of error is I__unit.
260C	Failure while verifying operation of Virtual I/O trap.
**	Second possible cause of error is I__unit P.
260D	Failure while verifying Physical Page Number Rams.

260E through 260F	Reserved.
2610	Lower privilege trap not taken.
**	Second possible cause of error is I_unit.
2611	Failure while verifying data path through PIDs.
2612	Failure while verifying data path through PCSQ.
2613	Second possible cause of error is Cache.
2614	Failure while verifying Physical Address Generation or Physical Page Number Ram.
**	Second possible cause of error is Cache.
2615	Failure while verifying Read and Write with virtual address.
**	Second possible cause of error is Cache.
2616	Gate way instruction does not promote privilege to zero in a real mode.
**	Second possible cause of error is I_unit.
**	Third possible cause of error is Register File.
2617	Reserved.
2618	Failure while verifying privilege level generation with gate way instruction for page types 2 or 3.
**	Second possible cause of error is I_unit.
**	Third possible cause of error is Register File.
2619	Failure while verifying privilege level generation with gate way instruction for page types 4, 5, 6, or 7
**	Second possible cause of error is I_unit.
**	Third possible cause of error is Register File.
261A	Gate way instruction does not promote privilege to zero in a virtual mode.
**	Second possible cause of error is I_unit.
**	Third possible cause of error is Register File.
261B	Failure while verifying execution of gate way instruction in delay slot of branch (No trap was generated.)
**	Second possible cause of error is I_unit.
261C	Failure while verifying generation of Data Memory Protection trap.
**	Second possible cause of error is I_unit P.
261D	Failure while verifying generation of Instruction Memory Protection trap.
**	Second possible cause of error is I_unit.
261E through 261F	Reserved.
2620	Failure while verifying operation of ISR.
2621	Failure while verifying operation of IOR.

2622	Failure while verifying Parity generator and parity checking on D_TLB physical page Number RAMs.
**	Second possible cause of error is I_unit.
2623	Failure while verifying parity generator and parity checking on I_TLB Physical Page Number RAMs.
**	Second possible cause of error is I_unit.
2624 and 2625	Reserved.
2626	Failure while verifying memory protection trap with byte access.
2627	Failure while verifying memory protection trap with half word access.
2628	Failure while verifying memory protection trap with word access.
2629	Failure while verifying Instruction TLB miss fault.
262A	Could not force data TLB miss fault.
262B	Cannot verify Protection ID, Access ID.
262C	Cannot verify Public Pages.
262D	Cannot distinguish between I_CA and D_CA via diagnostic register
262E	Failure while verifying two cycle opcode instruction (Cannot verify TLB FREZ).
262F	Reserved.
2640	Cannot verify TLB indexing through its rams.
2631	Unexpected instruction TLB miss fault was taken.
**	Second possible cause of error is I_unit.
2632	Unexpected instruction memory protection trap was taken.
**	Second possible cause of error is I_unit.
2633	Unexpected data TLB miss trap was taken.
**	Second possible cause of error is I_unit.
2634	Unexpected non_access instruction TLB miss trap was taken.
**	Second possible cause of error is I_unit.
2635	Unexpected non_access data TLB miss trap was taken.
**	Second possible cause of error is I_unit.
2636	Unexpected data memory protection trap was taken.
**	Second possible cause of error is I_unit.
2637	Unexpected data memory break trap was taken.
**	Second possible cause of error is I_unit.

2638	Unexpected TLB dirty bit fault was taken.
**	Second possible cause of error is I_unit.
2639	Unexpected virtual device reference trap was taken.
**	Second possible cause of error is I_unit
26F0 through 26FE	High Priority Machine Check (Refer to list 19 for detailed error messages.)

5. **Class ERROR 2:** Translation Lookaside Buffer/Cache failure; (Cache), error code = 27XX

Error Numbers	**Description of error condition**
2700	Undefined error occurred at start of test of this board.
2701	Failure while verifying Read/Write protocol in the first and last set of D_cache RAM.
2702	Reserved.
2703	Failure while verifying Read or Write operation (address test) on Data Cache.
**	Second possible cause of error is memory.
**	Third possible cause of error is TLB.
2704	Failure while verifying Read or Write operation (data path test) on Data Cache.
**	Second possible cause of error is memory.
2705	Failure while verifying half word or byte operation on D_Cache.
**	Second possible cause of error is Register File.
**	Third possible cause of error is memory.
2706	D_Cache cannot set EIR bits.
**	Second possible cause of error is Register File.
2707	Failure while verifying operation of D_Cache Dirty bit, MISS, or flush.
**	Second possible cause of error is Register File.
**	Third possible cause of error is memory.
2708	Failure while verifying operation of D_Cache load word with clean miss.
**	Second possible cause of error is memory.
2709	Reserved.
270A	Failure while verifying parity error generator on byte zero.
**	Second possible cause of error is memory.
270B	Failure while verifying parity error generator on byte 1.
**	Second possible cause of error is memory.
270C	Failure while verifying Parity error generator on byte 2.
**	Second possible cause of error is memory.

270D **	Failure while verifying parity error generator on byte 3. Second possible cause of error is memory.
270E	Reserved.
270F	Stuck bit on CA diagnostic register.
2710 **	Failure while verifying data path on the Instruction Cache. Second possible cause of error is E unit.
2711 through 2714	Reserved.
2715 **	Size of I__CA and D__CA do not match (Check revision of E unit). Second possible cause of error is E unit.
2716	Cache line gets updated on data TLB MISS fault.
2717	Memory line get updated on data TLB MISS fault.
2718	Failure while verifying byte transaction with data cache MISS.
2719	Failure while verifying half word transaction with data cache MISS.
271A	Failure while verifying parity checking/generator with EIRR/CMD.
271B	Cache line gets updated on TLB data trap.
271C	Memory gets updated on TLB data trap.
1E and 1F	Reserved.
2720	Failure while verifying Cache tag parity error.
2721	Failure while verifying EIRR/CMD with its address.
2722	Failure while verifying soft reset with its address.
2723	Failure while verifying operation of LDCWS instruction.
2724	Failure while verifying semaphore in load word and clear.
2725	Failure while verifying operation of Cache MISS.
2726	Failure while verifying operation of Cache FREZ.
27F0 through 27FE	High Priority Machine Check (Refer to list 19 for detailed error messages.)

6. Class ERROR 3: Processor Dependent Hardware failure; error code = 3ZXX, Z = Slot Dependent Value (System Monitor Card 30)

Error Numbers	Description of error condition
3Z00	Undefined error occurred at start of test of this board.
3Z01	Data error while verifying byte 30 of NVM
3Z02	GR0 was found to be not zero in Transfer of Control (TOC).
3Z03 **	Invalid return address for Transfer of Control (TOC). Second possible cause of error is memory.
3Z04 through 3Z06	Reserved.
3Z07	Could not read PDC PROM, no PDC PROM installed.
3Z08	Could not find second part of selftest in PDC PROM, no PROM installed.
3Z09	Could not find PDC code in PDC PROM check PDC PROM.
3Z0A	Cannot initialize memory with Switch 3 Open.
3Z0B	GR0 was found to be not zero at TOC or HPMC save state routine.
3Z0C	Undefined error message was found for HPMC in HPMC save state routine.
3Z0D	Could not verify Checksum while down loading code from E_PROM on System Monitor Card.
3Z0E	Selftest completed with WARNING.
3Z0F	Selftest completed successfully.
3Z10 through 3Z20	Reserved.
3Z21	**Warning**: Failure while verifying stable storage.
3Z22	**Warning**: Failure while reading from stable storage.
3Z23 through 3Z27	Reserved for PDC/IODC code.
3Z28	**Warning**: Failure while reading from time of day clock.
3ZF0 through 3ZFE	High Priority Machine Check (Refer to list 19 for detailed error messages.)

7. **Class ERROR 4**: Co_Processor failure; error code = 4ZXX, Z = Slot Dependent value.

Error Numbers	Description of error condition
4Z00	Possible problem with FP.DMAWR+, FP.STATUS+, FP.ABORT+, FP.FRINH, C.MSR.CLK+, C.8MHZB-, C2.CPLD.VLD-, or any of UIW+[0:31]. A number of other problems are possible since this error code indicates that the coprocessor is frozen.
4Z01	Undefined.
4Z02	A single load followed by a single store with no intervening I-cache miss is executed. This checks FP.RREG.2B-, C.RREG.CLK+, FP.DMAWR+, FP.LSFREEZE+, FP.XREG.2B-, C.XREG.CLK+, FP.IFRZ+, and C1.CP1FREEZE-.
4Z03	A double load is done followed by a double store, checking to see that the lower word returns correctly. This tests FP.DMALO+ and FP.RAMADR+[7].
4Z04	A floating point operation is executed followed by a sufficient number of non-floating point instructions insure that the floating point operation is to completed. A single precision store is then performed to check the result. This tests FP.NFLOP+, the FLOP state, FP.MMB.DLY+, FP.FIR.CLK.4B-, FP.MAPEN+, the FIR register, and part U0504 (the mapper ROM), as well as logic controlling the math chips and microcode exception conditions. This code also occurs with a number of other problems.
4Z05	A floating point compare operation that sets the C-bit is executed. This is followed by an FTEST instruction that checks whether the C-bit has indeed been set. This tests FP.FREEZE.X+, C2.CP1.NULL-, FP.FBUSY+, FP.FINHIBIT-, and FP.TINHIBIT- as well as compare logic.
4Z06	A load of the status register is attempted from an I/O address. This should abort. This tests FP.ABORT+, FP.BAILOUT+, FP.STATUS+, and LSPH (internal to PAL).
4Z07	A coprocessor load is executed immediately followed by a floating point operation that uses the load data. This tests FP.LSBUSY+ and FP.LSB.DLY (internal to PAL).
4Z08	A floating point operation that causes a trapping exception is executed immediately followed by a coprocessor store with t-register conflict. The store should be delayed until the trap completes and thus should reflect the result of the trap. This tests FP.FRZTRP.C+, the t comparator, FP.CONFLICT.2B+, FP.CONFLICT+, FP.NIR-[22], FP.TVLD-, C2.TRAPASSIST1-, FP.TINHIBIT-, and FP.TRAP.X+ as well as microcode exception conditions.
4Z09	An unanticipated trap occurs possibly caused by failure of the $r1$ comparator or trap logic.

4Z0A	Bit-14 in GR[28] is set. An invalid operand is put in a given register and a floating point operation is attempted with *r*2 set to that register. This operation is immediately followed by a coprocessor load of a valid operand to *r*2. The test then checks bit 14 in GR[28]; it should be clear. The attempted operation results in an exception trap if the load is delayed by the *r*2 conflict comparator properly, and the trap handler clears GR[28]. This test therefore checks the *r*2 conflict comparator for proper operation.
4Z0B	A coprocessor load of a non-zero number to FPR[0] (the status register) is executed. Then a floating point operation with FPR[0] (zero for floating point operations) as an operand is executed. This test then ascertains that the floating point operation reflects an operand of zero. This checks FP.LSIR+[1] and FP.RAMADR+[1].
4Z0C	A floating point compare instruction that generates an exception is executed. This is followed immediately by a coprocessor load that has a destination field identical to the condition field in the compare instruction. This is followed immediately by a coprocessor double store of FPR[0]. The double store should find the T-bit set since the load should be completed by the time that the compare determines that a trap is necessary. If the load is frozen (an error), the trap will occur clearing the T-bit before the load. This tests FP.TVLD-.
4Z0D	A floating point operation with a zero t-field is executed followed by a coprocessor store of the status register. The status register is checked to assure that it has not been affected by the floating point operation. This tests FP.TOK- and FP.RAMADR+[0].
4Z0E	A coprocessor load to a reserved register is attempted. This should cause a reserved operation trap. This tests FP.RESERVED+.
4Z0F	A coprocessor load from an I/O address is attempted. This load should abort. This tests FP.STATUS+ and FP.ABORT+.
4Z31	Test results in unexpected assist exception trap, which could be caused by a number of problems in the system, possibly resulting from a test of the conflict comparator. In this test a floating point operation is executed immediately followed by a coprocessor load with an *r*1 conflict, i.e. a load the destination field of which is the same as the *r*1 field of the floating point operation. The result of the floating point operation is checked to ascertain that it reflects the original *r*1 data. This tests the function of the *r*1 comparator. This error code can also reflect a malfunction of one or more of the math chips.
4Z42	Test of ALUZERO condition fails.
4Z43	Test of ALUZERO condition fails.
4Z44	Test of ALUSIGN condition fails.
4Z45	Test of XOR in ALU fails.

4Z46	Test of AND in ALU fails.
4Z47	Test of OR in ALU fails.
4Z48	Test of load to status register fails.
4Z49	Test of instruction register fails.
4Z62	Failure of multiply chip U2302 detected.
4Z64	Failure of add chip U2104 detected.
4Z65	Failure of divide chip U2305 detected.
4Z80	Failure in nullify generation circuitry detected.
4Z86	Possible failure of RAM6, U1101 detected by microcode.
4Z90	Possible failure of RAM7, U1301 detected by microcode.
4Z91	Possible failure of RAM2, U1302 detected by microcode.
4Z92	Possible failure of RAM3, U1303 detected by microcode.
4Z95	Possible failure of RAM5, U1401 detected by microcode.
4Z96	Possible failure of RAM1, U1402 detected by microcode.
4Z97	Possible failure of RAM4, U1403 detected by microcode.
4Z98	Possible failure of RAM0, U1404 detected by microcode.
4ZC0	Possible failure of RAM0, U1404 detected by macrocode.
4ZC1	Possible failure of RAM1, U1402 detected by macrocode.
4ZC2	Possible failure of RAM2, U1302 detected by macrocode.
4ZC3	Possible failure of RAM3, U1303 detected by macrocode.
4ZC4	Possible failure of RAM4, U1403 detected by macrocode.
4ZC5	Possible failure of RAM5, U1401 detected by macrocode.
4ZC6	Possible failure of RAM6, U1101 detected by macrocode.
4ZC7	Possible failure of RAM7, U1301 detected by macrocode.
4ZCA	Error detected during a series of arbitrary microcoded calculations. Possible cause: mapper PROM or math chips.
4ZCC	Error detected which slows the execution of the Floating Point Unit.

4ZF0 through 4ZFE	High Priority Machine Check (Refer to list 19 for detailed error messages.)

8. Class ERROR 5: Bus Protocol failure; error code = 5ZXX, Z = Slot dependent value.

Error Numbers	Description of error condition
5Z00	Undefined error occurred at the start of this test.

9. Class ERROR 6: Architecturally Reserved (6XXX)

10. Class ERROR 7: Memory failure; error code = 7ZXX, Z = Slot Dependent value.

Error Numbers	Description of error condition
7Z00	Undefined error occurred at start of test of this board.
7Z01	Stuck bit in I/O status register or couldn't find four contiguous words without single bit error within the first 256Kb.
7Z02 ** **	Failure while verifying memory with its address. Second possible cause of error is Cache. Third possible cause of error is TLB.
7Z03 ** **	Failure while pattern testing memory. Second possible cause of error is Cache. Third possible cause of error is TLB.
7Z04 **	Multiple bit flag was set with single bit error. Second possible cause of error is Cache.
7Z05 **	Multiple bit flag does not get set with multiple bit error. Second possible cause of error is Cache.
7Z06 **	MC cannot calculate address of faulty memory. Second possible cause of error is Cache.
7Z07 **	Single bit error was found. Second possible cause of error is Cache.
7Z08 through 7Z09	Reserved.
7Z0A **	Parity checking/generator not working. Second possible cause of error is Cache.
7Z0B **	Failure while verifying Read and Write protocol. Second possible cause of error is Cache.
7Z0C **	Failure while verifying Read and Clear protocol. Second possible cause of error is Cache.

7Z0D through 7Z0F	Reserved.
7Z10	Undefined type of memory controller was found.
7Z11	32Mb memory controller must be installed first, HOLE is not allowed in the memory.
7Z12	Last 32Mb memory controller does not have memory array.
7Z13	Last 8Mb (3Mb MC & 5Mb MA) memory controller does not have memory array installed.
7Z2F **	During memory initialization no memory board was found. Second possible cause of error is Cache.
7Z50	During initialization no memory controller was found in slot 13.
7Z51 through 5F	Reserved for initialization.
7ZF0 through 7ZFE	High Priority Machine Check (Refer to list 19 for detailed error messages.)

NOTE

Memory test takes approximately 1.5 seconds per Megabyte of memory.

11. Class ERROR 8: I/O Channel Adapter Test; error code = 8ZXX, Z = Slot Dependent value

Error Number	Description of error condition
8Z00	Undefined error occurred at start of test of this board.
8Z01	Cannot enable Soft Physical Address (cannot set the SSET bit).
8Z02	Cannot disable Soft Physical Address (cannot reset the SSET bit to zero).
8Z03	Cannot verify memory with its address.
8Z04	Cannot verify memory with sliding ones.
8Z05	Cannot verify memory with sliding zeros.
8Z06	Cannot verify memory with all zeros.
8Z07	Failure while pattern testing EIEM register.
8Z08	Cannot set Interrupt register to zero.
8Z09	Failure while pattern testing Interrupt register.

8Z0A	Failure while pattern testing Chain_Ram_Base register
8Z0B	Failure while pattern testing Mask register.
8Z0C and 8Z0D	Reserved.
8Z0E	Failure while pattern testing Reset Address register.
8Z0F	Failure while pattern testing Reset Data register.
8Z10	Reset does not clear SPA.
8Z11	No installed CIO card was found, or none of CIO cards pass Selftest and ready for command.
8Z12	Stop Command does not set the RDY bit.
8Z13	Chain Command does not clear RDY bit.
8Z14	Cannot get interrupt at end of DMA (Appropriate bit in sub_mask register does not get reset).
8Z15	DMA does not transfer any data.
8Z16	RDY bit does not get set at end of DMA.
8Z17	Wrong status was returned from CIO card after disconnecting subchannel.
8Z18	Undefined error was found with CIO card (RFC, PST, PRE or LEV did not match).
8Z19	Reserved.
8Z1A	Data write error on HP-IB loopback (status error).
8Z17 through 8Z10	Reserved.
8Z1A	Data write status error was reported on HP-IB loopback test.
8Z1B	HP-IB card does not get ready for command.
8Z1C	Undefined status error was reported on HP-IB loopback test.
8Z1D	Data error on HP-IB loopback test.
18ZE	Channel does not request attention after disconnecting subchannel.
8Z1F	Reserved.
8Z20	Cannot verify link to previous link status block.
8Z21	Status error while verifying link status quad (reserved for now).

8Z22	Cannot verify link to last data quad.
8Z23	Cannot verify counter within the DMA chain quad.
8Z24	Reserved.
8Z25	Failure while verifying operation of channel with semaphore set to zero.
8Z26	Undefined error, could not find any installed memory board.
8Z27	Failure while verifying operation of channel with semaphore set to one after being zero for a while.
8Z28	Failure while verifying parity checking operation.
8Z29	Failure while verifying functionality of ME bit on channel adapter status register for data parity errors. Channel does not set ME bit on data parity errors.
8Z2A	Channel cannot identify a data parity error (wrong MSTAT on data parity error).
8Z2B	Failure while verifying functionality of ME bit on channel adapter status register for address parity errors. Channel does not set ME bit on address parity errors.
8Z2C	Channel cannot identify an address parity error (wrong MSTAT on address parity error)
8Z2D through 8Z2E	Reserved.
8Z2F	No midbus I/O card was found.
8Z30 through 8Z3F	Reserved for unexpected trap errors.
8Z40	Channel cannot finish log channel transaction (no interrupt at end of log channel transaction)
8Z41	Log channel status error. Transaction requires device adapter to be system controller and it is not. Check HP-IB card switch setting.
8Z42	Undefined log channel status error.
8Z43	Bad status was returned at end of HP-IB loopback test with log channel.
8Z43	Bad status was returned from HP-IB loopback test at the end of log channel.
8Z44	Subchannel does not come ready after log channel operation.
8Z45	Subchannel does not come ready after attention request enable followed by attention request operation.

8Z46	Wrong status was return from I/O card after ARQ.
8Z47	Correct bit does not get set in ARQ register.
8Z48	ARQ bit was found to be set before ARQ test (unknown error).
8Z49	Subchannel does not request attention after enabling attention request and request attention (write control of ARE and ARG).
8Z4A through 8Z4E	Reserved.
8Z4F	**Warning:** Channel cannot complete its test without HP-IB card
8ZF0 through 8ZFE	High Priority Machine Check (Refer to list 19 for detailed error messages.)

NOTE

Channel Adapter is about a 5 second duration.

12. Class ERROR 9: Console path test; error code = 9XXX. This error is a multiplexed error, refer to table 4-5 for a definition.

Error Numbers	**Description of error condition**
01WX 9YZZ	Console path related error or CIO error. W = CIO slot number. X = device address (always 0 for console). Y = CIO channel Mid-bus slot number. ZZ = IODC driver error code (00 - 7F).
0100 9Y80	IODC load from CIO channel in console path fail. Y = CIO channel Mid-bus slot number.
0100 9Y88	(Fault) No working console found, autoboot disabled. Y = CIO channel Mid-bus slot number.
01C0 9YZZ	(WARNING) Access Port selftest failure. Y = CIO channel Mid-bus slot number. ZZ = Access Port selftest code (00 - 7F).
01C0 9YF0	(WARNING) Access Port read of hex display failed. Y = CIO channel Mid-bus slot number.
01C0 9YFF	(WARNING) no Access Port found. Y = CIO channel Mid-bus slot number.

13. Class ERROR A: Boot path test; error code = AXXX. This error is a multiplexed error, refer to table 4-5 for a definition.

Error Numbers	Description of error condition
01WX AYZZ	Boot path related error and/or CIO error. W = CIO slot number. X = Device address (always 0 for console). Y = CIO Channel Mid-bus slot number. ZZ = IODC driver error code (00 - 7F).
0100 AY80	(WARNING) IODC load from CIO channel in boot path failed.
01WX AYF0	(WARNING) LIF volume label error (media may have been improperly initialized).
01WX AYF8	IPL checksum failed.

14. Class ERROR CX: Boot path display code; error/information code = CXXX.

Error Numbers	Description of error condition
C20X	Informational: First memory controller initialization. X = 1st memory controller Mid-bus slot number.
C201	(Fault) No memory controller found.
C40X	Informational: Primary console path initialization. X = CIO Channel Mid-bus slot number.
C54X	Informational: Primary boot path initialization. X = CIO Channel Mid-bus slot number.
C58X	Informational: Primary boot path I/O. X = CIO Channel Mid-bus slot number.
C5FF	Informational: Launch IPL that was read from primary boot path. X = CIO Channel Mid-bus slot number.
C60X	Informational: Alternate (hard wired) console path initialization. X = CIO Channel Mid-bus slot number.
C74X	Informational: Alternate boot path initialization. X = CIO Channel Mid-bus slot number.
C78X	Informational: Alternate boot path I/O. X = CIO Channel Mid-bus slot number.
C7FF	Informational: Launch IPL that was read from alternate boot path. X = CIO Channel Mid-bus slot number.

15. Class ERROR CA: Initialization; Power Fail, error code = CAXX

Error Numbers	Description of error condition
CAF0 through CAFE	High Priority Machine Check (Refer to list 19 for detailed error messages.)

16. Class ERROR CB: initialization; Transfer of control, error code = CBXX

Error Numbers	Description of error condition
CB01	GR0 was not zero.
CBF0 through CBFE	High Priority Machine Check (Refer to list 19 for detailed error messages.)

17. Class ERROR CE: Initialization; ISL Code, error/information code = CEXX

Error Number	Description of error condition
CE00	ISL is executing.
CE01	ISL is autobooting from the autoexecute file.
CE02	Cannot find an autoexecute file. Autoboot abort.
CE03	No system console found, ISL can only autoboot.
CE05	Directory size is too big, ISL reads only 2K bytes.
CE06	Autoexecute file in inconsistent. Autoboot aborted.
CE07	Utility file header inconsistent. SOM values invalid.
CE08	Autoexecute file input string exceeds 2048 characters. Autoboot aborted.
CE09	ISL command or utility name exceeds 10 characters.
CE0F	ISL has transferred control to utility.
CE10	Error detected in reading volume label - **FATAL!**
CE11	Error detected in reading directory - **FATAL!**
CE12	Error reading auto-file goes interactive.
CE13	Error reading from system console.
CE14	Error writing to system console.
CE15	Not an ISL command or utility in ISL directory.

CE16	System ID was not Precision Architecture ID.
CE17	Error reading in SOM header.
CE18	Bad magic number in SOM header.
CE19	Utility would overlay ISL in memory.
CE1A	Utility needs more memory than is configured.
CE1B	Error in reading utility into memory.
CE1C	Checksum was not correct after reading utility into memory.
CE1D	User input or autoboot input greater than 2Kb.
CE1E	Unknown or NULL boot device class.
CE21	Destination address is unvalid.
CE22	Error calling PDC_cache entry.
CE23	Error reading IODC_entry_init to memory.
CE24	Error in IODC_entry_init for console.
CE25	Error in IODC_entry_init for boot device.
CE26	Bad aux_id in SOM auxiliary header.
CE27	Utility file type not an IPL file type.
CEFO through CEFE	High Priority Machine Check (Refer to list 19 for detailed error messages.)

FFFF NO ERROR--Utility launched.

18. Loader ERROR: Parallel Card; error code = 005X

Error Numbers	**Description of error condition**
005B	Leftover word in parallel card buffer when it should have been empty.
005C	Word alignment problem in command address.
005D	Unknown hardware problem in parallel card.
005E	Unrecognized command.
005F	Parallel card in bad state.
00F0 through 00FE	High Priority Machine Check (Refer to list 19 for detailed error messages.)

19. High Priority Machine Check - detailed error messages; (error codes = XXF0 through XXFF)

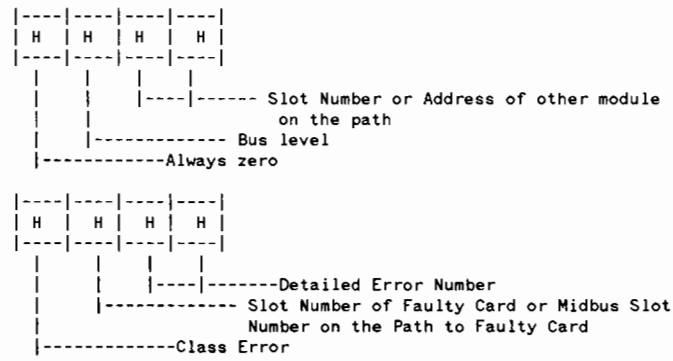
Error Numbers	Description of error condition
XXF1	Instruction TLB parity error (I-Unit).
XXF2	Data TLB parity error (I-Unit).
XXF3	Mid-bus address parity error or no slave response. The cache is the master and either the slave detects bad parity on the address cycle or a slave never responds to the address (does not assert word_slave).
XXF4	Mid-bus read data parity error. The cache is the master and is performing a read transaction and detects bad parity from the slave.
XXF5	Multiple bit Read error. The cache is the master and is performing a Read transaction and the slave pulls error. This is a possible multiple bit memory error, or a slave checking its own data and finding a parity error.
XXF6	Mid-bus Write data parity error. The cache is the master and is performing a Write transaction and the slave detects bad parity and pulls error.
XXF7	Mid-bus CMD/EIR data parity error/Mid-bus timeout. The cache is the slave and detects bad parity on a WRITE 4 to its command register or EIR register; or the cache detects a Mid-bus timeout error. A timeout error is one of the following: - cache detects master asserted for 8 cycles without an address valid cycle - master asserted for 60 cycles. - read_write asserted for 60 cycles.
XXF8	Cache tag parity error.
XXF9	Data cache Read parity error (RAMs internal to cache, not on MId-bus).
XXFA	Floating Point HPMC.
XXFB	Instruction parity error (I-Unit).
XXFC through XXFF	Undefined HPMC.

NOTE

This is an attempt to further define HPMCs. Its accuracy is not guaranteed. If more than one error occurred, only the smallest error number is displayed (if error F4 and F7 occurred, only F4 is displayed on Hex display).

Multiplexed Error Display Codes

Multiplexed error displays are used to provide more detail when available. The particular error display format is used primarily with the I/O tests. Refer to Section 8 of the Hardware Support Manual, P/N 09740-90011, for additional information. The first and second display formats are as follows:



Detailed error numbers are listed in the Selftest Error Message section.

SYSTEM DISPLAY CODES

Once the selftest has completed and the system is operating, the codes listed in this section can occur. Be sure to correlate the correct error code with the operating system of the SPU.

HP-UX System Display Codes

Error Numbers	Description of error conditions
B00X	System Panic.
B000	Panic Begun.
B009	Panic dump completed (discs not fully synchronized).
B00A	Panic dump completed (discs fully synchronized).
FXFF	System Running. An F in the first, third, and fourth digits implies the system is running normally. The X, second digit, is updated every 5 seconds with the length of the run queue at that time (an instantaneous reading, NOT an average). Loads higher than 9, display as an A. The Range is 0 to 100%, in increments of 10%.

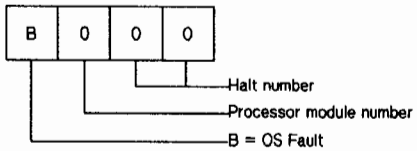
MPE-XL System Display Codes

When the system halts, the reason for the halt can be seen on the SPU Control Panel Status Display (refer to the Hex display in Figure 4-3). The first number is the source of the halt call, and following it are numbers of the form **0nxx** where **n** is a number that starts at 1 and increments. The reason can be interpreted by stringing the **xx** values together to form a number. When the monitor is the source of the halt, the first number is B000 (System Abort uses B007).

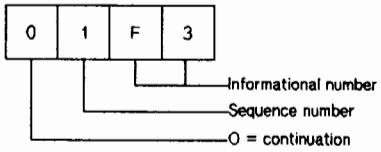
Examples:

B000 01F3 DNZZ	Monitor Halt 00F3 (same as selftest XXF3)
B000 018F DNZZ	Monitor Halt 008F (data page fault without RDB, MPE-XL not ready.)
B007 0103 DNZZ	SYSTEM ABORT 0003
B007 0103 0215 DNZZ DEAD	SYSTEM_ABORT 0315 (Hex)

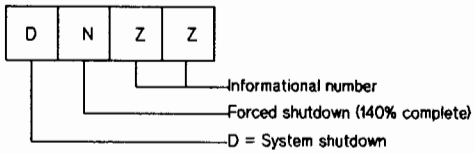
Multiplexed Display, first number displayed:



Following numbers displayed:



Last number displayed:



Error Numbers	Description of error condition
0001 through 0019	The breaker handler to (RDB) was re-entered. The last two digits are the hex number from Section 5 of the processor ACD.
0020	A breaker 0 instruction was encountered without RDB.
0021	An unknown HPMC happened.
0022	A non-recoverable LPMC happened.
0028	Reinit_idoc failed to read entry_init.
0029	Reinit_idoc failed to read entry_io
0030	Image larger than first memory controller.
003E	a non-recoverable branch taken or break trap occurred.
003F	A bad instruction was received from RDB.
0040	A configured module was lost on power fail.
0041	A bus converter was lost on power fail.
0042	A bus converter was added on power fail.
0043	Memory was added on power fail.
0044	A module was added on power fail which generated an address conflict.
0045	Memory selftest failed in map_system_state.
0046 through 004E	Error on call to entry_init in reinit_IODC (Error return number is 0050).
005B through 005F	The parallel card driver (RDB communications) encountered something it didn't like.
0066 through 006E	Error on call to entry_io in CONSOLE_READ or CONSOLE_WRITE (error return number is 0050).
0080 through 0099	A trap which neither RDB or MPE-XL was prepared for occurred. Number 0800 is the hex trap number from Section 5 of the processor ACD.
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.

SPU TROUBLESHOOTING

The repair strategy of the System Processing Unit (SPU) is to identify and replace any failed Field Replaceable Unit (FRU). In most cases the FRU will be a Printed Circuit Assembly (PCA).

Minimum Hardware Configuration

To troubleshoot the SPU, the following minimum hardware configuration is required:

- CPU (IU, EU, RF, CA, TLB).
- At least one Memory Controller (MC).
- Mid-bus.
- Channel Adapter.
- CIO Bus.
- Verified Power System.
- System Control Panel.
- System Monitor.
- Access Port (AP) card and MUX (6-port) card connected to System Console through an RS-232C junction panel.
- System Disc Drive connected to CIO Bus through an HP-IB card.
- Magtape drive connected to CIO Bus through an HP-IB card.

Table 4-7. Minimum Hardware Configuration (9000/840S)

QTY	Product number	Description
1	9740A	SPU
1	19748A	8 MB Memory
1	19744	Channel set (3 cards each set)
1	30192A	Access port
1	19742A	Floating point coprocessor
2	27110B	HP-IB device adapters *
1	27140A	Console mux
1	2392A	Console term
1	7914,7933 7935 or 7937	Disc drive
1	9144, 7974 or 7978	Tape drive **

* If using a 7914A with a built in cartridge tape using a single controller, only 1 27110B device adapter is required.

** A tape drive is not required if using a 7914 with integrated cartridge tape.

Troubleshooting Procedures

Observe for proper operation of the following SPU hardware, firmware, and software elements:

- AC and DC power supply and distribution.
- Selftest operation.
- Access port operation.
- Initial System Load (ISL) prompt appearance.
- Operating System boot.
- Online diagnostic subsystem operation.

When a malfunction is encountered, replace the assembly indicated in the test procedures and SPU Internal Control Panel selftest code legend. Refer to Chapter 8 in the Hardware Support Manual, P/N 09740-90011 for additional information.

Computer malfunctions can be isolated to the assembly level by performing the following tests:

1. DC power supply check.
2. Selftest (refer to Table 4-6, Selftest Error Messages, and Section 5. For additional information, refer to Chapter 8 in the Hardware Support Manual, P/N 09740-90011).
3. Diagnostics (refer to Section 5 or the Online Diagnostics Subsystem Manual, P/N 09740-90020 for more detailed information).

DC Power Supply Check

Verify the power supply voltages by performing the following procedure. The voltage checks must be made with all plug-in cards installed in the computer.

WARNING

Hazardous voltages are present. Observe all warning labels on equipment to ensure safety of personnel. All maintenance/repair work must be done by qualified personnel.

The following is a procedure for checking power supply voltages:

1. Verify that the Main Power Breaker is OFF.
2. Connect power cord to a power outlet having the electrical characteristics specified on the rear of the computer.
3. Turn the Main Power Breaker to ON.
4. Verify that voltages and signals found at the test points on the System Monitor Module (see Figure 4-5) are as listed in Table 4-8 by using a digital voltmeter.
5. Replace power supply if the computer does not pass the DC Power Supply Check. Refer to Section 6 in this manual or the Hardware Support Manual, P/N 09740-90011, for removal/replacement procedures.

Power Fail Check

Check the power fail recovery system as follows:

1. Verify the computer is on and the operating system is functioning properly.
2. Press battery backup test switch, ensuring that the LED is lighted (located on the System Status Display Panel in the front of cabinet).
3. Turn OFF the Main Power Breaker, located on the rear of the cabinet.
4. Open the front door, ensuring the Battery Backup LED is still lighted.
5. Measure battery voltage by using the +10BATTERY and GND test points (See Figure 4-5). If voltage measures less than 9.5 volts after approximately 5 minutes, replace the backup battery by referring to Chapter 6 in the Hardware Support Manual, P/N 09740-90011.
6. Turn ON the Main Power Breaker.
7. Turn OFF the battery backup switch.

CAUTION

Ensure the battery backup switch is used for testing only. Leaving the switch on will cause the battery to discharge.

8. Ensure the system runs selftest and boots correctly.

PDU Strapping Verification

While performing power verification, the PDU strapping is verified by removing the power cord cover and unplugging the power cord for the fan tray (see Figure 6-1 for location). Measure for the nominal AC source voltage of 230V AC (+/- 5%). This AC voltage must be the same nominal range as the source voltage at the wall outlet (nominal 200V - 240V AC). If the voltage is not within the desired range, re-strap the PDU to accomodate the source voltage. See Figure 4-4 for verification of the PDU strapping.

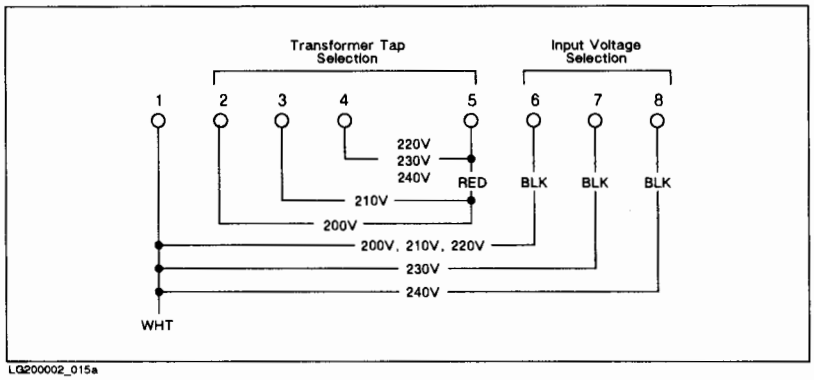


Figure 4-4. PDU Transformer Strapping Diagram

NOTE

The PDU is strapped, RED jumper from 4 to 5, BLACK to 6, and WHITE to 1, at the factory.

POWER SUPPLY TROUBLESHOOTING

Power supply troubleshooting consists of removal and replacement. The two procedures (one for Power Supply #1 and another for Power Supply #2 and #3) are found in Section 6 .

Power supply and distribution problems that do occur can be checked for proper operation by following the Troubleshooting Flowcharts (see Figures 4-6 thru 4-11).

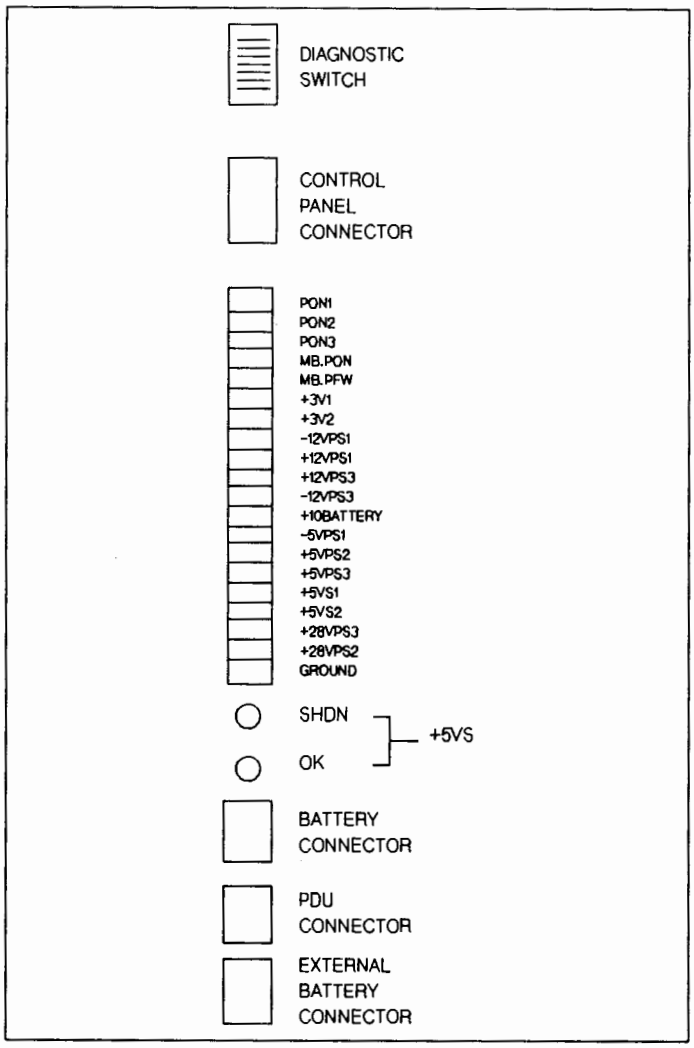


Figure 4-5. System Monitor Test Points

Table 4-8. Power Supply Voltage/Signal Test Points

Voltage Status	Maximum Ripple (Volt)	Test Signal	DC Voltage Specification
Power Supply		PON1, PON2, PON3 MB.PFW, MB.PON	2.4V min. (logic 1) 2.4V min. (logic 1)
Lithium Battery		+3V1, +3V2	2.5V minimum
Power Supplies (3)	0.12V 0.12V 0.30V 0.10V	-12V PS1, -12V PS3 +12V PS1, +12V PS3 +28V PS2, +28V PS3 +5V PS1, +5V PS2, +5V PS3	-10.56V to -13.44V 10.80V to 13.20V 22.4V to 33.6V 4.8V to 5.25V
Internal Battery		+10V BATT	8.4V to 11.90V
Secondary Power (Mid-bus slots)	0.1V	+5VS1, +5VS2 (SM)	4.8V to 5.25V
Ground		Ground	

NOTE

The above power supply test points are located on the System Monitor Card, P/N 09740-60905 (or 09740-69595, Exchange).

Table 4-9. Power Supply Voltage/Signal Test Table

SM Test Point	DC Volt Spec	Max Ripple (volt)
PON1	2.4V min. (logic high)	
PON2	2.4V min. (logic high)	
PON3	2.4V min. (logic high)	
MB.PON	2.4V min. (logic high)	
MB.PFW	2.4V min. (logic high)	
+3V1	2.5V min.	
+3V2	2.5V min.	
-12VPS1	-10.56V to -13.44V	0.12V
+12VPS1	10.80V to 13.20V	0.12V
+12VPS3	10.80V to 13.20V	0.12V
-12VPS3	-10.56V to -13.44V	0.12V
+10BATTERY	8.4V to 11.90V	
+5VPS1	4.8V to 5.25V	0.10V
+5VPS2	4.8V to 5.25V	0.10V
+5VPS3	4.8V to 5.25V	0.10V
+5VS1	4.8V to 5.25V	0.10V
+5VS2	4.8V to 5.25V	0.10V
+28VPS3	22.4V to 33.6V	0.3V
+28VPS2	22.4V to 33.6V	0.3V

If any of the DC voltages are out of specification, refer to the Hardware Support Manual for the appropriate troubleshooting or replacement procedure.

Selftest Switch Settings

Eight Dip switches (labeled Diagnostic Switch) located on the front of the System Monitor Module (see Figure 4-5) control the execution of selftest. Normal position for all switches is the CLOSED position.

Table 4-10. Selftest Switch Settings

SWITCH NUMBER	CLOSED POSITION	OPEN POSITION
1	Normal	Toggle switch to bypass error and execute the remainder of selftest; to boot system.
2	Normal	Continuous loop on selftest.
3	Normal	Soft Reset or Transfer of Control (TOC).
4	Normal	Detect single bit errors on memory.
5	Normal	Selftest will continue on nonfatal errors. Bypass I/O errors.
6	Normal	Reserved for future use.
7	Normal	Displays test sequence flow on the System Console.
8	Normal	Reserved for future use.

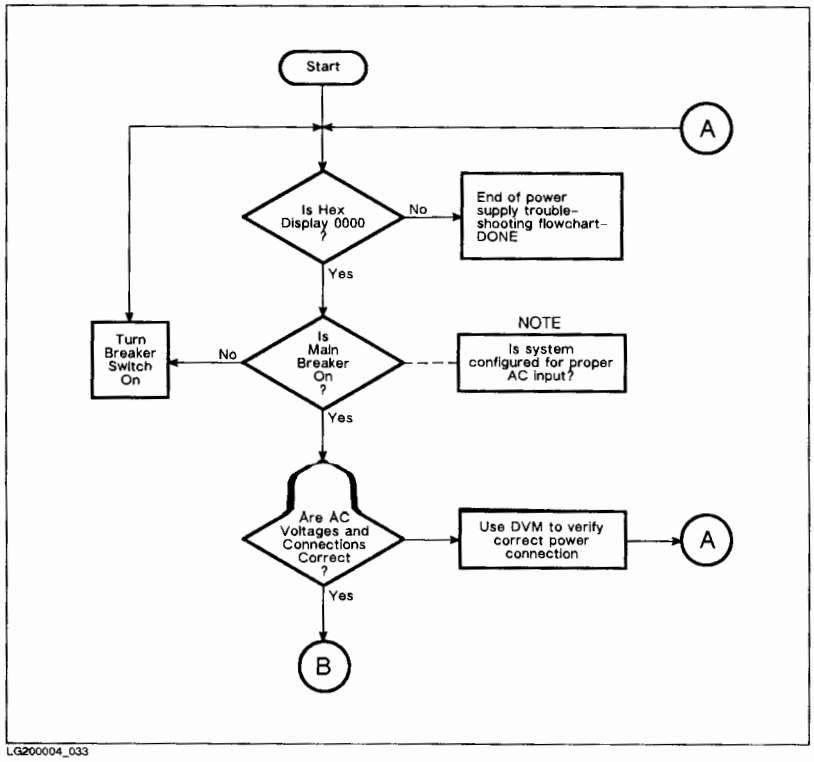


Figure 4-6. Power System Troubleshooting Flowchart 1

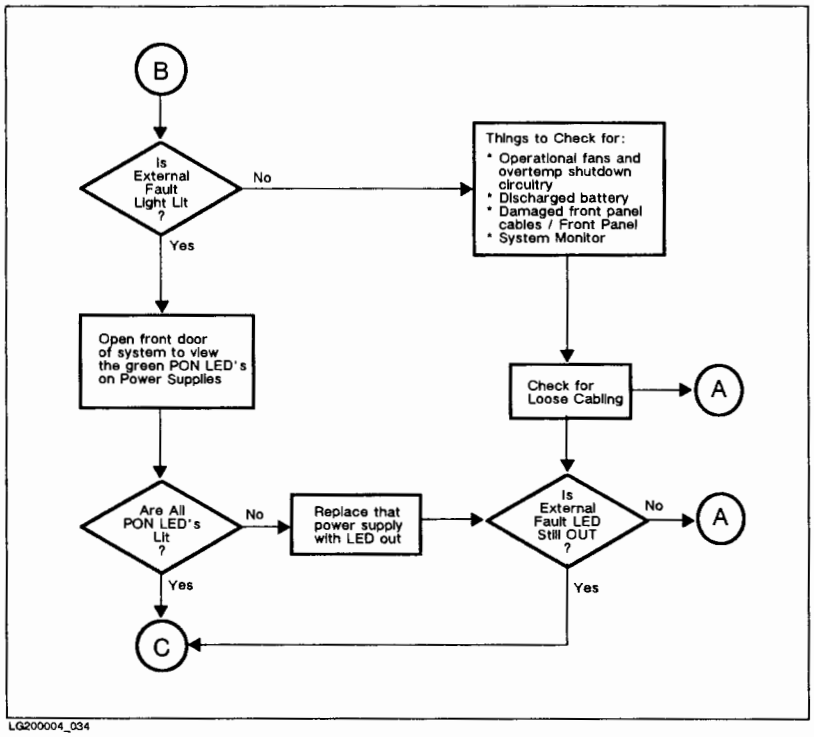


Figure 4-7. Power System Troubleshooting Flowchart 2

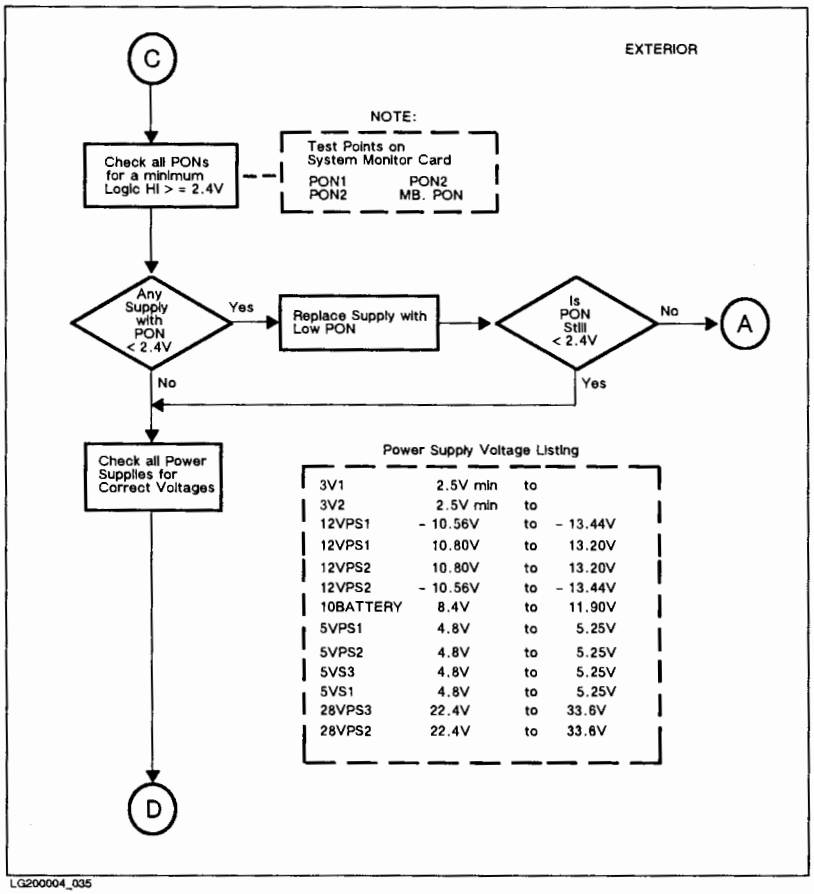


Figure 4-8. Power System Troubleshooting Flowchart 3

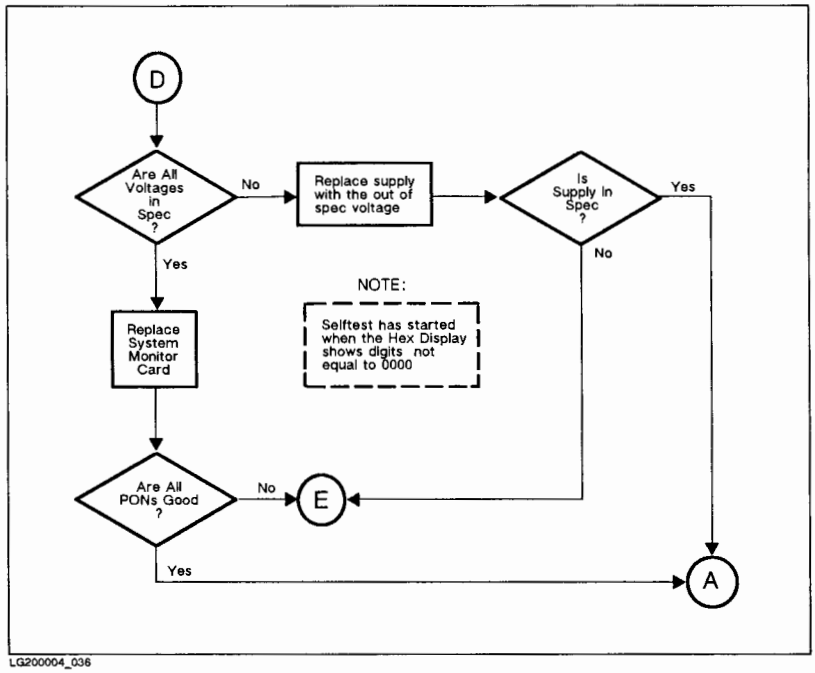


Figure 4-9. Power System Troubleshooting Flowchart 4

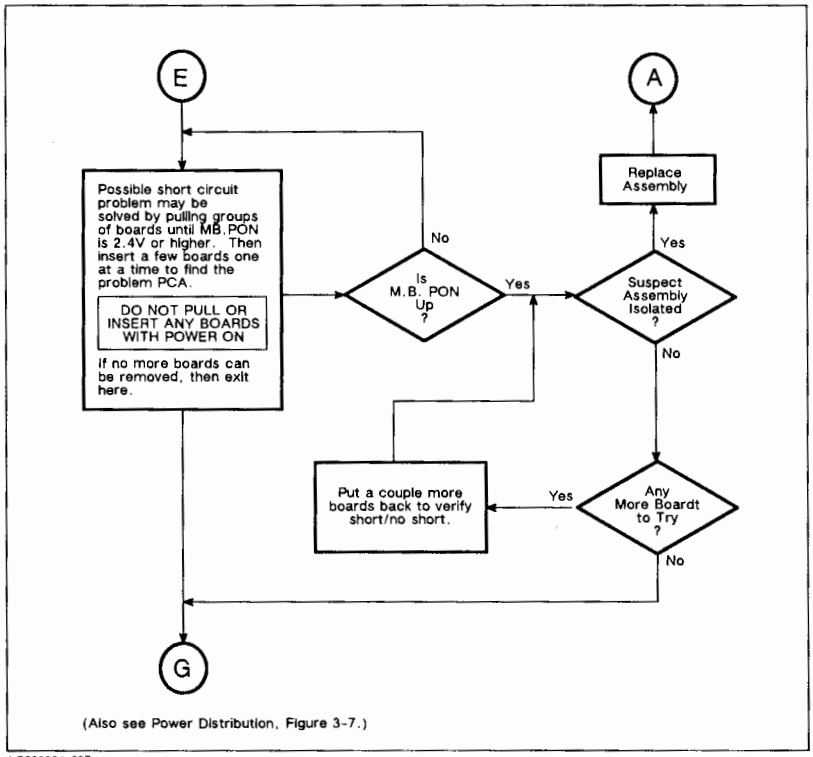


Figure 4-10. Power System Troubleshooting Flowchart 5

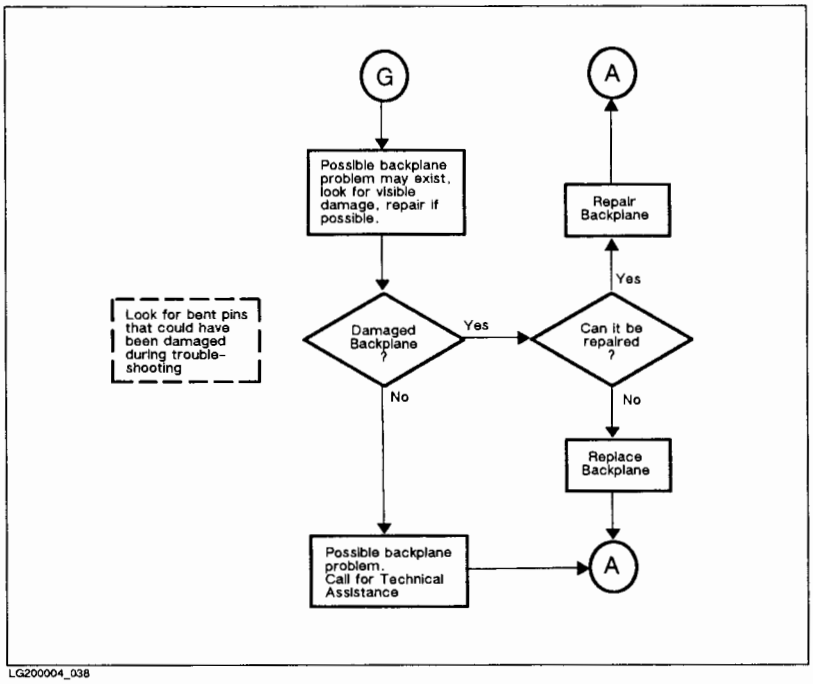


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Figure 4-11. Power System Troubleshooting Flowchart 6

Selftest as a Troubleshooting Tool

The following flowcharts (Figures 4-12 thru 4-18) illustrate how to use Selftest as a troubleshooting tool. Figures 4-12 thru 4-15 reference selftest operation and Figures 4-16 thru 4-18 reference HPMC troubleshooting.

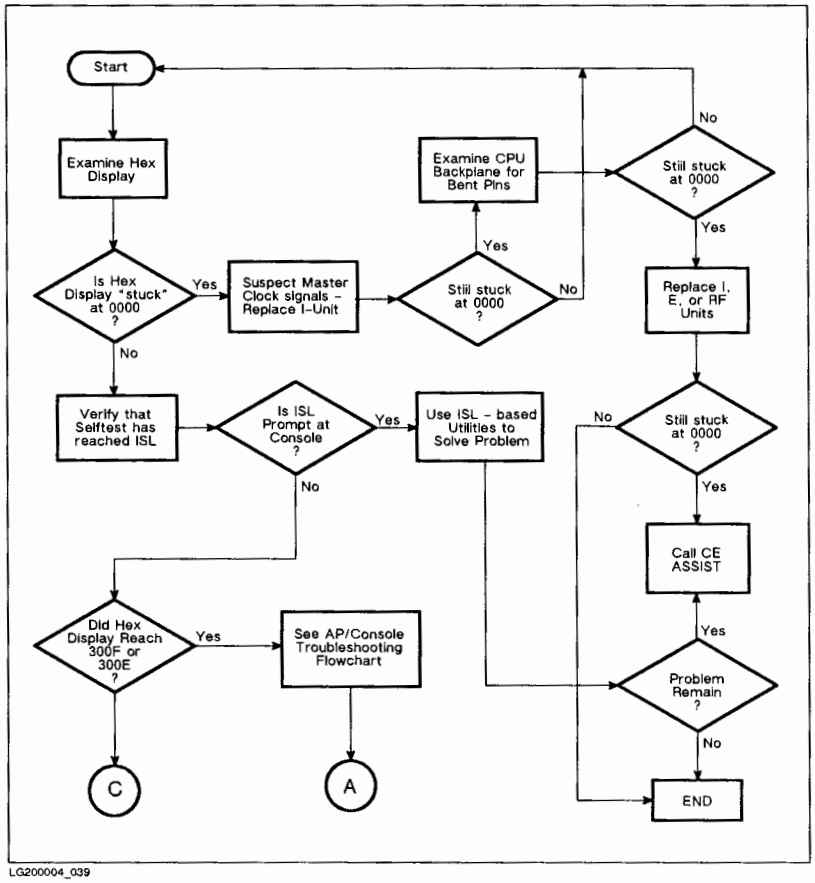

Figure 4-12. Selftest Operation Flowchart 1

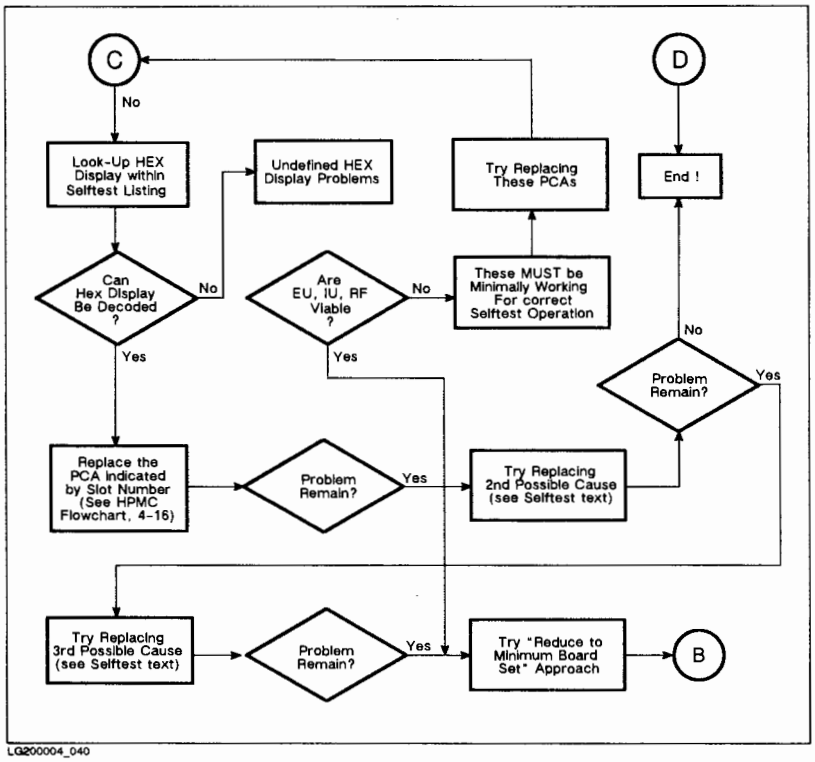

Figure 4-13. Selftest Operation Flowchart 2

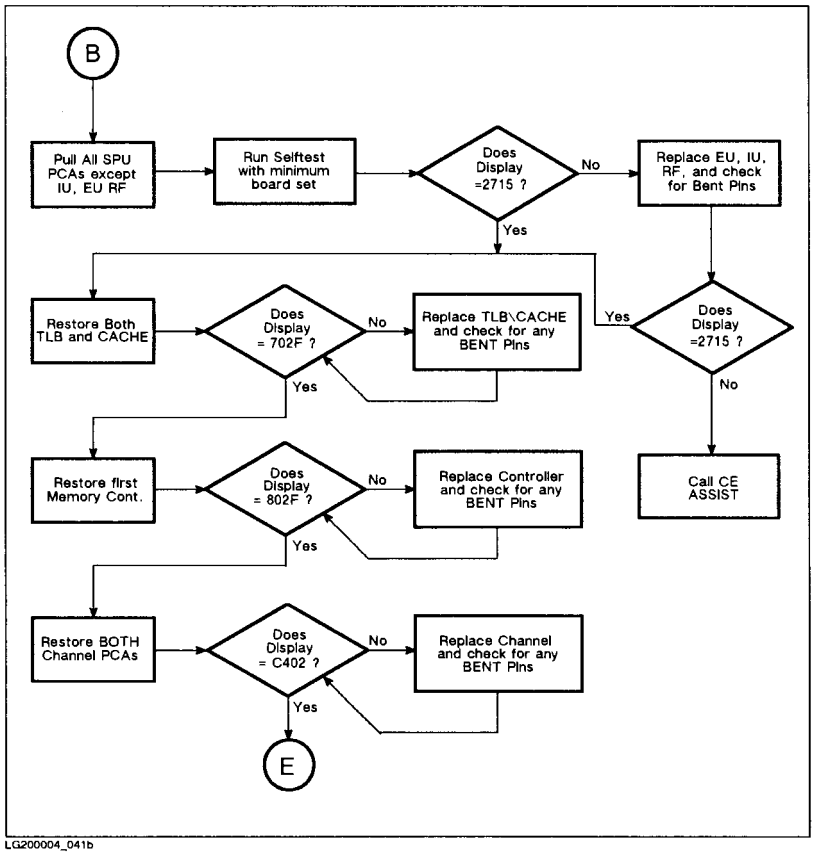

Figure 4-14. Selftest Operation Flowchart 3

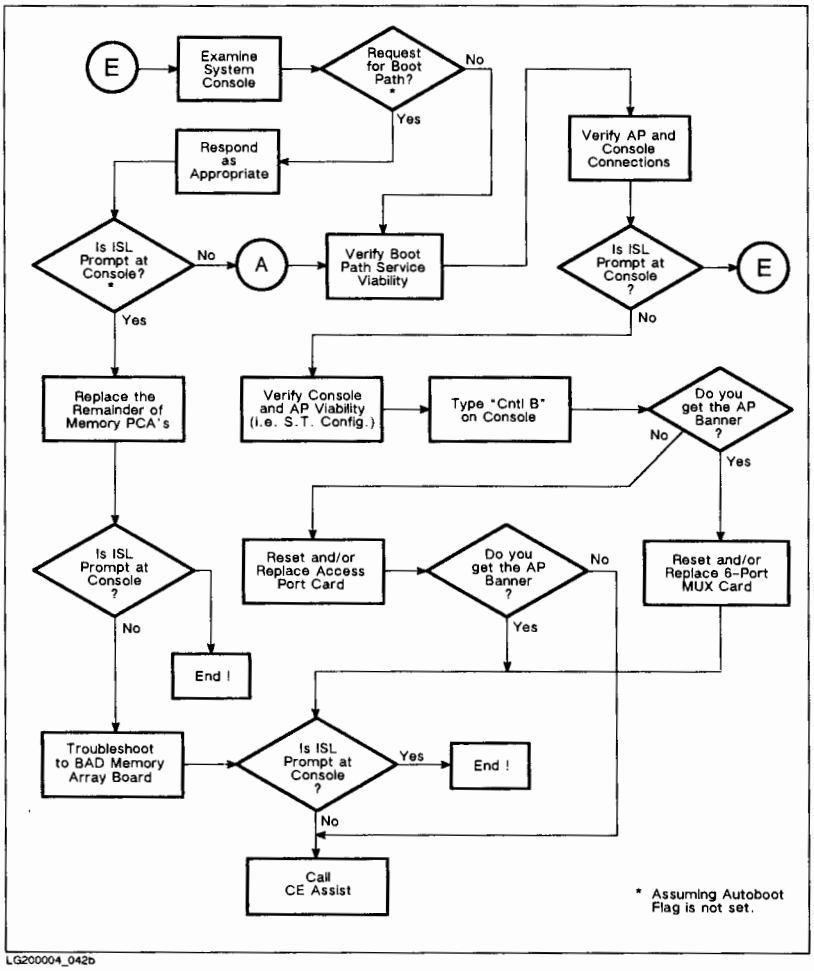

Figure 4-15. Selftest Operation Flowchart 4

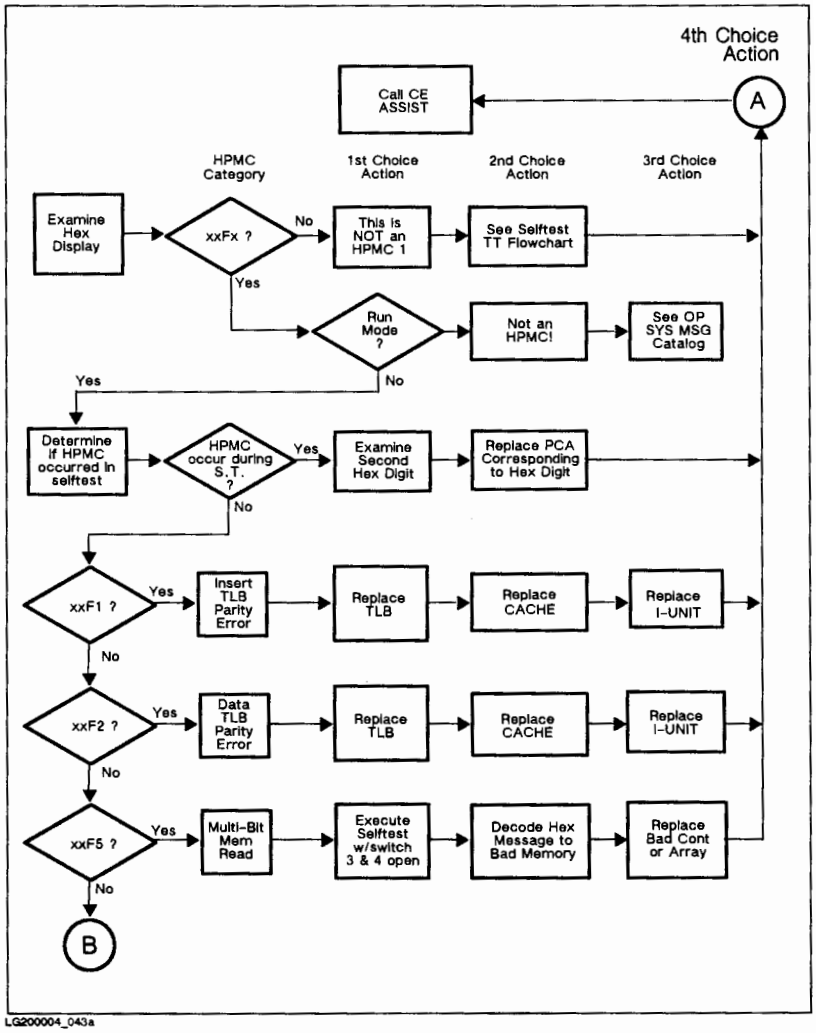

Figure 4-16. HPMC Troubleshooting Flowchart 1

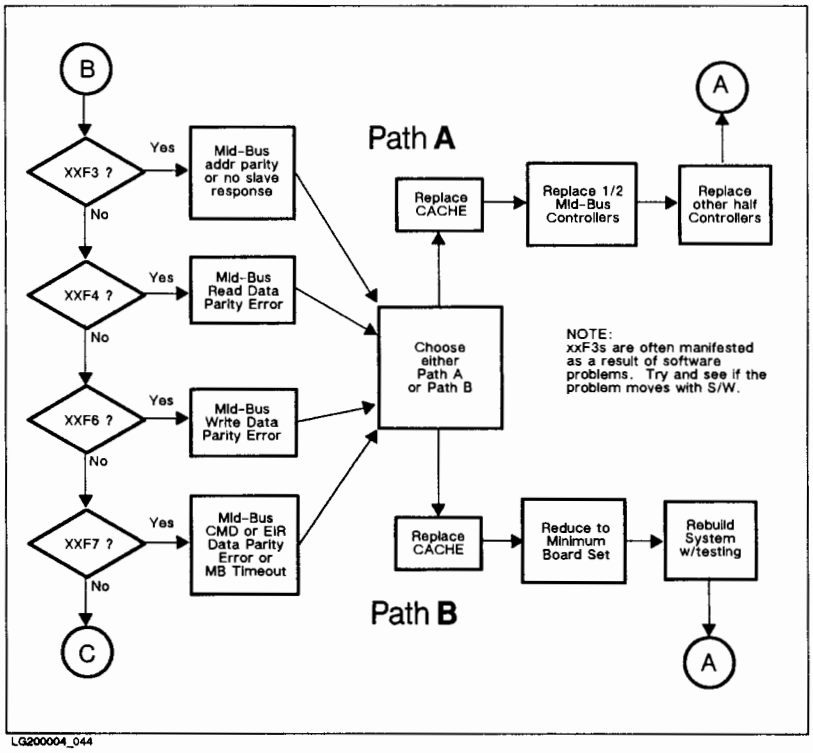

Figure 4-17. HPMC Troubleshooting Flowchart 2

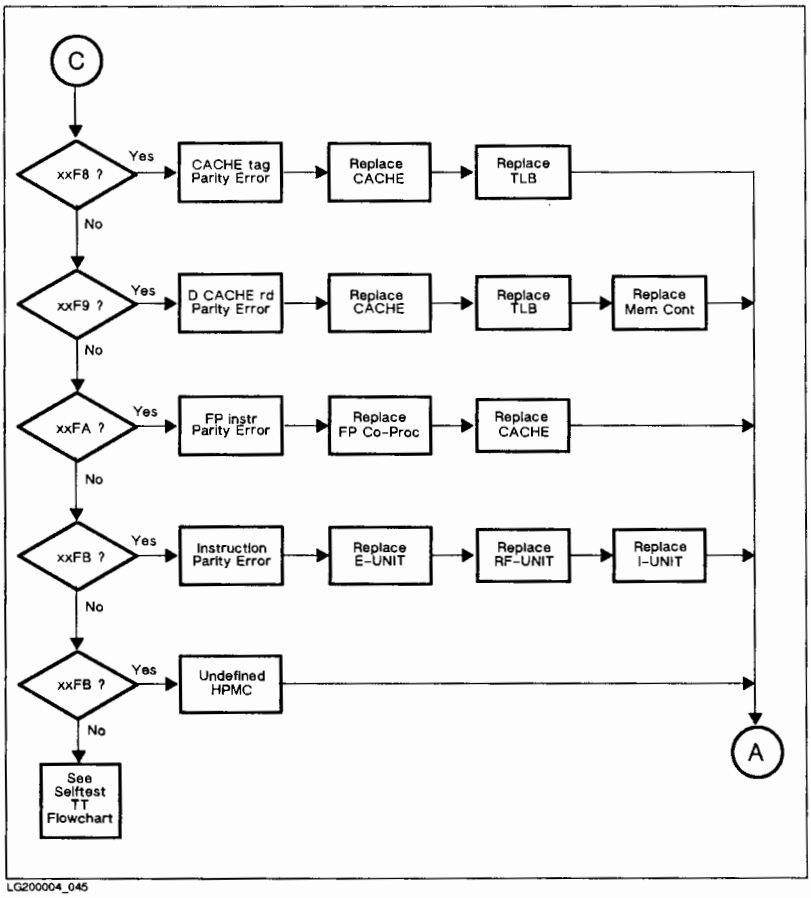

Figure 4-18. HPMC Troubleshooting Flowchart 3

ACCESS PORT SELFTEST AND TROUBLESHOOTING

Access Port (AP) Selftest checks the AP hardware with its associated cabling and connections. There are two primary ways of running AP selftest for troubleshooting purposes:

- Use the System Console.
- Use the frontplane of the AP PCA.

Additional information on AP Cable Test Hoods, verification of cable connections, and AP Selftest messages can be found in Chapter 8 of the Hardware Support Manual, P/N 09740-90011.

System Console Selftest

Invoke AP Selftest from the Access Port's command interpreter (CI) and use the following command:

```
CM> TA
```

Execution of AP Selftest through the AP CI is a full selftest. Results and test progress are printed on banners on the console display. Subtest codes appear successively on the ST_START_BANNER. If the test passes, the banner displays:

AP SELFTEST PASSED.

If the test fails, the banner displays:

AP SELFTEST FAILED SUBTEST XX (APERR 05).

XX is the code of the subtest that detected the failure. Refer to Table 4-9 to interpret any observed subtest results. Information for troubleshooting by port designation (see Figure 4-18) is found in Chapter 8 of the Hardware Support Manual, P/N 09740-90011.

AP Frontplane Selftest

The AP Selftest can be executed from the AP frontplane. This execution can be used when the System Console is not working well enough to report results of the test. The following is used in the execution of the AP Frontplane Selftest (see Figure 4-19 for the AP frontplane layout):

- A pushbutton switch (Selftest button).
- A display of eight LEDs.
- A test point pin labeled "LOOP".

Execution of the AP Frontplane Selftest is performed as follows:

1. The frontplane selftest button on the AP can be pressed (then released) at any time. The subtest codes are executed sequentially and displayed on the AP frontplane LEDs. When test hoods are present, they also are detected along with the associated circuitry.

2. The frontplane LEDs represent selftest in the following manner (TEST 0 and ST LED are the two upper LEDs that are not used as part of the Selftest display):

   - TEST 0 represents the LED Test. LEDs illuminate and extinguish.
   - ST LED represents selftest display mode and should be lit during Selftest execution.
   - LED 1, 2, 4, 8, 16, 32, and 64 display the number of the subtest being sequentially executed.

3. Selftest stops execution whenever a fault is discovered. The code of the failed subtest is displayed for 20 seconds. During this time, the CE should do the following:

   a. Copy the decimal values visible on the illuminated LEDs.

   b. Add decimal values together to get number of the subtest that failed.

   c. Refer to Table 4-9 to interpret test results.

   When selftest passes, the ST LED is lit and all the numbered LEDs are OFF. (This display lasts for only five seconds.)

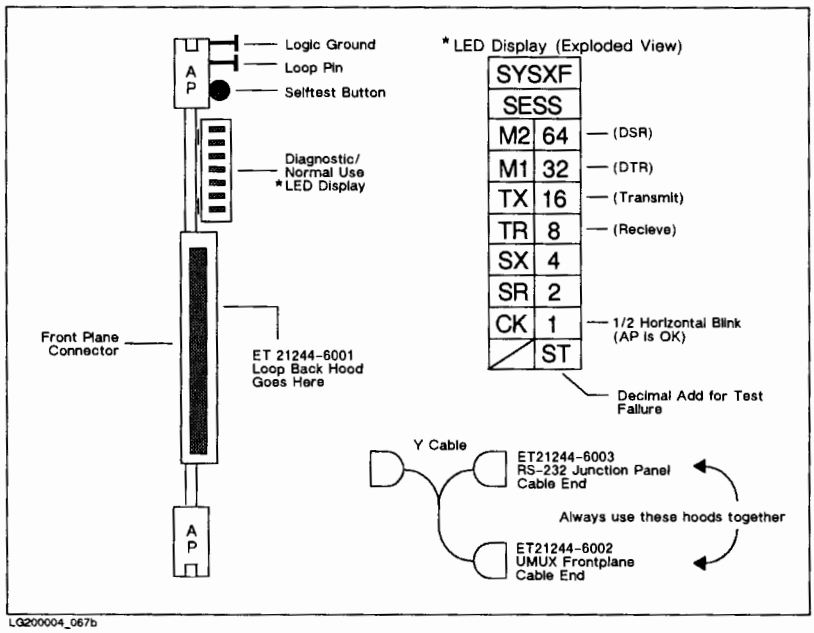

Figure 4-19. AP Frontplane Layout

4. If an intermittent failure is suspected, press and hold the Selftest button down so the AP Selftest can execute continuously until the fault is encountered. When the failed subtest code appears, release the button and continue with the previous troubleshooting procedure.

5. Test looping with the use of the LOOP PIN and an oscilloscope is used to locate intermittent faults and time critical faults. The CE does the following:

   a. Ground the LOOP PIN, then press and hold the Selftest button down.

   b. Observe the displayed timing as the test continuously loops over the executed subtest that is failing.

   c. Release the Selftest button for Selftest to execute to completion.

Table 4-11. Selftest Results

Subtest #	Subtest Name	PON_ST	Button_ST	CI_ST T0	CI_ST T1	S0_ST	DP_ST	IDLE_ST
00	LEDTEST	X	X	X	X	X	X	
01	Z80TEST1	X	X	X	X	X	X	X
02	Z80TEST2	X	X	X	X	X	X	X
03	ROMTEST	X	X	X	X	X	X	X
04	RAMTEST	X	X	X	X	X	X	X
05	Z80TEST3	X	X	X	X	X	X	
06	RAMALIAS	X	X	X	X	X	X	
07	NVMTEST	X	X	X	X	X	X	X
08	CTRL1	X	X	X	X	X	X	
09	CIO_TIMER	X	X	X	X	X	X	
10	FPREG	X	X	X	X	X	X	
11	S0LOOP	X	X	X	X	X	X	
12	T0LOOP	X	X	X	X	X	X	
13	DPLOOP	X	X	X	X	X	X	
14	ST_CONFIG	X	X	X	X	X	X	
15	SESS_INDCATR	FPH	FPH				FPH	
16	T1_CONN	X	X	X	X	X	X	
17	Y_T1LOOP_IDLE	X	X	X		X	X	
18	S1_HOOD_ORNC	X	X	X		X	X	
19	CONSLOE	X	X	X	X	X	X	
20	FPLOOP_TEST_S0	FPH	FPH				FPH	
21	T1LOOP	X	X	X	X	X	X	
22	FPLOOP_TEST_T1	FPH	FPH				FPH	
23	NFPTEST_T1	FPH	FPH				FPH	
24	NFTTEST_T1	FPH	FPH				FPH	
25	D_CONLOOP_T1	T1H	T1H	T1H		T1H	T1H	
26	TERM_TEST_T1		X	X	X	X	X	
27	FPLOOPTESTS1	FPH	FPH				FPH	
28	NFPTEST_S1	FPH	FPH				FPH	
29	NFSTEST_S1	FPH	FPH				FPH	
30	D_CONLOOP_S1	S1H	S1H	S1H		S1H	S1H	

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X: The subtest is executed.
FPH: The subtest is executed only if there is a hood on front plane.
T1H: The subtest is executed only if there is a hood on port T1.
(T1 is the Remote Support modem port.)
S1H: The subtest is executed only if there are hoods on ports T1 and S1.
(T1 is the Remote Support modem port and S1 is the Session port.)

REMOTE MAINTENANCE

Remote support capability for the HP 3000/930 and HP 9000/840 Computer Systems is provided through the Access Port (AP) in conjunction with the modem connection at the system site.

NOTE

The term REMOTE refers to a console terminal (HP 2392A) connected to a computer system via a modem (not located at the system site). LOCAL refers to the console terminal located at the system site.

The following installation must apply to ensure remote maintenance contact:

- Access Port (AP) Card, P/N 5061-2537, is installed in slot C of the lower CIO Card Cage. (See Figure 3-3.)
- Cables are properly installed. (See Figures 4-20 and 4-21.)
- System Console is correctly configured for remote maintenance.

Validate the configuration of the remote support port by performing the following steps:

1. Open the front cabinet door.
2. Press the CONSOLE button (located on the Internal System Status Display Panel) if the CONSOLE ENABLED LED (located on the External System Status Display Panel) is not lighted. (See Figure 4-1 for illustrations.)
3. Press CNTL and B on the System Console simultaneously for the System Console to access the AP Control Mode.
4. Ensure that the CM> prompt is displayed on the System Console. The user softkey area should now display remote status and SPU status display hex codes.
5. Enter the valid AP command (refer to Table 4-12) at the CM> prompt. Table 4-12 lists the valid Access Port commands used for Remote Maintenance. Refer to Chapter 8 of the Hardware Support Manual, P/N 09740-90011, for detailed command syntax information.

Table 4-12. AP Commands for Remote Maintenance

COMMAND	DESCRIPTION
he or Help	To list valid commands for the Access Port.
ca	To configure or validate the configuration of the remote support port.
er	To enable remote access.
dr	To disable remote access. (Pressing the CONSOLE button on the Internal Display Panel also disables remote access.)
p pam	To alter ram or eeprom on card. Eeprom is protected by check sum bytes.
pdm	Allows user to display rom, ram, and eeprom.
pdd	Allows user to display I/O control and data bytes.
pad	To alter I/O control and data bytes.

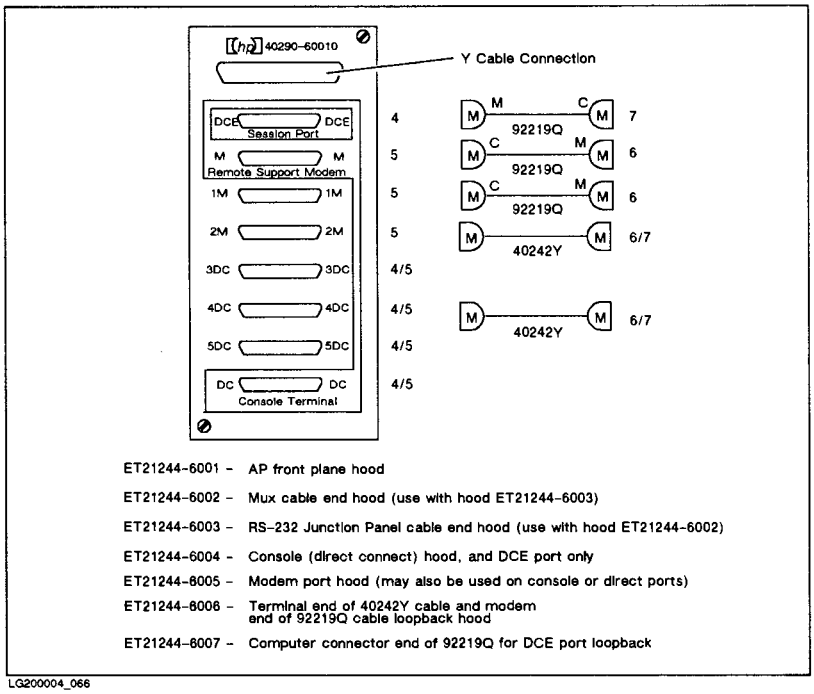


Figure 4-20. AP Cable Testhood Diagram

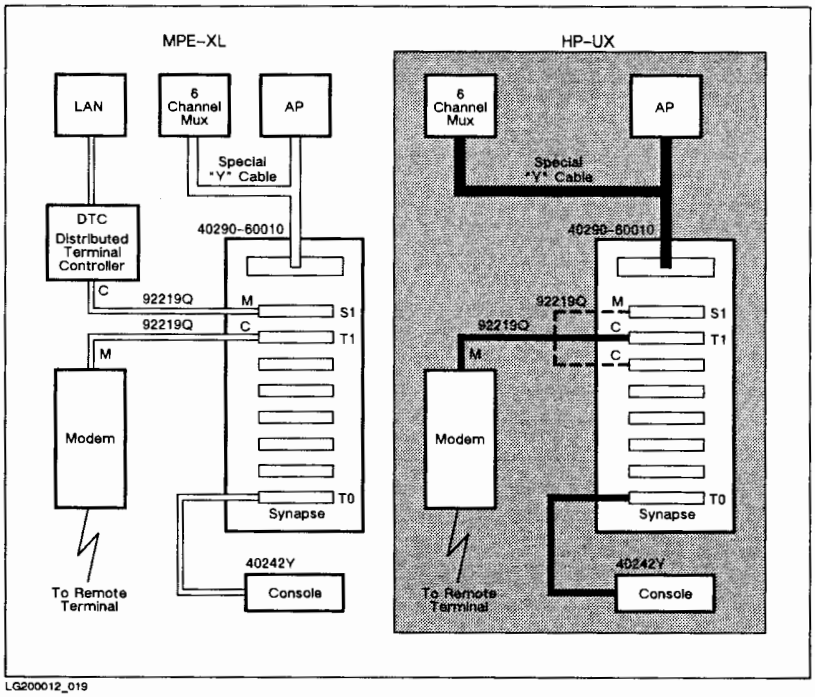


Figure 4-21. Remote Maintenance Cable Configuration Diagram

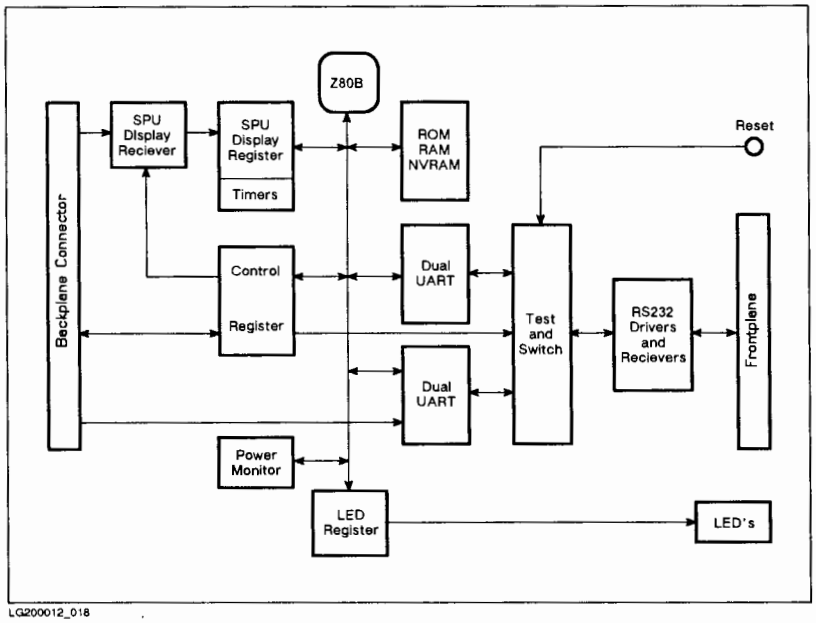


Figure 4-22. AP Card Block Diagram

PDS BOOT ERROR CODES

IODC Status

A. MAIN ERROR CODES

PARAMETER RELATED ERRORS

unsupported device adapter	-2	FFFF FFFE
Unsupported device	-3	FFFF FFFD
Unsupported unit	-4	FFFF FFFC
Unsupported data transfer size	-5	FFFF FFFB
Invalid slot	-8	FFFF FFF8
Invalid HPIB address or Port number	-9	FFFF FFF7
Invalid Unit	-10	FFFF FFF6
Invalid Volume	-11	FFFF FFF5

HPA AND CHANNEL ERRORS

CIO Channel not ready (io_status.ry = 0)	-17	FFFF FFBF

SUBCHANNEL ERRORS

Subchannel not ready(subch_status.rdy=0)	-32	FFFF FFE0

DEVICE ADPATER ERRORS

Device adapter not ready (sense.rfc =0)	-66	FFFF FFBE
Device adapter selftest failed (sense.pst =0)	-67	FFFF FFBD

DEVICE ADAPTER LEVEL TRANSACTION ERRORS

IDY error	-128	FFFF FF80
HPIB initialize error	-192	FFFF FF40
HPIB data loopback error	-256	FFFF FF00
HPIB configuration error	-320	FFFF FEC0
HPIB amigo identify error	-384	FFFF FE80
6_port mux io error	-448	FFFF FE40
6_port mux read status error	-512	FFFF FE00
6_port mux device controlled Xon/Xoff enabled error	-576	FFFF FDC0
6_port mux forced transmit error	-640	FFFF FD80

TAPE DRIVE DEVICE LEVEL TRANSACTION ERRORS

Device adapter program download error	-1088	FFFF FBC0
Selected device clear to tape drive error	-1152	FFFF FB80
Tape drive write loopback data error	-1216	FFFF FB40
Tape drive loopback error	-1280	FFFF FB00
Tape drive rewind error	-1344	FFFF FAC0
Tape drive io error	-1408	FFFF FA80

CS80 DEVICE LEVEL TRANSACTION ERRORS

Selected device clear to CS80 device error	-2112	FFFF F7C0
Read loopback to CS80 device error	-2176	FFFF F780
CS80 io error	-2240	FFFF F740
CS80 describe error	-2304	FFFF F700

IODC Status (Cont.)

ALINK-AMUX ERRORS

Global status error	-4096	FFFF F000
Device identify error	-4160	FFFF EFC0
Configure error	-4224	FFFF EF80
Reset error	-4288	FFFF EF40
CLOOP error	-4352	FFFF EF00
DLOOP error	-4416	FFFF EEC0
ACS80 IO error	-5120	FFFF EC00
ACS80 extended describe error	-5184	FFFF EBC0

B. SECONDARY ERROR CODES

In order to provide more information, IODC may add one of the following error codes to a main error code:

DMA TRANSACTION ERRORS

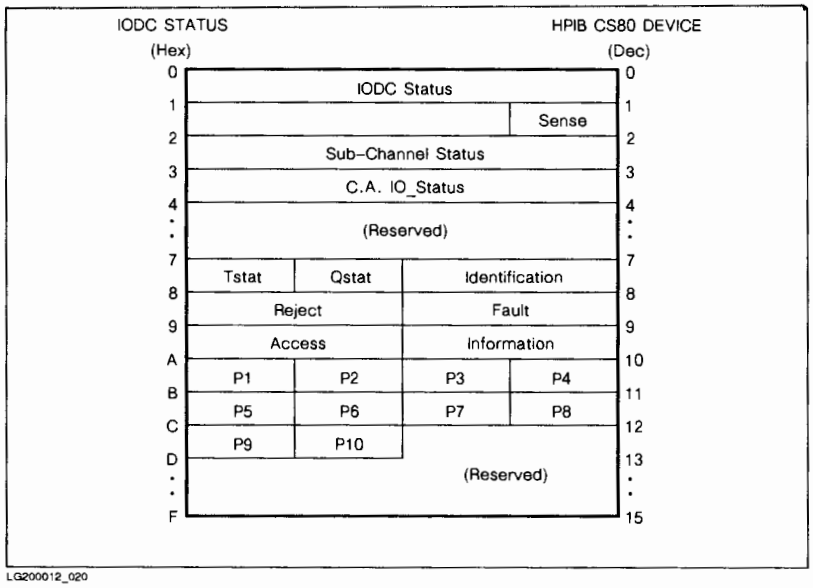
DMA timeout	-1	FFFF FFFF
DMA abort error	-2	FFFF FFFE
DMA residue <>0 in last transaction of chain	-8	FFFF FFF8
DMA residue <>0 in 2nd to last transaction of chain	-9	FFFF FFF7
DMA residue <>0 in 3rd to last transaction of chain	-10	FFFF FFF6
DMA residue <>0 in 4th to last transaction of chain	-11	FFFF FFF5
DMA residue <>0 in 5th to last transaction of chain	-12	FFFF FFF4
DMA residue <>0 in 6th to last transaction of chain	-13	FFFF FFF3
DMA residue <>0 in 7th to last transaction of chain	-14	FFFF FFF2
DMA residue <>0 in 8th to last transaction of chain	-15	FFFF FFF1

CIO TRANSACTION STATUS ERRORS

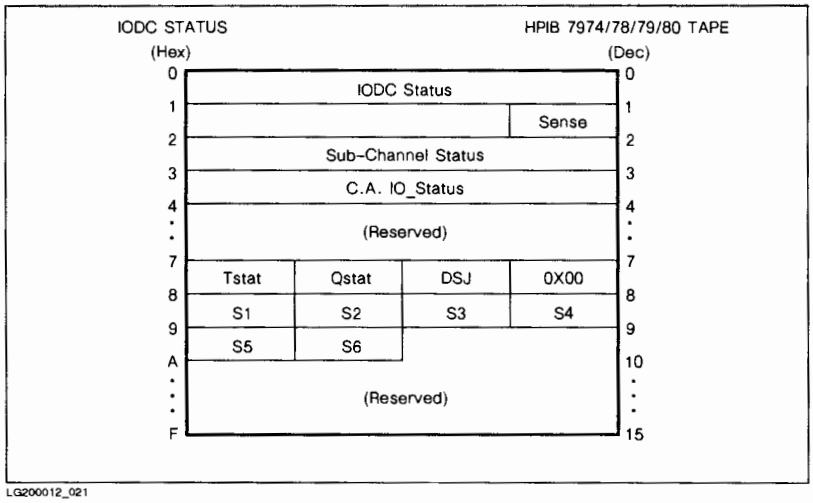
Data error	-48	FFFF FFD0
TSTAT error	-49	FFFF FFCF
CS80 QSTAT error	-50	FFFF FFCE
Tape drive device adapter program HSTAT error	-51	FFFF FFCD

(DSC = Disconnect Subchannel)

IODC Status (Cont.)

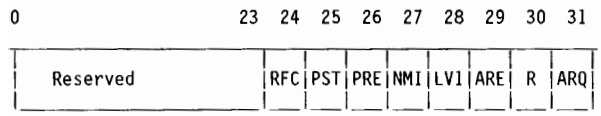


LG200012_020



LG200012_021

CIO DA Read Sense Data



RFC - Ready For Command: Asserted if the device adapter can accept a command byte.

PST - Passed Self Test: Asserted if selftest passed.

PRE - Present: Asserted if the device adapter is a Non Level 1 device adapter.

NMI - Non Maskable Interrupt: Asserted if the device adapter is asserting the NMI backplane signal.

LV1 - Level 1 Present: Asserted if the device adapter is a Level 1 device adapter.

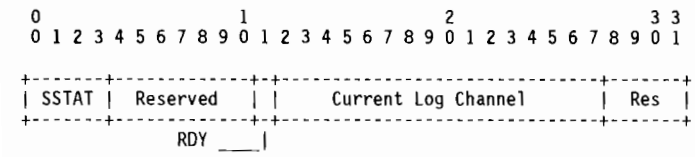
ARE - Attention Request Enabled: Asserted if the device adapter is enable to respond.

R - Reserved

ARQ - Attention Request: Asserted if the device adapter is requesting attention independent of ARE.

(Note : This register resides on the CIO Device Adapter Card).

Subchannel Status Register



The sub channel Status register contains the last error detected on this sub channel (SSTAT), the sub channel Ready bit, and the number of the Log channel (if any) currently active on this sub channel.

The SSTAT field is always 0 and as such, indicates that the channel received an RTS response of:

AES, LCD, ERT, or an undefined RTS Op Code

When an error occurs, the software can read the sub channel status register to determine which logical channel was involved.

The RDY bit, if set, indicates that a CHAIN command can be executed for this sub channel. The CHAIN command causes the CA to clear the RDY bit. The RDY bit will stay clear (0) until the DMA chain is completed if the sub channel is sub channel multiplexed, or until the chain of log channel initiates is completed if the sub channel is log channel multiplexed.

(Note : This Register resides on the Channel Adapter).

HPIB DA TSTAT Codes

The TSTAT provides status information regarding the transaction. The meaning of a particular value of TSTAT is the same for all transactions. Some meanings, however, are not applicable to all transactions and hence will never be returned for particular transactions. The TSTAT values and their corresponding meanings are tabulated below. The range of the values is 0 to 254. The value 255 is reserved for purposes of extending the range of the values if the need should ever develop.

TSTAT will reflect the first failure detected in the most recent transaction or may indicate terminating conditions or will indicate no exceptional conditions. Some transactions will have additional status information following TSTAT such as QSTAT for CS/80.

(hex) TSTAT	Description
00	No exceptional conditions. (Does not mean QSTAT =0)
01	Read transaction was terminated by EOI
02	Read transaction was terminated by EOI; Count was odd
03	Read transaction was terminated by count
04	Read transaction was terminated by count; Count was odd
05	Read transaction was terminated by LF
06	Read transaction was terminated by LF; Count was odd
07	Read transaction was terminated by MSA
08	Read transaction was terminated by MSA; Count was odd
09	Transaction was terminated by host - data transfer to host was terminated by CEND instead of DEND
Additional TSTAT's for Read terminations are described below	
0A	Transaction FCODE is not supported by the 27110B
0B	Transaction requires 27110B to be SC and it is not
0C	Transaction requires 27110B to be CIC and it is not
0D	Transaction requires 27110B to not be CIC and it is
0E	Transaction requires 27110B to be either addressed or not CIC (so some one else can address it) and it is not

HPIB DA TSTAT Codes (Cont.)

0F	Unexpected Level 3 Message has arrived since last Level 3 Status Message
10	HPIB DCL was detected (See the data transfer transactions for details)
11	IFC abort of data transfer
12	27110B hardware failure due to HPIB chip "processor abort"
13	27110B hardware failure due to illegal DMA interrupt
14	27110B outbound data frozen due to presence of inbound data on the 27110B; won't happen when 27110B is CIC
15	Data error
16	reserved.
17	Can not be done because PPOLL interrupt is enabled Can be returned in response to a set ATN false transaction
18 : 1F	reserved : reserved
20	The data portion of the CS/80 request block was missing from the request phase
21	End of a FIFO disabled transfer occurred with an EOI on the last byte and the count ran down at the same time
22	Same as 21 only the count was odd
23	End of a FIFO disabled transfer occurred with an EOI and a LF
24	Same as 23 only the count was odd
25	End of a FIFO disabled transfer occurred with an EOI on the match byte

HPIB DA TSTAT Codes (Cont.)

26	Same as 25 only the count was odd
27	End of a FIFO disabled transfer occurred with a match byte
28	Same as 27 only the count was odd
29	A write transfer was terminated by a byte arriving in the device adapter inbound FIFO when the 27110B was not the CIC
2A	A read or write was terminated by the 27110B receiving an DCL or SDC when it was not the CIC. For reads an extra byte is sent to the host in order to terminate the transfer. This byte is counted in the odd/even sense of the status.
2B	Same as 2A for a read only the byte count was odd
2C	reserved
2D	Download_error. This condition occurs when the contents of the data block to be stored on the 27110B is inconsistent with the indicated byte count for the download.
2E	reserved
2F	No DAP downloaded. This error will be given when an execute downloaded DAP transaction is attempted before the DAP has been downloaded.

HPIB DA TSTAT Codes (Cont.)

CS/80 Timeout status values are as follows:

30	Timeout during Command. No PPOLL response prior to entering Execution.
34	Timeout during Execution. No PPOLL response prior to entering Report.
38	Timeout during Report. Command of Detailed report has not been sent.
3C	Timeout during Detailed Report. Could be Command, Execution, or Report.
3X+1	Timeout and 27110B was not the CIC after timeout was detected.
3X+2	Timeout and a second timeout occurred while 27110B was trying to send UNT and UNL after the first timeout.
40	Timeout during Perform Amigo Identify transaction
41	Illegal DAL opcode attempted during DAP interpretation/ execution
42	DAP boundary exceeded. I.E. C.I. program counter has bad value
43	Device Locked during some error report/recovery
44	reserved
:	reserved
FD	reserved
FE	No status available. This status is set upon receiving a function byte and indicates that the 27110B didn't complete the transaction but also didn't detect any particular error. This value will also set upon reset and power on.
FF	reserved for extension

QSTAT Codes

CS80 Transactions

0 - NORMAL COMPLETION

Indicates normal completion of the requested operation.

1 - HARD ERROR

Indicates that error information is available. The host must issue the Request Status command in order to determine what went wrong.

2 - POWER ON

Indicates that the device has just returned from a power failure or some form of operator intervention (such as removal of the storage media). Any incomplete transactions were aborted and should be repeated. The host must reconfigure any programmable operating parameters because they have returned to their power-on values.
(not used by ALINK-AMUX)

3 - INTERFACE ERROR

Indicates that an interface command error, such as illegal parity or loopback failure was detected by the device channel module.
(not used by ALINK-AMUX)

HSTAT Codes

HSTAT CODES

HSTAT is the operand from the halt instruction of the DAP (Device Adapter Program) program. It is used during tape transactions.

The DAP program actually verifies the DSJ (Device Specified Jump) value returned by the tape drive, and uses that value as the halt operand. Thus, HSTAT= DSJ returned value.

HSTAT	Meaning
0	No error
1	Error found during command execution See device status bytes
2	This usually indicates that the door was opened during command execution

CS80 Hardware Status

IDENTIFICATION ERRORS (word 8)

```
   1111 2222  22 22 22 33
   6789 0123  45 67 89 01
  <VVVV UUUU><SS SS SS SS>
```

VVVV = Volume number

UUUU = Unit number
SSSSSSSS = Value of the lowest numbered unit with status pending (all ones,or 0xFF if no units have status pending)

Notes:

1. Error bit positions and word numbers correspond to IODC/PDC status data printed on console in 9740A HPPAs.

2. All fault errors are unmaskable.

3. Error uses parameter field.

4. Parameter field configuration is dependent on reported errors.

   Highest priority is given to the lowest numbered error.

   Masked errors relinquish their priority.

REJECT ERRORS (word 9)

```
    0000 0000  0011 1111
    0123 4567  8901 2345
   <..A. .BCD><EFG. H...>
```

A = CHANNEL PARITY ERROR
A channel command was received without odd parity.

B = ILLEGAL OPCODE
An unrecognizable opcode was received.

C = MODULE ADDRESSING
An illegal volume or unit number was specified.

D = ADDRESS BOUNDS
The target address has exceeded the bounds for this device.

E = PARAMETER BOUNDS
A parameter (other than unit, volume, or target address) is not allowed for this device.

F = ILLEGAL PARAMETER
A parameter field was the wrong length for the opcode preceding it.

G = MESSAGE SEQUENCE
The message sequence has been violated. (Error suppressed if any reject or fault errors have occurred prior to sequence error.)

H = MESSAGE LENGTH
The total length of the execution message differs from the current default value.

CS80 Hardware Status (Cont.)

FAULT ERRORS (word 9) (2)

```
  1111 2222  2222 2233
  6789 0123  4567 8901
 <.A.B ..C.><D.EF G.HI>
```

A = CROSS-UNIT (3)
An error has occurred during a Copy Data operation.

B = CONTROLLER FAULT
A hardware fault occurred in the controller.

C = UNIT FAULT
A hardware fault has occurred in the unit addressed.

D = DIAGNOSTIC RESULT (3)
Hardware failed the diagnostic shown in the parameter field.

E,F,G= RELEASE REQUIRED
This command cannot be executed until after release is granted to the device.

E = OPERATOR REQUEST
Release required for operator request (eg: load/unload...)

F = DIAGNOSTIC REQUEST
Release required for diagnostic initiated from control panel (eg: HIO, selftest...)

G = INTERNAL MAINTENANCE
Release required for internal maintenance (eg: head alignment error log...)

H = POWER FAIL
The power to the unit failed, a diagnostic destroyed the configuration, or a pack was loaded. Device should be reconfigured.

I = RETRANSMIT
The preceding transaction should be retried.

ACCESS ERRORS (word 10)

```
  0000 0000   0011 1111
  0123 4567   8901 2345
 <ABCD EF..> <GH.I J...>
```

A = ILLEGAL PARALLEL OPERATION
The requested operation cannot be executed in parallel with some other operation(s) currently in progress.

B = UNINITIALIZED MEDIA
The host attempted to access unformatted media, or unusable media has been loaded.

C = NO SPARES AVAILABLE
Spare Block cannot be executed due to lack of spare media.

D = NOT READY
The selected unit is not ready for access at the time (eg: heads or media not yet fully loaded).

E = WRITE PROTECT
The selected volume is write protected.

F = NO DATA FOUND
A block accessed during a read has not been written.

G = UNRECOVERABLE DATA OVERFLOW
The previous transaction generated more than 1 unrecoverable data error. The entire transfer should be considered in error.

H = UNRECOVERABLE DATA (3)
Unrecoverable data at indicated block(s).

I = END OF FILE
End of file encountered on file structured device.

J = END OF VOLUME
The host attempted to access across a volume boundary.

CS80 Hardware Status (Cont.)

INFORMATION ERRORS (word 10)

```
    1111 2222   2222 2233
    6789 0123   4567 8901
   <ABCD E..F> <.GHI .J..>
```

A..C= REQUEST RELEASE (3)
Device requests release for indicated reason.

A = OPERATOR REQUEST (3)
Release requested for operator request (eg: load/unload...)

B = DIAGNOSTIC REQUEST (3)
Release request initiated from diagnostic control panel (eg: HIO, selftest...)

C = INTERNAL MAINTENANCE (3)
Release requested for internal maintenance (eg: head alignment error log...)

D = MEDIA WEAR
Only one spare track (disc) or one spare block (tape) remaining.

E = LATENCY INDUCED
A latency was induced during the transfer due to slow transfer rate or seek retry.

PARAMETER BYTES
(words 11,12,13) (4)

```
   <P1>.....<P10>
```

NO ERRORS: P1 through P6 indicate new Target Address. the address format, which is used any time P1 through P6 contain address information, is defined by the Set Return Addressing command.

NO ERRORS: P7 through P10 contain run-time drive error codes (DERRORS), execpt after a Spare Block command. The errors are arranged chronologically: P7 contains the most recent, and P 10 contains the oldest of the 4 errors recorded.

Note: Error codes 40H and CBH will always be followed by a single byte containing fault latch information.

After a Spare Block command, P1 through P6 contain the beginning address of the reformatted area. the address format is described above (disc operation only).

CROSS UNIT (word 9, bit 17)
P1 through P6 contain the encoded values of each unit which has experienced an error. A byte of all ones indicates no additional units

CS80 Hardware Status (Cont.)

INFORMATION ERRORS (word 10)

```
    1111 2222   2222 2233
    6789 0123   4567 8901
   <ABCD E..F> <.GHI .J..>
```

F = AUTO SPARING INVOKED
A defective block has been automatically spared by the device.

G = RECOVERABLE DATA OVERFLOW
The previous transaction generated more than 1 recoverable data error.

H = MARGINAL DATA (3)
Data was recovered, but with difficulty.

I = RECOVERABLE DATA (3)
A latency was introduced in order to correct a data error.

J = MAINTENANCE TRACK OVERFLOW
Error and fault log area is full.

PARAMETER BYTES
(words 11,12,13) (4)

```
<P1>.....<P10>
```

DIAGNOSTIC RESULTS (word9, bit 24)
P1 through P6 contain the following:
P1= most suspect component
P2= next most suspect component
P3= test error (TERROR) relating to P1
P4= test error (TERROR) relating to P2
P5 through P6 are not used
P7 through P10 contain DERROR information (format described above).

UNRECOVERABLE DATA (word 10, bit 9)
P1 through P6 contain address of bad block

REQUEST RELEASE (word10, bits 16..18)
P1 through P6 contain the encoded values of each unit requesting release. A byte of all ones indicate no additional units.

MARGINAL DATA (word10, bit 26)
RECOVERABLE DATA (word 10, bit 27)
P1 through P6 contain the address of offending block.

7974/78/79/80 Status Codes

```
Bit#        Interpretation

BYTE_S1  (Word  9.[0..7] )
  0      End of file (tape mark)
  1      BOT (load point)
  2      EOT (end of tape)
  3      Recovered error check (see retry count)

  4      Command rejected (see reject codes A1/BE )
  5      File write protected (no write ring)
  6      Unrecovered (data/format) error (see reject
         codes 29/49)
  7      Unit on-line

BYTE_S2  (Word  9.[8..15] )
  8      GCR format (6250 BPI)  (7978B)
  9      Unknown tape format/density
  10     Data parity error (transport electronics)
  11     Data timing error (shouldn't happen on 7974A/7978B)

  12     Tape run-away
  13     Door open
  14     Long records supported (7978B)
  15     Immediate response mode enabled

BYTE_S3  (Word  9.[16..23] )
  16     PE format (1600 BPI)
  17     NRZI format (800 BPI)   (7974A)
  18     Power restored or device cleared
  19     HP-IB command parity error

  20     Tape position lost or loss of tension (see
          reject codes 51/5E)
  21     Formatter error (see reject codes 65/6E )
  22     Servo error (see reject codes 51/5E )
  23     Controller error (see reject codes 79/8C )

BYTE_S4  (Word  9.[23..31] )
  24 \                        0 : Null code
  25  > Command error code:   1 : reserved
  26 /                        2 : Device reject (see reject codes)
                              3 : Protocol reject
                              4 : reserved
                              5 : Prior error abort
                              6 : reserved
                              7 : Error selftest and on-line
```

7974/78/79/80 Status Codes (Cont.)

```
 27 \
    \
 28  \ Retry count
 29  /
 30 /
 31 /
```

BYTE_S5 (Word 10.[0..7])

HEX Value	**REJECT CODE Meaning**
5	File protected on write
6	Tape not tensioned
7	Tape format option not present on write density command
9	Cannot identify format from media on read
A	Write command & format not identified (do write format command)
B	Drive not on-line
10	Write format but media not at BOT
13	At BOT and command backwards received
17	Protocol not synchronized
18	Command byte not recognized
1F	Write record length too long for buffer
21	Selftest failure
25	Tape positioning failure after EOT sensed
28	Door opened after EOT sensed
(Unrecovered data/format errors)	
29	Tape speed out of spec
2D	MTE (multiple track error during write)
2F	Verify or write failed on TM or IDB
30	Noise read from media (data not valid)
31	Data format error
32	Failure to identify tape after rewind
33	Media failure on data portion of block (drop out)
34	Media failure on pre/post-amble of block (drop out)
35	Redundancy check character error
36	Uncorrected read parity error (7978B)
37	Abnormal command abort (door opened) (7974A)
39	Maximum skew exceeded (7974A)
3A	False pre/post-amble detected (7974A)
3B	Write data error corrected (7974A)
3C	Buffer overrun
3D	Data block timeout: no gap after data block
3E	Media fail on Tape Mark (EOF) (drop out)
3F	Tape mark not verified (doesn't meet ANSI)
40	Tape mark timeout

7974/78/79/80 Status Codes (Cont.)

(Servo errors or loss of tension)

51	Servo controller unresponsive
52	Servo failed to reach desired state
53	Unexpected servo shutdown (tension lost)
54	Servo controller hard failure
55	Servo protocol error
56	Servo run-time error
57	"In position" interrupt not received by master controller
58	No GAP detected after Read block, Write block, or TM
59	Safety shutdown of motor driver
5A	No BOT detected on load/rewind
5B	Speed out of specifications
5C	Invalid request from master controller
5E	Tape positioning failure

(Formatter errors)

65	No "end of record" after data (7978B)
66	Formatter HW error (7978B)
67	Bad block type detected on write
68	Erase failed (flux transitions detected on erased area)
69	No data detected on write (read after write)
6A	Tracks out of sync on write verify
6B	Formatter HW error (7974A)
6C	Formatter unresponsive (7974A)
6D	Gap timer failed
6E	Formatter byte count <> data buffer byte count

(Controller errors)

79	Transaction ID mismatch (command Vs status)
7A	No pending command for the status received
7B	Invalid status received from device program
7C	Status queue overflow
7D	Unknown command received by device program
7E	Command queue overflow
80	End of record missing in data buffer
81	Data buffer parity error
82	Data buffer underrun during write
83	Write byte count <> read buffer byte count
84	Bad message type received by channel program from device program
85	CPU handshake abort (between HPIB I/F and channel program)
86	Unknown HP-IB condition detected
89	Illegal access to servo controller registers detected
8A	Device program firmware error
8B	Hardware utilities firmware error
8C	Channel program firmware error
8D	ON-line encoder inoperative

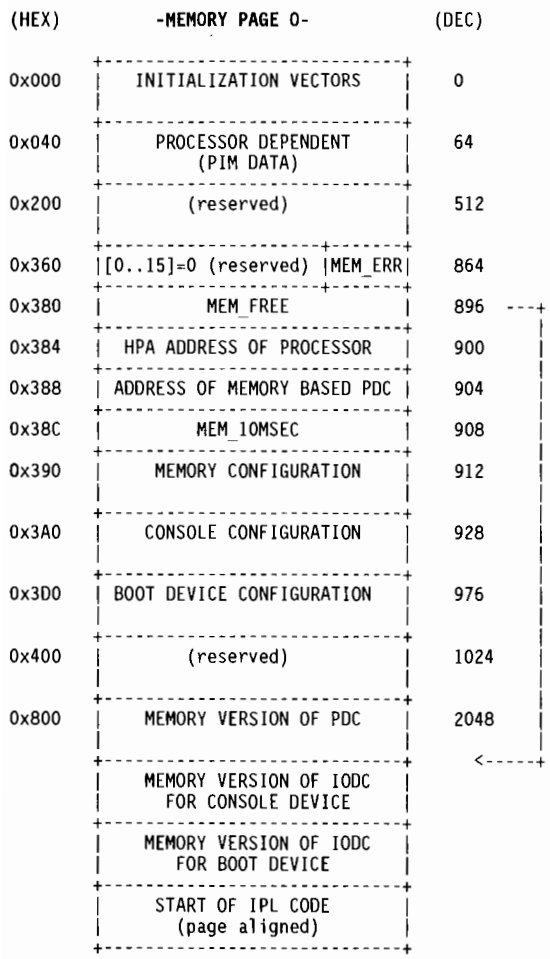
7974/78/79/80 Status Codes (Cont.)

(Command reject errors)

A1	Command queue not empty (request denied)
A2	Request DSJ expected
A3	Request status expected
A5	Unknown unit selected
A6	Tape command secondary expected
A7	Data byte expected
A8	Missing parameter EOI on COMMAND, selftest#, or END
AA	Protocol error for "write record" command in command phase
AC	Protocol error for "read record" command in status phase
AD	Protocol error in "status" request phase
AE	Protocol error in "Cold load sequence"
B0	END "complete" or "complete idle" expected
B2	END "data" expected
B4	Unknown secondary command
B5	Misplaced data byte
B8	Protocol error (loopback)
B9	Protocol error (selftest)
BC	Parity error in HP-IB command
BD	Operator reset during protocol sequence
BE	Device clear received (internal)

BYTE_S6 (word 10.[8..15])
This byte represents the number of commands rejected since the last error, including the command in error. It should be smaller then 14.

Memory Layout



Memory Layout (Cont.)

MEM_ERR: up to 8 entries, used by PDC to log non-fatal errors when PDC is called by S/W. Each entry contains the code that would be displayed by PDC on the HEX display of the CPU.

MEM_10MSEC: PDC places in here the calibration factor for the CPU timer (CR16), normalized to the number of clock ticks in 10 m-seconds.

-INITIALIZATION VECTORS-

(HEX)		(DEC)
0x0	0x0	0
0x4	POWER_FAIL	4
0x8	TRANSFER OF CONTROL (TOC)	8
0xC	TOC_LENGTH (in bytes)	12
0x10	(reserved)	16

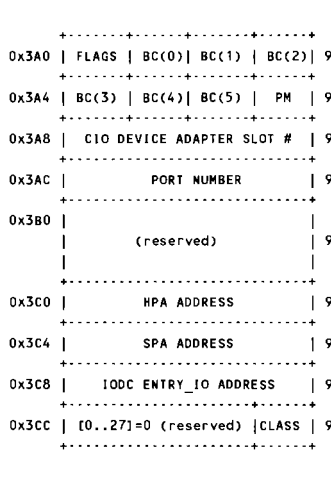
-INITIAL MEMORY CONTROLLER ENTRY-

(HEX)			(DEC)
0x390	HARD PHYSICAL ADDRESS (HPA)		912
0x394	[0..30] = 0x0	sb	916
0x398	SPA_SIZE (in bytes)		920
0x39C	MAX_MEM (in bytes)		924

"sb" indicates type of last boot: 1= softboot, 0= hardboot
MAX_MEM <= SPA_SIZE (& both values are aligned to a power of 2)

Memory Layout (Cont.)

(HEX) **-CONSOLE DEVICE-** (DEC)

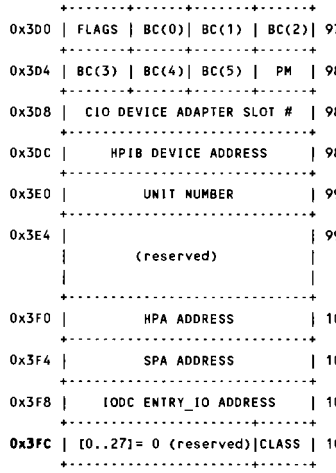


For Boot devices:
FLAGS.[0] = autoboot flag
FLAGS.[1] = autosearch flag
FLAGS.[6] = alternate boot path

For Console device:
FLAGS.[0] = interactive
FLAGS.[1] = buffers allocated
FLAGS.[6] = hard conspath in use
FLAGS.[7] = console initialized

BC(n) : Bus converter address
(not used, = 0xFF)
PM: Physical module number
(= 4* (Mid_bus slot #))
Console path and alternate path
format is the same, with the FLAGS=0,
and word 0x3AC is the port number
for the console path.
CLASS defines the type of device:
0= CL_NULL
1= CL_RANDOM (random access, ie: disc)
2= CL_SEQ (sequential access, ie: tape)
7= CL_DUPLEX (point-to-point, ie: console)

(HEX) **-BOOT DEVICE-** (DEC)



HPA : [0..3] = 0xF
[4..13] = FLEX Address
(= 0x3FE, for 974x)
[14..19] = Physical Module Number
[14..17] = MID-BUS Slot Number
[20] = Privilege Page
[21..29] = Register Number
[30..31] = 0

DIAGNOSTICS

SECTION 5

The Diagnostics Section provides information pertaining to the supported diagnostics and utilities for MPE-XL and HP-UX operating systems. Also included in this section is booting up information when using the HP-UX Support Tape.

HP 9740A SPU SELFTEST 5-2
Selftest Display 5-2
Diagnostic/Utility Orientation 5-3
Diagnostic User Interface (DUI) 5-6
CS/80 Disc Diagnostic (CS80DIAG) 5-8
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HP 9740A SPU SELFTEST

The HP 9740A SPU Selftest is responsible for initializing and testing the IU, EU, RF, TLB, CA boards, all installed memory controller and memory array boards, and I/O cards that have built in selftest code. It checks data paths and component functionality for all boards in the SPU processor.

Selftest code can be invoked in the following ways:

- Cold Power On (PON).
- External Reset (ER).
- High Priority Machine Check (HPMC).
- Return from Power Fail (Powerfail Recovery).
- Transfer of Control/Soft Reset (TOC/SRS).

Refer to Online Diagnostics Subsystem Manual, P/N 09740-90020, for detailed descriptions and procedures.

Selftest Display

The two types of display messages used for Selftest are displayed on a four digit hexadecimal display window located inside the front cabinet door (Refer to Section 4, Figure 4-4) and on the System Console. These display messages are:

1. ERROR/WARNING MESSAGES - Indicates failure in one of the defined Classes, directs user to slot number of the Field Replaceable Unit (FRU), and provides detailed information about the cause of error.

   - 300F is displayed at successful completion of selftest.
   - 300E is displayed at successful completion of selftest with warning.
   - 0000 is displayed to indicate a catastrophic error at an entry point in the execution of selftest.

2. INFORMATIONAL/RUN TIME MESSAGES - Indicates what the selftest is doing at any given time. On Informational displays, the detailed error numbers are set to zero.

For detailed descriptions of error messages, refer to Chapter 8 of the Hardware Support Manual, P/N 09740-90011.

DIAGNOSTIC/UTILITY ORIENTATION

The Online Subsystem Operating Software is the Diagnostic User Interface (DUI) that provides access to the following diagnostic programs:

- CS/80 Disc Diagnostic (CS80DIAG).
- HP 7974A/7978A Magnetic Tape Diagnostic (DIAG7478).
- CIPER Line Printer Diagnostic (CIPERLPD).
- HPIB Device Adapter Diagnostic (HPIBDIAG).
- Memory Array Diagnostic (MAD).
- Six-Channel MUX Diagnostic (MUXDIAG).
- Local Area Network Device Adapter Diagnostic (LANDAD).
- CIO Channel Adapter Diagnostic (CADIAG).
- HP-FL Device Adapter Diagnostic (HPFLDIAG)
- Eagle Diagnostic (EGLDIAG).
- Page Printer Diagnostic (PPDIAG).
- AFI Device Adapter Diagnostic (AFIDAD)
- Flex Disc Diagnostic (FLEXDIAG)
- HP98720A Graphics Processor Diagnostic (GP3DDIAG)

The following are the supported Utilities:

- I/O Test Tool (IOTT).
- System and Memory Log Analysis Tool (LOGTOOL).
- System Map (SYSMAP).
- HP-UX Logging Facility (DECODE and DELOG).
- MPE-XL Online Diagnostic Installer (DIAGINST).

The Diagnostic and Utility Subsystems are designed for:

- MPE-XL Diagnostic Implementation.
- HP-UX Online Diagnostic Implementation.

Table 5-1. Supported Diagnostic Programs

DIAGNOSTIC NAME	DESCRIPTION	MPE-XL	HP-UX
CS80DIAG	CS/80 Disc Diagnostic	Yes	Yes
FLEXDIAG	Flex Disc Diagnostic	*N/R	*N/R
DIAG7478	HP 7974A/7978A/B Magnetic Tape Diagnostic	Yes	Yes
CIPERLPD	CIPER Line Printer Diagnostic	Yes	Yes
PPDIAG	Page Printer Diagnostic	Yes	Yes
HPIBDIAG	HP-IB Device Adapter Diagnostic	Yes	Yes
HPFLDIAG	HP-FL Device Adapter Diagnostic	*N/R	Yes
MAD	Memory Array Diagnostic	No	Yes
MUXDIAG	Six-Channel MUX Diagnostic	Yes	Yes
LANDAD	Local Area Network (LAN) Device Adapter Diagnostic	Yes	Yes
GP3DDIAG	HP98720A Graphics Processor Diagnostic	*N/R	Yes
CADIAG	CIO Channel Adapter Diagnostic	Yes	No
AFIDAD	AFI Device Adapter Diagnostic	No	Yes

*not released as of this printing date

Table 5-2. Supported Subsystem Utilities

UTILITY NAME	DESCRIPTION	MPE-XL	HP-UX
IOTT	I/O Test Tool	Yes	No
LOGTOOL	System and Memory Log Analysis Tool	Yes	No
DECODE	HP-UX Logging Facility	No	Yes
DELOG	HP-UX Logging Facility	No	Yes
MEMLOGP	Memory Error Logging Process	Yes	No
SYSMAP	System Map	Yes	No
DIAGINST	MPE-XL Online Diagnostic Installer	Yes	No

Diagnostic User Interface (DUI)

The Diagnostic User Interface (DUI) provides access to all programs in the Online Diagnostic System.

Mini-Operating Instructions

1. Enter the following system command to the system prompt:

   SYSDIAG (MPE-XL)

   /USR/DIAG/BIN/SYSDIAG (HP-UX)

   The diagnostic will respond with the following header and welcome message indicating that access has been gained to the Online Diagnostic System:

```
**********************************************************
******                                              ******
******        ONLINE DIAGNOSTIC SUBSYSTEM           ******
******                                              ******
******    (c)  Hewlett Packard Corporation          ******
******                                              ******
******  DUI version xx.yy   Monitor version xx.yy   ******
******                                              ******
**********************************************************

                  Type "HELP" for assistance.
```

   There is no Monitor version appearing on HP-UX systems. On HP-UX systems a positive integer will appear as part of the DUI prompt to represent how many commands have been entered into the current DUI session.

2. Enter HELP to the DUI prompt for the following list of available commands to appear:

```
DUI > HELP

COMMAND     DESCRIPTION
ABORT       Terminates active diagnostic programs.
CI or !     Provide access to operating system interpreter (shell).
EXIT        Exit from the diagnostic system.
HARDCOPY    Echo information displayed on terminal to printer or file.
HELP or ?   Provide help information for DUI or diagnostic programs.
INSTALL     Add/update programs in the diagnostic system.
LIST        List the programs that are part of the diagnostic system.
MODE        Display/change current system mode.
PURGE       Delete programs from the diagnostic system.
REDO or ^   Display and edit last DUI command.
RESUME      Allow a suspended program to resume processing.
RUN         Execute the specified program.
SHOWACTIVE  Display programs running in diagnostic system.
SUSPEND     Suspend the processing of the specified program.
TEST        Provides the ability to test a diagnostic program.
UNLOCK      Releases specified device from lock status.
USE         Causes DUI commands to be read from a file.
WAIT        Wait for background programs to terminate.
```

NOTE

The commands INSTALL and PURGE are applicable for HP-UX, only. The commands TEST and UNLOCK are applicable for MPE-XL, only.

Installation, modification, and removal of Online Diagnostic Programs on MPE-XL operating systems is accomplished by using the MPE-XL Online Installer (DIAGINST) facility. Installation, modification, and removal of Online Diagnostic Programs on HP-UX operating systems is accomplished by using the HP-UX Online Installer facility. Refer to the Online Diagnostics Subsystem Manual, P/N 09740-90020 for detailed information regarding MPE-XL. Refer to the HP-UX System Administrator's manual (92453-90004) for detailed information regarding HP-UX.

3. To exit the DUI, type EXIT.

For a list of possible error messages which may appear when using the DUI, refer to Section 2 in the Online Diagnostics Subsystem Manual, P/N 09740-90020.

CS/80 Disc Diagnostic (CS80DIAG)

The CS/80 Disc Diagnostic (CS80DIAG) will test HP 7908/11/12/14 or HP 7933/35/37 disc drives. This diagnostic can detect failures of one or more Field Replaceable Unit (FRU).

Mini-Operating Instructions

1. Enter the following to the system prompt:

   SYSDIAG (MPE-XL)

   /USR/DIAG/BIN/SYSDIAG (HP-UX)

2. Enter the following to the DUI prompt:

   DUI> RUN CS80DIAG < RUN Command Options >

   Typing HELP will cause a summary of the DUI function and its commands to appear on the screen. Refer to the DUI section in the Online Diagnostics Subsystem Manual, P/N 09740-90020, for details concerning the RUN command options.

3. The diagnostic responds with a header and welcome message.

   If sections and steps to be run are not specified, the default sections and steps will be executed. The default sections are Sections 2, 3, 4, 5, 8, and 9. Default steps are all steps within sections. Execution of these defaults is dependent on the test mode that has been granted by the system.

   DEFAULT SECTIONS
   - o Section 2 - Clear
   - o Section 3 - Identify
   - o Section 4 - Loopback (all steps)
   - o Section 5 - Selftest
   - o Section 8 - Common System Operations (all steps)
   - o Section 9 - Status Tests (all steps)

   - o Section 17 - CS/80 External Exerciser (Interactive Section)

   ADDITIONAL SECTIONS AVAILABLE
   - o Section 6 - Status
   - o Section 7 - Error Logs

4. If Section 17 is selected, the CS/80 diagnostic prompt will appear.

```
CS80DIAG>
```

Entering **HELP** to the prompt will display a list of the available CS/80 External Exerciser commands.

```
CS80DIAG > HELP

ADDRESS          Converts block addresses to 3-vector and visa versa.
BUTTERFLY SEEK   Performs a Butterfly Seek utility on a HP 7936/37
                 disc drive.
CANCEL           Tells the device to cancel the provious command.
CICLEAR          Issues a CS/80 Channel Independent Clear on the disc.
CLEAR LOGS       Clears the various error logs on the device.
DESCRIBE         Obtains describe information from the device.
DIAG             Provides access to device's internal diagnostics.
ERRSUM           Obtains an error summary from the device.
ERT LOG          Provides access to the device's ERT data error log.
EXIT             Terminates execution of the External Exerciser.
FAULT LOG        Provides access to the device's fault log.
HELP             Provides this list of commands as well as more detailed
                 descriptions and syntax of each command.
INIT MEDIA       Initializes the device's media.
READ             Reads and displays a block of data from the device.
REV              Provides access to the revision data for the device.
RFSECTOR         Reads and displays a full sector of data from the disc,
                 including header and trailer information.
RO ERT           Performs a read-only error rate test on the device.
RUN LOG          Reads the device's run-time data error log.
SDCLEAR          Performs a CS/80 Selected Device Clear on the device.
SENSE            Reads data from the device's environmental sensors.
SET PATTERN      Set pattern to be used in error rate tests.
SET RPS          Sets/resets the Rotational Position Sensing feature on
                 the device.
SPARE            Spares a block of data on the device.
SUSPEND          Suspends CS80DIAG and returns control to the DUI.
TABLES           Provides access to the various tables on the device.
UNIT             Sets the unit number on the device.
WTR ERT          Performs a write-then-read error rate test on the
                 device.
```

5. Type **EXIT** to exit Section 17 and control will return to the Online Diagnostic System.

```
End of Section 17 - External Exerciser
```

For a list of error messages which may appear when using CS80DIAG, refer to the Online Diagnostics Subsystem Manual, P/N 09740-90020.

Flex Disc Diagnostic (FLEXDIAG)

The Flex Disc Diagnostic (FLEXDIAG) will test the Flex disc drives. This diagnostic can detect failures of one or more Field Replaceable Unit (FRU).

Mini-Operating Instructions

1. Enter the following to the system prompt:

   SYSDIAG (MPE-XL)

   /USR/DIAG/BIN/SYSDIAG (HP-UX)

2. Enter the following to the DUI prompt:

   DUI> RUN FLEXDIAG < RUN Command Options >

   Typing HELP will cause a summary of the DUI function and its commands to appear on the screen. Refer to the DUI section in the Online Diagnostics Subsystem Manual, P/N 09740-90020, for details concerning the RUN command options.

3. The diagnostic responds with a header and welcome message.

   If sections and steps to be run are not specified, the default sections and steps will be executed. The default sections are Sections 2, 3, 4, 5, 8, and 9. Default steps are all steps within sections. Execution of these defaults is dependent on the test mode that has been granted by the system.

   DEFAULT SECTIONS
   - o Section 2 - Clear
   - o Section 3 - Identify
   - o Section 4 - Loopback (all steps)
   - o Section 5 - Selftest
   - o Section 8 - Common System Operations (all steps)
   - o Section 9 - Status Tests (all steps)

4. To exit FLEXDIAG, type EXIT. Control will return to the Online Diagnostic System.

HP 7974A and 7978A/B Magnetic Tape Drive Diagnostic (DIAG7478)

The HP 7974A and 7978A/B Magnetic Tape Drive Diagnostic (DIAG7478) will test an HP 7974A or HP 7978A/B Magnetic Tape Drive online and offline. Specify which sections and steps are to be run.

Mini-Operating Instructions

1. Ensure the tape drive to be tested is powered on. Ensure that a scratch tape has been mounted and the tape drive is placed online for sections which tape movement and write/read operations are to be run.

2. Enter the following command to the system prompt:

   SYSDIAG (MPE-XL)

   /USR/DIAG/BIN/SYSDIAG (HP-UX)

3. Enter the following command to the DUI prompt:

   DUI > RUN DIAG7478 <RUN Command Options>

   Type HELP for a summary of the available RUN commands. Refer to the DUI section in the Online Diagnostics Subsystem Manual, P/N 09740-90020, for details.

4. The diagnostic responds with a header and welcome message.

   If specific sections and steps are not specified, the following default sections and steps will be executed:

   DEFAULT SECTIONS
   - o Section 2 - Clear
   - o Section 3 - Identify
   - o Section 4 - Loopback
   - o Section 6 - Hardware Status
   - o Section 40 - Firmware Utilities
   - o Section 50 - Image Utilities
   - o Section 55 - Display Logs

   For the HP 7974A Only:
   - o Section 34 - HP 7974A Selftests

   For the HP 7978A/B Only:
   - o Section 38 - HP 7978A/B Selftests

   ADDITIONAL SECTIONS AVAILABLE
   - o Section 10 - Set Tape Density Commands
   - o Section 15 - Write/Read Comparison Check (NRZI or GCR)
   - o Section 16 - Write/Read Comparison Check (PE)
   - o Section 20 - Selectable Tape Movement Commands
   - o Section 23 - Selectable Tape Read Data Commands
   - o Section 25 - Paces

- o Section 45 - Download Diagnostics
- o Section 60 - Interactive Section
- o Section 62 - Do All Tests

NOTE

For MPE-XL, the default magtape LDEV parameter is 7. For HP-UX, no default magtape device parameter exists.

5. Type EXIT and control will return to the Online Diagnostic System as soon as all requested steps are complete.

   For a list of error messages that may appear when using DIAG7478, refer to Section 4 in the Online Diagnostics Subsystem Manual, P/N 09740-90020.

Ciper Line Printer Diagnostic (CIPERLPD)

The Control messages for Intelligent Peripherals (CIPER) Diagnostic will test an HP 2563A or HP 2565A/66A Line Printer to detect failures of a Field Replaceable Unit (FRU). The CE can:

- Specify which sections and steps are to be run.
- Set test parameters to control the handling of error messages.
- Select the number of test executions and the particular CIPER Line Printer unit to be tested.

Mini-Operating Instructions

1. Enter the following command to the system prompt:

   SYSDIAG (MPE-XL)

   /USR/DIAG/BIN/SYSDIAG (HP-UX)

2. Enter the following command to the DUI prompt:

   DUI > RUN CIPERLPD <RUN Command Options>

   Enter HELP to display a summary of the available RUN commands. Refer to the DUI section in the Online Diagnostics Subsystem Manual, P/N 09740-90020, for details.

3. The diagnostic responds with a header and welcome message.

   If specific sections and steps are not specified, the following default sections and steps will be executed:

   NOTE

   The CIPER device to be tested must be powered up and put online to ensure proper completion of all sections and steps.

   DEFAULT SECTIONS
   o Section 2 - Reset
   o Section 3 - Clear/Identify
   o Section 5 - Selftest
   o Section 6 - Request Device Status (all steps)

   ADDITIONAL SECTIONS AVAILABLE
   o Section 10 - Ripple Print
   o Section 12 - Request and Decode Environmental Status
   o Section 14 - Request and Decode Job Status

4. To exit CIPERLPD, type EXIT and control will return to the DUI upon completion of the current section and step.

   For a list of error messages which may appear using CIPERLPD, refer to Section 5 in the Online Diagnostics Subsystem Manual, P/N 09740-90020.

Page Printer Diagnostic (PPDIAG)

The Page Printer Diagnostic (PPDIAG) tests the HP 2680A or HP 2688A Page Printer to detect failures of Field Replaceable Units (FRUs). The Page Printer Diagnostic program can be invoked by the I/O system on catastophic errors for auto-diagnostic purposes. Only MPE-XL operating systems have auto-diagnostic capability.

Mini-Operating Instructions

1. Enter the following command to the system prompt:

   SYSDIAG (MPE-XL)

   /USR/DIAG/BIN/SYSDIAG (HP-UX)

2. Enter the following command to the DUI prompt:

   DUI> RUN PPDIAG <RUN Command Options>

   Refer to the DUI section in the Online Diagnostics Subsystem Manual, P/N 09740-90020, for details concerning the RUN command options.

3. The diagnostic responds with a header and welcome message.

   NOTE

   The Page Printer to be tested must be powered up and put online to ensure proper completion of all sections and steps.

   If specific sections and steps are not specified, the default sections and steps will be executed.

   DEFAULT SECTIONS
   Section 2 - Clear
   Section 3 - Identify
   Section 4 - Loopback
   Section 5 - Selftest
   Section 20 - Pattern Print

   ADDITIONAL SECTIONS AVAILABLE
   Section 6 - Display I/O Status
   Section 8 - Display Environmental Status
   Section 50 - Simulate Panel (HP 2680 only)

4. To exit PPDIAG type EXIT. Control will return to the DUI upon completion of the current section and step. A description of PPDIAG and all sections contained within are available through the DUI HELP facility.

   For a list of warning and error messages that may appear when using PPDIAG, refer to Section 6 in the Online Diagnostics Subsystem Manual, P/N 09740-90020.

AFI Device Adapter Diagnostic (AFIDAD)

The AFI Device Adapter Diagnostic (Asynchronous FIFO Interface Device Diagnostic, AFIDAD) will test the HP 27114A AFI. This diagnostic runs on the HP 9000 Series 800 Computer System.

Mini-Operating Instructions

1. Enter the following command to the system prompt:

   SYSDIAG (MPE-XL)

   /USR/DIAG/BIN/SYSDIAG (HP-UX)

2. Enter the following command to the DUI prompt:

   DUI> RUN AFIDAD <RUN Command Options>

   Refer to the DUI section in the Online Diagnostics Subsystem Manual, P/N 09740-90020, for details concerning the RUN command options.

3. The diagnostic responds with a header and welcome message.

   If sections to be run are not specified, the default sections will be executed.

   DEFAULT SECTION

   o Section 3 - Identify

4. To exit AFIDAD, type EXIT.

HP-IB Device Adapter Diagnostic (HPIBDIAG)

The HP-IB Device Adapter Diagnostic (HPIBDIAG) is a diagnostic system program that provides the capability to test online the functionality of the HP-IB Device Adapter, which is itself a Field Replaceable Unit (FRU).

Mini-Operating Instructions

1. Enter the following command to the system prompt:

   SYSDIAG (MPE-XL)

   /USR/DIAG/BIN/SYSDIAG (HP-UX)

2. Enter the following command to the DUI prompt:

   DUI> RUN HPIBDIAG <RUN Command Options>

   Refer to the DUI section in the Online Diagnostics Subsystem Manual, P/N 09740-90020, for details concerning the RUN command options.

3. The diagnostic responds with a header and welcome message.

   If specific sections and steps are not specified, the default sections and steps will be executed based on the following diagnostic system modes:

   DEFAULT SECTIONS
   - o Section 3 - Identify
   - o Section 4 - Loopback
   - o Section 5 - Selftest

   ADDITIONAL SECTIONS AVAILABLE
   - o Section 6 - Request Status
   - o Section 12 - Rollcall

4. To exit HPIBDIAG type EXIT. Control will return to the Online Diagnostic System.

   For a list of error messages that may appear when using HPIBDIAG refer to Section 9 in the Online Diagnostics Subsystem Manual, P/N 09740-90020.

HP-FL Device Adapter Diagnostic (HPFLDIAG)

The HP-FL Device Adapter Diagnostic (HPFLDIAG) is a diagnostic system program that provides the capability for online testing of the Device Adapter, which is itself a Field Replaceable Unit (FRU).

Mini-Operating Instructions

1. Enter the following to the system prompt:

   SYSDIAG (MPE-XL)

   /USR/DIAG/BIN/SYSDIAG (HP-UX)

2. Enter the following to the DUI prompt:

   DUI> RUN HPFLDIAG < RUN Command Options >

   Refer to the DUI section in the Online Diagnostics Subsystem Manual, P/N 09740-90020, for details concerning the RUN command options.

3. The diagnostic responds with a header and welcome message.

   If sections and steps to be run are not specified, the default sections and steps will be executed. The default sections are Sections 10 and 11.

   DEFAULT SECTIONS
   o Section 10 - Verification Trouble Tree
   o Section 11 - Diagnostic Trouble Tree

4. To exit HPFLDIAG, type EXIT. Control will return to the Online Diagnostic System.

Memory Array Diagnostic (MAD)

The Memory Array Diagnostic (MAD) tests and verifies the memory controllers and memory arrays online from the System Console or a remote maintenance terminal.

The Memory Array Diagnostic provides three diagnostic functions and one verifier function. The diagnostic functions consist of a total pattern test of memory, a partial pattern test of memory, and an interactive section.

Mini-Operating Instructions

1. Enter the following commands:

   SYSDIAG (MPE-XL)

   /USR/DIAG/BIN/SYSDIAG (HP-UX)

2. DUI > RUN MAD <RUN Command Options>

   Refer to the DUI section in the Online Diagnostics Subsystem Manual, P/N 09740-90020, for details concerning the RUN command options.

3. The diagnostic responds with a header and welcome message.

   If specific sections and steps are not specified, the following default sections and steps are executed based on the diagnostic mode which has been selected by the Online subsystem. Refer to the Online Overview discussion of diagnostic modes in the Online Diagnostics Subsystem Manual, P/N 09740-90020, for details.

   SECTIONS AVAILABLE
   - o Section 10 - Full Automatic Memory Test (all steps)
   - o Section 11 - Partial Automatic Memory Test (all steps)
   - o Section 13 - User Interactive Testing (all steps)

4. To exit MAD type EXIT. Control will return to the Online Diagnostic System.

   For a list of error messages that may appear when using MAD, refer to Section 10 in the Online Diagnostics Subsystem Manual, P/N 09740-90020.

Six-Channel MUX Diagnostic (MUXDIAG)

The Asynchronous Six-Channel Multiplexer Diagnostic (MUXDIAG) is a diagnostic subsystem program that checks the functionality of the HP 27140A Asynchronous Six-Channel Multiplexer Interface card, which is itself a Field Replaceable Unit (FRU).

Minimum Configuration

The hardware required to run the diagnostic is different for the MPE-XL or HP-UX operating system.

When running the HP-UX operating system, ensure that the following hardware is present:

- At least two MUX (6 channel) cards for running the diagnostic from a terminal attached to one card to test the other card.
- A System Console to run diagnostics for the other MUX card.

When running the MPE-XL operating system, ensure that the following hardware is present:

- One MUX card (6 channel).
- A configured and functional LAN system.
- A configured and functional Distributed Terminal Control (DTC) system.

Mini-Operating Instructions

1. Enter the following command:

   SYSDIAG (MPE-XL)

   /USR/DIAG/BIN/SYSDIAG (HP-UX)

   Typing HELP to the prompt will display a summary of the available RUN commands. Refer to Section 11 in the Online Diagnostics Subsystem Manual, P/N 09740-90020, for details concerning these RUN command options.

2. Enter the following to the DUI prompt:

```
DUI1> MODE SUM                    Go into Single User Mode
Single User Mode (SUM)              Displayed by SYSDIAG
DUI2> RUN MUXDIAG dev=/dev/diag/mux* <RUN Command Options>
```

NOTE

When running MUXDIAG under HP-UX, it is recommended to specify an output file to which all diagnostic messages can be sent for determining if the MUX card needs to be replaced.

3. The diagnostic will respond with a header and welcome message.

   If specific sections and steps are not specified, the default sections and steps will be executed based on the following diagnostic system modes:

   DEFAULT SECTIONS
   o Section 1 - State
   o Section 3 - Identify
   o Section 4 - Loopback

   ADDITIONAL SECTIONS AVAILABLE
   o Section 2 - Clear
   o Section 5 - Selftest
   o Section 10 - Write/Read

4. To exit MUXDIAG type EXIT.

   For a list of explanations of error messages that may be generated by MUXDIAG, refer to Section 11 in the Online Diagnostics Subsystem Manual, P/N 09740-90020.

Local Area Network Device Adapter Diagnostic (LANDAD)

The Local Area Network Device Adapter Diagnostic (LANDAD) tests HP 36921A LAN Links (used on HP 3000/930 Computer Systems) and HP 98194A LAN Links (used on HP 9000/840 Computer Systems). LANDAD is capable of detecting a failure in one or more Field Replaceable Unit (FRU). An FRU for LANDAD is the LAN interface card (LANIC), the LANIC connector cable, the attachment unit interface (AUI) cable, the medium attachment unit (MAU), and the medium interface (MDI).

Mini-Operating Instructions

Refer to Section 12 of the Online Diagnostics Subsystem Manual, P/N 09740-90020, for detailed explanations for running the diagnostics below.

1. Enter the following command to the system prompt.

   SYSDIAG (MPE-XL)

   /USR/DIAG/BIN/SYSDIAG (HP-UX)

```
**********************************************************
****                                                  ****
****           ONLINE DIAGNOSTIC SUBSYSTEM            ****
****       (c)  Hewlett-Packard Company 1986          ****
****                 Version x.yy                     ****
****                                                  ****
**********************************************************
```

2. Enter the following command to the DUI prompt:

   DUI 1> RUN LANDAD PDEV=8.4

   (where PDEV is the physical device number. The first digit is the Midbus number (usually 8) and the second digit is the CIB slot number in which LANIC is located.)

3. The diagnostic responds with a header and welcome message.

   The diagnostic will request a routine which allocates the LANIC and displays the following sections which can be run:

   DEFAULT SECTIONS
   - o Section 3 - Identify
   - o Section 4 - Local Loopback (to LANIC and back)
   - o Section 6 - Status

   ADDITIONAL SECTIONS AVAILABLE
   - o Section 1 - More Help
   - o Section 2 - Reset
   - o Section 5 - Selftest
   - o Section 7 - Link Statistics

- o Section 8 - External Loopback
- o Section 9 - Remote Node Test
- o Section 10 - Remote XID Test
- o Section 11 - AUI Cable Fault Isolation Test
- o Section 12 - Offline MAU Test

CAUTION

For MPE-XL, never abort LANDAD when Sections 3, 4, 9, or 10 are specified. This can cause the diagnostic to lose functionality the next time the diagnostic is run.

4. To access the HELP facility for LANDAD, enter HELP to the DUI prompt. The HELP messages are described in Section 12 of the Online Diagnostics Subsystem Manual, P/N 09740-90020.

   LANDAD is not an interactive diagnostic, and contains no user accessible commands.

5. Type EXIT to terminate the LANDAD diagnostic. Control will return to the Online Diagnostic System.

I/O Test Tool (IOTT)

The I/O Test Tool (IOTT) is a utility intended for online diagnosis of I/O related problems from any system terminal. Numerous commands, instructions, and program statements are available as inputs through I/O Test Tool.

Mini-Operating Instructions

Before attempting to run the utility, ensure that the user has diagnostic level 0 security as described in the Online Diagnostics Subsystem Utilities Manual, P/N 09740-90021.

1. Enter the following command to the MPE-XL prompt:

   SYSDIAG (MPE-XL)

   /USR/DIAG/BIN/SYSDIAG (HP-UX)

2. Enter the following command to the DUI prompt:

   DUI> RUN IOTT <RUN Command Options>

   Refer to the Section on DUI for details concerning the RUN command options and the detailed IOTT command options in this section.

3. The diagnostic responds with a header and welcome message.

   Once the I/O Test Tool is invoked, the following message will be displayed indicating an input request:

   IOTT>

   The four categories of input commands and the five categories of input Buffer Manipulation Instructions available for I/O Test Tool are provided in this section.

4. To exit IOTT type EXIT. Control will return to the Online Diagnostic System as shown by the appearance of the DUI prompt:

   DUI>

   For information on error messages that may appear when using IOTT, refer to Section 5 in the Online Diagnostics Subsystem Utilities Manual, P/N 09740-90021.

COMMAND SUMMARY

The four categories of input commands available with IOTT are listed as follows:

Control Commands (CC)

The following commands are used to control the current execution mode of I/O Test Tool:

```
ABORT
EXIT
```

```
RESUME
RUN[count]
SUSPEND
```

User Program File Commands (UPFC)

The following commands are available to utilize user program files:

```
LOAD (filename)
PURGE (filename)
SAVE (filename)
SHOWFILE [file specifier string]
```

Program Editing Commands (PEC)

The following commands can be used to manipulate the contents of the Program Storage Area:

```
DELETE [linenumber]
DELETE [linenumber]/[linenumber]
DELETE ALL
LIST [linenumber]
MODIFY [linenumber]
MOVE [linenumber]/[linenumber] TO [linenumber]
MOVE [linenumber] TO [linenumber]
RENUMBER [value]
```

Miscellaneous Commands (MC)

The following commands are available for general use:

```
HELP [command, instruction, or statement name][:SYNTAX]
REDO
```

INSTRUCTION SUMMARY

The five categories of input Buffer Manipulation Instructions available for IOTT are as follows:

Test Environment Instructions (TEI)

The following instructions are used to set the environment for the use of I/O Test Tool:

```
ERRPAUSE ON
ERRPAUSE OFF
RELDEVICE LDEV=[ldev]
RELDEVICE PDEV=[pdev]
SETDEVICE LDEV=[logical device number]
SETDEVICE PDEV=[CA#][.DA#[.Device#[.Unit#]]]
SETTIMER (value)
SHOWDEV
```

Buffer Manipulation Instructions (BMI)

Buffer function instructions provide the availability to fill, modify, and display data which was used for the I/O request. The two types of buffers used are integer buffers (32-bit entities) and byte buffers (8-bit entities). For functions which involve two buffers, both buffers must be of the same type. The available instructions are:

```
ADJBUFF [buffer name]([index]),[value],[count]
ALTBUFF [buffer name]([index]),[value],[value]
ALTBUFF [buffer name]([index]),"ascii text"
COMPBUFF [buffer](index]),[buffer]([index]),[length],[count]
         [diff
         [similar]:[display mode]
COPYBUFF {buffer}({index}),{buffer}{{index}),{length},[count]
DBUFF {buffer name} [:display mode]
DBUFF {buffer name} [index] [:display mode]
DBUFF {buffer name} [index/index] [:display mode]
DEFBUFF {buffer name},{length},{BYTE} [:STATUS]
DEFBUFF {buffer name},{length},{WORD} [:STATUS]
FILLBUFF [buffer]([index]),[value],[count]
FINCBUFF {buffer name}({index}),{start},{end}[,inc]
RELBUFF {buffer name}
SHOWBUFF
```

Predefined I/O Request Instructions (PIORI)

The following instructions give all information needed for the predefined I/O request:

```
ABORTIO
EINCADDR {value}
EXECUTE {function}[,count][: UNBLOCK]
DSTATUS
INCADDR {value}
RESETIO
SETADDR CLY={cylinder};HEAD={head};SECT={sect}
SETADDR {value}
SETDATA {buffer},{length}
SETOPTION {option}[,option]
SHOWPARM
```

HP-IB Device Adapter Program Instructions (HPIBPI)

I/O Test Tool provides instructions for creating unique HP-IB device adapter programs. This allows more control over the protocol between the HP-IB device adapter and a peripheral device. The instructions available are as follows:

```
{line number} CASEJUMP {value},{line number}[,line number]
CLEAR {value}
{line number} CRCCOMP {line number}
CRCINIT
CRCWRITE
{line number} DSJ {sindex},{line number},[line number],[line number]
```

```
ENDHPIB
HALT {status length},{hstat}
IDENTIFY {sindex}
{line number} JUMP {line number}
ONTIMEOUT [timeout],[sindex],[line number]
PINDEX {value}
RBURST {secondary},{buffer name},{length},{#burst},{burstlen}
RDATA {secondary},{sindex},{length}
RDMA {secondary},{buffer name},{length}
SETHPIB
SHOWHPIB [:display mode]
TIMEOUTOFF
TIMESTAMP {sindex}
UNLOCK
WAITPOLL [:nobreak]
WBURST {secondary},{buffer name},{length},{#burst}[:eoi]
WDATA {secondary},{buffer name},{length}[:eoi]
WDMA {secondary},{buffer name},{length} [:eoi]
WINTERF {buffer name},{length}
```

For further information on HP-IB Device Adapter Programs, refer to the HP 27110B CIO/HP-IB Interface Card Technical Reference and Programming Manual, P/N 27110-90005.

HP-CIO DMA Chain Instructions (HPCIOI)

I/O Test Tool provides the following instuctions to control the protocol across the HP-CIO:

```
ADDQUAD {order ID},{buffer name},{length}[:hpcio optional]
ADDQUAD {cmd value},{buffer name},{length}
ENDHPCIO
SETHPCIO
SHOWHPCIO [:display mode]
```

PROGRAM STATEMENT SUMMARY

The following are program command statements available in IOTT:

```
COMMENT
DO-LOOPTO
GOTO
IF-THEN/IFN-THEN
PAUSE
PRINT
STOP
```

CIO Channel Adapter Diagnostic (CADIAG)

The CIO Channel Adapter Diagnostic (CADIAG) is a Diagnostic subsystem program providing capability to test online the functionality of the CIO Channel Adapter, which is itself a Field Replaceable Unit (FRU).

Mini-Operating Instructions

1. Enter the following command to the system prompt:

   SYSDIAG (MPE-XL)

   /USR/DIAG/BIN/SYSDIAG (HP-UX)

2. Enter the following command to the DUI prompt:

   DUI > RUN CADIAG <RUN Command Options>

   Refer to the DUI section in the Online Diagnostics Subsystem Manual, P/N 09740-90020 for details concerning the RUN command options.

3. The diagnostic responds with a header and welcome message.

   If the sections and steps to be run aren't specified, the following default sections and steps will be executed:

   DEFAULT SECTIONS
   - o Section 3 - Identify
   - o Section 5 - Selftest
   - o Section 6 - Request Status
   - o Section 8 - Description

   ADDITIONAL SECTIONS AVAILABLE
   - o Section 9 - Rollcall
   - o Section 10 - Subchannel Hardware Status

   Enter HELP to provide a summary of the DUI commands to be printed.

4. Type EXIT to exit CADIAG and control will return to the Online Diagnostic System.

   Refer to Section 8 in the Online Diagnostics Subsystem Manual, P/N 09740-90020, for a list of error messages which may appear when using CADIAG.

HP98720A Graphics Processor Diagnostic (GP3DDIAG)

The HP98720A Diagnostic (HPFLDIAG) will test the HP98720A Graphics Display Station.

Mini-Operating Instructions

1. Enter the following to the system prompt:

   SYSDIAG (MPE-XL)

   /USR/DIAG/BIN/SYSDIAG (HP-UX)

2. Enter the following to the DUI prompt:

   DUI> RUN GP3DDIAG < RUN Command Options >

   Refer to the DUI section for details concerning RUN command options. The diagnostic responds with a header and welcome message. If the user does specify which section to run, then the default is "all".

   Because some sections may be either disruptive or destructive, the diagnostic subsystem will grant the highest mode available based on the user's security level. Only those users with level 1 or 0 security will be able to execute all default sections.

3. When the specified/default sections have been completed, the diagnostic terminates and the following prompt is displayed:

   DUI>

4. To exit the DUI, type EXIT. Control will return to the Online Diagnostic System.

System and Memory Log Analysis Tool (LOGTOOL)

The system and memory log analysis tool (LOGTOOL) provides capability to perform various operations on the system log files. Error logs may be identified, deleted, and created. Timing intervals for background log analysis may be displayed and reset.

Mini-Operating Instructions

1. Enter the following command:

   SYSDIAG (MPE-XL)

   /USR/DIAG/BIN/SYSDIAG (HP-UX)

2. Enter the following command to the DUI prompt:

   ```
   DUI > run logtool
   ```

3. The utility responds with a header and welcome message.

   Refer to the detailed LOGTOOL command explanations in the Online Diagnostics Subsystem Utilities Manual, P/N 09740-90021, for more details. Once LOGTOOL has been invoked the following prompt will be displayed indicating an input request:

   ```
   LOGTOOL>
   ```

4. Respond by entering a logtool command along with any necessary data, parameter(s), or options. Entering HELP will access the logtool HELP facility and display a complete list of logtool commands.

   The four categories of input commands available are:

   - System Log File Commands (SFL).
   - Memory Log File Commands (MLF).
   - Miscellaneous Commands (MC).

   The following commands listed with their command category are available in LOGTOOL:

DISPLAYLOG (MC)	PURGESYSLOG (SLF)
EXIT (MC)	PURGEWORK (SLF)
HELP (MC)	REDO (MC)
LAYOUT (SLF)	SELECT (SLF)
LIST (SLF)	STATUS (SLF)
MEMCLR (MLF)	SUSPEND (MC)
MEMRPT (MLF)	SWITCHLOG (SLF)
MEMTIMER (MLF)	TYPES (SLF)

5. Type EXIT to leave the HELP facility or to terminate any current logtool process.

   For a list of warning and error messages that may appear when using LOGTOOL, refer to the Online Diagnostics Subsystem Utilities Manual, P/N 09740-90021.

System Map (SYSMAP)

The System Map (SYSMAP) utility provides information concerning these three areas of the HP Precision Architecture Computer System: Input/Output System (IOMAP), Central Processing Unit(s) (CPUMAP), and System Memory (MEMMAP). Maps of these three areas are available only on the host system.

Mini-Operating Instructions

1. Enter the following command:

   SYSDIAG (MPE-XL)

   /USR/DIAG/BIN/SYSDIAG (HP-UX)

2. Enter the following command to the DUI prompt:

   ```
   DUI > run sysmap
   ```

3. The utility responds with a header and welcome message.

   Refer to the command descriptions in the Online Diagnostics Subsystem Utilities Manual, P/N 09740-90021, for details of SYSMAP commands. SYSMAP has no RUN command options. Once SYSMAP has been invoked the following prompt is displayed indicating an input request:

   ```
   ENTER MAP>
   ```

3. Typing HELP will cause SYSMAP to list a menu of the following global SYSMAP commands:

   ```
   IOMAP
   CPUMAP
   MEMMAP
   CONFIRM (ON/OFF)
   TIMEOUT
   SUSPEND
   EXIT
   ```

   Respond with one of the above six commands.

4. Type EXIT to terminate any current mapping process or to leave the HELP facility.

HP-UX Logging Facility

The HP-UX Logging Facility provides a means of obtaining and decoding Diagnostic Event Messages (DEMs). The acquisition of the event messages is handled by the HP-UX DELOG (Diagnostic Event Logger) program. To decode these messages, use the HP-UX DECODE (Diagnostic Event Decoder) program.

Mini-Operating Instructions

1. Enter the following command to the system prompt:

   SYSDIAG (MPE-XL)

   /USR/DIAG/BIN/SYSDIAG (HP-UX)

   The system responds with a header and welcome message. Enter HELP for assistance.

   ```
   DUI (n)>
   ```

2. Enter desired command by preceeding each command entry with an exclamation point:

   ```
   DUI (n)> ! delog or

   DUI (n)> ! decode
   ```

   Use the DELOG command when the altering operation of the Delog background log process deamon is desired. Use the DECODE command when decoding and displaying a particular Diagnostic Event Message (DEM).

3. Refer to the Online Diagnostics Subsystem Utilities Manual (P/N 09740-90021) for detailed operating instructions or explanations of DELOG and DECODE.

4. Type EXIT to terminate program or to leave the HELP facility.

MPE-XL Online Diagnostic Installer (DIAGINST)

The MPE-XL Online Diagnostic Installer (DIAGINST) utility permits online updating of the Online Diagnostic Subsystem and its directory. This utility will serve as a remote and onsite support tool.

Mini-Operating Instructions

1. Enter the following command to the MPE-XL prompt:

   ```
   :run diaginst.diag.sys;lib=g
   ```

   After the introductory message is displayed at initialization, the following main menu will be displayed:

   ```
   Available Commands:
                        ADD
                        CORRECT
                        EXIT
                        LIST
                        REMOVE
                        SHOWMSG
                        SYSTEM
                        XCHECK
                        INSTALLATION TASK (select by command name) >
   ```

2. Enter HELP to any prompt for assistance on the use of this program. Another facility available is HELP "GENERAL/COMMANDS/HELP/RECOVER".

3. To leave this program, enter EXIT as displayed in the main menu of MPE-XL Online Diagnostic Installer.

   For a list of warning or error messages that may appear when using the program, refer to the Online Diagnostics Subsystem Manual, P/N 09740-90020.

MPE-XL Online Diagnostic Implementation

The MPE-XL operating system has components and conditions specific for implementation of the Online Diagnostic Subsystem.

Implementation Dependent Information

Maximum USE file nesting level:	10
Maximum processes per DUI:	10
User Interrupt Key:	Control Y
Command (REDO) Stack depth:	5
Input/Output Files:	80 Character Records
	Unnumbered
Directory "path":	file.group.acct
Monitor Version:	xx.yy

MPE-XL Specific Diagnostic Procedures/Features

Information concerning MPE-XL system tables and configuration can be found by referring to the MPE-XL System Configuration Manual, P/N 32650-90042.

HP-UX Online Diagnostic Implementation

The HP-UX operating system has components and conditions specific for implementation of the Online Diagnostic Subsystem.

Implementation Dependent Information

Maximum USE file nesting level:	10
Maximum processes per DUI:	System Dependent
User Interrupt Key:	Control C
Command (REDO) Stack depth:	10
Input/Output Files:	Character String (80 max)
Directory "path":	/dir/dir/.../file
Monitor Version:	n/a

HP-UX Specific Diagnostic Procedures/Features

Information concerning HP-UX Online Diagnostic subsystem security, the Online Diagnostic subsystem directory tree, Diagnostic special files, and DUI permissions can be found by referring to the HP-UX System Administrator's Manual, P/N 92453-90004.

HP-UX SUPPORT TAPE

The support tape (P/N 92452-13503 on 1600 BPI tapes and P/N 92452-13303 on Linus cartridge tapes) provides capability to diagnose and fix problems when the HP-UX operating system cannot be booted from system disc. For information on the HP-UX file system to use the support tape, refer to the HP 9000/840 System Administrator's Manual, P/N 92453-90004.

The minimum hardware configuration to use the support tape is:

- 8 Mb memory.
- Console.
- Magtape drive.
- Input/output paths to the console and tape drive.

Booting Up

If the system has halted and cannot be booted from the system disc, then booting up from the support tape is necessary. The procedure is as follows:

1. Select a tape drive to boot from and determine the drive's physical address. (The default alternate path physical address is 8.2.3.)

2. Load support tape on tape drive and put drive online.

3. Press system reset button and wait about 30 seconds.

4. If autoboot is enabled, the following will appear on the console:

   ```
   Autoboot from primary boot path enabled.
   To override, press any key within 10 seconds.
   ```

   When a console key is pressed, this prompt will appear on the console:

   ```
   Boot from primary boot path (Y or N)?>
   ```

5. Respond by typing `N` to this prompt. The next prompt is:

   ```
   Boot from alternate boot path (Y or N)?>
   ```

6. Respond to this prompt by typing `Y` if the support tape is loaded on the tape drive that corresponds to the alternate boot path.

   Respond by typing `N` if the support tape is not loaded on the tape drive that corresponds to the alternate boot path and then the following prompt will appear:

   ```
   Enter boot path, command or ?>
   ```

   Respond by entering the physical address of the drive you loaded the support tape onto.

   After the appropriate response is given, the tape should start spinning and the prompt `ISL>` will appear.

NOTE

If autoboot is not enabled, the previously listed sequence of prompts and responses will occur with one exception. The first prompt, which allows the primary boot path to be overriden, will not appear.

7. Enter the HP-UX command to the ISL> prompt. An example with the default physical device address is as shown:

```
ISL> hpux tape1(8.2.3;0xa0000,1)
```

The address field of this command is the only part that may vary, but the rest of the command is exactly as shown.

8. After the HP-UX command is entered, the appropriate files from the support tape are loaded and a input/output tree will be displayed followed by the message:

```
System needs more CIO channels?
```

The above message can be disregarded since there is usually always more CIO channels than exist on HP-UX systems.

9. After successfully booting, the tape will be positioned at the beginning of Section 1. A login prompt, which is `login:` will appear on the System Console. Log in as "root". The password is "support". After logging in, the Support Tape Main Menu will be displayed on the console.

Support Tape Main/Utilities Menus

The Support Tape Main Menu is used by typing a single character followed by a carriage return. If booting from the tape drive at address 8.2.3, any character may be selected. If booting from another address other than 8.2.3, the character "u" must be selected because the tape unit number must be changed to conform to the physical address of the tape drive. The tape unit number is determined by the physical address of the tape drive.

The Support Tape Main Menu is as follows:

s. Search for file
l. Load a file
d. On-line Diagnostics
h. Help
u. Utilities
x. Exit to shell

Tape is unit 0

The Support Tape Utilities Menu is as follows:

c. Change tape unit number
p. Try to resynchronize position on tape
t. Table of contents of a tape section
r. Return to previous menu
x. Exit to the shell

Select one of the above:

For additional information regarding the Support Tape, refer to the Support Tape Users Manual, P/N 92453-90010.

ADJUSTMENTS

SECTION 6

This section contains procedures for power supply adjustments for the HP 3000 Series 900 Model 930 and HP 9000 Series 800 Model 840S Computer Systems.

Power Supply Removal/Replacement - Power Supply #1 6-2
Power Supply Removal/Replacement - Power Supplies #2 and #3 6-4

Power Supply Removal/Replacement - Power Supply #1

The following procedure describes how to remove power supply #1 from the left side of the card cage:

1. Turn off Main Power Breaker (located on the rear of cabinet).
2. Open front door and disconnect AC power cord from front of Power Supply #1. See Figure 6-1.
3. Remove the flat control panel cable from system monitor.
4. Remove four screws holding system monitor in place and slide the system monitor out one inch in its slides without disconnecting the attached cables.
5. Remove the four screws and lock washers holding power supply in place.
6. Grasp and pull power supply to slide out of cabinet on its guides.
7. Install new power supply module by reversing this procedure.

CAUTION

To prevent damage to the computer system and/or power supply, ensure power supply is fully seated in cabinet, without forcing it.

8. Reconnect AC power cord to Power Supply #1.
9. Turn on Main Power Breaker and check PS1 voltage test points (located on system monitor) for proper voltages. Refer to Table 4-8 (Troubleshooting, Section 4) for the power supply test points and their voltage specifications. If voltages are out of tolerance, replace the power supply again. No adjustments are required.
10. Verify that system performs a normal boot-up.

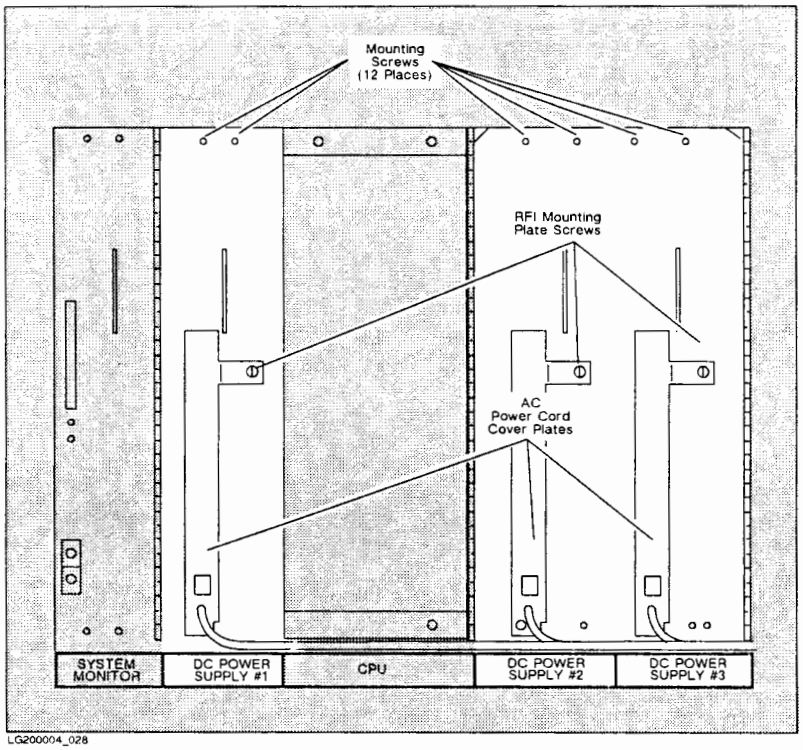


Figure 6-1. Location of Power Supplies

Power Supply Removal/Replacement - Power Supplies #2 and #3

The following procedure describes how to remove power supply #2 or #3 from the right side of the card cage:

1. Turn off Main Power Breaker (located on rear of cabinet).
2. Open front door and disconnect AC power cords from each power supply (#1, #2, and #3). See Figure 6-1.
3. Remove the eight mounting screws and lockwashers holding the RFI plate and power supplies in place.
4. Loosen the two captive, extruded, RFI plate mounting screws and use them to pull the RFI plate away from the power supplies.
5. Grasp and pull the applicable power supply handle to slide the power supply out of cabinet on its guides.
6. Install new power supply module by reversing this procedure, ensuring that the mounting screws are aligned before tightening.

CAUTION

To prevent damage to the system and/or power supplies, ensure each power supply is fully seated in cabinet, without forcing it.

7. Reconnect AC power cords to all of the power supplies.
8. Turn on Main Power Breaker and check PS2 or PS3 voltage test points (located on system monitor) for proper voltages. Refer to Table 4-8 (Troubleshooting, Section 4) for the power supply test points and their voltage specifications. If voltages are out of tolerance, replace applicable power supply again. No adjustments are required.
9. Verify that system performs a normal boot-up.

PERIPHERALS

SECTION 7

This section describes the devices supported on the HP 3000 Series 900 Model 930 and HP 9000 Series 800 Model 840S Computer Systems.

Supported Peripheral Devices 7-2
General Information 7-2
MPE-XL/HP-UX Default Device Configuration 7-2
Distributed Terminal Device (DTC) 7-4

SUPPORTED PERIPHERAL DEVICES

The types of peripherals supported by the SPU are terminals, printers, disc drives, mag tapes, and other devices. Additional information on specific peripherals supported by the SPU can be found in the Site Preparation and Requirements Guide, P/N 09740-90018, or the Installation and Configuration Guide, P/N 09740-90019. To install and verify the system peripherals, refer to the individual manuals supplied with the equipment.

General Information

The peripheral devices supported by the SPU use the following guidelines:

- Spacing between adjacent HP-IB/HP-FL devices on the same HP-IB/HP-FL cable must not exceed one meter (for disc drives) to two meters.
- Total cable length must not exceed 20 meters (15 meters for high speed devices) with appropriate loading.

MPE-XL/HP-UX Default Device Configuration

Default device configuration for MPE-XL and HP-UX supported peripherals are represented in Tables 7-1 and 7-2.

Table 7-1. MPE-XL Default Device Configuration

LDEV#	I/O-PATH	CLASS NAME
1	8.0.0	DISC; SPOOL
20	8.1.0	CONSOLE
6	16.3.4	LP; (SYSTEM PTR)
7	16.3.0	TAPE; DDUMP (PRIMARY)
10	16.3.7	JOBTAPE

NOTE

During the MPE-XL "install" process, the I/O paths are critical for successful booting.

Table 7-2. HP-UX Default Device Configuration

LU#	I/O-PATH	CLASS NAME
0	8.0.0	DISC
1	8.0.1	DISC
2	8.0.2	DISC
3	8.0.3	DISC
0	8.1.0	MUX (6 PORT)
1	8.2.0	PRINTER
0	8.2.1	PRINTER
1	16.3.0	TAPE
0	16.3.4	TAPE
2	8.2.5	TAPE
0	8.2.7	INSTRUMENT
1	8.3.0	MUX
0	8.4.0	LAN
0	8.5.0	GPIO
4	8.6.0	DISC
5	8.6.1	DISC
6	8.6.2	DISC
7	8.6.3	DISC
2	8.7.1	PRINTER
3	8.7.2	TAPE
4	8.7.3	TAPE
1	8.7.7	INSTRUMENT
2	8.8.0	MUX
3	8.9.0	MUX
4	8.10.0	MUX
5	8.11.0	MUX
1	8.12.0	ACCESS PORT

Distributed Terminal Controller (DTC)

General Installation Information

The HP 2345A Distributed Terminal Controller (DTC) is only for MPE-XL supported computer systems. The HP 32480A and HP 19747B are equipped to support installation of DTC's. The DTC is mounted inside the Expansion Bay cabinet to allow multiple asynchronous workstations to communicate with the HP 3000/930 host computer system via any one connection point on an IEEE S02.3 Local Area Network (LAN) cable.

The DTC is delivered with all of the ordered options already fitted inside. For the hardware installation summary, refer to Installation in the DTC HP2345A Distributed Terminal Controller Installation and Service Manual, Part Number 02345-90001.

DTC Installation in the Expansion Bay Cabinet

Installation of the HP 2345A Distributed Terminal Controller into the Expansion Bay cabinet assumes the slide racks are in the required position in the cabinet. The procedure is as follows:

1. Unpack the HP 2345A from the shipping carton and inspect to ensure that it is not damaged. If the DTC is damaged, then do not install it. Have the customer notify the carrier and the nearest Hewlett-Packard office immediately. Retain the shipping carton and packing material for inspection by the carrier.
2. Before sliding the DTC into the slide repack, remove the two (2) shipping screws located on the Internal Protective Metal Plate. See Figure 7-1.
3. Loosen the four (4) captive screws on the Internal Protective Metal Plate to remove from the DTC, then slide DTC into rack through the front of the Expansion Bay cabinet. See Figure 7-1.

NOTE

A list of error codes associated with the DTC are referenced on the inside of the front panel. Also, make note of the LAN address, called the Nodal address, for later configuration using the NMMGR program.

---

4. Return the Internal Metal Plate to the DTC and tighten with the four (4) captive screws.
5. Connect the LAN, workstation and modem cables to the rear of the DTC. The peripheral cables from each Connector card in the DTC are routed alternatively to the left and to the right and draped around the cable management reacks that are

attached to the support rails in the Expansion Bay cabinet. Route the cables between the support rails and the side panels to the base and down through the cabinet base cut-out, as shown in Figure 7-1 and Figure 7-2. Connect cables to applicable peripherals.

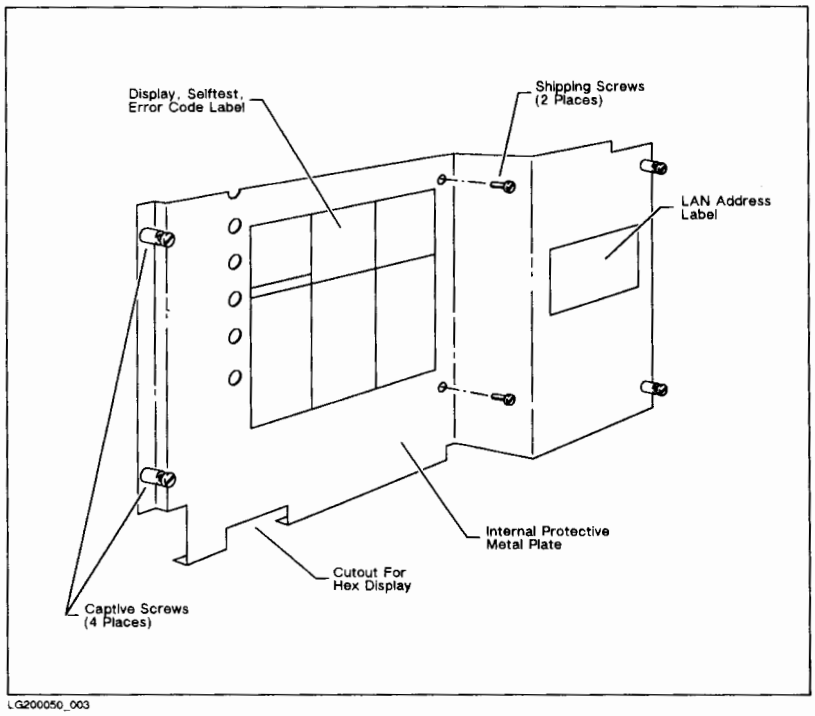


Figure 7-1. DTC Internal Protective Plate (Front View)

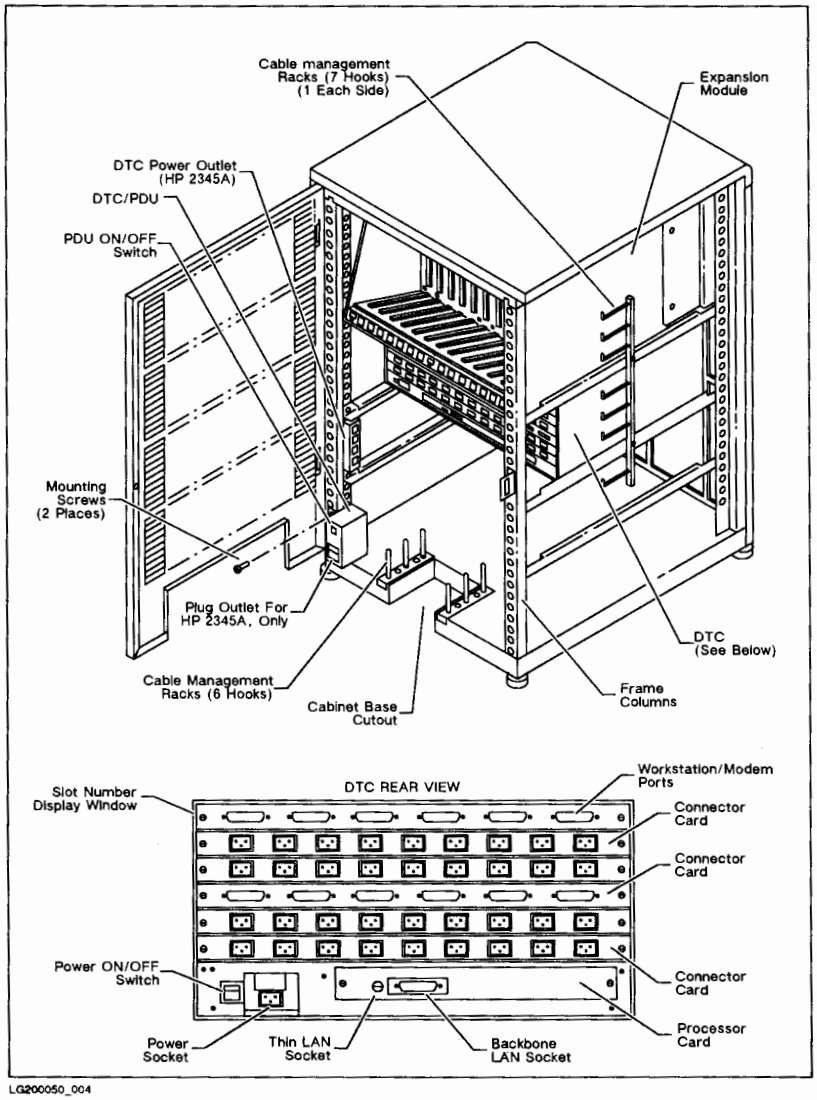


Figure 7-2. DTC Internal Protective Plate (Rear View)

NOTE

On each Connector Card, all cables must be tied together and aligned horizontally to go through the cable management racks. Access to the Connector cards and the Processor card is then easily attained.

6. Connect the power cord to the PDU labeled for use of the HP 2345A DTCs, only (located inside the lower rear of the Expansion Bay cabinet). See Figure 7-2.
7. Switch the power switch, located on the rear left corner of the DTC, on ON. (It is not required to connect the workstations to the DTC before the DTC is powered up.) Installation of DTC hardware is completed.

DTC Selftest

The self-test routine is stored within DTC firmware. It checks the functional operation of all major DTC hardware components, including the LAN connection. The selftest is performed automatically when the DTC is powered on.

The DTC displays the results of the selftest on the two-digit hexadecimal display in the lower front left corner of the DTC. Refer to the label inside the Internal Metal Plate for a summary of the selftest sequence and appropriate error codes.

Successful completion of selftest assumes that there are no problems with the DTC hardware and that all LAN connections are good. The workstation/modem connections are not tested during the selftest. Refer to the DTC HP2345A Distributed Terminal Controller Installation and Service Manual, Part Number 02345-90001, for diagnostic programs, troubleshooting, and additional DTC related information.

Software Installation

Once the selftest has successfully completed, the host computer will start to download the software into the DTC. Once the download is complete, then the DTC is ready for normal operator.

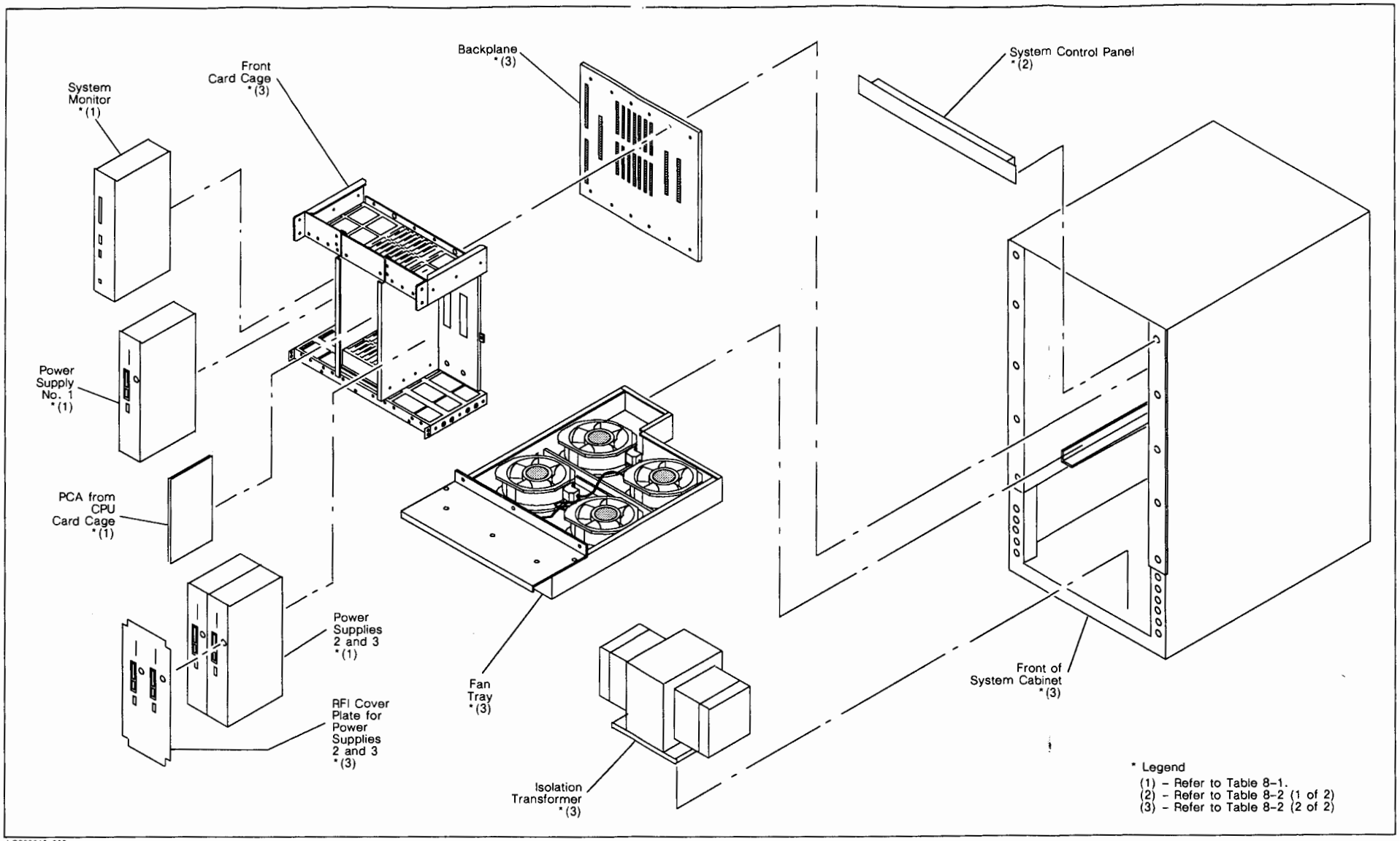
The Distributed Terminal Subsystem (DTS) software should be configured first on the host computer, using the NMMGR program, for the software download to take place. Refer to the ASC System Administrators Reference Manual, Part Number 32022-90001, for information on the standard Fundamental Operating System that must be installed into the system.

REPLACEABLE PARTS

SECTION 8

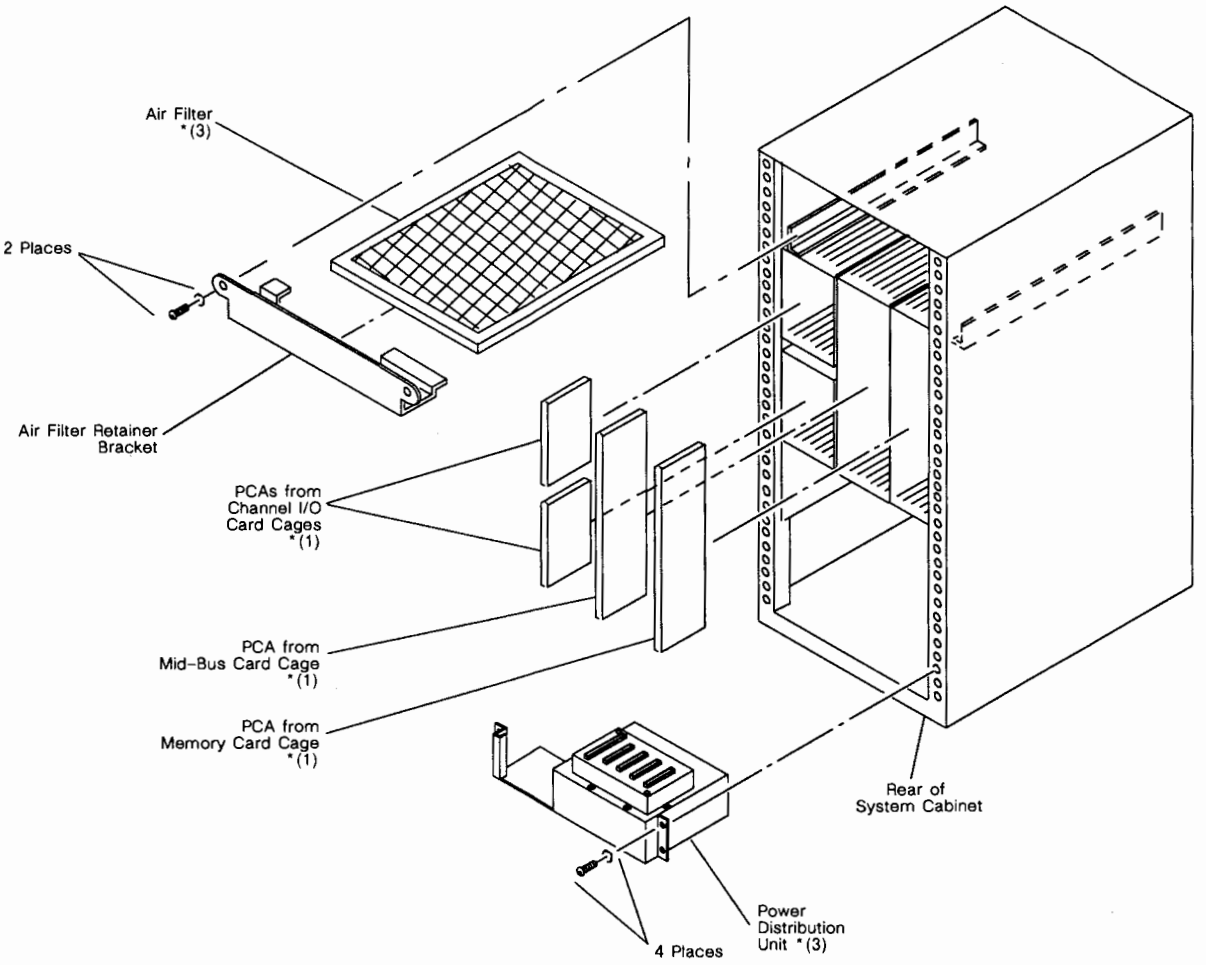
The Replaceable Parts Catalog provides illustrations and parts lists to assist the user in locating replaceable assemblies for the HP 3000 Series 900 Model 930 and HP 9000 Series 800 Model 840S Computer Systems. The catalog contains part number data for the Customer Engineer (CE) when parts replacement is necessary.

Replaceable Parts Catalog 8-7



LG200012_008

Figure 8-1. SPU, Front View



* Legend
(1) – Refer to Table 8–1.
(2) – Refer to Table 8–2 (1 of 2)
(3) – Refer to Table 8–2 (2 of 2)

LG200012_009

Figure 8-2. SPU, Rear View

REPLACEABLE PARTS CATALOG

The replaceable parts catalog is organized in the order of Exchange Parts and Non-Exchange Parts. Each system diagram (exploded view) shown in Figures 8-1 and 8-2, contains a legend that represents parts listed in Tables 8-1 and 8-2.

Table 8-1. Exchange Parts

HP PART NO.	HP PART NO. (EXCHANGE)	DESCRIPTION
09740-60101	09740-69511	PCA-RGSTR File (CPU Register File Unit)
09740-61701	09740-69671	PCA-E Unit (CPU Execution Unit)
09740-60301	09740-69531	PCA-I Unit (CPU Instruction Unit)
09740-61501	09740-69651	PCA-TLB (CPU Translation Lookaside Buffer)
09740-61602	09740-69662	PCA-CACHE (CPU Cache)
09740-60603	09740-69563	PCA-CIOA MB (Channel I/O, C1)
09740-60707	09740-69577	PCA-CIOA CIO (Channel I/O, C2)
09740-60905	09740-69595	PCA-SYS MONITOR (System Monitor)
09740-61001	09740-69601	PCA-3MB Memory Controller
19741-60001	19741-69001	PCA-5MB Memory Array
19730-60001	19730-69001	PCA-12MB Memory Controller
19731-60001	19731-69001	PCA-20MB Memory Array
19742-60004	19742-69004	PCA-Floating Pt (CPU Floating Point Coprocessor)
5061-2537	5061-2541	PCA-AP (CIO Access Port)
0950-1788	0950-1806	Assy - Power Supply, 300 Watt

NOTE

All exchange assemblies include ROMs. The ROMs will only be changed as part of update procedures.

Table 8-2. Non-Exchange Parts (1 of 2)

HP PART NO.	DESCRIPTION
09740-60010	Cable, PDU - Transformer
09740-60015	CA-CNTRL PANEL (INT/EXT Display)
09740-60017	CA-SYS MON, CNTRL (System Monitor, Control)
09740-60018	CA-SYS MON, BATT (System Monitor Battery Cable)
09740-60019	CA-SYS MON, PDU (System Monitor, PDU)
09740-60024	CA-CHAN ADAPT A, Channel Adapter A Cable
09740-60025	CA-CHAN ADAPT B, Channel Adapter B Cable
09740-60803	PCA-CIO Buffer (Channel I/O, C3)
09740-61101	PCA-Display Board, External
09740-61202	PCA-Display Board, Internal
19746-60003	SM, Config Board (Exp. Module)
19746-60010	Cable, CIO Buffer
8120-4859	AP CBL ASYM. LEGS (Access Port Cable)

Table 8-2. Non-Exchange Parts (2 of 2)

HP PART NO.	DESCRIPTION
1390-0345	Key, SPU Cabinet
1390-0741	Lock, door
1420-0341	Battery - Lithium
2110-0051	Fuse 10A SB, Power Supply
3105-0209	CKT BKR - 5 AMP (Fan Circuit Breaker)
3105-0208	CKT BKR - 15 AMP (Battery Circuit Breaker)
3105-0228	CKT BKR - .025 AMP (Exp. Bay PDU)
3150-0504	Filter, Air
3160-0478	Fan, AC
9100-4177	XFMR-ISLN (Isolation Transformer)
09740-00027	Door, Front CPU
09740-00029	Door, I/O Mid-Bus
09740-00030	Door, CIO Upper
09740-00031	Door, Memory Mid-Bus
09740-00041	Front Cover, PDU
09740-00042	Panel Cover, PDU
09740-00049	Cover, Power Supply
09740-00051	Door, CIO Lower
09740-40002	Panel, Control
09740-60003	Assy - Card Cage
09740-60005	Assy - Fan Tray
09740-60007	BATT 10V, 10AH (Battery Assembly)
09740-60008	Assy - PDU (Power Distribution Unit)
09740-60012	Assy - Door, Front
09740-60020	Ribbon Cable, CIO
09740-60041	Assy - Door, Rear
09740-60042	Backplane
09740-61401	TTL SPU CAB (SPU Cabinet Bay Assembly)
19743-60001	Parallel Card
19746-00008	Door, CIO
19747-60003	Assy - PDU (Exp. Module)
19747-60005	Assy - Expandr Cbnt
19747-60010	Cable Assy
19770-67901	Service Kit
19771-67801	Cable Kit

NOTE

If the transformer fails, it is recommended that the SPU Cabinet Bay Assembly (P/N 09740-61401) be replaced.

Table 8-3. CIO Expansion Bay/Module, Replaceable Parts

Quantity	HP Part Number	Description
Ref.	19747A	CIO Expansion Bay
	19747B	Expansion Bay w/DTC
	19746A	CIO Expansion Module
	19746B	Technical Expansion Bundle
	19778C	CIO Expander, Misc.
	19744A	TTL Channel Adapter Set
1	0515-0928	Scr-Mach M5X. 8
1	0515-1655	Screw Assy M4X0. 7
1	0515-1724	Screw-Cap
1	0535-0093	Nut
1	2190-0647	Wsh-Lk Ext T-B
1	2510-0041	Mach Scr, 8-32
1	3050-0139	Flat Washer, #8
1	8120-4882	CA, AC Power
1	09740-00050	Plate-Striker, Fr
1	09740-00052	Hinge, Front
1	09740-40002	Molded Control Panel
1	09740-60011	Assy-Door, Rear
1	09740-60012	Assy-Door, Front
1	12679-20001	Support Angle
1	19746-00001	Pwr Sup Guide Bracket
1	19746-00002	Switch Box
1	19746-00003	Fan Plate
1	19746-00004	U-Channel
1	19746-00005	Brkt-Config.
1	19746-00006	Card Cage
1	19746-00007	Mounting Bracket
1	19746-00010	Door, Fan
1	19746-00011	Bottom Plate
1	19746-00012	Top Cover
1	19746-00016	Door, CIO
1	19746-60001	PCA, Backplane
1	19746-60002	PCA-Display, Int
1	19746-60003	PCA-SM/Config
1	19746-60004	CA-Pwr Sup Backplane
1	19746-60005	CA-Int/Ext CP
1	19746-60006	CA-Fan
1	19746-60007	CA-AC Switch
1	19746-60008	CA-Backpland/Control Panel
1	19746-60009	CA-Pwr Sup Shutdown
1	19746-60010	CA-Channel Buffer
1	19746-60011	Assy. Module

Table 8-3. CIO Expansion Bay/Module, Replaceable Parts (cont.)

Quantity	HP Part Number	Description
1	19747-00001	Separator Plate
1	19747-0002	PDU Outlet Panel
1	19747-00003	PDU Bottom Panel
1	19747-00004	PDU Front Panel
1	19747-00005	PDU Side Panel
1	19747-00006	Rail Support
1	19747-00008	Guide-Cbl, Base
1	19747-00019	BKT-Fan Door/Pwr
1	19747-60001	PCA Ext. Display
1	19747-60002	Assy. Control Panel
1	19747-60003	Assy. PDU
1	19747-60006	Expndrcab, 1000mm
1	19747-60011	Assy. Door, Rear
1	19747-60012	CIO Exp. Bay & Module
1	19747-60013	Kit Number, DTC
1	19747-80002	Control Panel Label
1	29400-00013	Rear Key Striker
1	29400-00023	Assy-Blk Top Cap
1	29400-61000	Front Door Hinge Kit
2	29400-61001	Rear Door Hinge Kit
1	29451-60001	Cabinet Subassembly
1	40118-60001	Tie-together Kit

DIAGRAMS

SECTION 9

The diagrams provided in this section are to aid the CE in troubleshooting the system.

Overall Block Diagram - 9740 CPU 9-3
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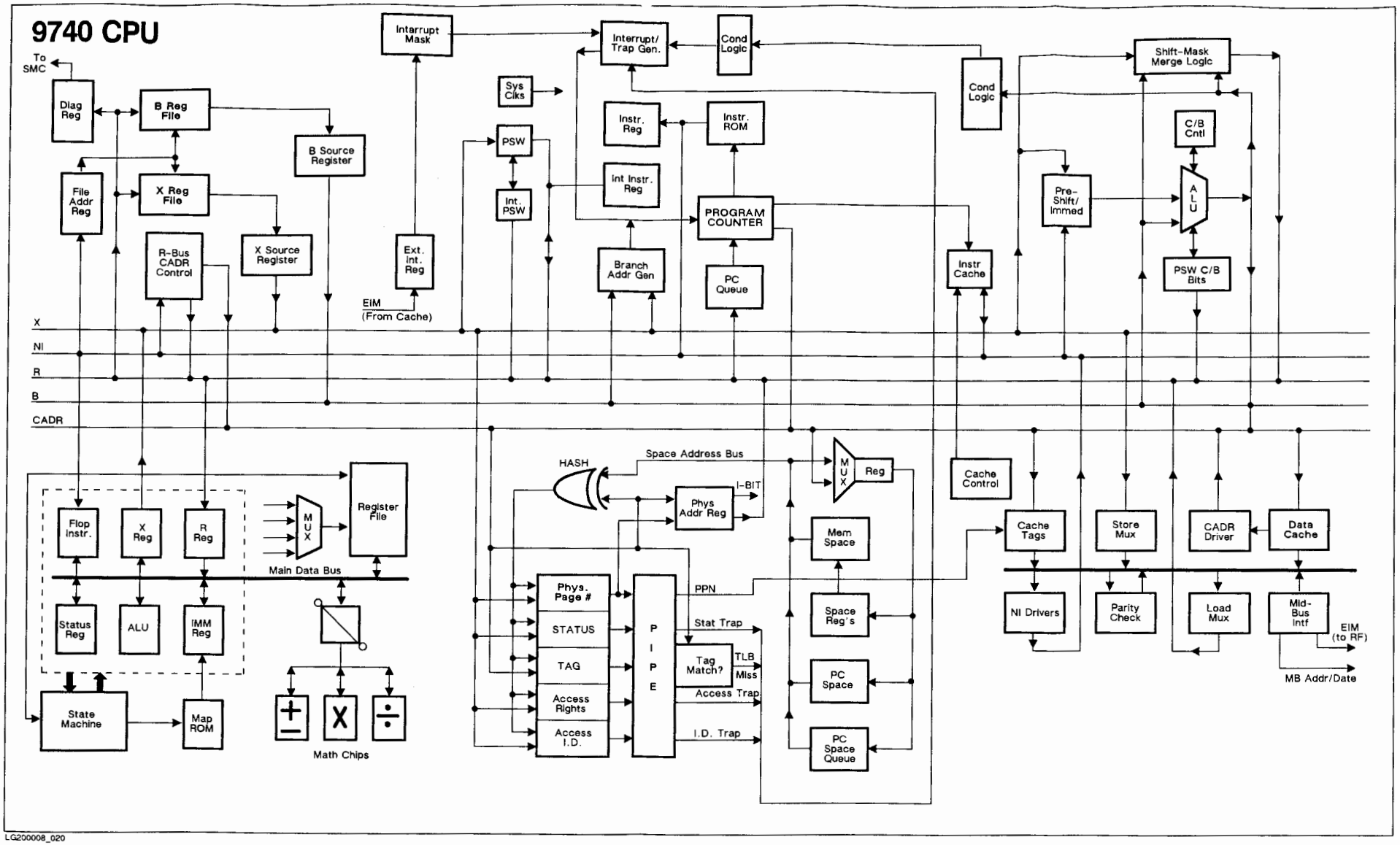
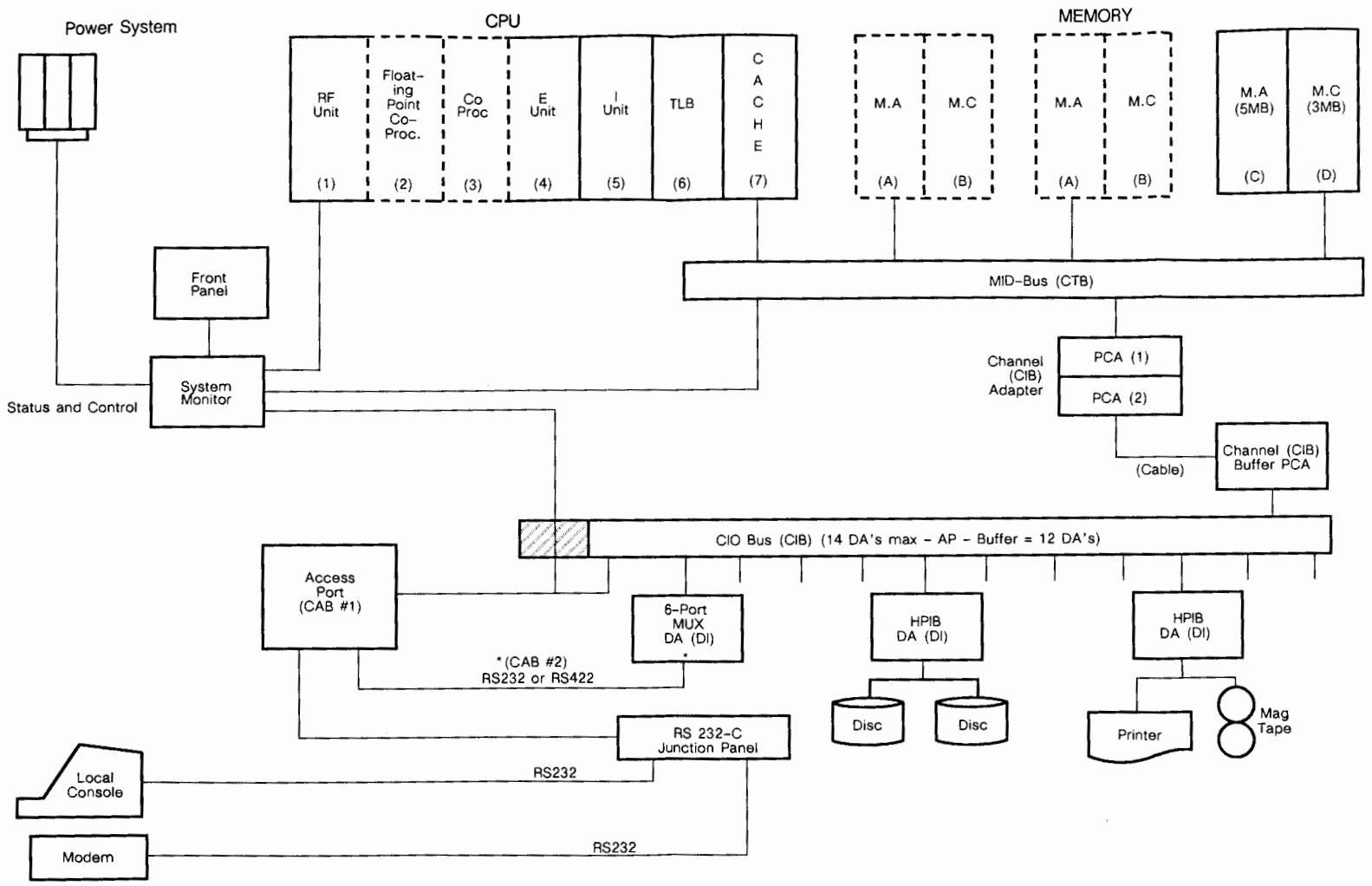


Series 800 Model 840 Block Diagram



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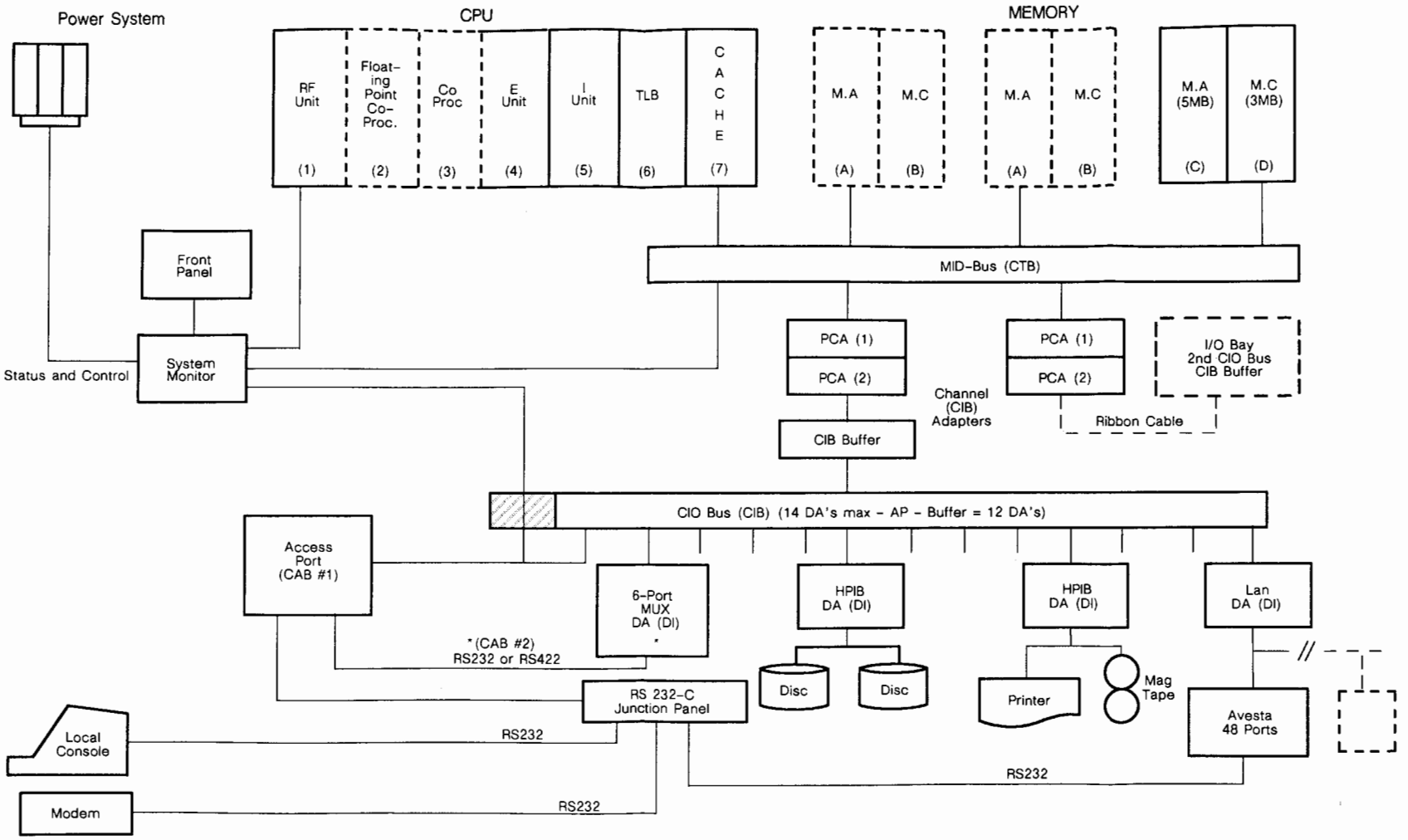
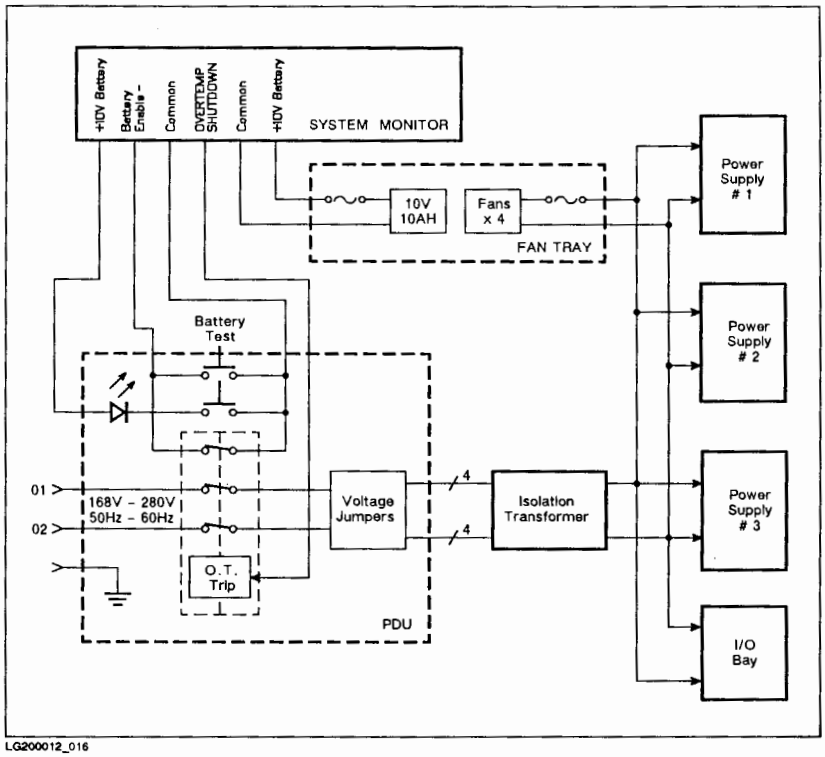
Series 900 Model 930 Block Diagram



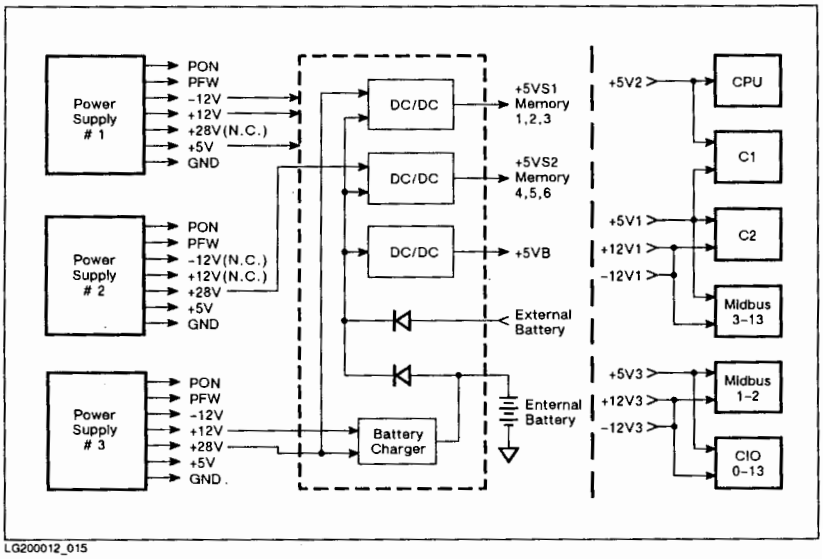
LG200012_006b

AC POWER DISTRIBUTION SYSTEM



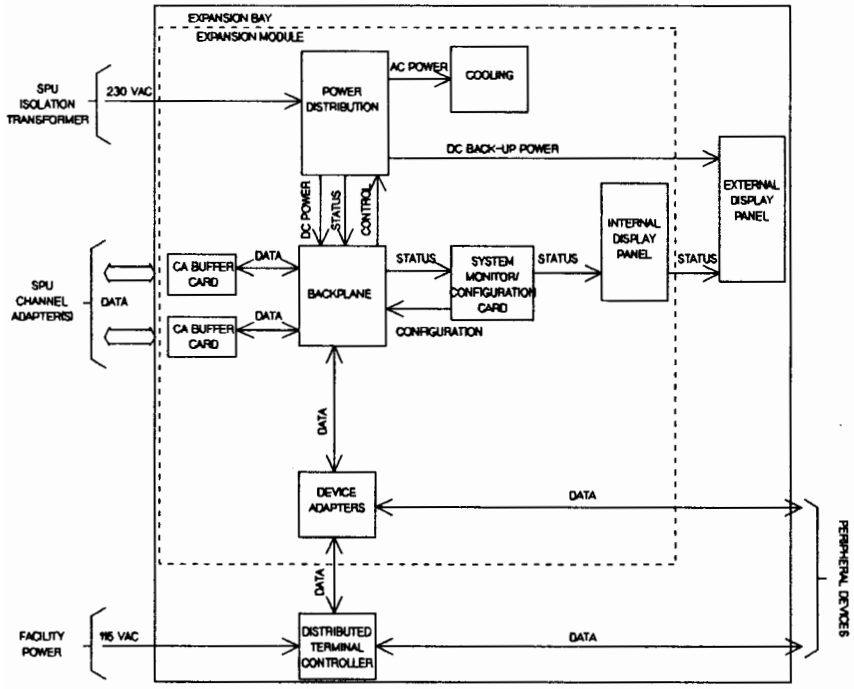
LG200012_016

DC POWER DISTRIBUTION SYSTEM

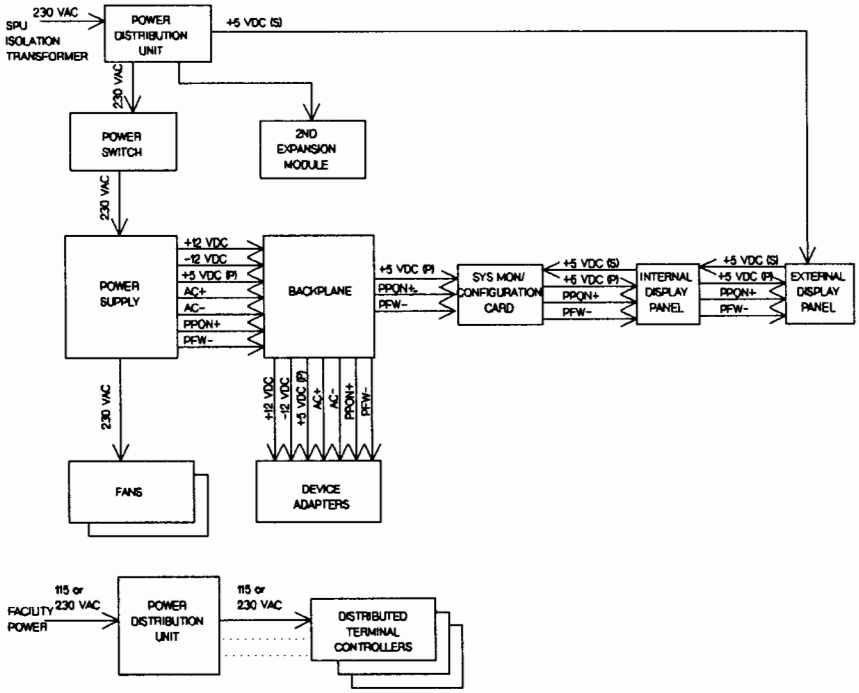


LG200012_015

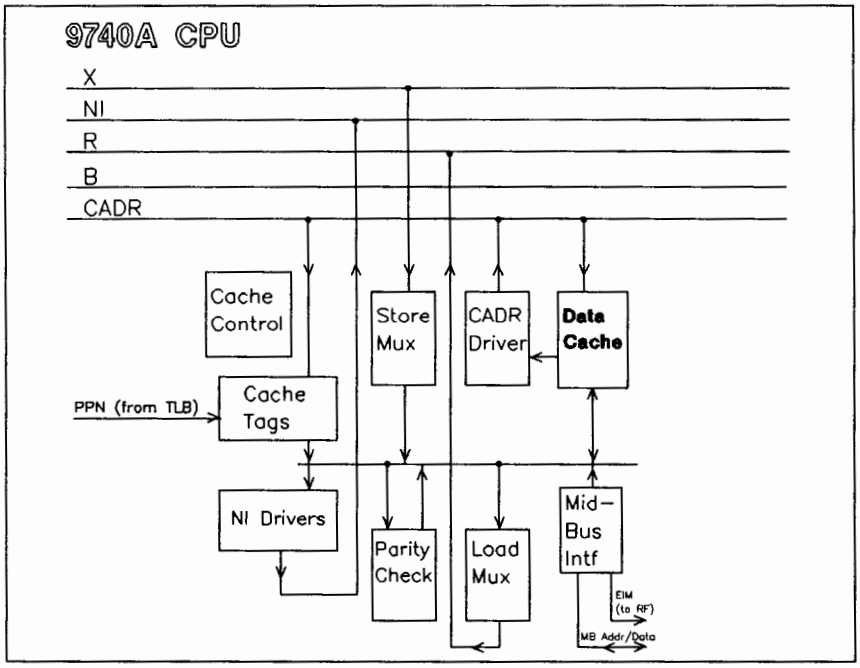
EXPANSION BAY/MODULE BLOCK DIAGRAM



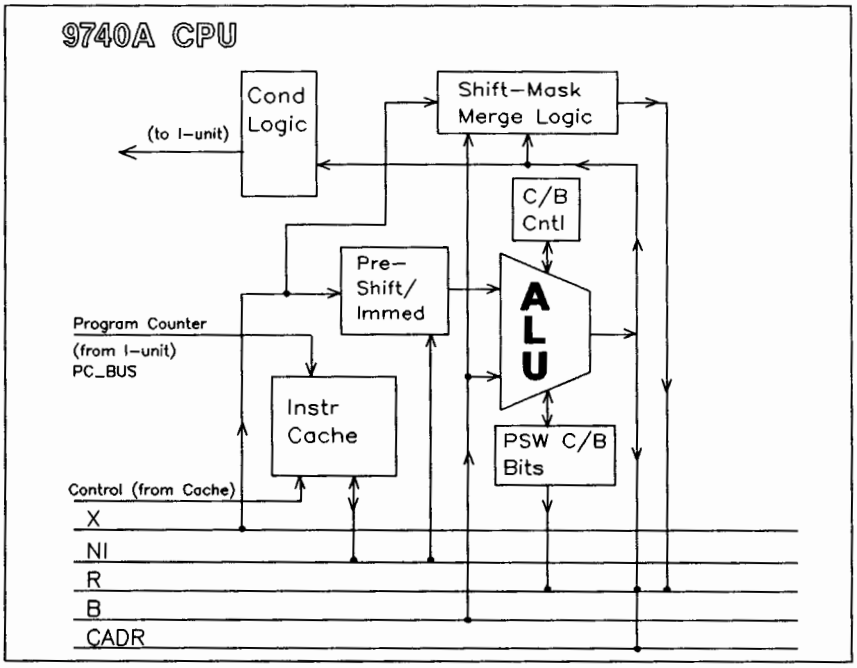
EXPANSION BAY POWER DISTRIBUTION SYSTEM



CACHE UNIT (CA+) BLOCK DIAGRAM



EXECUTION UNIT (EU+) BLOCK DIAGRAM



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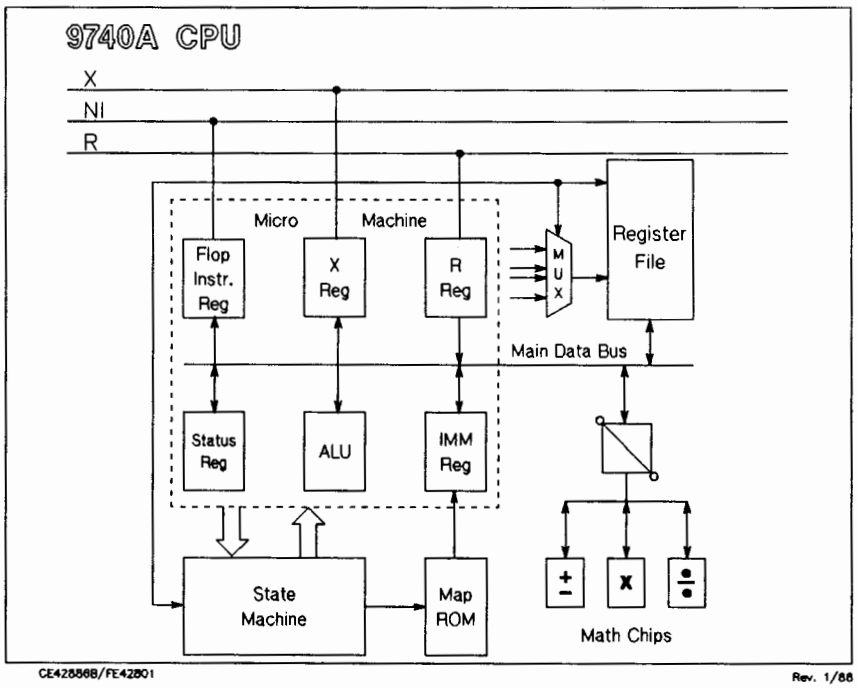
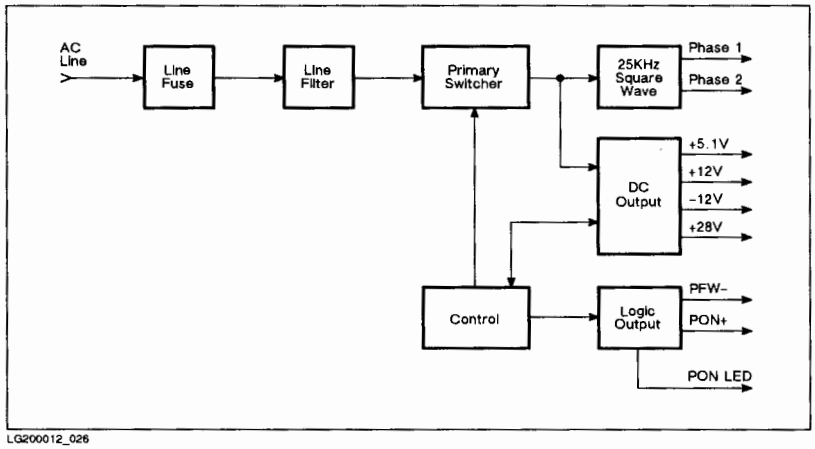
FLOATING POINT UNIT (FP) BLOCK DIAGRAM

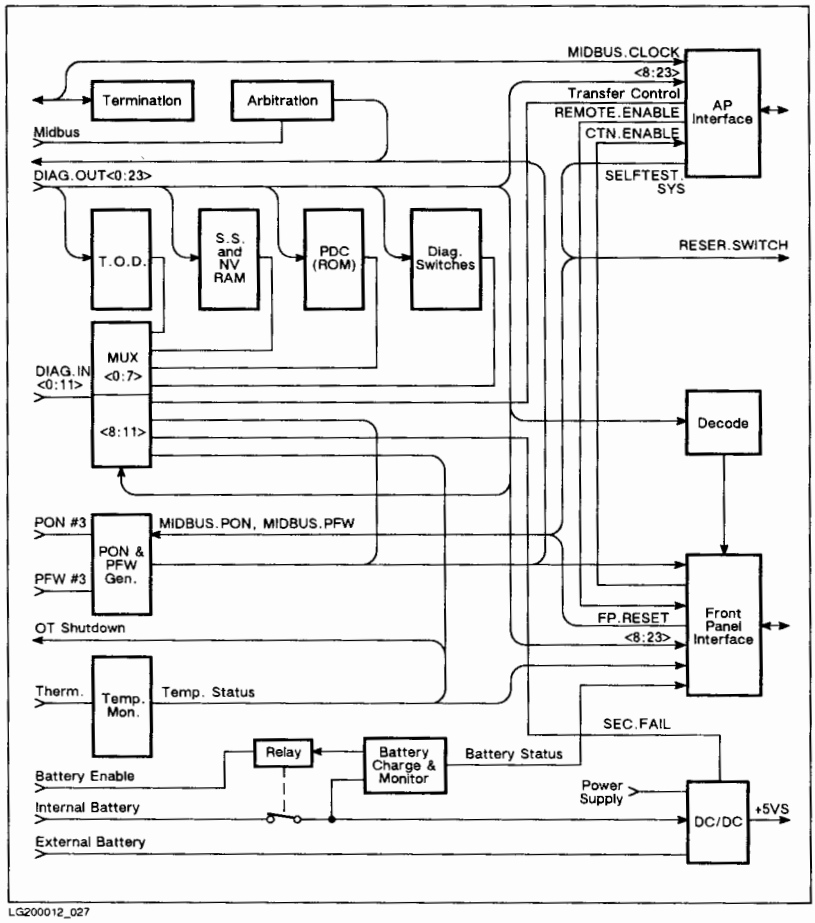


POWER SUPPLY BLOCK DIAGRAM



LG200012_026

SYSTEM MONITOR BLOCK DIAGRAM



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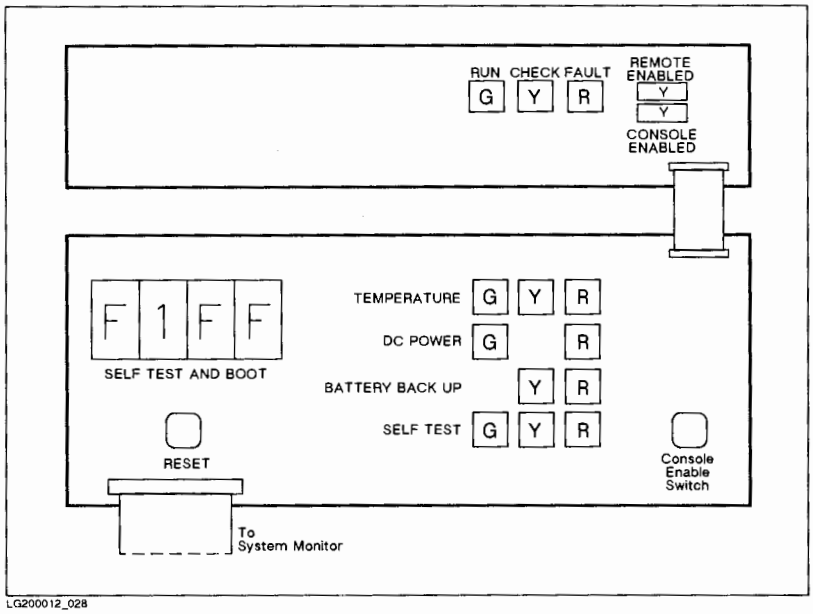
FRONT PANEL INDICATORS

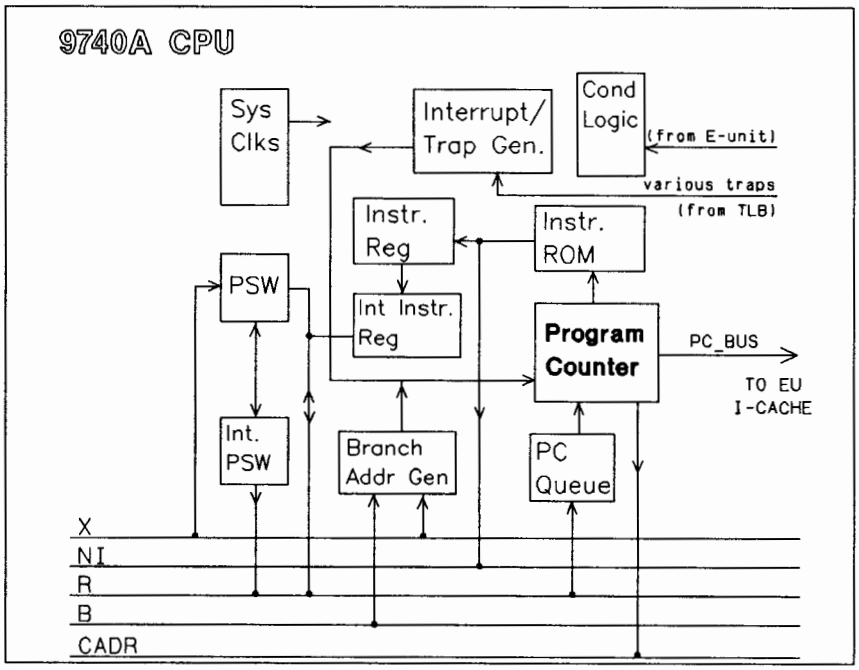


DISPLAY POWER TABLE

Control Panel Type	LED Color	LED Power	Driver Power	Driving Signal
Internal Control Panel				
TEMP (OK)	Green	+12V1	+5VS1	TEMP.OK+
TEMP (Warning)	Yellow	+12V1	+5VS2	OVT.WARNING+
TEMP (Shutdown)	Red	+5B	+5B	OVT.SHDN-
DC POWER (OK)	Green	+12V1	+5VS1	PON+
DC POWER (Fail)	Red	+5VS2	+5B	PFW-
BATTERY (Charging)	Yellow	+12V1	+5VS2	BAT.CHG-
BATTERY (Dis-Charging)	Red	+5VS2	+5B	BAT.USE-
SELFTEST (OK)	Green	+12V1	+5VS1	SELFTEST.OK+
SELFTEST (I/O Error)	Yellow	+12V1	+5VS1	I/O.ERROR+
SELFTEST (Failed)	Red	+5VS2	+5VS1	SELFTEST.FAIL+
HEX DISPLAY	Red	+5V1	--	--
External Control Panel				
REMOTE ENABLED	Yellow	+12V1	+5VS2	REMOTE.ENABLE-
CONSOLE ENABLED	Yellow	+12V1	+5VS2	CONTROL ENABLE F/F
RUN	Green	+12V1	+5VS2	SYS.FCTN-
CHECK	Yellow	+12V1	+5VS1	CHK.SYS+
FAULT	Red	+5VS1	+5B	SYS.FAIL-

LG200012_029

INSTRUCTION UNIT (IU) BLOCK DIAGRAM



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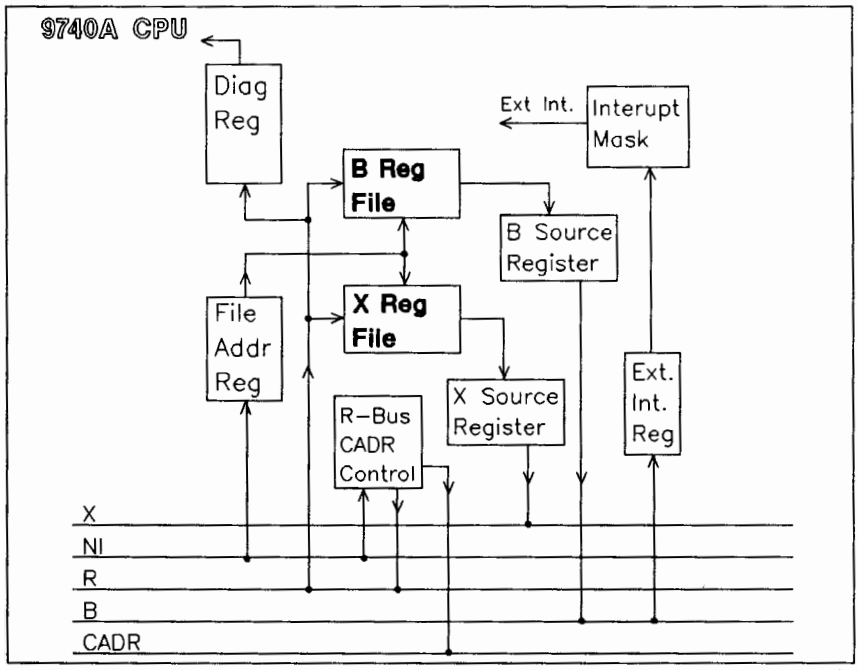
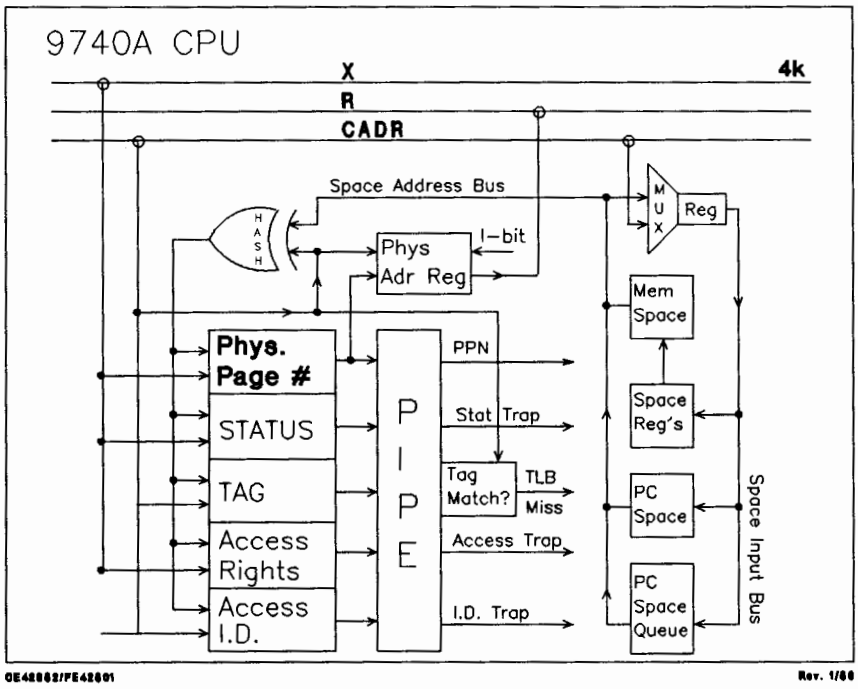
REGISTER FILE UNIT (RF) BLOCK DIAGRAM

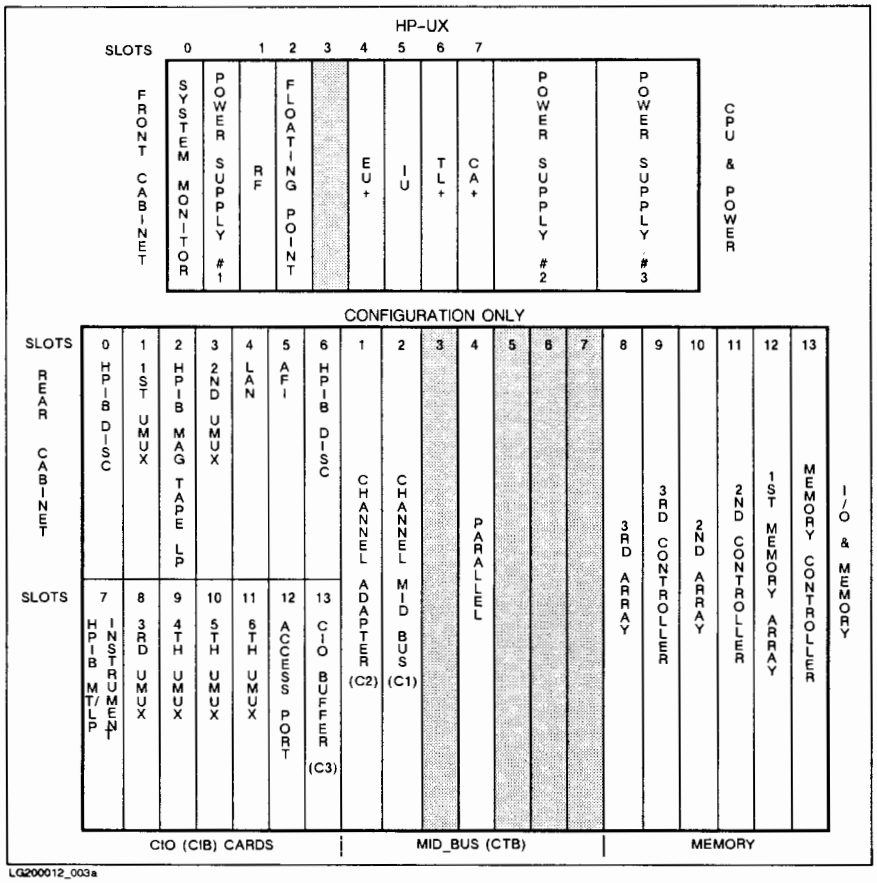


CE42877 Rev. 1/86

TRANSLATION LOOKASIDE BUFFER (TL+) BLOCK DIAGRAM



HP 9000 SERIES 800 MODEL 840S FRONT/REAR CABINET PCAS



LG200012_003a

38 PFW- (P/S #1)
39 PON+ (P/S #1)
40 +5S1

38 PFW- (P/S #2)
39 PON+ (P/S #2)
40 +5S1

38 PFW- (P/S #3)
39 PON+ (P/S #3)
40 +5S1

NOTE

Use +5S1 secondary power for Mid-bus Slots 11, 12, and 13.
Use +5S2 secondary power for Mid-bus Slots 8, 9, 10, and the IU and CA boards.

Row C Connector Definition for Processor Board (CIO slot 12)

Row C

1 FGND
2 CTL.ENABLE -
3 RESET.SYS -
4 GND
5 SELFTEST.SYS -
6 FP.DATA +
7 GND
8 FP.CLK +
9 REMOTE.EN-
10 GND
11 TXD-OUT-DP
12 RXD-IN-DP
13 GND
14-15 RESERVED
16 GND
17-20 RESERVED
21 GND
22 RESERVED
23 GND
24-26 RESERVED
27 GND
28-33 RESERVED
34 GND
35-38 N.C.
39 +5S
40 +5V

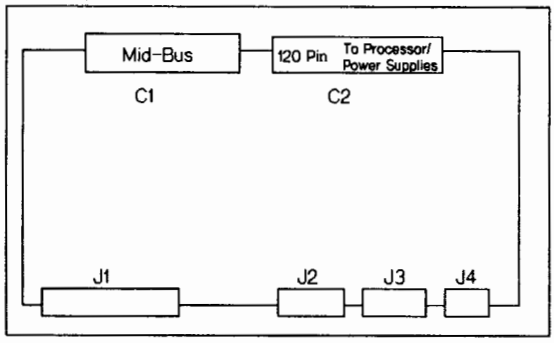


Figure 9-2. System Monitor Board Connector Location.

SYSTEM MONITOR CARD FRONT PANEL CONNECTORS

The four connectors on the front edge of the System Monitor Card are described as follows:

- J1 is a 50 pin connector to the front control panel.
- J2 is a 9 pin connector to the internal backup battery on the fan tray.
- J3 is a 5 pin connector to the AC Circuit Breaker (OVERTEMP SHUTDOWN and BATTERY ENABLE) on the PDU.
- J4 is a 2 pin connector provided for an optional external battery.

See Figure 9-2 for location of the front panel connectors.

J1 PIN ALLOCATION

ROW A		ROW B	
1	+5V	1	+5V
2	DIAG.OUT 8+	2	DIAG.OUT 9+
3	DIAG.OUT 10+	3	DIAG.OUT 11+
4	DIAG.OUT 12+	4	DIAG.OUT 13+
5	DIAG.OUT 14+	5	DIAG.OUT 15+
6	GND	6	GND
7	DIAG.OUT 16+	7	DIAG.OUT 17+
8	DIAG.OUT 18+	8	DIAG.OUT 19+
9	DIAG.OUT 20+	9	DIAG.OUT 21+
10	DIAG.OUT 22+	10	DIAG.OUT 23+
11	GND	11	GND
12	DISPLAY LATCH (DIAG.OUT 1+)	12	DISPLAY BLANK (DIAG.OUT 7+)
13	+12V	13	+12V
14	OVERTEMP SHUTDOWN -	14	MB.PON+
15	BATTERY CHARGING -	15	MB.PFW-
16	AP. PRESET +	16	+5VB
17	BATTERY IN USE -	17	SELFTEST.OK +
18	TEMP. OK +	18	GND
19	OVERTEMP WARNING +	19	FP.REMOTE -
20	GND	20	GND
21	SELFTEST.FAIL +	21	FP.RESET -
22	I/O ERROR +	22	-12V
23	SYS.FAIL -	23	REMOTE.ENABLE -
24	CHK. SYS. +	24	SYS.FCTN -
25	+5VS1	25	+5VS2

J2 PIN ALLOCATION

1	GND
2	GND
3	GND
4	GND
5	N.C.
6	+10V BATTERY
7	+10V BATTERY
8	+10V BATTERY
9	+10V BATTERY

J3 PIN ALLOCATION

1	OVERTEMP.SHUTDOWN +
2	+5VS1
3	GND
4	BATTERY.ENABLE -
5	+10V BATTERY

J4 PIN ALLOCATION

1	+12V BATTERY (EXT.)
2	GND

This section contains reference material to aid in troubleshooting the HP Precision Architecture Products.

Table 10-1. ASCII Code Table

ASCII Code Chart

HOW TO USE THIS TABLE

- The table is sorted by character code, each code being represented by its decimal, octal, and hexadecimal equivalent.
- Each row of the table gives the ASCII and EBCDIC meaning of the character code, the ASCII↔EBCDIC conversion code, and the Hollerith representation (punched card code) for the ASCII character.

The following examples describe several ways of using the table:

Example 1: Suppose you want to determine the ASCII code for the $ character. Scan down the ASCII graphic column until you locate $, then look left on that row to find the character code – 36 (dec), 044 (oct), and 24 (hex). This is the code used by an ASCII device (terminal, printer, computer, etc.) to represent the $ character. Its Hollerith punched card code is 11-3-8.

Example 2: The character code 5B (hex) is the EBCDIC code for what character? Also, when 5B is converted to ASCII (for example, by FCOPY with the EBCDICIN option), what is the octal character code? First, locate 5B in the hex character code column and move right on that row to the EBCDIC graphic which is $. The next column to the right gives the conversion to ASCII, 044. As a check, find 044 (oct) in the character code column, look right to the ASCII graphic column and note that $ converted to EBCDIC is 133 (oct) which equals 5B (hex).

Table 10-1. ASCII Code Table

CHAR CODE			ASCII			EBCDIC	
Dec	Oct	Hex	Cntl/ Gph	to EBCDIC (Oct)	Hollerith	Cntl/ Gph	to ASCII (Oct)
0	000	00	NUL	000	12-0-1-8-9	NUL	000
1	001	01	SOH	001	12-1-9	SOH	001
2	002	02	STX	002	12-2-9	STX	002
3	003	03	ETX	003	12-3-9	ETX	003
4	004	04	EOT	067	7-9	PF	234
5	005	05	ENQ	055	0-5-8-9	HT	011
6	006	06	ACK	056	0-6-8-9	LC	206
7	007	07	BEL	057	0-7-8-9	DEL	177
8	010	08	BS	026	11-6-9		227
9	011	09	HT	005	12-5-9		215
10	012	0A	LF	045	0-5-9	SMM	216
11	013	0B	VT	013	12-3-8-9	VT	013
12	014	0C	FF	014	12-4-6-9	FF	014
13	015	0D	CR	015	12-5-8-9	CR	015
14	016	0E	SO	016	12-6-8-9	SO	016
15	017	0F	SI	017	12-7-8-9	SI	017
16	020	10	DLE	020	12-11-1-8-9	DLE	020
17	021	11	DC1	021	11-1-9	OC1	021
18	022	12	DC2	022	11-2-9	DC2	022
19	023	13	DC3	023	11-3-9	TM	023
20	024	14	DC4	074	4-8-9	RES	235
21	025	15	NAK	075	5-8-9	NL	205
22	026	16	SYN	062	2-9	BS	010
23	027	17	ETB	046	0-6-9	IL	207
24	030	18	CAN	030	11-8-9	CAN	030
25	031	19	EM	031	11-1-8-9	EM	031
26	032	1A	SUB	077	7-8-9	CC	222
27	033	1B	ESC	047	0-7-9	CU1	217
28	034	1C	FS	034	11-4-8-9	IFS	034
29	035	1D	GS	035	11-5-8-9	IGS	035
30	036	1E	RS	036	11-6-8-9	IRS	036
31	037	1F	US	037	11-7-8-9	IUS	037
32	040	20	SP	100	Blank	DS	200
33	041	21	!	117	12-7-8	SOS	201
34	042	22	"	177	7-8	FS	202
35	043	23	#	173	3-8		203
36	044	24	$	133	11-3-8	BYP	204
37	045	25	%	154	0-4-8	LF	012

CHAR CODE			ASCII			EBCDIC	
Dec	Oct	Hex	Cntl/ Gph	to EBCDIC (Oct)	Hollerith	Cntl/ Gph	to ASCII (Oct)
48	060	30	0	360	0		220
49	061	31	1	361	1		221
50	062	32	2	362	2	SYN	026
51	063	33	3	363	3		223
52	064	34	4	364	4	PN	224
53	065	35	5	365	5	RS	225
54	066	36	6	366	6	UC	226
55	067	37	7	367	7	EOT	004
56	070	38	8	370	8		230
57	071	39	9	371	9		231
58	072	3A	:	172	2-8		232
59	073	3B	;	136	11-8-8	CU3	233
60	074	3C	<	114	12-4-8	DC4	024
61	075	3D	=	176	6-8	NAK	025
62	076	3E	>	156	0-6-8		236
63	077	3F	?	157	0-7-8	SUB	032
64	100	40	@	174	4-8	SP	040
65	101	41	A	301	12-1		240
66	102	42	B	302	12-2		241
67	103	43	C	303	12-3		242
68	104	44	D	304	12-4		243
69	105	45	E	305	12-5		244
70	106	46	F	306	12-6		245
71	107	47	G	307	12-7		246
72	110	48	H	310	12-8		247
73	111	49	I	311	12-9		250
74	112	4A	J	321	11-1	¢	133
75	113	4B	K	322	11-2	.	056
76	114	4C	L	323	11-3	<	074
77	115	4D	M	324	11-4	(	050
78	116	4E	N	325	11-5	+	053
79	117	4F	O	326	11-6		041
80	120	50	P	327	11-7	&	046
81	121	51	Q	330	11-8		251
82	122	52	R	331	11-9		252
83	123	53	S	342	0-2		253
84	124	54	T	343	0-3		254
85	125	55	U	344	0-4		255

Table 10-1. ASCII Code Table (con't.)

CHAR CODE			ASCII			EBCDIC
Dec	Oct	Hex	Cntrl/Gph	to EBCDIC (Oct)	Hollerith	Cntrl/Gph	to ASCII (Oct)
38	046	26	&	120	12	ETB	027
39	047	27	'	175	5 8	ESC	033
40	050	28	(	115	12 5 8		210
41	051	29	)	135	11 5 8		211
42	052	2A	*	134	11 4 8	SM	212
43	053	2B	+	116	12 6 8	CU2	213
44	054	2C	,	153	0 3 8		214
45	055	2D	-	140	11	ENQ	005
46	056	2E	.	113	12 3 8	ACK	006
47	057	2F	/	141	0 1	BEL	007
96	140	60	`	171	1 8	-	055
97	141	61	a	201	12 0 1	/	057
98	142	62	b	202	12 0 2		262
99	143	63	c	203	12 0 3		263
100	144	64	d	204	12 0 4		264
101	145	65	e	205	12 0 5		265
102	146	66	f	206	12 0 6		266
103	147	67	g	207	12 0 7		267
104	150	68	h	210	12 0 8		270
105	151	69	i	211	12 0 9		271
106	152	6A	j	221	12 11 1	¢	174
107	153	6B	k	222	12 11 2	.	054
108	154	6C	l	223	12 11 3	%	045
109	155	6D	m	224	12 11 4	_	137
110	156	6E	n	225	12 11 5	>	076
111	157	6F	o	226	12 11 6	?	077
112	160	70	p	227	12 11 7		272
113	161	71	q	230	12 11 8		273
114	162	72	r	231	12 11 9		274
115	163	73	s	242	11 0 2		275
116	164	74	t	243	11 0 3		276
117	165	75	u	244	11 0 4		277
118	166	76	v	245	11 0 5		300
119	167	77	w	246	11 0 6		301
120	170	78	x	247	11 0 7		302
121	171	79	y	250	11 0 8		140
122	172	7A	z	251	11 0 9	:	072
123	173	7B	{	300	12 0	#	043
124	174	7C	|	152	12 11	@	100
125	175	7D	}	320	11 0	'	047
126	176	7E	~	241	11 0 1	=	075
127	177	7F	DEL	007	12 7 9	"	042
128	200	80		040	11 0 1 8 9		303
129	201	81		041	0 1 9	a	141
130	202	82		042	0 2 9	b	142
131	203	83		043	0 3 9	c	143
132	204	84		044	0 4 9	d	144
133	205	85		025	11 5 9	e	145
134	206	86		006	12 6 9	f	146
135	207	87		027	11 7 9	g	147
136	210	88		050	0 8 9	h	150
137	211	89		051	0 1 8 9	i	151
138	212	8A		052	0 2 8 9		304
139	213	8B		053	0 3 8 9		305
140	214	8C		054	0 4 8 9		306
141	215	8D		011	12 1 8 9		307
142	216	8E		012	12 2 8 9		310
143	217	8F		033	11 3 8 9		311
144	220	90		060	12 11 0 1 8 9		312
145	221	91		061	1 8	j	152
146	222	92		032	11 2 8 9	k	153
147	223	93		063	3 9	l	154
148	224	94		064	4 9	m	155
149	225	95		065	5 9	n	156
150	226	96		066	6 9	o	157
151	227	97		010	12 8 9	p	160
152	230	98		070	8 9	q	161
153	231	99		071	1 8 9	r	162
154	232	9A		072	2 8 9		313
155	233	9B		073	3 8 9		314
156	234	9C		004	12 4 9		315
157	235	9D		024	11 4 9		316
158	236	9E		076	6 8 9		317
159	237	9F		341	11 0 1 9		320
160	240	A0		101	12 0 1 9		321
161	241	A1		102	12 0 2 9	~	176
162	242	A2		103	12 0 3 9	s	163
163	243	A3		104	12 0 4 9	t	164
164	244	A4		105	12 0 5 9	u	165
165	245	A5		106	12 0 6 9	v	166
166	246	A6		107	12 0 7 9	w	167
167	247	A7		110	12 0 8 9	x	170
168	250	A8		111	12 1 8	y	171
169	251	A9		121	12 11 1 9	z	172
170	252	AA		122	12 11 2 9		372
171	253	AB		123	12 11 3 9		323
172	254	AC		124	12 11 4 9		324
173	255	AD		125	12 11 5 9		325
174	256	AE		126	12 11 6 9		326
175	257	AF		127	12 11 7 9		327

CHAR CODE			ASCII			EBCDIC
Dec	Oct	Hex	Cntrl/Gph	to EBCDIC (Oct)	Hollerith	Cntrl/Gph	to ASCII (Oct)
86	126	56	V	345	0 5		256
87	127	57	W	346	0 6		257
88	130	58	X	347	0 7		260
89	131	59	Y	350	0 8		261
90	132	5A	Z	351	0 9	[	135
91	133	5B	[	112	12 2 8	$	044
92	134	5C	\	340	0 2 8	*	052
93	135	5D	]	132	11 2 8	)	051
94	136	5E	^	137	11 7 8	;	073
95	137	5F		155	0 5 8	¬	136
176	260	80		130	12 11 8 9		330
177	261	81		131	11 1 8		331
178	262	82		142	11 0 2 9		332
179	263	83		143	11 0 3 8		333
180	264	84		144	11 0 4 8		334
181	265	85		145	11 0 5 8		335
182	266	86		146	11 0 6 8		336
183	267	87		147	11 0 7 9		337
184	270	88		150	11 0 8 9		340
185	271	89		151	0 1 8		341
186	272	8A		160	12 11 0		342
187	273	8B		161	12 11 0 1 8		343
188	274	8C		162	12 11 0 2 8		344
189	275	8D		163	12 11 0 3 8		345
190	276	8E		164	12 11 0 4 9		346
191	277	8F		165	12 11 0 5 9		347
192	300	C0		166	12 11 0 6 9	{	173
193	301	C1		167	12 11 0 7 9	A	101
194	302	C2		170	12 11 0 8 9	B	102
195	303	C3		200	12 0 1 8	C	103
196	304	C4		212	12 0 2 8	D	104
197	305	C5		213	12 0 3 8	E	105
198	306	C6		214	12 0 4 8	F	106
199	307	C7		215	12 0 5 8	G	107
200	310	C8		216	12 0 6 8	H	110
201	311	C9		217	12 0 7 8	I	111
202	312	CA		220	12 11 1 8		350
203	313	CB		232	12 11 2 8		351
204	314	CC		233	12 11 3 8	}	352
205	315	CD		234	12 11 4 8		353
206	316	CE		235	12 11 5 8		354
207	317	CF		236	12 11 6 8		355
208	320	D0		237	12 11 7 8		175
209	321	D1		240	11 0 1 8	J	112
210	322	D2		252	11 0 2 8	K	113
211	323	D3		253	11 0 3 8	L	114
212	324	D4		254	11 0 4 8	M	115
213	325	D5		255	11 0 5 8	N	116
214	326	D6		256	11 0 6 8	O	117
215	327	D7		257	11 0 7 8	P	120
216	330	D8		260	12 11 0 1 8	Q	121
217	331	D9		261	12 11 0 2	R	122
218	332	DA		262	12 11 0 2		356
219	333	DB		263	12 11 0 3		357
220	334	DC		264	12 11 0 4		360
221	335	DD		265	12 11 0 5		361
222	336	DE		266	12 11 0 6		362
223	337	DF		267	12 11 0 7		363
224	340	E0		270	12 11 0 8		134
225	341	E1		271	12 11 0 9		137
226	342	E2		272	12 11 0 2 8	S	123
227	343	E3		273	12 11 0 3 8	T	124
228	344	E4		274	12 11 0 4 8	U	125
229	345	E5		275	12 11 0 5 8	V	126
230	346	E6		276	12 11 0 6 8	W	127
231	347	E7		277	12 11 0 7 8	X	130
232	350	E8		312	12 0 2 8 9	Y	131
233	351	E9		313	12 0 3 8 9	Z	132
234	352	EA		314	12 0 4 8 9		364
235	353	EB		315	12 0 5 8 9		365
236	354	EC		316	12 0 6 8 9	#	366
237	355	ED		317	12 0 7 8 9		367
238	356	EE		332	12 11 2 8 9		370
239	357	EF		333	12 11 3 8 9		371
240	360	F0		334	12 11 4 8 9	0	060
241	361	F1		335	12 11 5 8 9	1	061
242	362	F2		336	12 11 6 8 9	2	062
243	363	F3		337	12 11 7 8 9	3	063
244	364	F4		352	11 0 2 8 9	4	064
245	365	F5		353	11 0 3 8 9	5	065
246	366	F6		354	11 0 4 8 9	6	066
247	367	F7		355	11 0 5 8 9	7	067
248	370	F8		356	11 0 6 8 9	8	070
249	371	F9		357	11 0 7 8 9	9	071
250	372	FA		372	12 11 0 7 8 9		372
251	373	FB		373	12 11 0 3 8 9		373
252	374	FC		374	12 11 0 4 8 9		374
253	375	FD		375	12 11 0 5 8 9		375
254	376	FE		376	12 11 0 6 8 9		376
255	377	FF		377	12 11 0 7 8 9	(1)	377

Acronyms

AC	Analyzer Card
AFI	Asynchronous FIFO Interface Card
ALU	Arithmatic Logic Unit
AP	Access Port
ASC	Asynchronous Serial Communicator
AUI	Attachment Unit Interface
C1	Channel Adapter (Card 1 of 3) Mid__Bus Interface
C2	Channel Adapter (Card 2 of 3) CIO__Bus Interface
C3	Channel Adapter (Card 3 of 3) Buffer Card
CA	Channel Adapter
CA+	Cache Array Board
CAB	Console Attachment Board
CAM	Channel Adapter Manager
CI	Command Interrupter
CIB	Central Interface Bus Adapter
CIO	Channel I/O
CPU	Central Processor Unit
CR	Control Register
CRT	Cathode Ray Tube
CTB	Central Bus
DA	Device Adapter
DAM	Device Adapter Manager
DCE	Data Communications Equipment
DM	Device Manager
DMA	Direct Memory Access
DTC	Distributed Terminal Controller
DTE	Data Terminal Equipment
DUI	Diagnostic User Interface
ECL	Emitter Coupled Logic
EIR	External Interrupt Register
EIM	External Interrupt Message
EIEM	External Interrupt Elastic Mask
ERS	External Reference Specifications
ESD	Electrostatic Discharge
EU+	Execution Unit
FP	Floating Point Coprocessor
FRU	Field Replacement Unit
GR	General Register
HPA	Hard Physical Address
HP-IB	Hewlett-Packard Interface Bus
HP-FL	Hewlett-Packard Fiber Optic Link
HPMC	High Priority Machine Check
HP-UX	Hewlett-Packard UNIX
IMS	Internal Maintenance Specification
I/O	Input/Output
IIR	Interrupt Instruction Register
IODC	I/O Dependent Code
IOR	Interrupt Offset Register
IOTT	I/O Test Tool

IROM	Instruction Rom
ISL	Initial System Load
ISR	Interrupt Space Register
IU	Instruction Unit
IVA	Interrupt Vector Address
LAN	Local Area Network
LANIC	Local Area Network Interface Controller
LDM	Logical Device Manager
LED	Light Emitting Diode
LPMC	Low Priority Machine Check
LRU	Least Recently Used
LUT	Look-Up Table
MA	Memory Array
MAU	Media Attachment Unit
MC	Memory Controller
MPE-XL	Multi Programming Executive-Version XL
NIR	Next Instruction Register
NS	Network Services
OS	Operation System
PA	Physical Address
PA	Parrallel I/O PCA
PAGE	2K Bytes
PC	Program Counter or Parallel I/O Interface Card
PDC	Processor Dependent Code
PDIR	Page Directory Table
PF	Power Fail Warn
PFW	Power Fail Warn
PHI	Processor to HP-IB Interface
PID	Protection Identification Number
PL	Privilege Level
PON	Power On
PPN	Physical Page Number
PROM	Programmable ROM
PSW	Processor Status Word
Q	Quad
RAM	Random Access Memory
RF	Register File
RISC	Reduced Instruction Set Computer
ROM	Read Only Memory
RS232	Standard for Serial Bus
SM	System Monitor Module
SPA	Soft Physical Address
SPU	System Processor Unit
SR	Space Register
TC	Transfer of Control
TLB	Translation Lookaside Buffer
TOS	Top-Of-Stack
TTL	Transister/Transister Logic
UART	Universal Synchronouos Receiver/Transmitter
VA	Virtual Address
VLSI	Very Large Scale Integration
VPN	Virtual Page Number
WORD	4 Bytes, 32 Bits

SERVICE NOTES

SECTION 11

Notes

Notes

SERVICE NOTE

SUPERSEDES: none

APPLIES TO:	All Units ■	Only Units on Agreement/Warranty ☐
PERFORM:	Immediately ☐	At PM/Normal Call ☐
	On Failure ☐	Information Only ■

WARRANTY:	EXTENDED	NORMAL	NONE
LABOR:			X
PARTS:			X
TRAVEL:			X

SERVICE	Return for update ☐	Use as is ☐
INVENTORY	Return for salvage ☐	See text ☐

WARRANTY EXTENDED UNTIL: N/A

Model(s) Affected:

Series 9000 Model 840
Series 3000 Model 930

Assemblies Affected:

Backplane 09740-60042

Purpose:

This Service Note is to inform the field of the ability to change backplane pins and of the tools available to perform this operation.

Action:

The pins on the 840/930 (9740A CPU) backplane can be replaced if they should accidently get bent or broken. There are two kinds of pins in the backplane, both of which are made by AMP Inc. These pins can be ordered through CPC/PCE in minimum quantities of 100.

The connectors in the CIO section are of the MODU (AMP Reg Trademark) type. These connectors use the HP P/N 1252-2113 type of pins. When you order this part number you get 100 pins.

The rest of the Backplane uses HDI (Amp Reg. Trademark) connectors which use HP P/N 1252-2102 type of pins. When you order this part number you get 100 pins.

These two types of pins should NOT be interchanged. The MODU type of pins have longer heads and shorter tails than the HDI type.

Once a pin has been removed from the backplane it should NOT be reused because it has been deformed. Any one hole in the backplane can have a pin replaced up to ten times before degredation of the connection occurs.

The HP part number for the AMP pin extraction/insertion tool is P/N 8710-1758. The tool comes with instructions on how to use it. It can be ordered through CPC/PCE.

Prep: ALD 4/9/87

9320-4765 (1/83)

HEWLETT PACKARD

There is a second type of extraction tool available directly from AMP INC. for pulling backplane pins out from the front. This tool is considerably expensive ($450.00) but is recommended when a pin cannot be reached from the back to be extracted. It requires no force at all to pull out a backplane pin. The tool exerts all of the force. This tool is not intended to be qualified with an HP part number due to its high cost and infrequency of use. This tool can be ordered from AMP Inc., Harrisburg, Pennsylvania 17105 (PHONE: 717-564-0100). The AMP part number is 5809-1. This tool will be more useful for future products (3000-950/9000-850) where the backplane pins cannot be reached from the back.