HEWLETT PACKARD

HP 3000/930 and HP 9000/840 Computers CE Handbook

HP 3000/930 and HP 9000/840 Computers

CE Handbook

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LIST OF EFFECTIVE PAGES

The List of Effective Pages gives the date of the most recent version of each page in the manual. To verify that your manual contains the most current information, check the dates printed at the bottom of each page with those listed below. The date on the bottom of each page reflects the edition or subsequent update in which that page was printed.

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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 840), 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 840 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.

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 840 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 9000/840 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.

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

System Support Log, Part Number 09740-90013.

Reference Training Manual, Part Number 09740-90022.

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

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

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

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

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

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

Peripherals and Accessories Manual, Part Number 09740-90012.

System Operation - System Startup and Shutdown Guide, Part Number 32650-90034.

System Operation - Backup and Disaster Recovery Guide, Part Number 32650-90039.

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

PRODUCT INFORMATION

SECTION 1

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

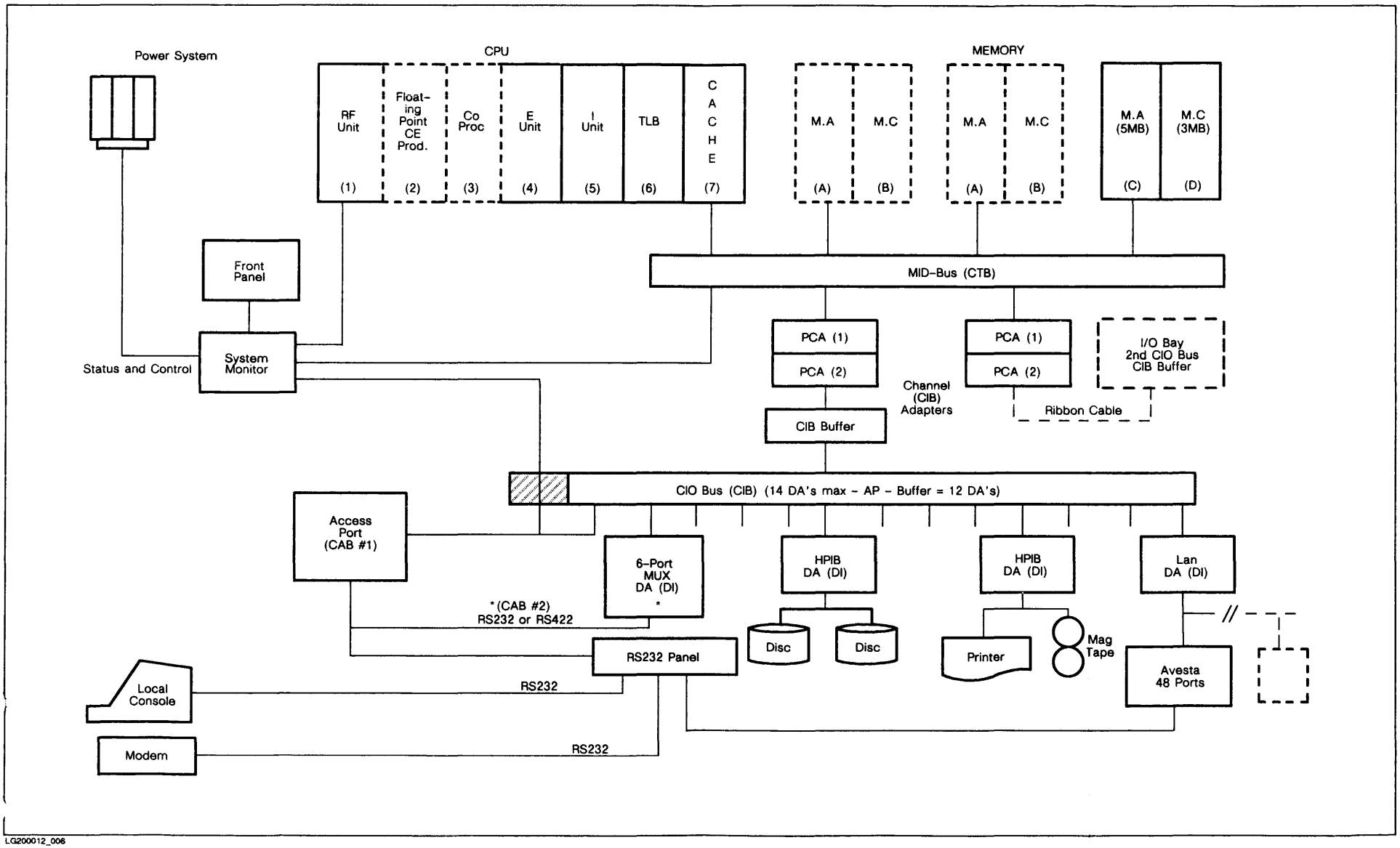

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Figure 1-1. HP 3000/930 Functional Diagram

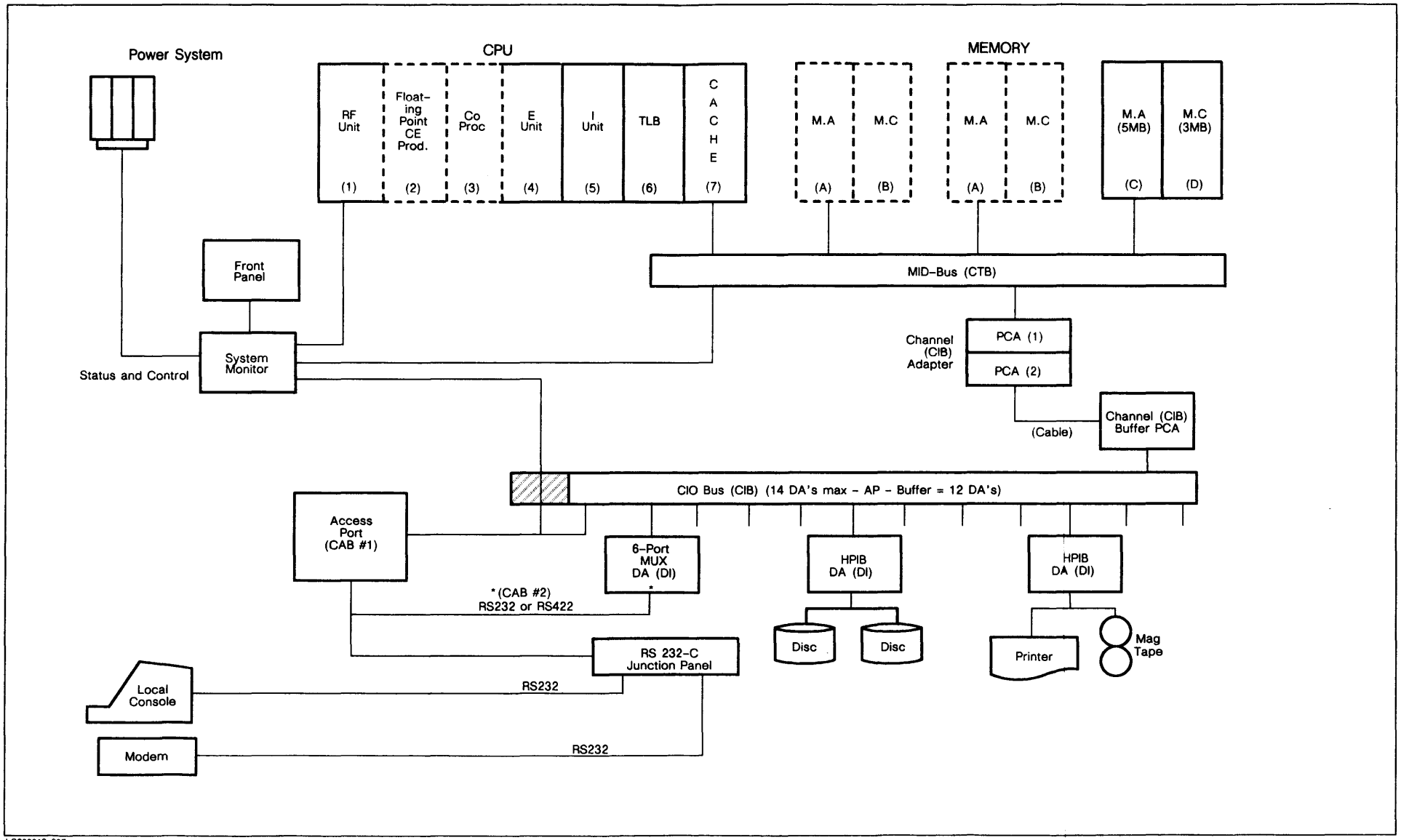

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Figure 1-2. HP 9000/840 Functional Diagram

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 9000/840 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
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
General Purpose Mid-Bus Cards (See NOTE)	5
Memory Boards	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 (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	Monitor 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.

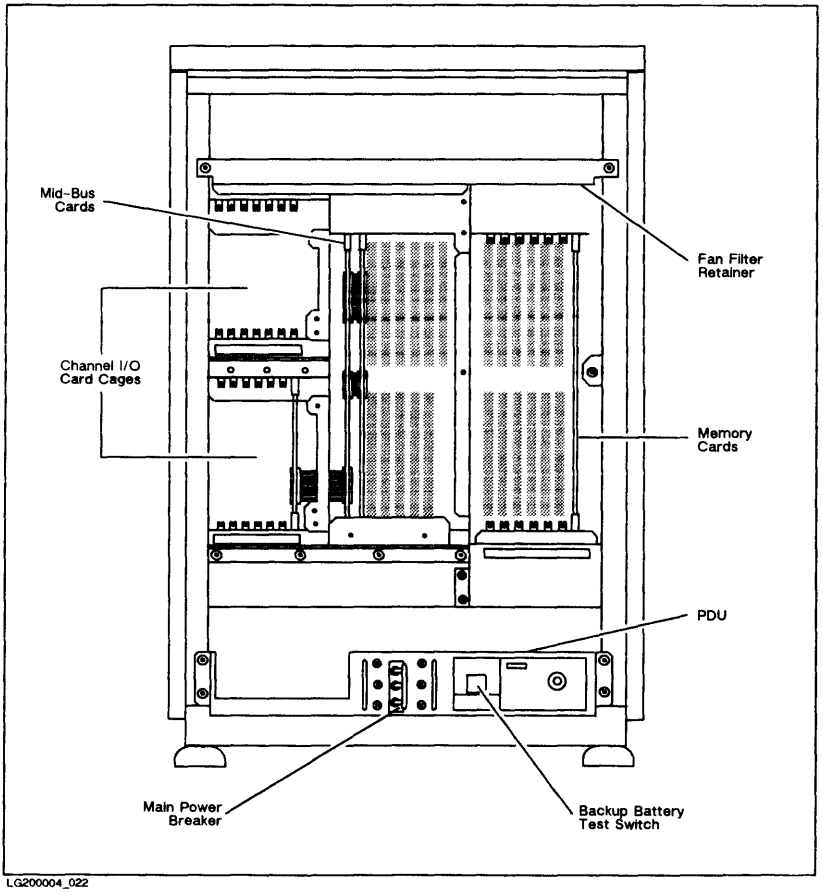

Figure 1-3. Cabinet, Front View (Door Removed)

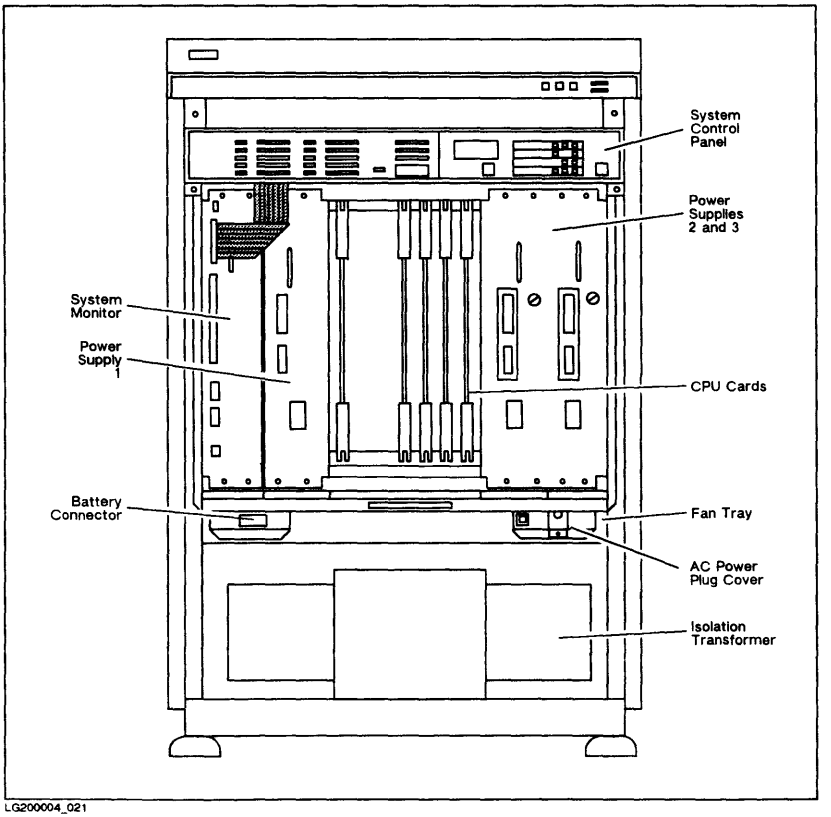

Figure 1-4. Cabinet, Rear View (Door Removed)

SYSTEM STATUS DISPLAY PANELS

The external and internal system status display panels are illustrated in Figure 1-5. Refer to Troubleshooting in Section 4 for Indicator/Status description information.

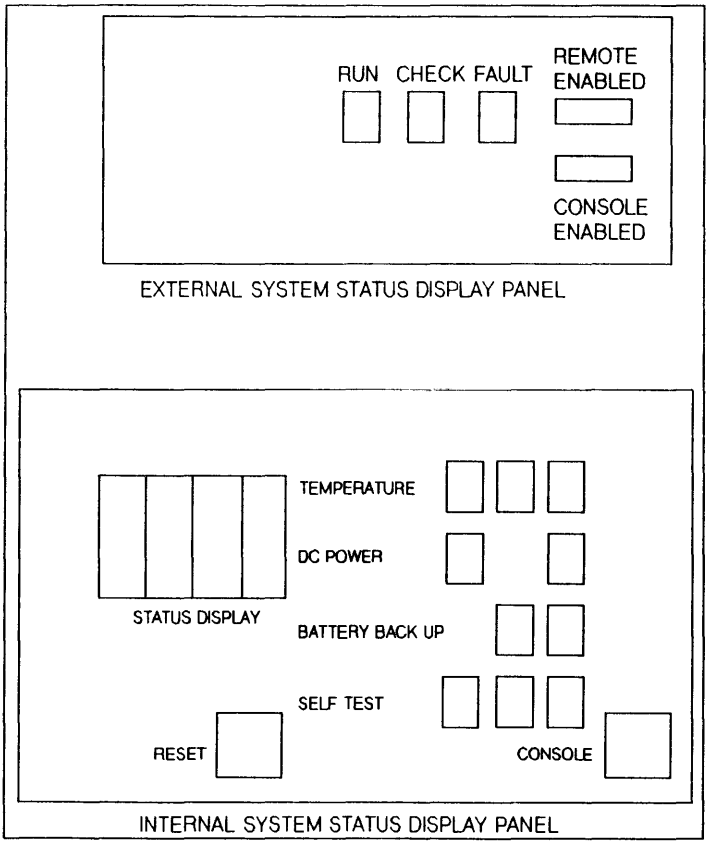

Figure 1-5. External and Internal System Status Display Panels

ENVIRONMENTAL/INSTALLATION/ PREVENTIVE MAINTENANCE

SECTION 2

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

ENVIRONMENTAL SPECIFICATIONS

The environmental specifications include physical and electrical specifications.

Physical Specifications

Dimensions:	
Height:	1.0 meters (39 inches)
Width:	0.6 meters (23.4 inches)
Depth:	0.8 meters (31.2 inches)
Weight:	162 Kg (357 lbs.)
Altitude:	
Operating:	0-4,600 meters (0-15,000 feet)
Nonoperating:	0-15,300 meters (0-50,000 feet)
Environment:	
Operating Temperature:	0 to 55 deg C (32 to 131 deg F)
Nonoperating (Shipping/Storage):	-40 to 70 deg C (-40 to 158 deg F)
Rate of Temperature Change:	20 deg C/hr (68 deg F/hr) max.
Operating Humidity:	5%-90% at 40 deg C (95 deg F) (non-condensing)
Nonoperating Humidity:	90% at 65 deg C (149 deg F) (non-condensing)
EMI Susceptibility:	1 Volt/Meter at 14 KHZ - 1 GHZ

Electrical Specifications

System Power:	
Nominal Voltage:	200V, 208V, 230V, 240V AC
Voltage Tolerance:	+/- 15% of Nominal Voltage
Input Frequency:	50 or 60 Hz Nom, 47.5 - 66 Hz
Line Distortion:	< 10% Total Harmonic Distortion
Rated Maximum Input Current:	13 Ampheres
Wattage:	2000 Watts (w/expansion bay)
Surge Current:	< 125 Ampheres
Power Line Transients:	Tested to IEEE Standard 587 (Category B).
Power Connections:	NEMA L6-20P (plug)
Heat Generation:	6,824 BTUs (w/expansion bay)

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.

Hardware Installation Checklist

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

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.

Table 2-2. Configuration Switch Definitions (HP 27110B/HP 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

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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).

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)	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 4-6 (Troubleshooting, Section 4). Replace power supply if not within normal specification.
Backup Battery - lead acid (P/N 09740-60007)	Test battery and replace as necessary.
System Monitor Module Batteries (2) - lithium (P/N 1420-0341)	Test both batteries and replace as necessary.

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 9000/840 Computer Systems.

The minimum hardware configuration that is required to support the HP 3000/930 or HP 9000/840 Computer Systems is provided in Table 3-1.

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
2	1	19744A	Channel Set (3 cards each set)
1		19746A	Expansion Module
1		19747A	Expansion Bay
2	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)

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
HPIB 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 spindles allowed on one HP-IB device adapter.	6	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.	n/a	6
Channel adapter sets allowed per system.	3	1

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	Coprocessor (C2 - option w/MPE-XL
4	CPU	Execution Unit (EU)
5	CPU	Instruction Unit (IU)
6	CPU	Translation Lookaside Buffer (TL) Unit
7	CPU	Cache (CA) Unit
		- - Midbus Module - -
8	Memory	Memory Array (MA) - 5Mb
9	Memory	Memory Controller (MC) - 3Mb
10	Memory	Memory Array (MA) - 5Mb
11	Mrmory	Memory Controller (MC) - 3Mb
12	Memory	Memory Array (MA) - 5Mb
13	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.

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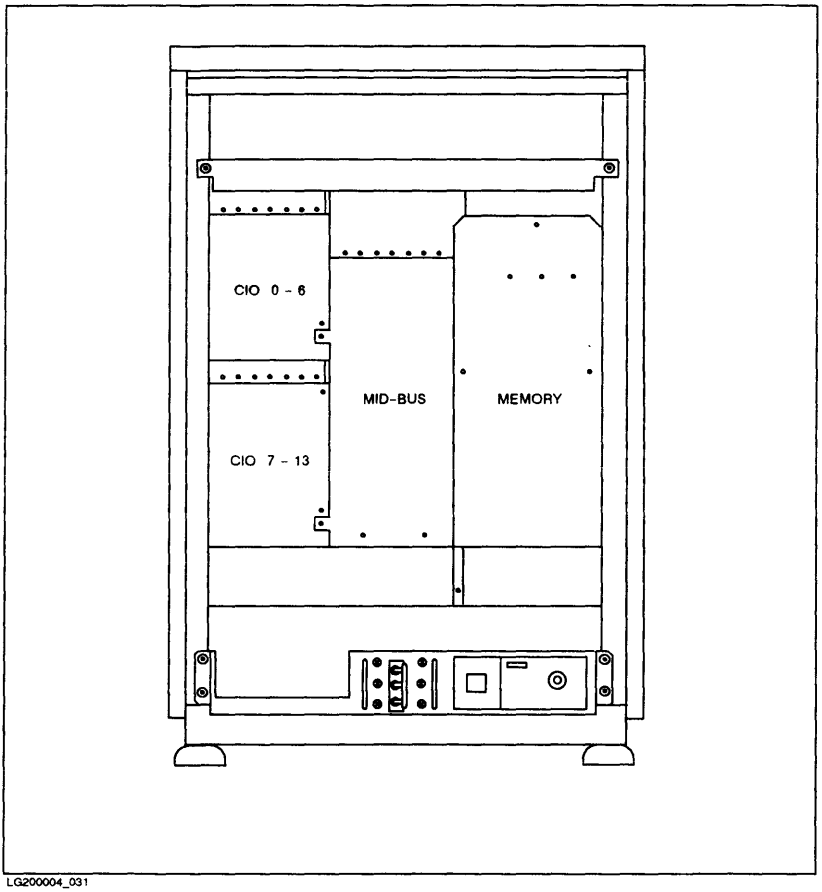


Figure 3-1. System Card Cage Location

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.

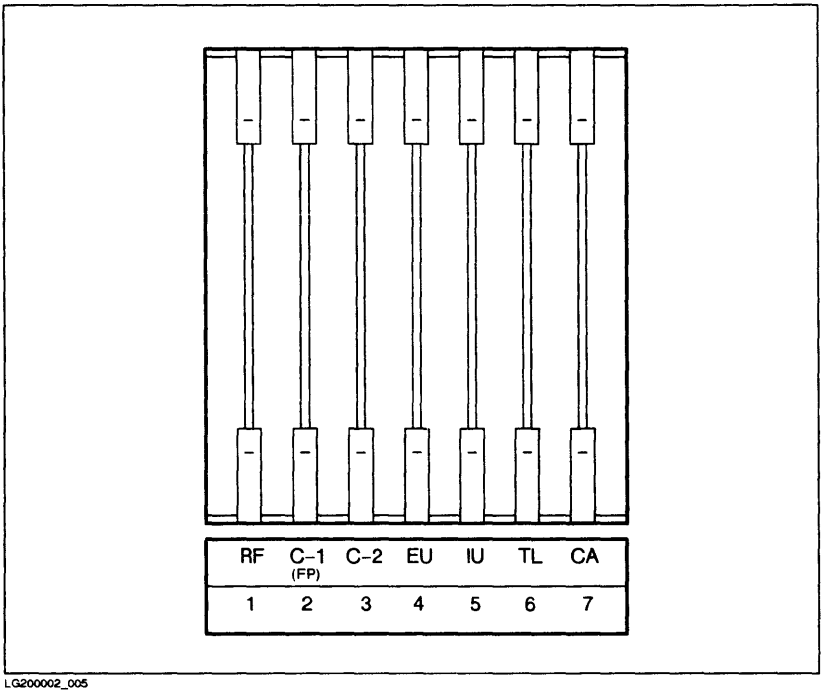


Figure 3-2. CPU Card Slot Assignments

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 adapters, with a third channel adapter available as an option. The standard HP-UX operating system consists of one channel adapter. 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.

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 #2, HP-IB for the Mag Tape and Printer
- CIO slot #12, Access Port Device Adapter
- CIO slot #13, first CIO Buffer Card
- Expansion Bay CIO slot #B1, second CIO Buffer Card

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

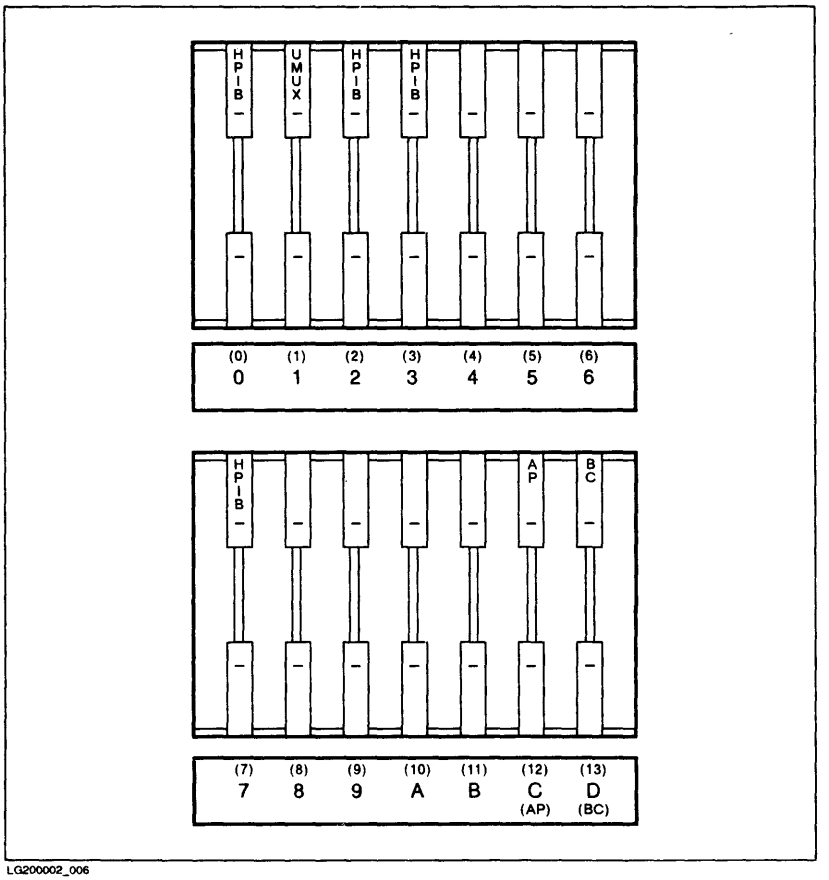


Figure 3-3. Channel I/O Card Slot Assignments

Memory Card Cage Configuration Assignment

Memory configuration consists of combinations of 3 Mbyte Memory Controller (MC) Cards and 5 Mbyte Memory Array (MA) Cards. All are installed in the Memory Card Cage, located to the right of the Midbus, inside the rear door of the computer cabinet. (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 16 Mbytes.
- Maximum memory allowed is 24 Mbytes.

Support of the HP-UX System Software:

- Minimum memory required is 8 Mbytes.
- Maximum memory allowed is 24 Mbytes.

NOTE

Supported memory configurations are 8, 16, and 24 Mbytes, only.

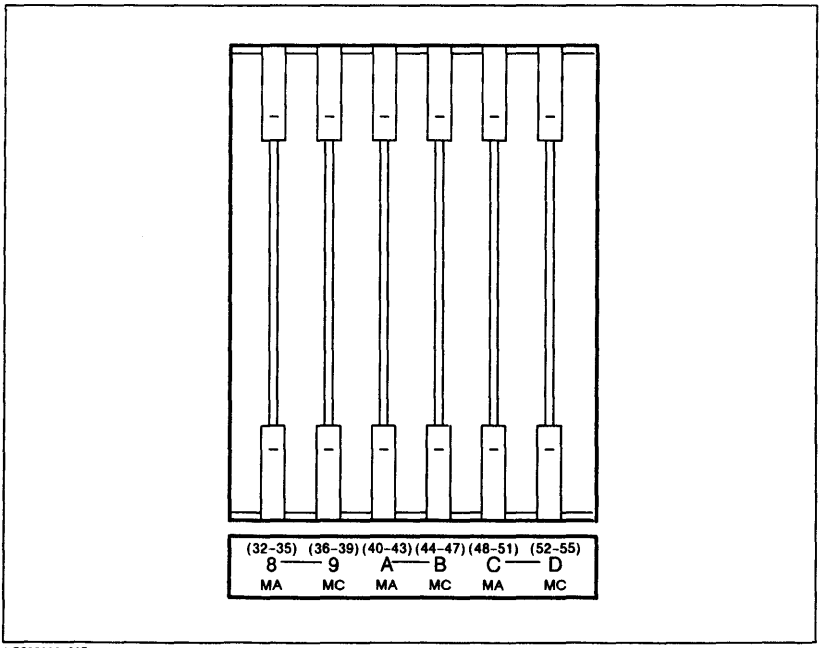
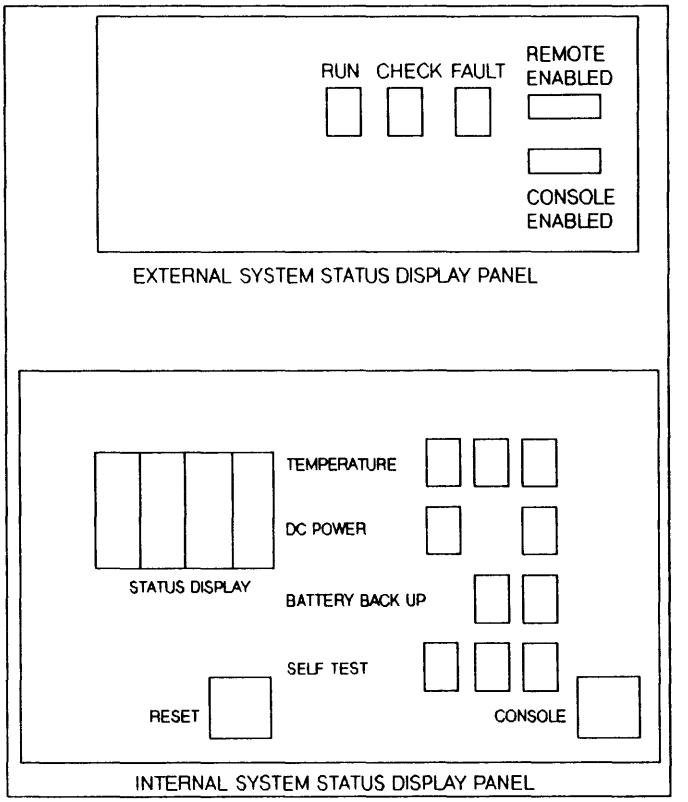


Figure 3-4. Memory Array and Memory Controller Slot Assignments

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 9000/840 Computer Systems.



NOTE

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

Figure 4-1. System Status Display Panels

Table 4-1. External System Control Panel

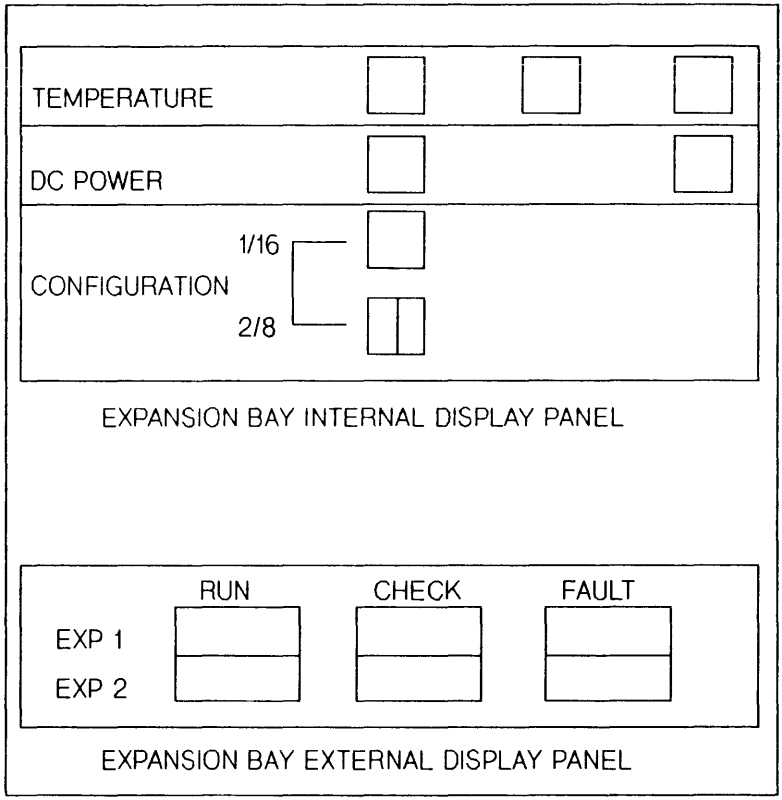
Indicator	Status
RUN (LED is Green)	All of the following: • Selftest passed. • ISL Program Module (OS, DIAG, or UTIL) is loaded. • Power supplies are within voltage specification. • Battery backup is charged. • Temperature is normal.
CHECK (LED is Yellow)	One or more of the following: • Selftest in progress. • Initialization in progress. • Software initiated shutdown. • Non-fatal error has occurred in selftest. • Battery backup is charging. • System temperature is marginal.
FAULT (LED is Red)	One or more of the following: • 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 the 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. 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. System shutdown.
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 - Fatal error.



NOTE

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

Figure 4-2. Expansion Bay Module 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.
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 Chapter 8 of the Hardware Support Manual, P/N 09740-90011.

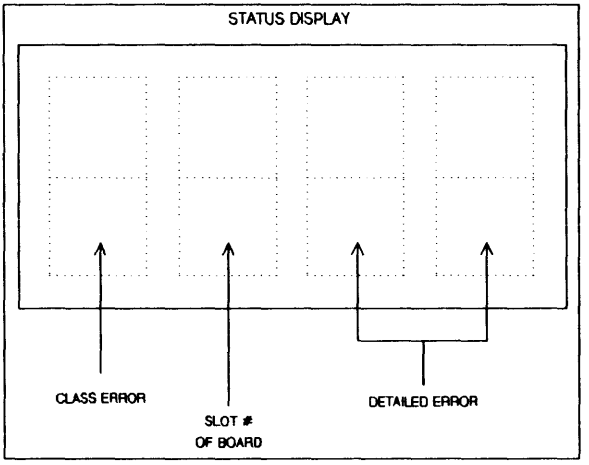


Figure 4-3. Hexadecimal Display Panel

Table 4-5. Class Error Descriptions

Class Errors	Description of Error Condition
0	Catastophic Failure.
1	Processor Hardware Failure.
2	Cache (CA+) or Translation Lookaside Buffer (TLB) Hardware Failure.
3	Processor Dependent Hardware/System Monitor Failure.
4	Coprocessor Hardware Failure.
5	Bus Protocol Error.
6	Reserved.
7	Memory Hardware Failure.
8	I/O Hardware Failure.
9	Console Device Failure.
A	Boot Device Failure.
B	Operating System Software.
C	Initialization Failure.
E	OS or Environmental Warning.
F	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	26FF	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 (See detailed error messages in Chapter 11 of Hardware Support Manual, P/N 09740-90011.)	Replace Faulty Board.
9	9ZXX*	Console Device Path Test.	Replace Faulty Board.
A	AZXX*	Boot Device Path Test.	Replace Faulty Board.
B	BZXX*	Operating System Failure.	Replace Faulty Board.
C	CAXX	Initialization: Power Fail.	Replace Faulty Board.
C	CBXX	Initialization: Transfer of Control.	Replace Faulty Board.
C	CEXX	Initialization: Initial System Load Code.	Replace Faulty Board.
	05XX	Loader Error: Parallel Card.	Replace Faulty Board.

* Z = Slot dependent value.

NOTE

The detailed error code is reflected by the last two digits on the System Display Panel. Detailed error descriptions are provided in Chapter 8 of the Hardware Support Manual, P/N 09740-90011.

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).

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 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 at the test points on System Monitor Module are as listed in Table 4-7 by using a digital voltmeter.

5. Replace power supply if the computer does not pass the DC Power Supply Check. Refer to Section 6 or the Hardware Support Manual, P/N 09740-90011, for removal/replacement procedures.

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 4-4 thru 4-9).

Table 4-7. Power Supply Test Points

Voltage Status	Test Point Color (Qty)	Test Signal	DC Voltage Specification
Power Supply	Yellow (5 ea.)	PON1, PON2, PON3 MB.PFW, MB.PON	2.4V min. (logic 1) 2.4V min. (logic 1)
Lithium Battery	Red (2 ea.)	+3V1, +3V2	2.5V minimum
Power Supplies (3)	Red (9 ea.)	-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	Red (1 ea.)	+10V BATT	8.4V to 11.90V
Secondary Power (Mid-bus slots)	Red (2 ea.)	+5VS1, +5VS2	4.8V to 5.25V
Ground	Black (1 ea.)	Ground	

NOTE

The above power supply test points are located on the System Monitor Card.

Selftest Switch Settings

Eight Dip switches located on the front of the System Monitor Module (refer to Diagrams, Section 9) control the execution of selftest. Normal position for all switches is the CLOSED position.

Table 4-8. 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.

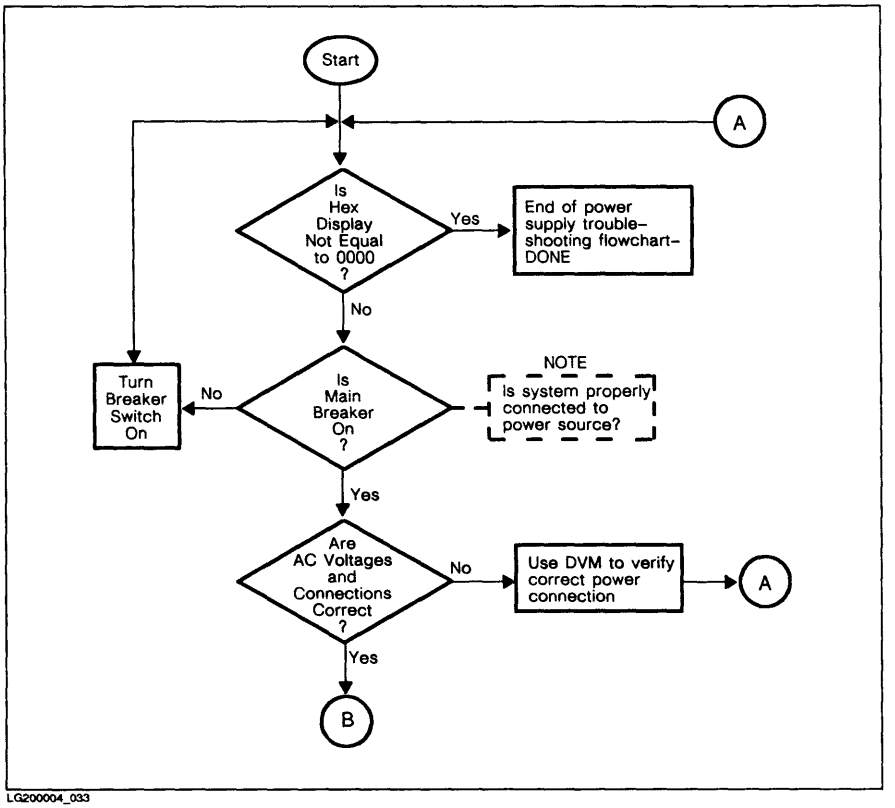


Figure 4-4. Power System Troubleshooting Flowchart 1

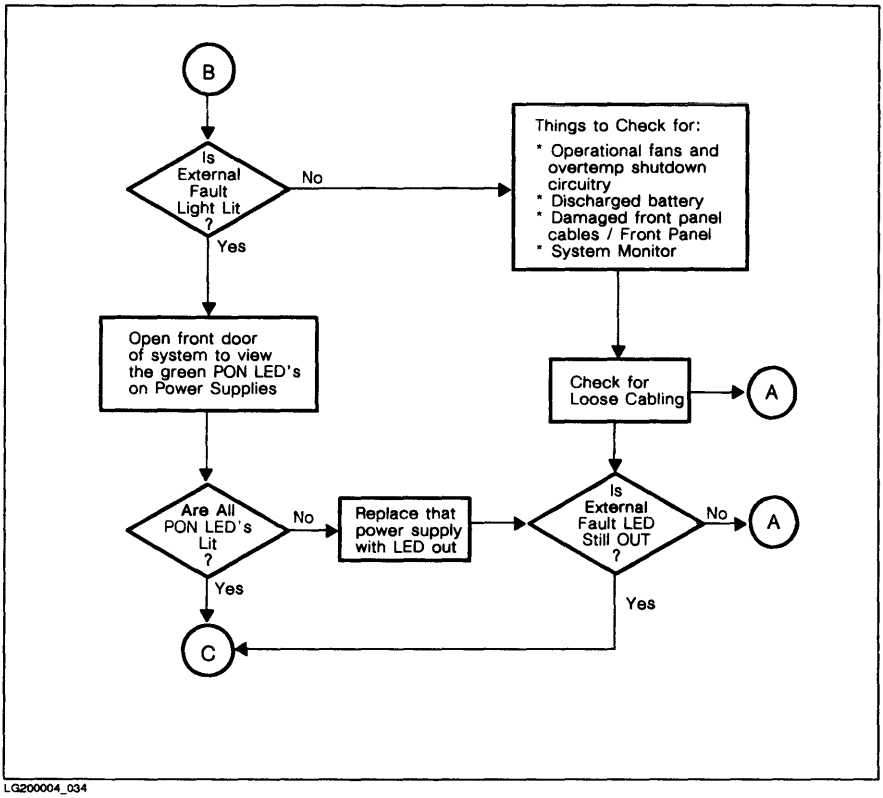
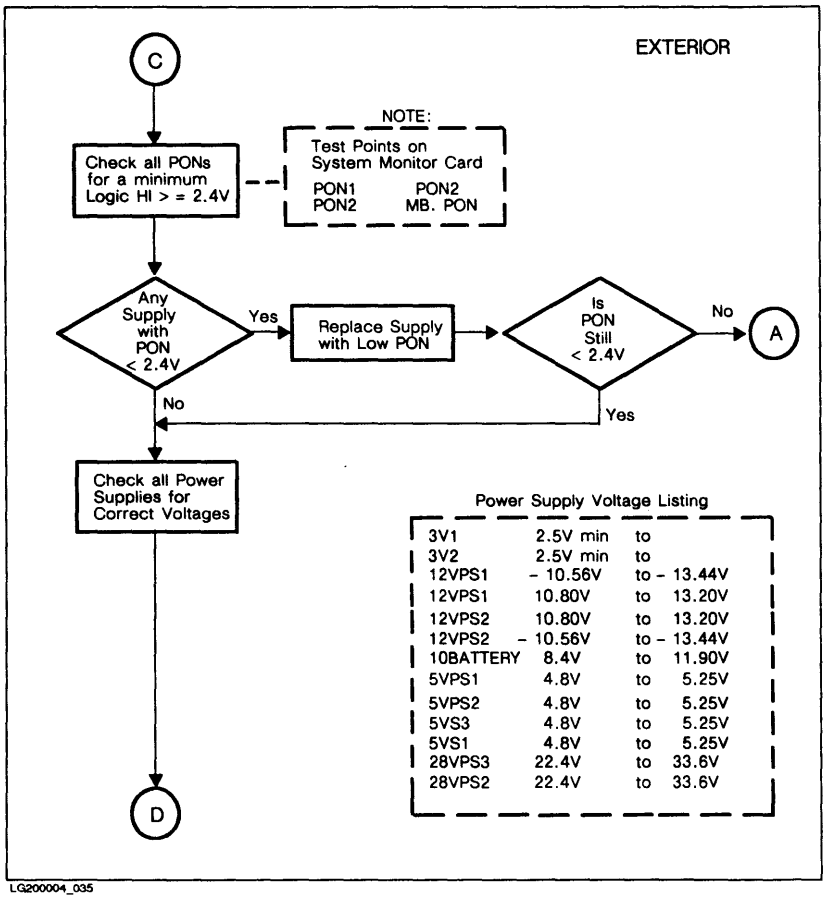


Figure 4-5. Power System Troubleshooting Flowchart 2



LG200004_035

Figure 4-6. Power System Troubleshooting Flowchart 3

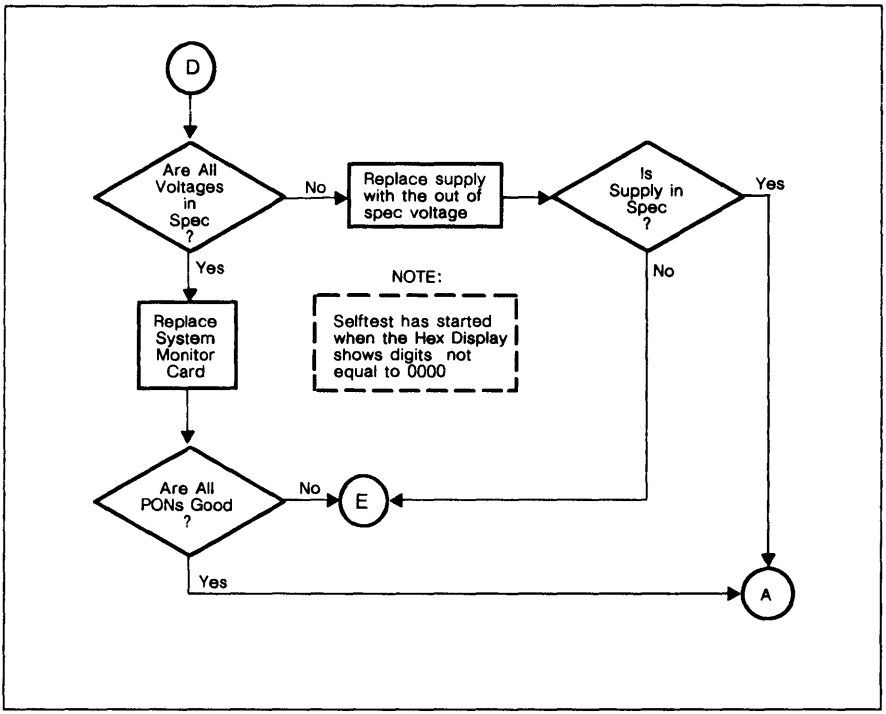


Figure 4-7. Power System Troubleshooting Flowchart 4

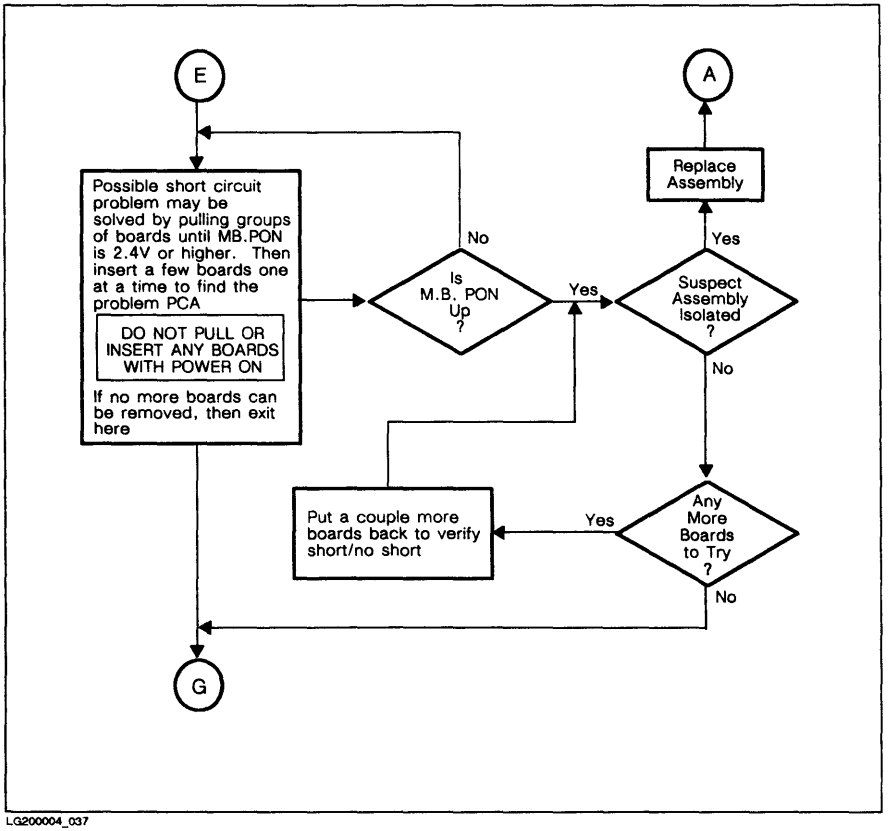


Figure 4-8. Power System Troubleshooting Flowchart 5

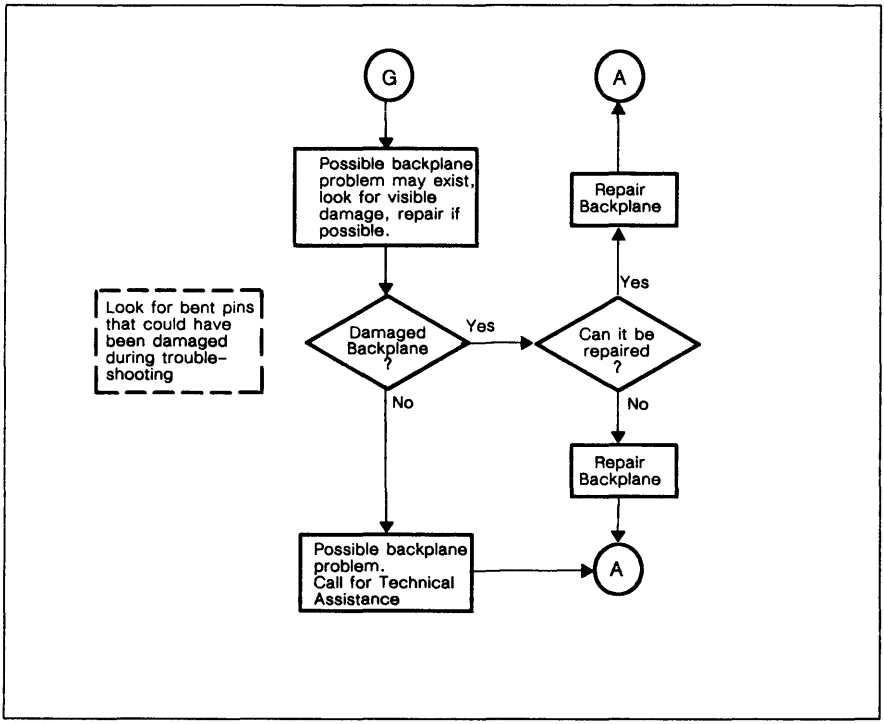
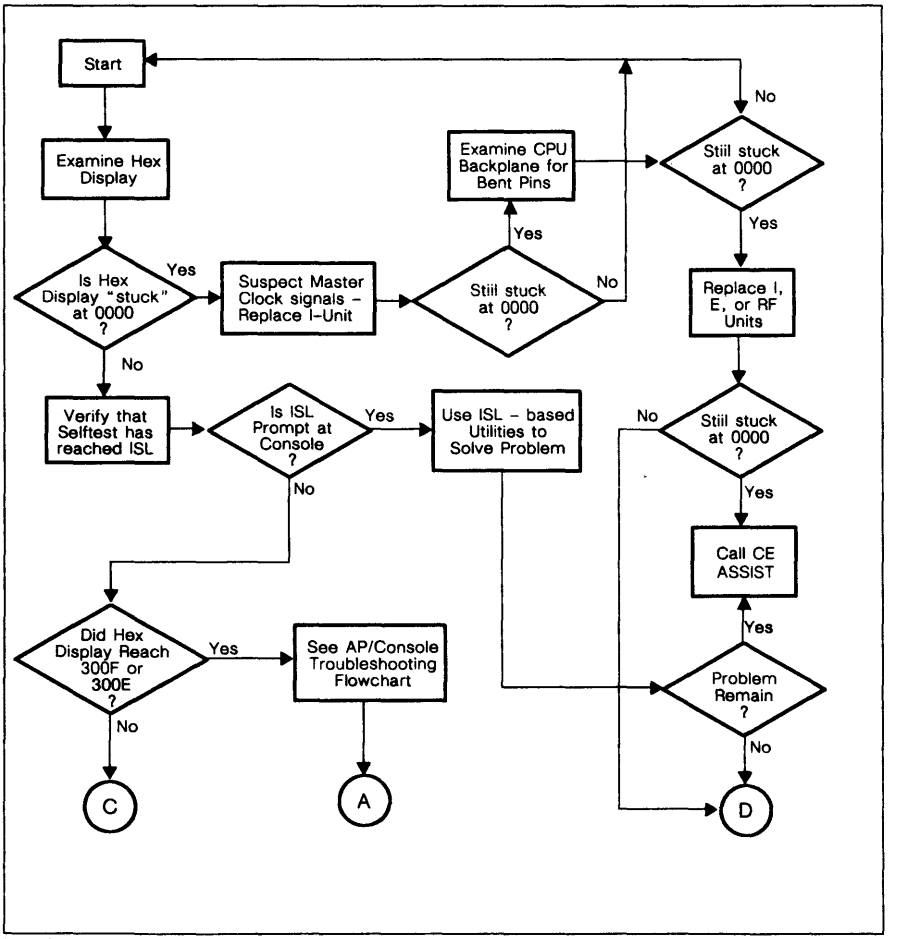


Figure 4-9. Power System Troubleshooting Flowchart 6

Selftest as a Troubleshooting Tool

The following flowcharts (Figures 4-10 thru 4-16) illustrate how to use Selftest as a troubleshooting tool.



LG200004_039

Figure 4-10. Selftest Operation Flowchart 1

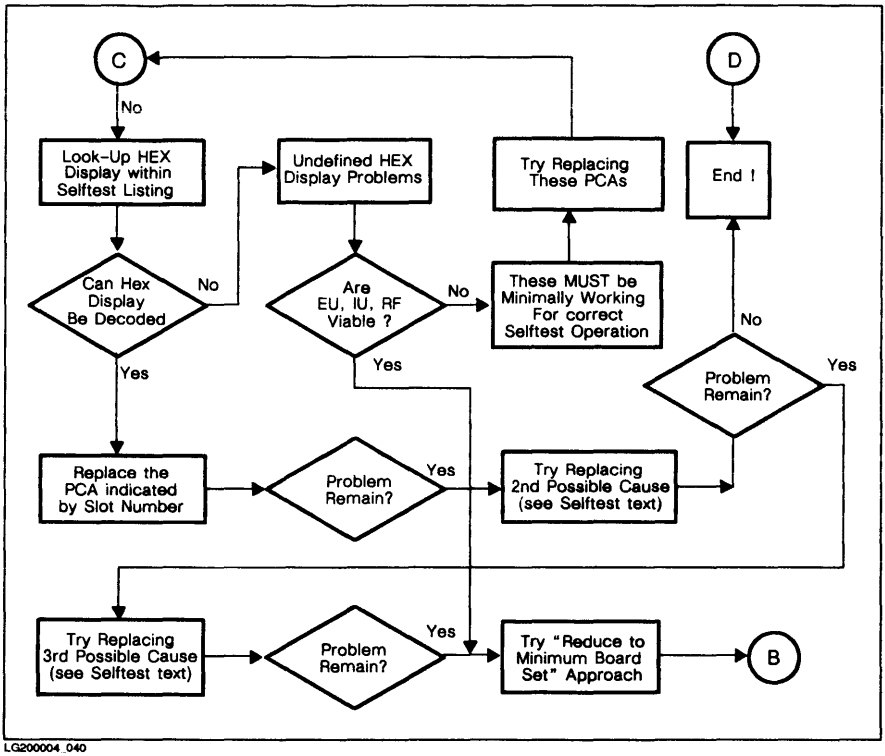
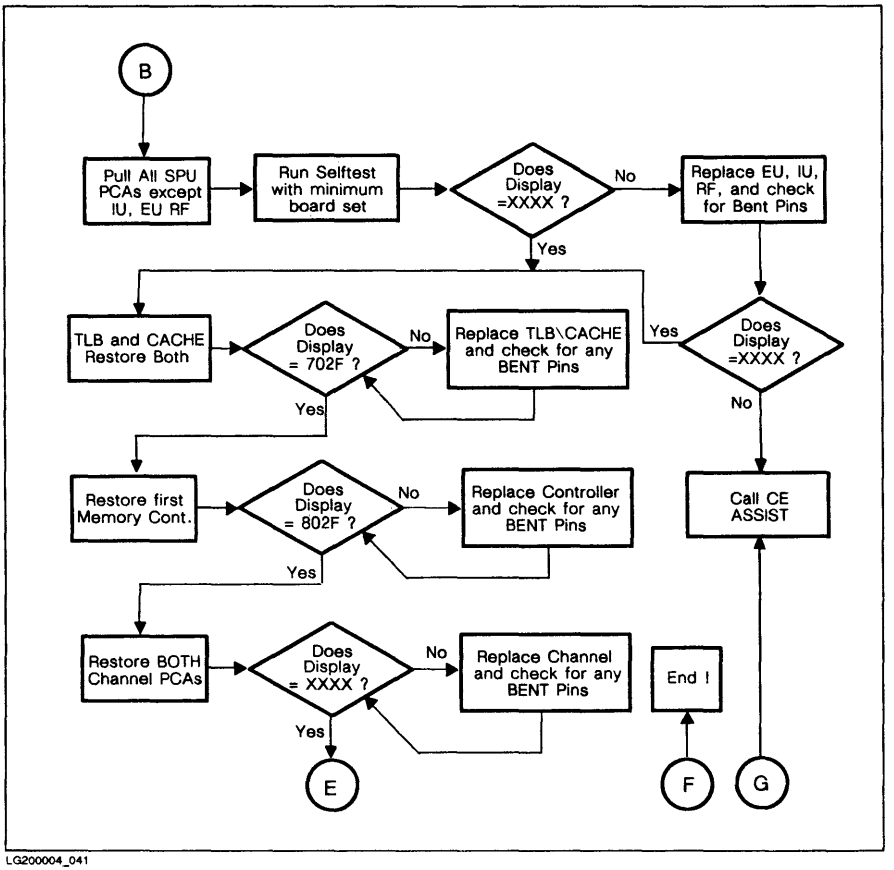


Figure 4-11. Selftest Operation Flowchart 2



LG200004_041

Figure 4-12. Selftest Operation Flowchart 3

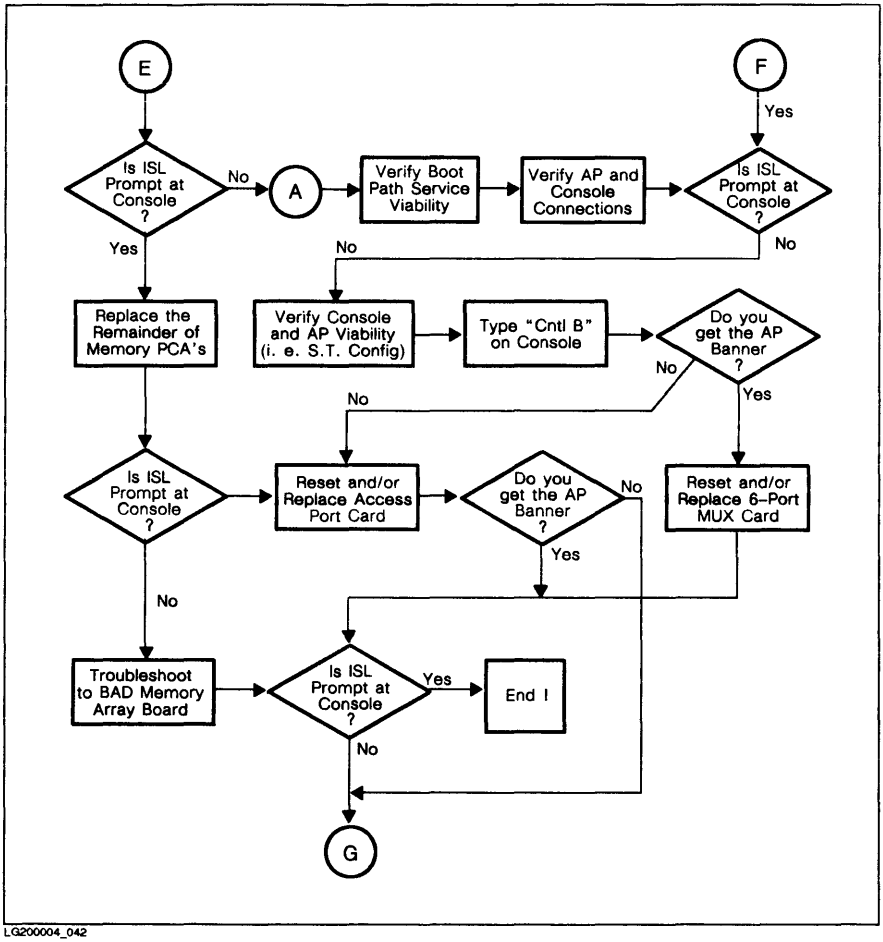
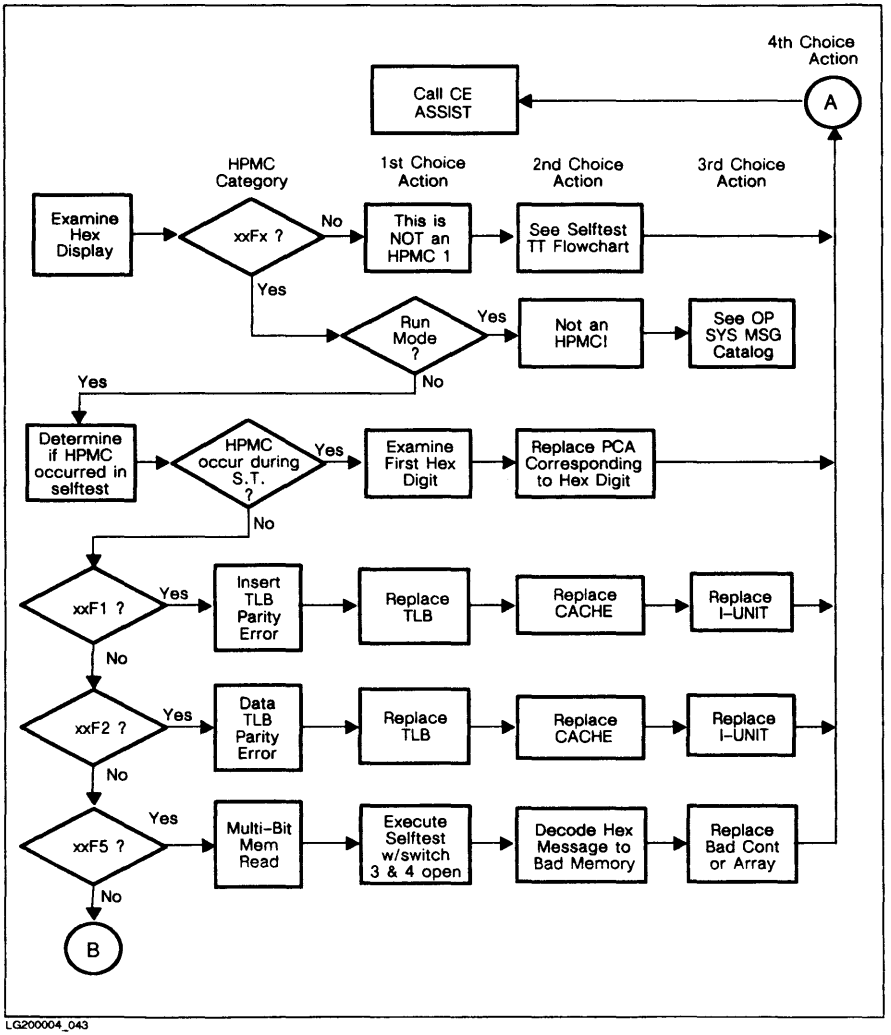


Figure 4-13. Selftest Operation Flowchart 4



LG200004_043

Figure 4-14. Selftest Operation Flowchart 5

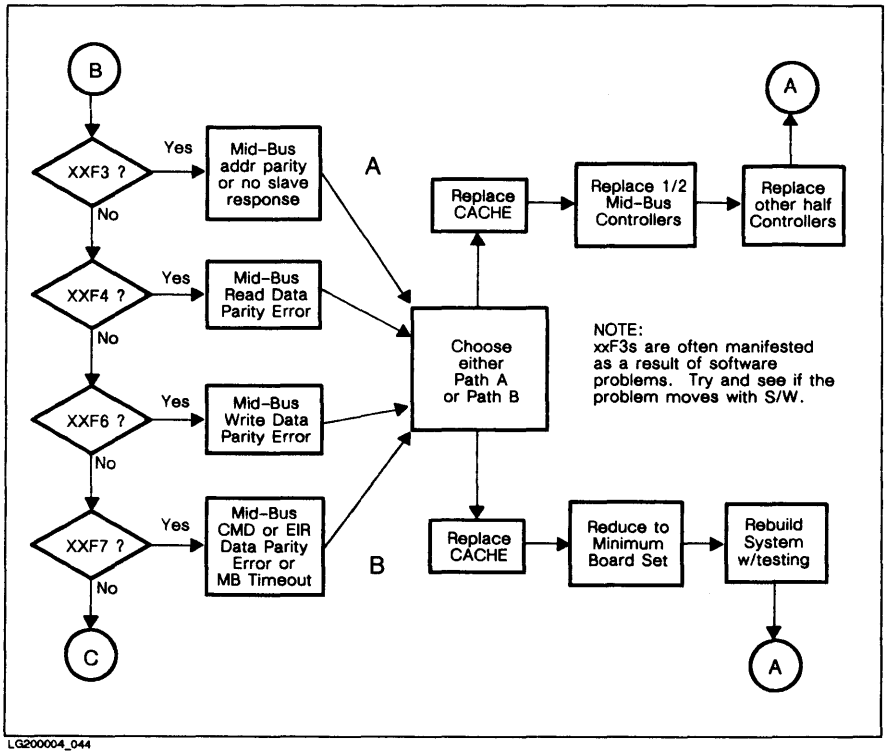


Figure 4-15. Selftest Operation Flowchart 6

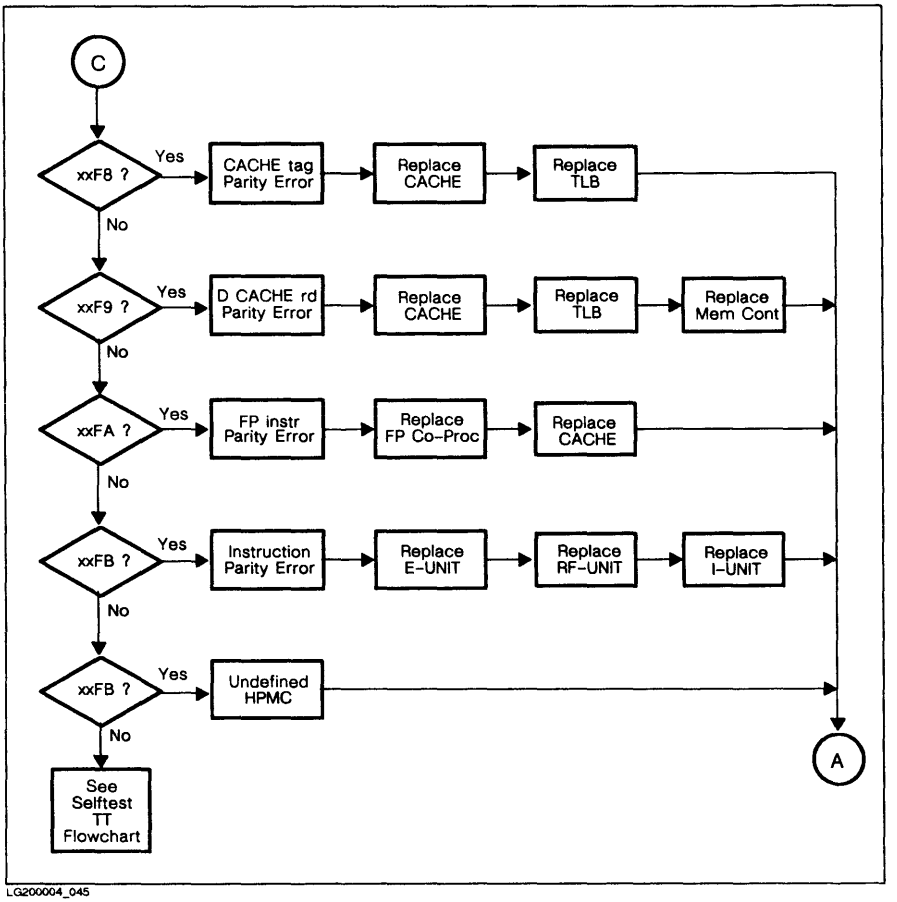


Figure 4-16. Selftest Operation Flowchart 7

DIAGNOSTICS

SECTION 5

The Diagnostics Section provides information pertaining to the supported diagnostics and utilities for MPE-XL and HP-UX operating systems.

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 (DIAG 7478).
- CIPER Line Printer Diagnostic (CIPERLPD).
- HPIB Device Adapter Diagnostic (HPIBDIAG).
- Memory Array Diagnostic (MEMDIAG).
- Asynchronous Six-Channel Multiplexer Diagnostic (MUXDIAG).
- Local Area Network Device Adapter Diagnostic (LANDAD).
- ALINK Diagnostics (ALDIAG).
- Eagle Diagnostic (EGLDIAG).
- Page Printer Diagnostic (PPDIAG).

The following are the supported Utilities:

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

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
DIAG7478	HP 7974A/7978A/B Magnetic Tape Diagnostic	Yes	Yes
CIPERLPD	CIPER Line Printer Diagnostic	Yes	Yes
PPDIAG	Page Printer Diagnostic	Yes	No
HPIBDIAG	HPIB Device Adapter Diagnostic	Yes	Yes
MEMDIAG	Memory Array Diagnostic	No	Yes
MUXDIAG	Asynchronous Six-Channel Multiplexer Diagnostic	No	Yes
LANDAD	Local Area Network Device Adapter Diagnostic	Yes	Yes

Table 5-2. Supported Subsystem Utilities

UTILITY NAME	DESCRIPTION	MPE-XL	HP-UX
IOTT	I/O Test Tool	Yes	No
CADIAG	HP-CIO Channel Adapter Utility	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
INSTALL	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
   ```

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

```
**********************************************************
******                                              ******
******         SHERLOCK DIAGNOSTIC SYSTEM           ******
******                                              ******
******     (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.
USE	Causes DUI commands to be read from a file.
WAIT	Wait for background programs to terminate.

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
   ```

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.
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.

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
   ```

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 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 - HP7978A/B Selftests
   - o Section 40 - Firmware Update Utilities
   - o Section 50 - Image Dump Utilities
   - o Section 55 - Internal Device Logs

   ADDITIONAL SECTIONS AVAILABLE
   - o Section 7 - Downloading Selftests
   - 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
   ```

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.

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
   ```

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 - 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 6 in the Online Diagnostics Subsystem Manual, P/N 09740-90020.

Memory Array Diagnostic (MEMDIAG)

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

The Memory Array Diagnostic provides four diagnostic functions and one verifier function. The diagnostic functions consist of a total pattern test of memory, a quick pattern test of memory, and a manual test select.

Mini-Operating Instructions

1. Enter the following commands:

   ```
   :SYSDIAG
   ```

2. `DUI > RUN MEMDIAG <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 12 - Error Detection and Correction Memory Test (all steps)
   - o Section 13 - User Interactive Testing (all steps)
   - o Section 14 - Verifier/Sweep Functions (all steps)

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

   For a list of error messages that may appear when using MEMDIAG, refer to Section 7 in the Online Diagnostics Subsystem Manual, 09740-90020.

Asynchronous Six-Channel Multiplexer 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).

Mini-Operating Instructions

1. Enter the following commands:

```
:SYSDIAG
DUI> RUN MUXDIAG <RUN Command Options>
```

Typing HELP to the prompt will display a summary of the available RUN commands. Refer to Section 8 in the Online Diagnostics Subsystem Manual, P/N 09740-90020, for details concerning these RUN command options.

2. 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

3. To exit MUXDIAG type EXIT.

For a list of explanations of error messages that may be generated by MUXDIAG, refer to Section 8 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 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
```

```
*************************************************************
****                                                     ****
****            ONLINE DIAGNOSTIC SUBSYSTEM              ****
****        (c)  Hewlett-Packard Company 1985            ****
****                   Version V.UU.FF                   ****
****                                                     ****
*************************************************************
```

```
SYSDIAG 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 - MAU Test

CAUTION

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.

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

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

4. 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
   ```

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   ]:[display mode]
         [similar]
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
```

HP-CIO Channel Adapter Utility (CADIAG)

The HP-CIO Channel Adapter Utility (CADIAG) is a utility 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 MPE-XL prompt:

   ```
   :SYSDIAG
   ```

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 6 - 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 3 in the Online Diagnostics Subsystem Utilities Manual, P/N 09740-90021, for a list of error messages which may appear when using CADIAG.

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 to the MPE-XL prompt:

   ```
   :SYSDIAG
   ```

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).
   - Diagnostic Log File Commands (DLF).
   - Memory Log File Commands (MLF).
   - Miscellaneous Commands (MC).

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

   ```
   DIAGRPT (DLF)          PURGEDIAG (DLF)
   DISPLAYLOG (MC)        PURGESYSLOG (SLF)
   EXIT (DLF)             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 to the MPE-XL prompt:

   ```
   :SYSDIAG
   ```

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
   ```

   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

The MPE-XL Online Diagnostic Installer 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
   ```

   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 number) >
   ```

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

*** To be supplied at a later date. ***

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

*** To be supplied at a later date. ***

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 840 Computer Systems.

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 4-6 (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.

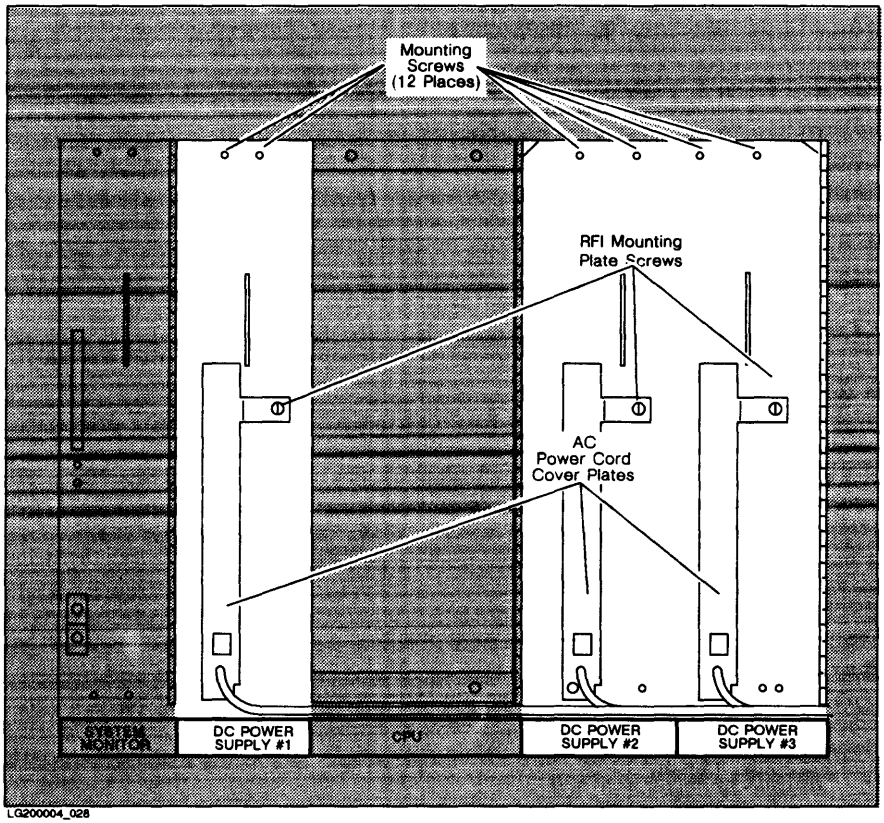


Figure 6-1. Location of Power Supplies

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 4-6 (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 840 Computer Systems.

Table 7-1. MPE-XL Default Device Configuration

LDEV#	I/O-PATH	CLASS NAME
1	8.0.0	DISC; SPOOL
4	8.1.0	CONSOLE
12	8.2.6	EPOC; BONSAI; PP; LP; FASTLP
13	8.2.7	LP; CIPER; SLOWLP
14	8.2.3	TAPE; BUCKHORN
15	8.2.4	JOBTAPE
20	8.0.1	DISC
21	8.0.2	DISC
22	8.0.3	DISC
23	8.2.2	

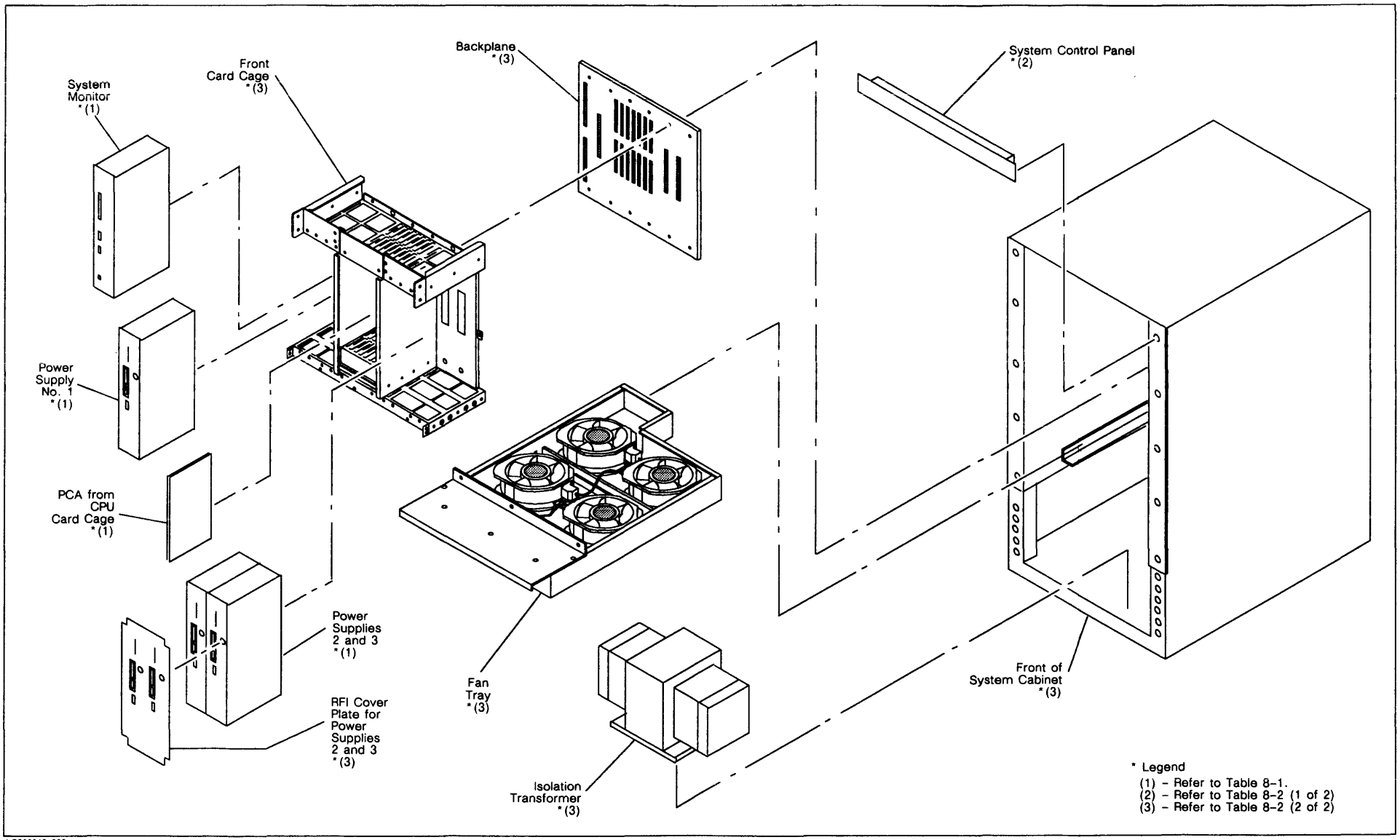
Table 7-2. HP-UX Default Device Configuration

LV#	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	8.2.2	TAPE
0	8.2.3	TAPE
2	8.2.4	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

REPLACEABLE PARTS

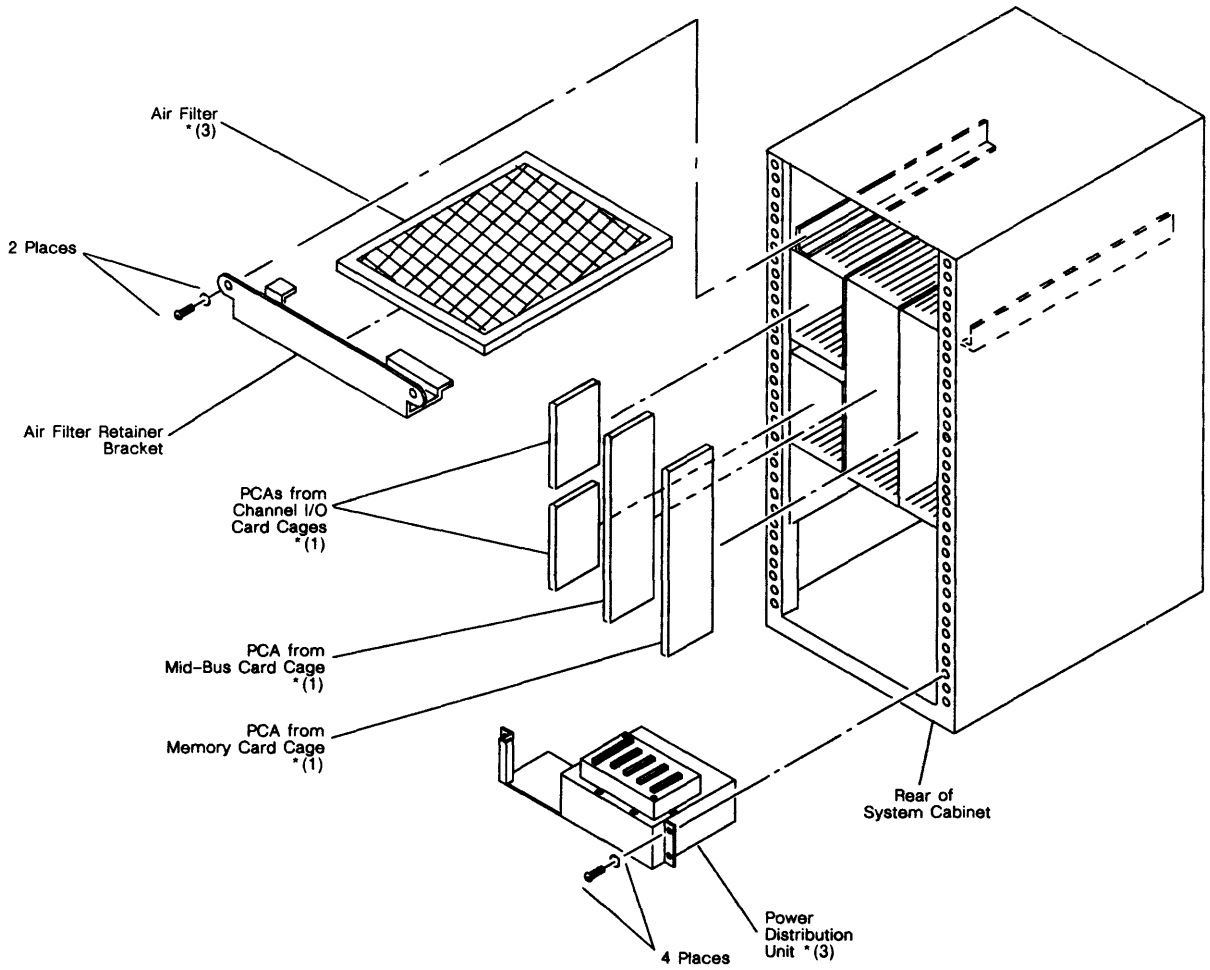
SECTION 8

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 840 Computer Systems. The catalog contains part number data for the Customer Engineer (CE) when parts replacement is necessary.



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-4X TLB (CPU Translation Lookaside Buffer)
09740-61601	09740-69661	PCA-4X CACHE (CPU Cache)
09740-60603	09740-69563	PCA-CIOA MB (Channel I/O, C1)
09740-60705	09740-69575	PCA-CIOA CIO (Channel I/O, C2)
09740-60904	09740-69594	PCA-SYS MONITOR (System Monitor)
09740-61001	09740-69601	PCA-3MB Memory Controller
19741-60001	19741-69001	PCA-5MB Memory Array
19742-60001	19742-69001	PCA-Floating Pt (CPU Floating Point Coprocessor)
19745-60001	n/a	Analyzer Card
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
19746-60010	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
3105-0208	CKT BKR-5 AMP (Fan Circuit Breaker)
3105-0209	CKT BKR-15 AMP (Battery Circuit Breaker)
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
09740-00042	Panel Cover, PDU
09740-00049	Cover, Power Supply
09740-00051	Door, CIO Lower
09740-40002	Panel, Control
09740-60043	Backplane
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
09740-60041	Assy - Door, Rear
09740-61401	TTL SPU CAB (SPU Cabinet Bay Assembly)
19743-60001	Parallel Card
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.

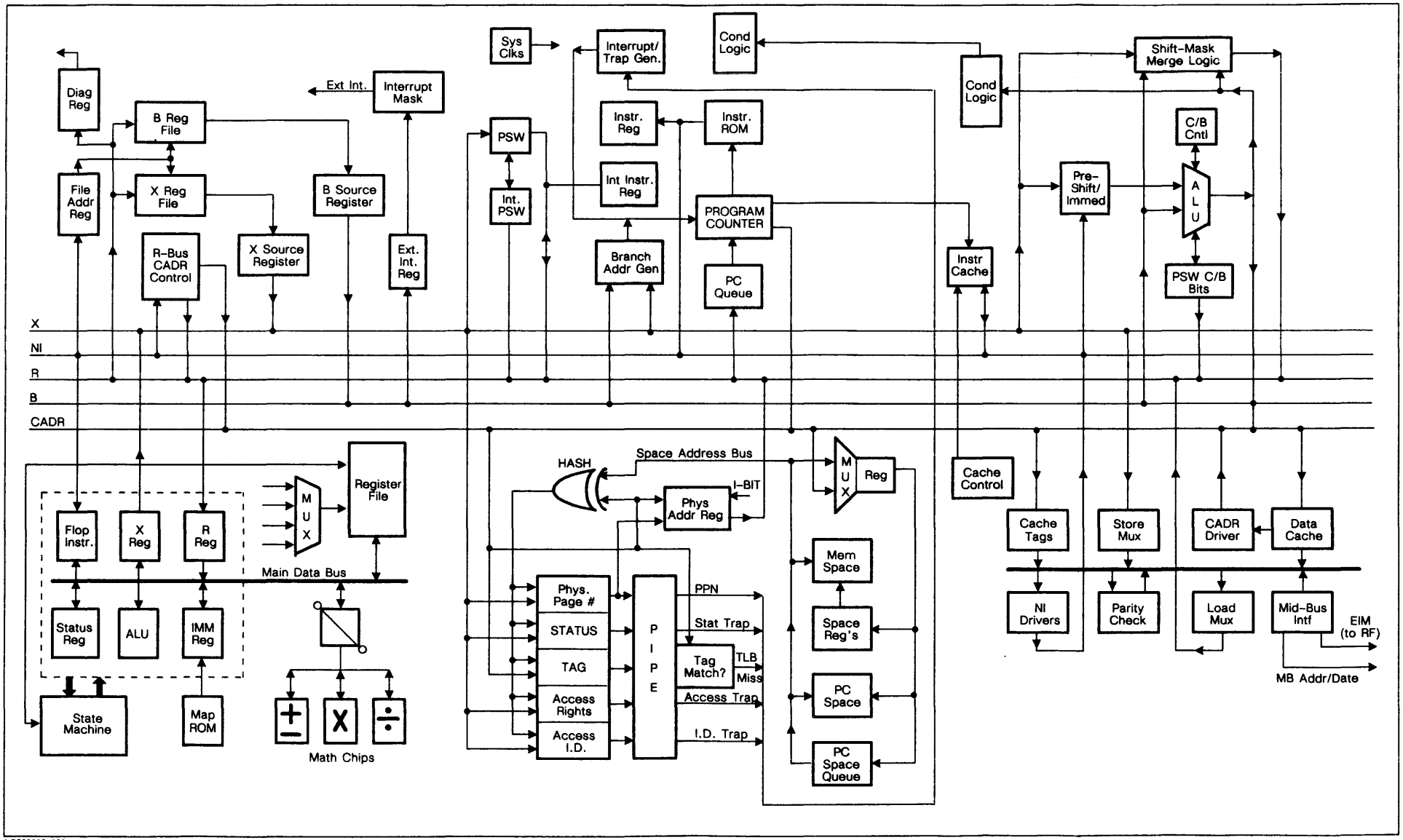
***** The assemblies with their corresponding callouts in Figures 8-1 and 8-2 were not able to be a completely represented at this time. *****

DIAGRAMS

SECTION 9

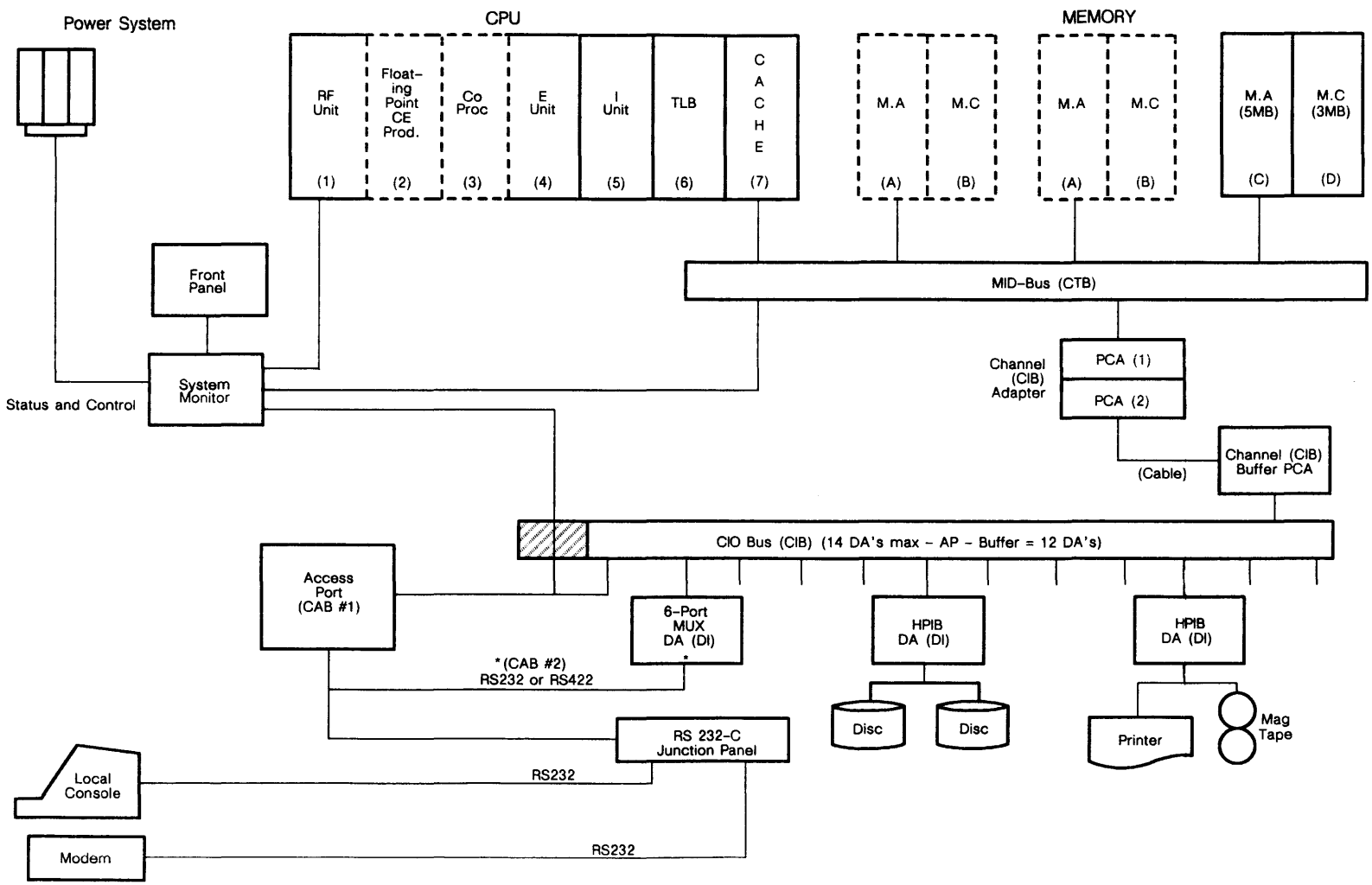
The diagrams provided in this section are to aid the CE in troubleshooting the system.

OVERALL BLOCK DIAGRAM - 9740 CPU



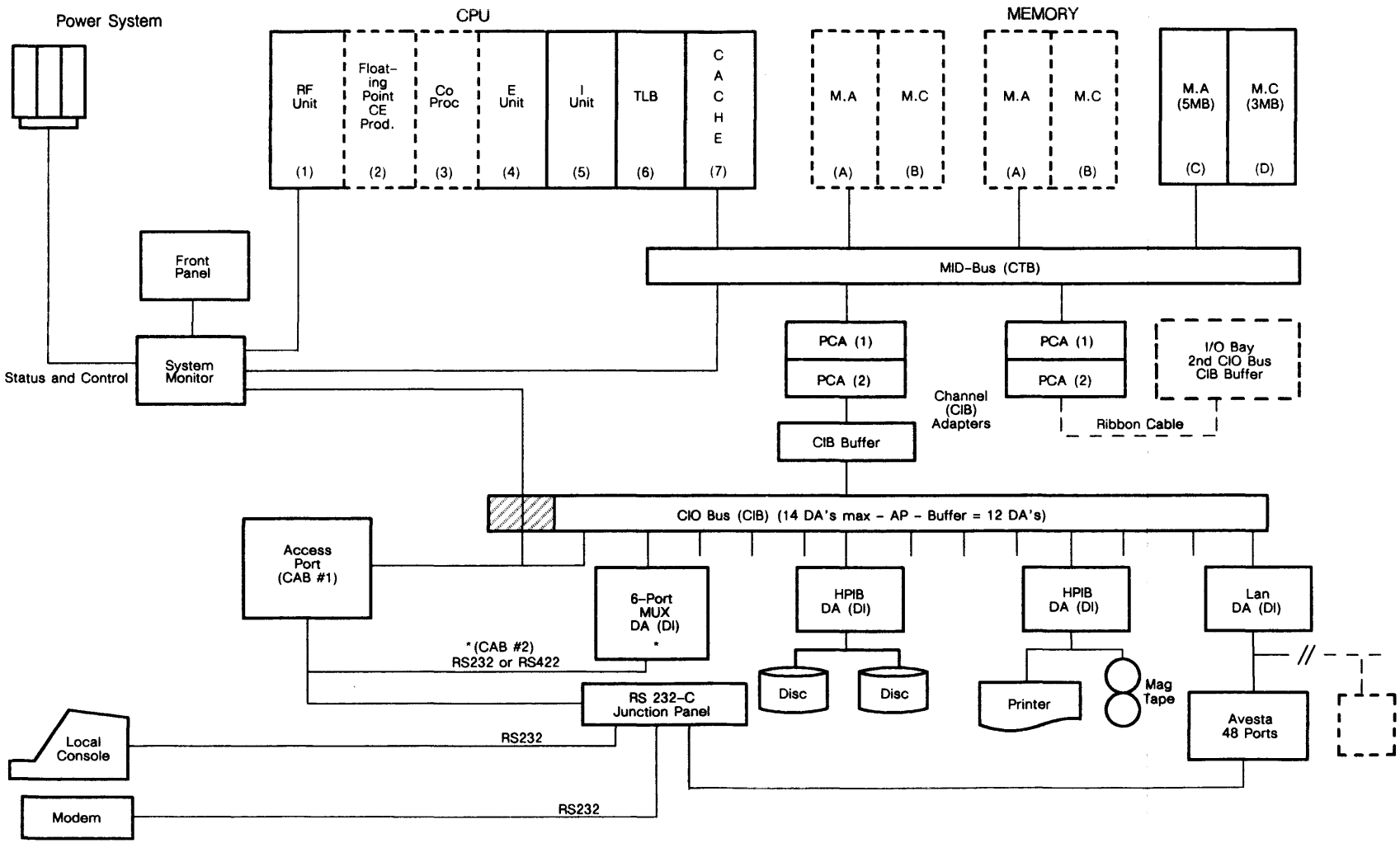
LG200008_020

Series 800 Model 840 Block Diagram



LG200012_007

Series 900 Model 930 Block Diagram



LG200012_006

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
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
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.

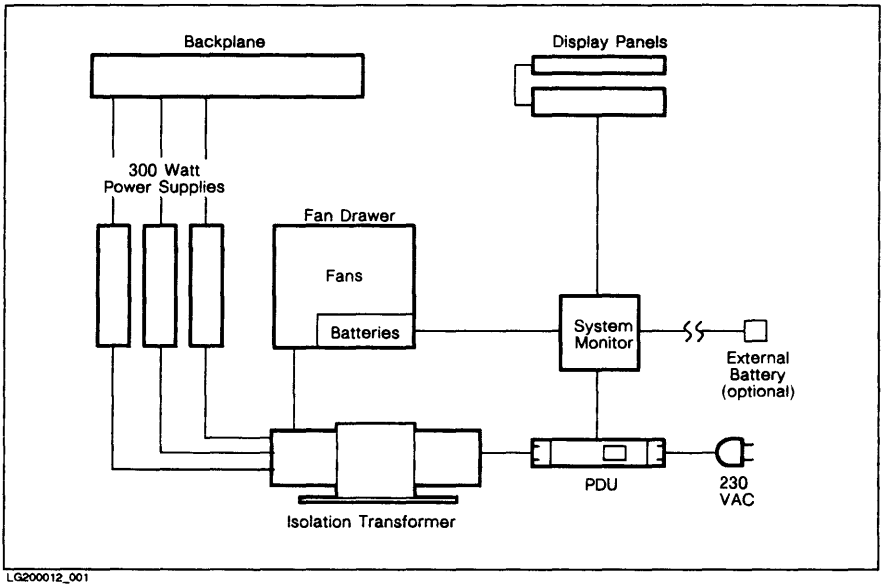
A power distribution matrix for card slots of the HP 3000/930 and HP 9000/840 Computer Systems is illustrated in Figure 9-1.

	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.

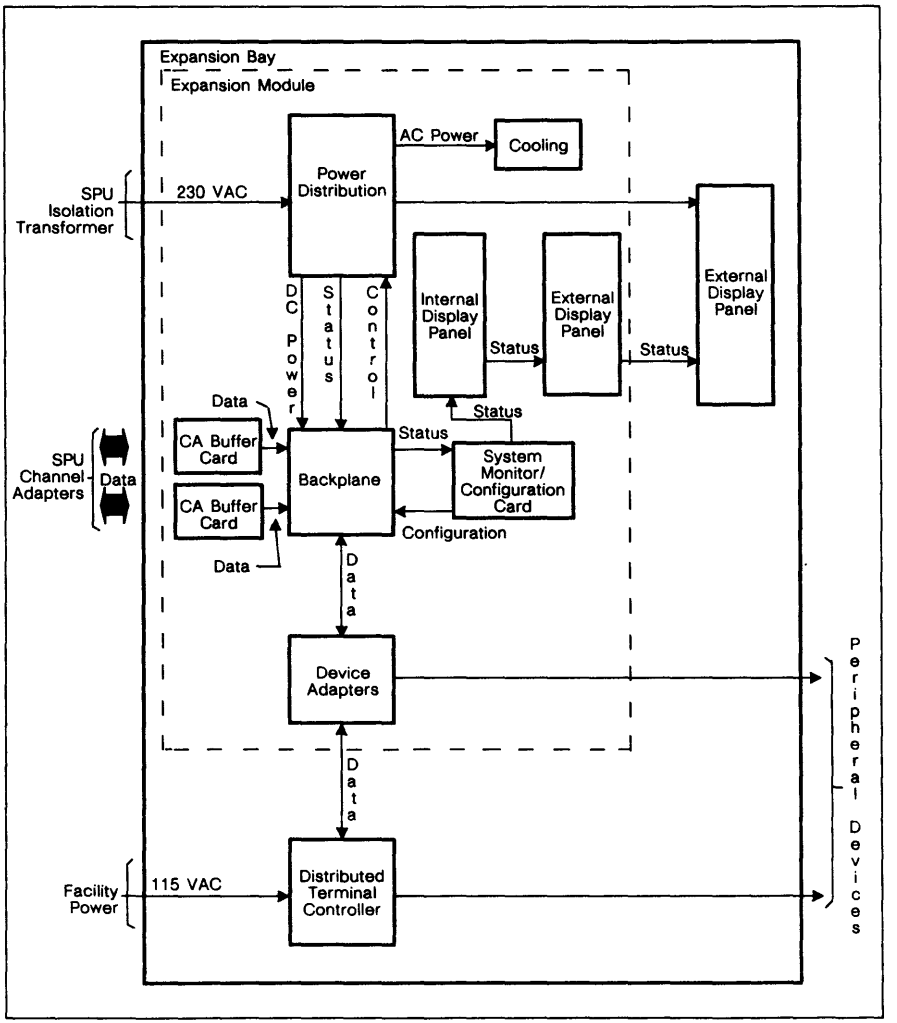
Figure 9-1. Power Distribution Matrix for Card Slots

POWER DISTRIBUTION SYSTEM



LG200012_001

EXPANSION BAY/MODULE BLOCK DIAGRAM



LG200012_002

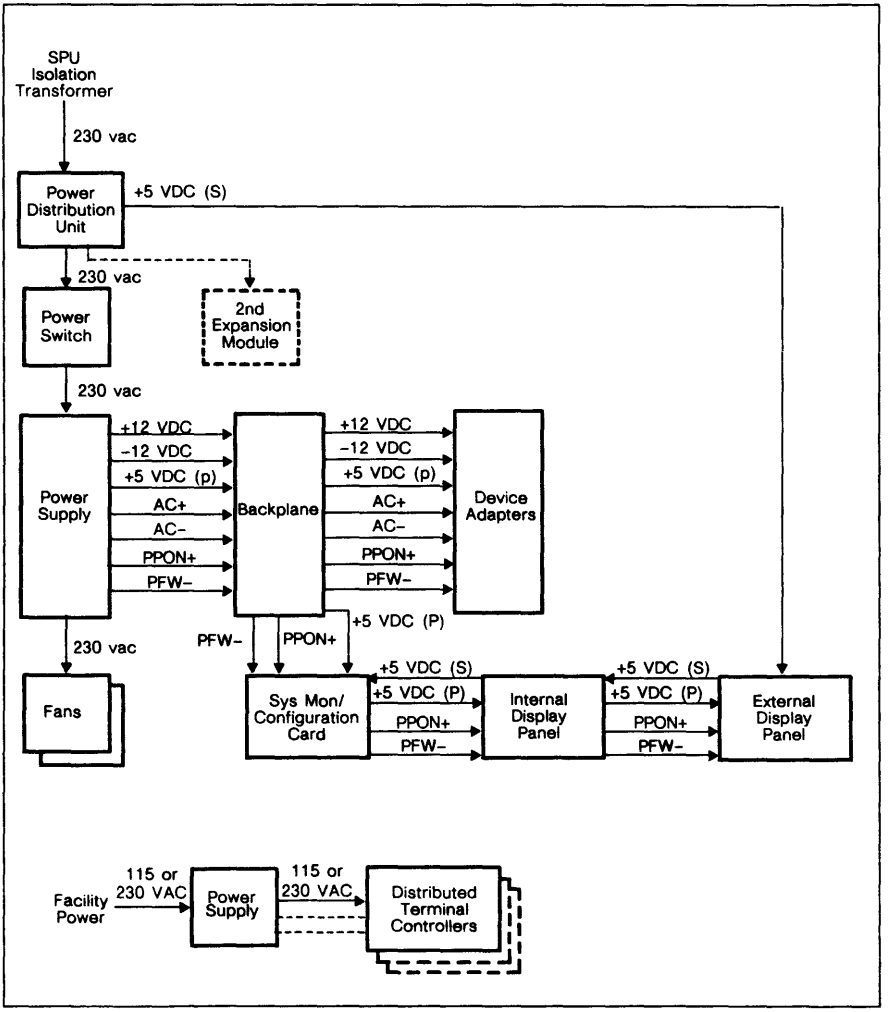
EXPANSION BAY POWER DISTRIBUTION CHART

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

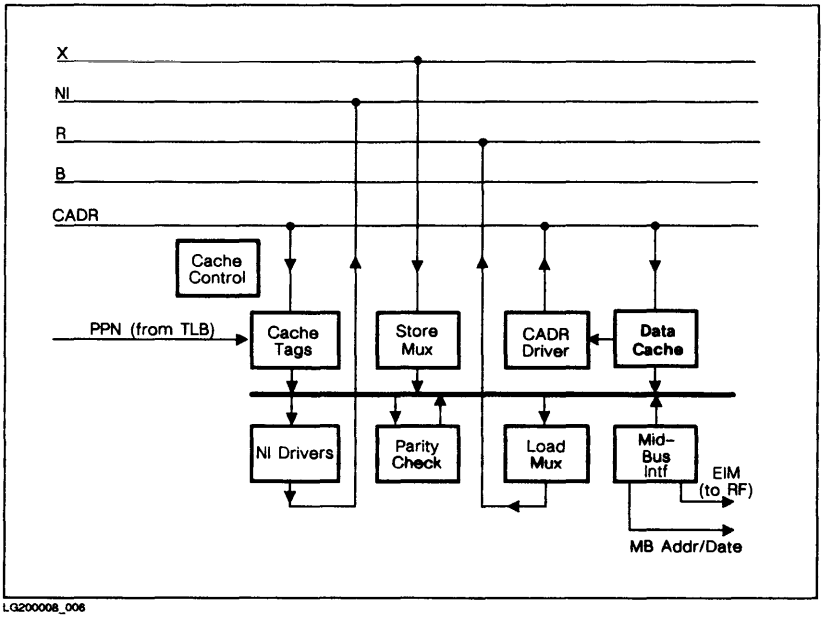
Facility Power to three Distributed Terminal Controllers (DTCs)

EXPANSION BAY POWER DISTRIBUTION SYSTEM



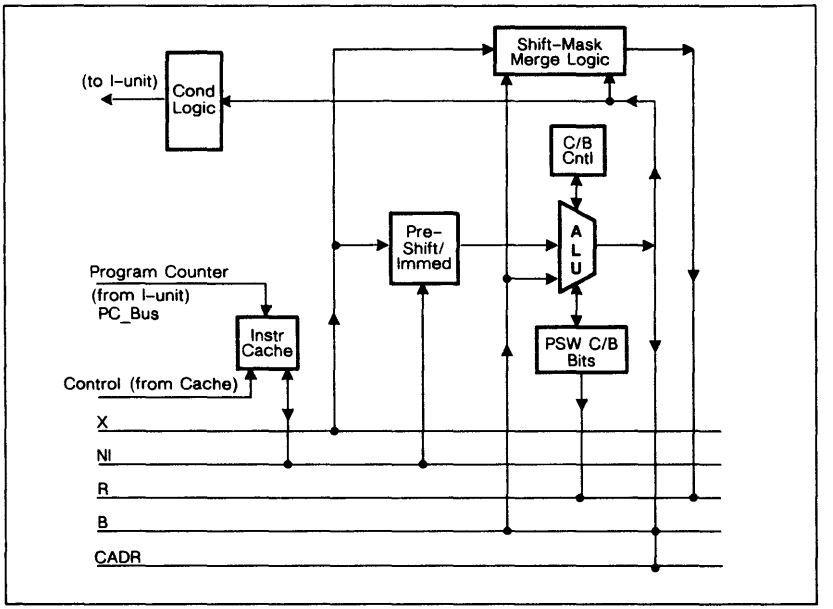
LG200005_012

CACHE UNIT (CA+) BLOCK DIAGRAM



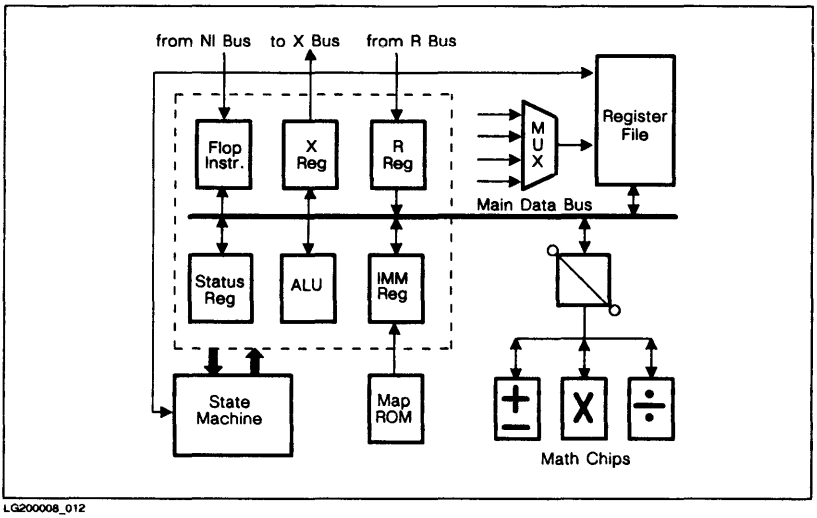
LG200008_006

EXECUTION UNIT (EU+) BLOCK DIAGRAM



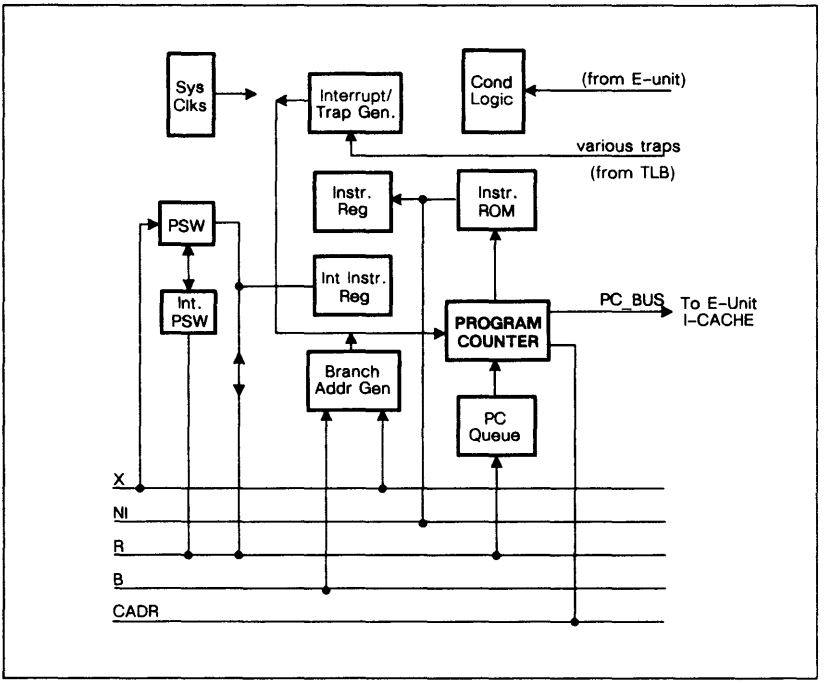
LG200008_013

FLOATING POINT UNIT (FP) BLOCK DIAGRAM



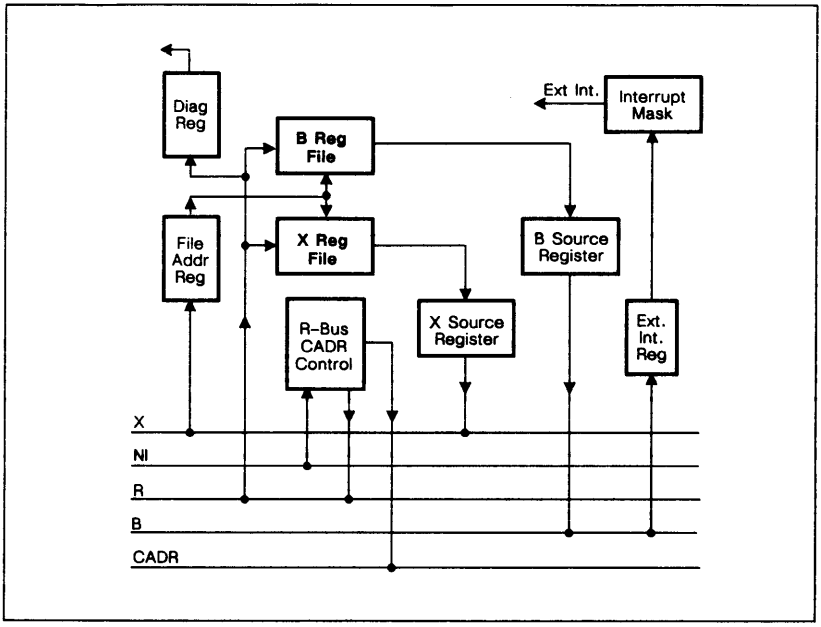
LG200008_012

INSTRUCTION UNIT (IU) BLOCK DIAGRAM



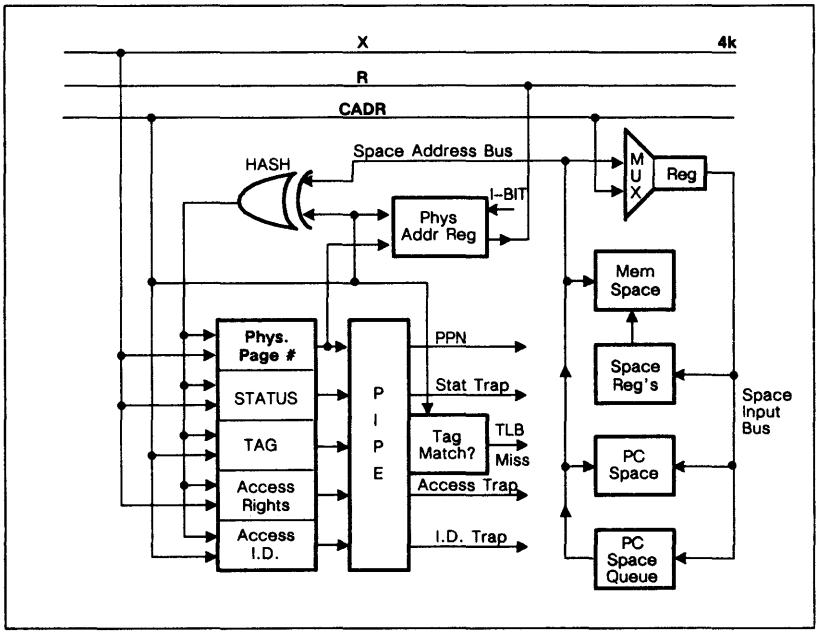
LG200008_002

REGISTER FILE UNIT (RF) BLOCK DIAGRAM



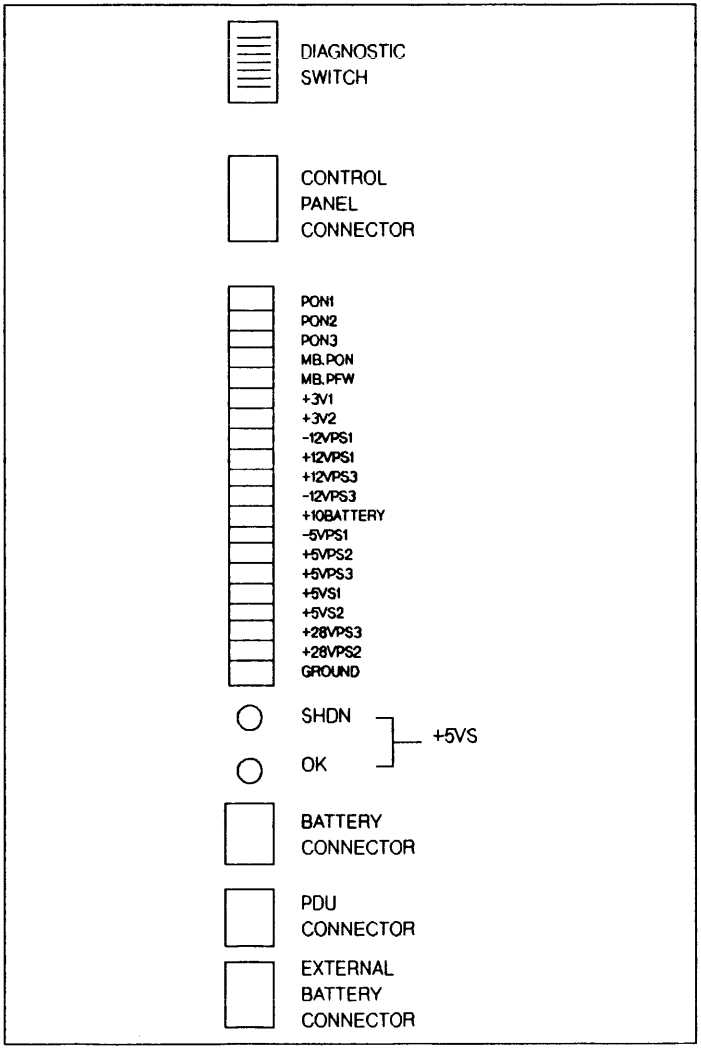
LG200008_003

TRANSLATION LOOKASIDE BUFFER (TL+) BLOCK DIAGRAM

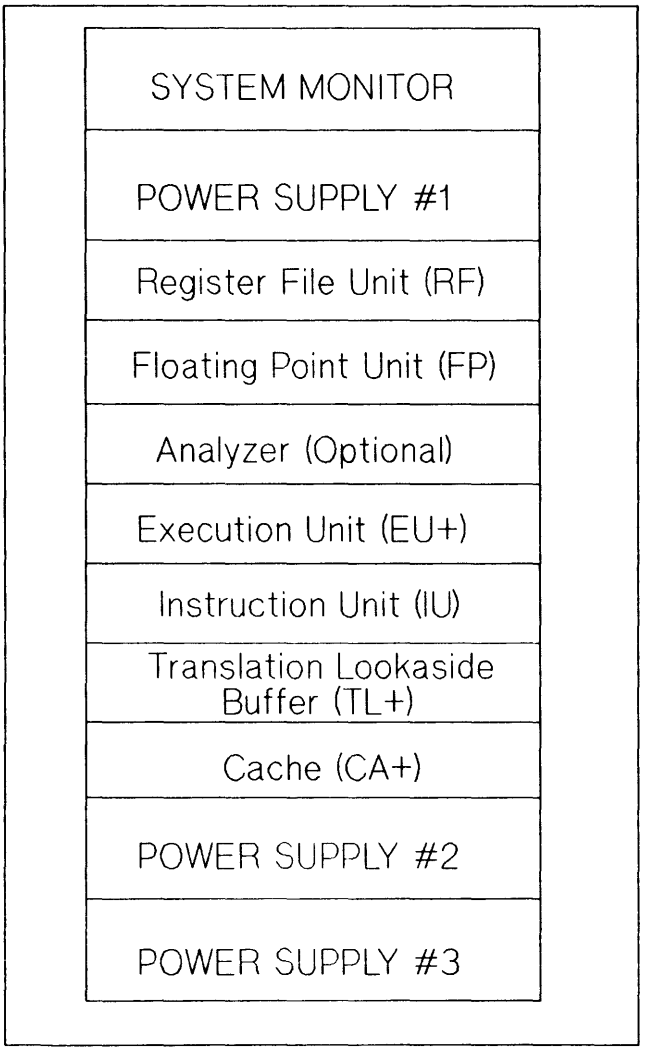


LG200008_005

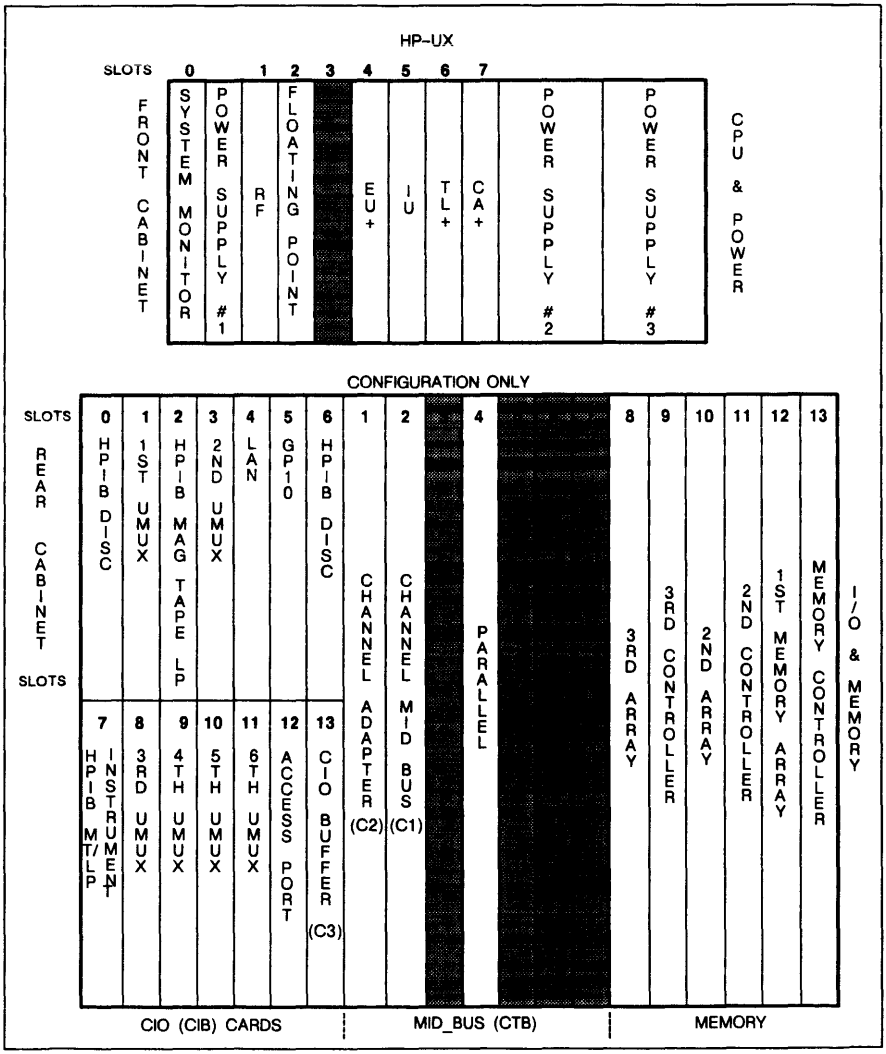
SYSTEM MONITOR MODULE



FRONT CABINET PCAS



HP 9000 SERIES 800 MODEL 840 FRONT/REAR CABINET PCAS



LG200012_003

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

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

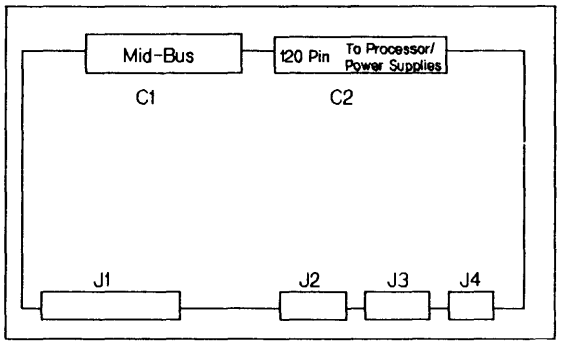


Figure 9-2. System Monitor Board Connector Location.

SYSTEM MONITOR CARD BACKPLANE CONNECTORS

The System Monitor Card has the two (2) following backplane connectors:

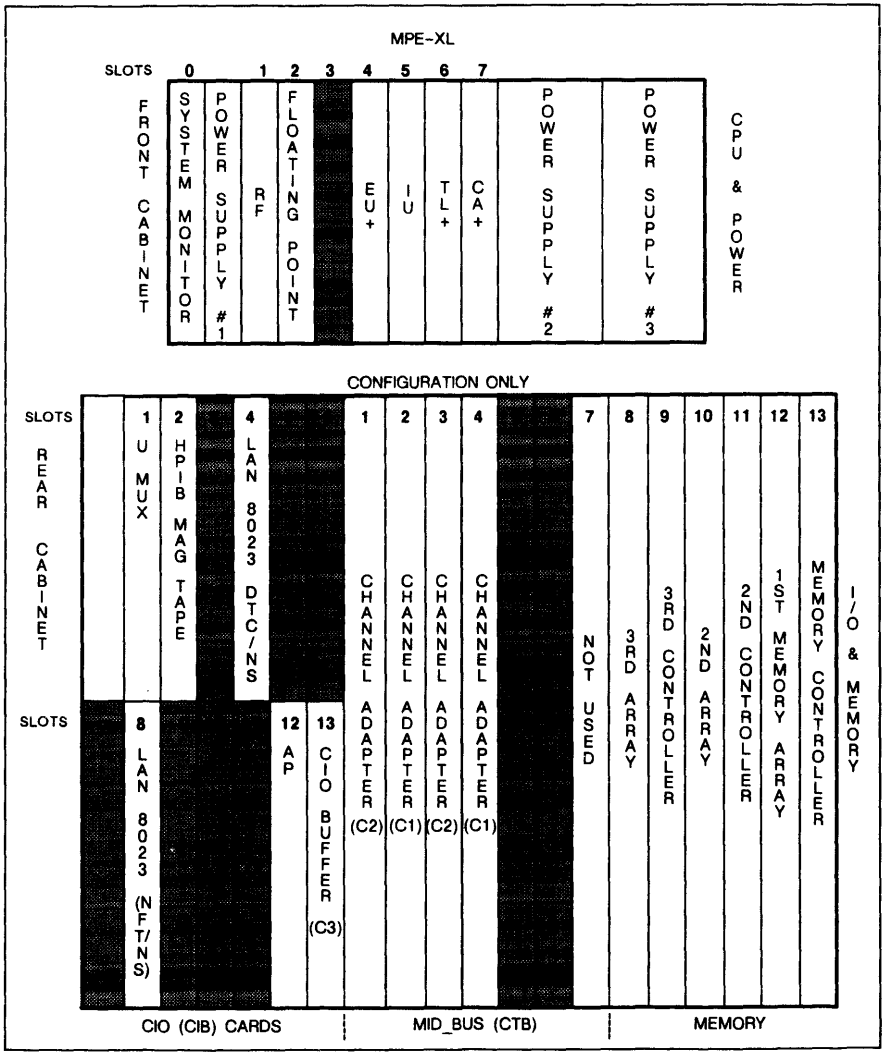
- C1 (P1) is the standard Mid-bus connector.
- C2 (P2) is a 120 pin connector to the processor and power supplies.

See Figure 9-2 for location of the backplane connectors.

C2 PIN ALLOCATION

	ROW A	ROW B	ROW C
1	+28V (P/S #2)	GND	+28V (P/S #2)
2	THERMO #3	C2.RESET.SWITCH -	THERMO #4
3	THERMO #1	-12V (P/S #3)	THERMO #2
4	N.C.	GND	N.C.
5	SELFTEST.SYS -	FP.DATA+	REM.ENABLE -
6	CTL ENABLE -	FP.CLK +	RESET.SYS -
7	GND	+5V (P/S #3)	GND
8	SEC.PWR.SHDN +	CIOEXT2.PFW-	+12V (P/S #3)
9	C2.DIAG.IN 11+	SEC.PWR.START+	CIOEXT1.PFW-
10	GND	GND	GND
11	C2.DIAG.IN 8+	C2.DIAG.IN 9+	C2.DIAG.IN 10+
12	C2.DIAG.IN 5+	C2.DIAG.IN 6+	C2.DIAG.IN 7+
13	GND	GND	GND
14	C2.DIAG.IN 2+	C2.DIAG.IN 3+	C2.DIAG.IN 4+
15	C2.DIAG.OUT 23+	C2.DIAG.IN 0+	C2.DIAG.IN 1+
16	+5S2	+5S2	+5S2
17	C2.DIAG.OUT 20+	C2.DIAG.OUT 21+	C2.DIAG.OUT 22+
18	C2.DIAG.OUT 17+	C2.DIAG.OUT 18+	C2.DIAG.OUT 19+
19	GND	GND	GND
20	C2.DIAG.OUT 14+	C2.DIAG.OUT 15+	C2.DIAG.OUT 16+
21	C2.DIAG.OUT 11+	C2.DIAG.OUT 12+	C2.DIAG.OUT 13+
22	+5S2	+5S2	+5S2
23	C2.DIAG.OUT 8+	C2.DIAG.OUT 9+	C2.DIAG.OUT 10+
24	C2.DIAG.OUT 5+	C2.DIAG.OUT 6+	C2.DIAG.OUT 7+
25	GND	+5S2	GND
26	C2.DIAG.OUT 2+	C2.DIAG.0UT 3+	C2.DIAG.OUT 4+
27	CONFLICT 6-	C2.DIAG.OUT 0+	C2.DIAG.OUT 1+
28	GND	GND	GND
29	CONFLICT 3-	CONFLICT 4-	CONFLICT 5-
30	ARBITRATE-(SLOT#13)	CONFLICT 1-	CONFLICT 2-
31	GND	+5V (P/S #2)	GND
32	ARBITRATE-(SLOT#10)	ARBITRATE-(SLOT#11)	ARBITRATE-(SLOT#12)
33	ARBITRATE-(SLOT#7)	ARBITRATE-(SLOT#8)	ARBITRATE-(SLOT#9)
34	+5S1	+5S1	+5S1
35	ARBITRATE-(SLOT#4)	ARBITRATE-(SLOT#5)	ARBITRATE-(SLOT#6)
36	ARBITRATE-(SLOT#1)	ARBITRATE-(SLOT#2)	ARBITRATE-(SLOT#3)
37	+28V (P/S #3)	+5S1	+28V (P/S #3)
38	PFW- (P/S #1)	PFW- (P/S #2)	PFW- (P/S #3)
39	PON+ (P/S #1)	PON+ (P/S #2)	PON+ (P/S #3)
40	+5S1	+5S1	+5S1

HP 3000 SERIES 930 FRONT/REAR CABINET PCAS



LG200012_004

REFERENCE

SECTION 10

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).

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	DC1	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	11-6-8	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	Cntl/ Gph	to EBCDIC (Oct)	Hollerith	Cntl/ 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 9	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		322
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	Cntl/ Gph	to EBCDIC (Oct)	Hollerith	Cntl/ 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	B0		130	12 11 8 9		330
177	261	B1		131	11 1 8		331
178	262	B2		142	11 0 2 9		332
179	263	B3		143	11 0 3 9		333
180	264	B4		144	11 0 4 9		334
181	265	B5		145	11 0 5 9		335
182	266	B6		146	11 0 6 9		336
183	267	B7		147	11 0 7 9		337
184	270	B8		150	11 0 8 9		340
185	271	B9		151	0 1 8		341
186	272	BA		160	12 11 0		342
187	273	BB		161	12 11 0 1 8		343
188	274	BC		162	12 11 0 2 9		344
189	275	BD		163	12 11 0 3 8		345
190	276	BE		164	12 11 0 4 9		346
191	277	BF		165	12 11 0 5 8		347
192	300	C0		166	12 11 0 6 9	{	173
193	161	C1		167	12 11 0 7 8	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 1	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		237
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 2 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	EO	377

SERVICE NOTES

SECTION 11

Notes

Notes

READER COMMENT SHEET

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