CE Handbook

HP 3000 Series 950 Family and HP 9000 Model 850S Family

Computer Systems

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Notice

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Safety and Regulatory Information

For your protection, this product has been tested to various national and international regulations and standards. The scope of this regulatory testing includes electrical/mechanical safety, radio frequency interference, ergonomics, acoustics, and hazardous materials. Where required, approvals obtained from third-party test agencies are shown on the product label. In addition, various regulatory bodies require some of the information under the following headings.

USA Radio Frequency Interference

The United States Federal Communications Commission (in 47CFR Subpart J, of Part 15) has specified that the following notice be brought to the attention of the users of this product:

Warning

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested for compliance with the limits for Class A computing devices pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

Japanese Radio Frequency Interference

The following notice is for users of this product in Japan:

この装置は，第一種情報装置（商工業地域において使用されるべき情報装置）で商工業地域での電波障害防止を目的とした情報処理装置等電波障害自主規制協議会（VCCI）基準に適合しております。

従って，住宅地域またはその隣接した地域で使用すると，ラジオ，テレビジョン受信機等に受信障害を与えることがあります。

取扱説明書に従って正しい取り扱いをして下さい。

Japanese Radio Frequency Notice

Warning **UNITED KINGDOM TELECOM WARNING**

(United Kingdom Only)

Interconnection of ports marked "UNITED KINGDOM TELECOM WARNING: Connect only apparatus complying with BS 6301 to these ports" with ports not so marked may produce hazardous conditions on the network and advice should be obtained from a competent engineer before such a connection is made.

Connect only apparatus complying with BS 6301 to the ports marked with the above warning.

Safety Considerations

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

SAFETY SYMBOLS

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

Indicates hazardous voltages.

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

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

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

Preface

This edition of the *CE Handbook* contains condensed information and procedures from existing manuals and guides for the HP 3000 Series 950 Family and HP 9000 Model 850S Family Computer Systems. This handbook is intended for trained and experienced Hewlett-Packard Customer Engineers.

The HP 3000 Series 950 Family Computer Systems run under the MPE/XL operating system. At the time of publication, this family included the following models:

Series 950	Multi-User System
Series 955	Multi-User System
Series 960	Multi-User System
Series 980/100	Multi-User System
Series 980/200	Multi-User System

The HP 9000 Model 850S Family Computer Systems run under the HP-UX operating system. At the time of publication, this family included the following models:

Model 850S	Multi-User System
Model 855S	Multi-User System
Model 860S	Multi-User System
Model 870S/100	Multi-User System
Model 870S/200	Multi-User System

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Product Information

General Description

This chapter provides an overview of the HP 3000 Series 950 Family and HP 9000 Model 850S Family Computer Systems. The HP 3000 Series 950 Family systems support the MPE-XL operating system and the HP 9000 Model 850S Family systems support the HP-UX operating system.

Product Models

The HP 3000 Series 950 Family and HP 9000 Model 850S Family systems use basically the same SPU. Although models are configured differently, they all share the same installation and troubleshooting procedures. Table 1-1 lists the models contained within each family of systems and their respective operating system.

Table 1-1. HP 3000 and HP 9000 Systems Covered in this Handbook

Family	Models	Description (Operating System)
HP 3000 Series 950 Family	Series 950, 955, 960, 980	Basic MPE-XL system
HP 9000 Model 850S Family	Model 850S, 855S, 860S, 870S	Basic HP-UX system

Note

Throughout this manual, the terms "HP 3000 Series 950 Family" and "HP 9000 Model 850S Family" are used when referring to all systems together. Differences between systems are noted where applicable.

At the time of publication, the HP 3000 Series 950 Family included the following models: Series 950, Series 955, Series 960, Series 980/100, and Series 980/200.

At the time of publication, the HP 9000 Model 850S Family included the following models: Model 850S, Model 855S, Model 860S, Model 870S/100, and Model 870S/200.

SPU Specifications

The SPU specifications for the HP 3000 Series 950 Family and HP 9000 Model 850S Family are listed in Table 1-2.

Table 1-2. SPU Specifications

Description		Specification
Word Length		32 bits
Virtual Memory Addressing	(950/955/960/850S/855S/860S)	48 bits
	(980/870S)	64 bits
Physical Addressing		29 bits
Cache Size	(950/850S)	128 Kbytes
	(955/855S)	256 Kbytes
	(960/860S)	1024 Kbytes
	(980/870S)	1024 Kbytes
Translation Lookaside Buffer (TLB)	(950/850S)	4 K entry
	(955/960/855S/860S)	16 K entry
	(980/870S)	8 K entry

Orientation

The computer system consists of a Processor Bay and a Power Bay that are internally attached to form a single unit. To facilitate moving, they may be separated.

The Processor Bay contains the following:

- Processor (front) cardcage.
- I/O cardcages.
- The processor(s) and I/O backplanes, mounted back to back.
- Various processor, memory, CIO, and Midbus boards.

The Power Bay contains the following:

- Power system chassis.
- AC input assembly, including an AC unit and two ferro-resonant transformers.
- DC converter power supply modules.
- Battery charger and battery pack.
- Auxiliary energy storage module (if more than two processors installed).*
- Control panel.

* At the time of publication, 3- and 4-processor systems have not been announced or released, and are not supported.

Figure 1-1 and Figure 1-2 show the front and rear of the Processor Bay and Power Bay cabinets.

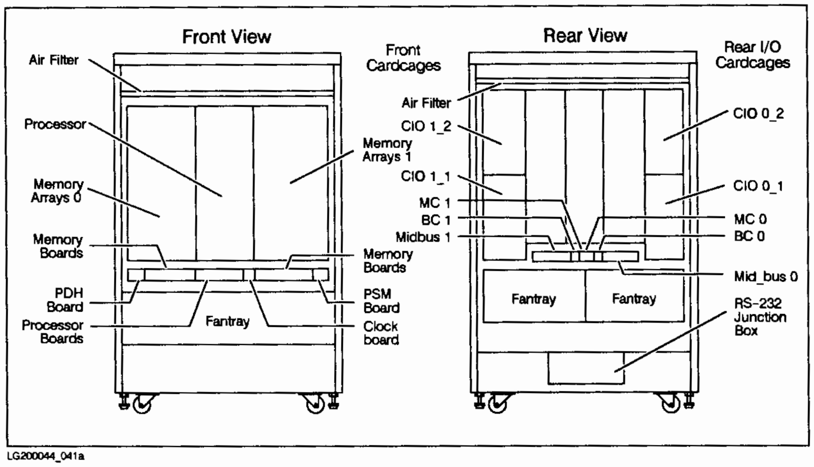


Figure 1-1. SPU Processor Bay (Front and Rear Views)

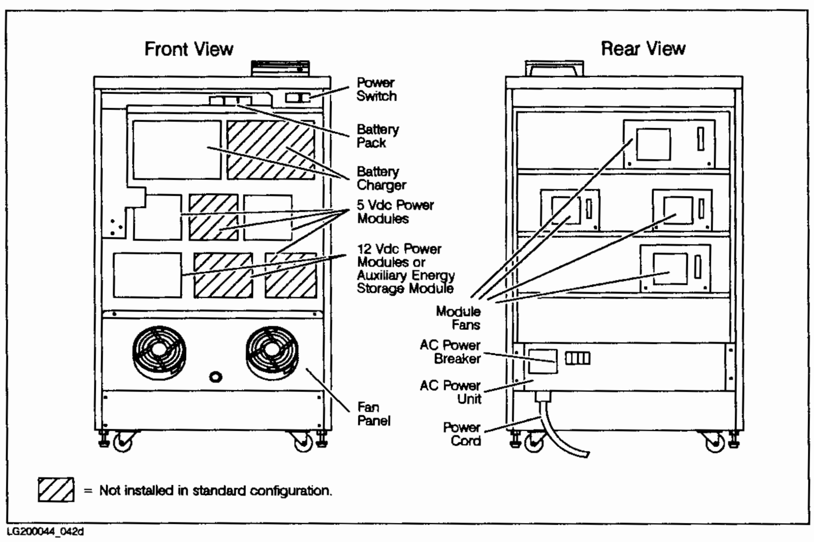


Figure 1-2. SPU Power Bay (Front and Rear Views)

System Features

Common features of the 950/850S, 955/855S, 960/860S and 980/870S processors are summarized below.

- Supports two Midbusses
- Supports up to four internal CIO busses.
- Uses CIO interfaces with up to 19 CIO slots available.
- Remote support capability using the Access Port (AP).
- Uses 32-bit instructions and datapaths.
- 27.5 MHz Clock.
- 48 bits of virtual addressing.
- 29 bits of physical addressing.
- Pipelined CPU.
- Four level diagnostic implementation.
- VLSI SPU that accommodates the CPU, Cache, TLB, Math Unit, and Floating Point on a single board.

Differences Between SPU Models

Table 1-3 lists key differences between SPU models of the Series 950/850S Family Computers. See Figure 1-3 for a functional block diagram of the Series 950/955/960 and Model 850S/855S/860S systems, and Figure 1-4 for a functional block diagram of the Series 980/870S systems.

Table 1-3. Differences Between 950/850S Family SPU Models

Subsystem/ Parameter	950/850S	955/855S	960/860S	980/870S
CPU				
CPU Chip:	NMOS III NS1	NMOS III NS1	NMOS III NS2	CMOS26
Cache				
Controller Chip:	NMOS III (CCU)	NMOS IIIB (CCU)	NMOS IIIB (CCU)	CMOS CMUX
Set Type:	Combined Data/Instruction	Separate Data/Instruction	Separate Data/Instruction	Separate Data/Instruction
Total Size:	128K Bytes	256K Bytes	1024K Bytes	1024K Bytes
TLB				
Controller Chip:	NMOS III (TCU)	NMOS IIIB (TCU)	NMOS IIIB (TCU)	CMOS26 (with internal RAM)
TLB (I) Size:	2K entries	8K entries	8K entries	4K entries
TLB (D) Size:	2K entries	8K entries	8K entries	4K entries
Processor Bd.				
Technology:	Through Hole	Single-Sided Surface Mount	Single-Sided Surface Mount	Dual-Sided Surface Mount
PDC	On PDH Bd. (Not writeable)	On PDH Bd. (Not writeable)	On PDH Bd. (Not writeable)	On Proc Bd. (Writeable)
IODC	4.0	4.0	4.0	5.0
IODC ROMs	5081-2723	5081-2723	5081-2723	5181-6131
part numbers:	5081-2724	5081-2723	5081-2723	5181-6132
Power System				
No. of +5V Power Modules:	2	2	2	2 (single-processor) 3 (multiprocessor)
AES Module:	No	No	No	Yes (for 3 or 4 processors only)*
PSM ROM date code:	3024 or earlier	3024 or earlier	2938 or later	3024 or later
Diagnostics				
Processor:	A1100AP	A1100AP	A1100AP	UNIPROC MPROC
Memory:	A1100AM	A1100AM	A1100AM	A1100AM

*At the time of publication, 3- and 4-processor systems have not been announced or released, and are not supported.

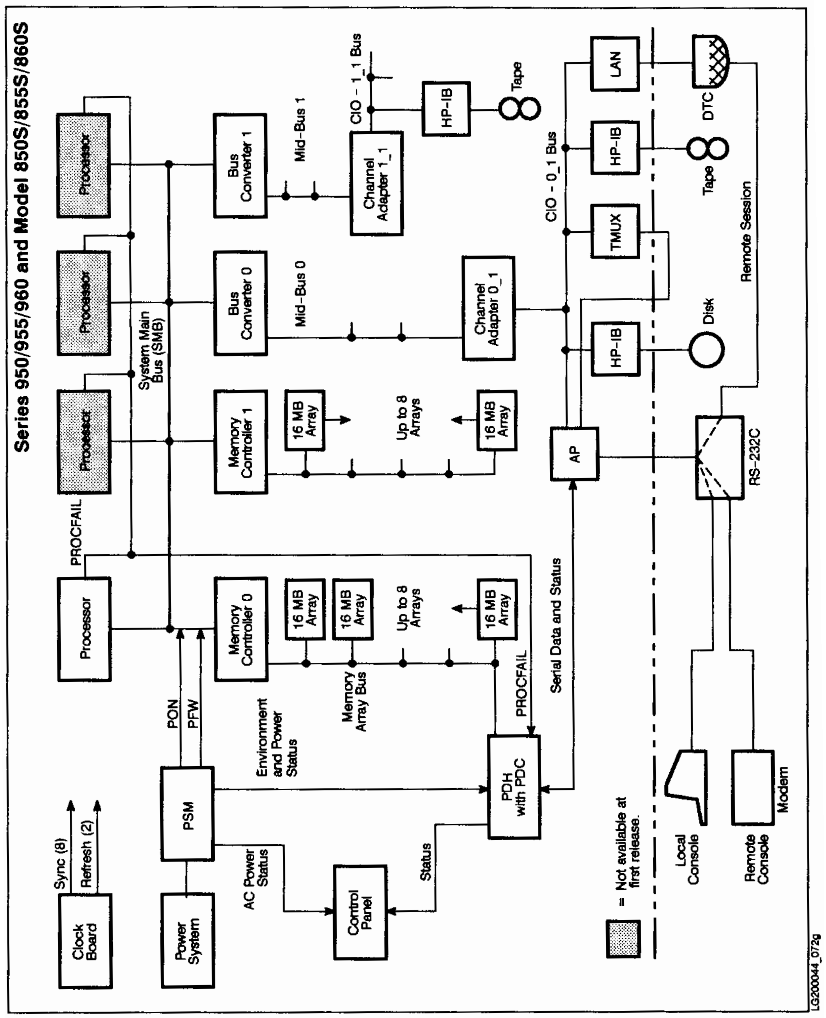


Figure 1-3. Series 950/955/960 and Model 850S/855S/860S SPU Functional Block Diagram

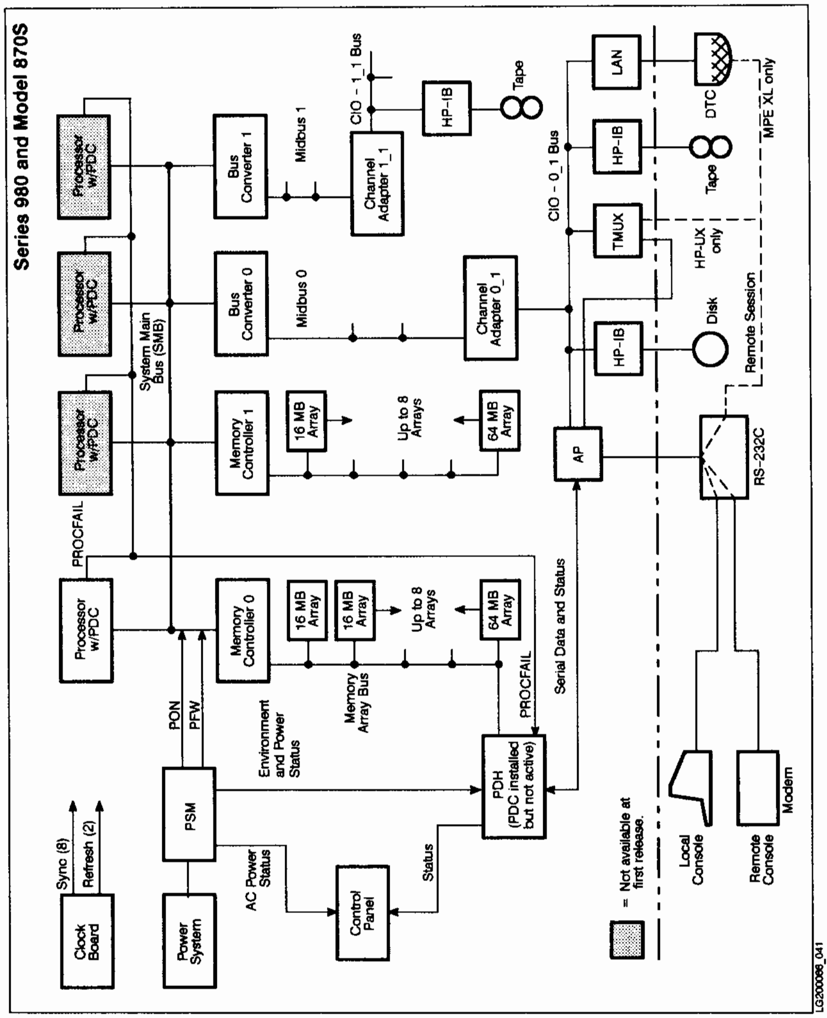
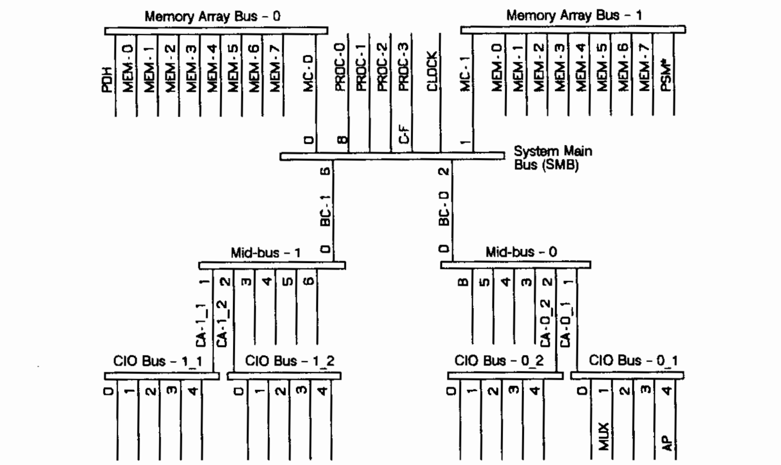


Figure 1-4. Series 980 and Model 870S SPU Functional Block Diagram

Bus Hierarchy

The bus hierarchy for the Series 950 Family and Model 850S Family systems is summarized below and illustrated in Figure 1-5.

- System Main Bus (SMB). The system main bus is a high speed synchronous, pipelined bus that supports 64-bit wide address and data transfers. The SMB carries all communications between system processors, memory, and I/O. All processors reside on the SMB.
- Memory Array Bus (MAB). The system has two memory array busses, 0 and 1. Each bus is a 72-bit wide bus capable of linking up to eight 16MB memory arrays providing 128MB of addressable memory (in Series 980/Model 870S systems, up to eight 64MB memory arrays providing 512MB of addressable memory). Each bus interfaces to the SMB via a memory controller. The Processor Dependent Hardware (PDH) board interfaces to the MAB-0; the Power System Monitor (PSM) board terminates, but does not interface to the MAB-1. Bus timing is provided by a single master clock.
- Midbus. The Midbus is a synchronous 32-bit wide, high speed, TTL compatible bus that provides interfacing capability, via a bus converter (BC), between the SMB and I/O devices.
- HP-CIO Bus. This is a processor-independent I/O bus having 4 bits of addressing capability, and 8 or 16 data bit capacity for supporting the interconnection of channel adapters and device adapters.



NOTES:

PROC = Processor
MC = Memory Controller
BC = Bus Converter
MEM = Memory Array Card
*PSM = Power System Monitor, PSM only terminates the MA-Bus1.
PDH = Processor Dependent Hardware
CA = Channel Adapter
MUX = CIO Mux Card
AP = Access Port Card
LAN = Network Services CIO Card
DTC = Distributed Terminal Controller (950 only)

The numbers marked next to buses are HPA fixed on power-up; SMB addresses change depending on the boards present.

LG200044_018c

Figure 1-5. Processor Bus Level Organization

System Status Panel Display

The following summarizes System Status Panel functionality. Refer to Figure 1-6 for control panel locations.

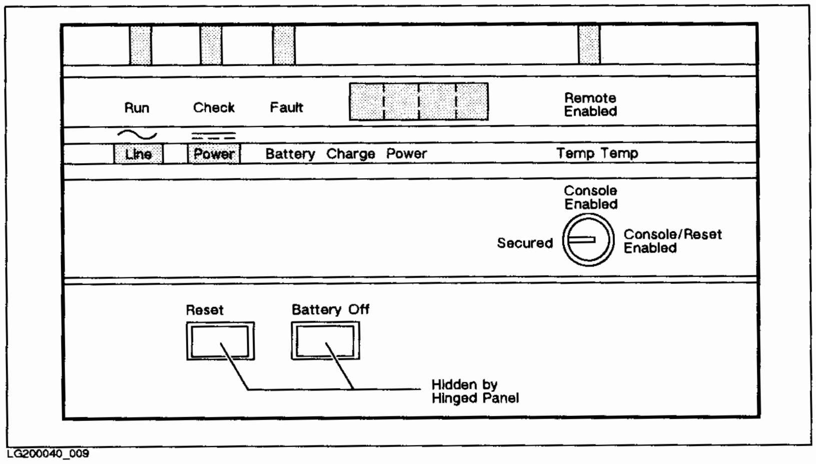


Figure 1-6. Control Panel Display

Switches

The Control Panel contains three switches:

- Key Switch (3-position):

  SECURED. Disables all AP commands and the local RESET button.

  CONSOLE ENABLED. Enables AP console commands (except the ER command); the local RESET button remains disabled.

  CONSOLE/RESET ENABLED. Enables the local RESET button, and provides the same functionality as in the CONSOLE ENABLED position.

- Battery Switch. When pressed, this momentary ON switch removes battery power from the memory busses. This clears Memory during a power off period, allowing reboot with a clean memory. It has no effect if system power is on. This switch is located behind a hinged panel to prevent accidental mis-use.
- Reset Switch. A momentary ON switch which resets the system hardware to a "power on" state. The switch is located behind a hinged panel to prevent accidental mis-use.

Display

The four digit display shows error codes for hardware and software generated messages. Software messages refer to boot errors, self-test errors, I/O errors and OS errors. Hardware messages refer to power supply, clock, PDH, memory, and processor error conditions.

Indicators

RUN	Green LED ON indicates that the system is operating properly. This indicator remains ON during a boot test or self-test.
CHECK	Yellow LED ON indicates that a non-fatal error has occurred. This signals that the system is in a "Warning" state, although it remains operational.
FAULT	Red LED ON indicates that a fatal error occurred, and the system has failed.
LINE	Green LED ON indicates that AC power is available to the system.
PWR	Green LED ON indicates that DC power is on.
BATT PWR	Yellow LED ON indicates that the battery is discharging.
BATT CHG	Yellow LED ON indicates that the battery is charging.
TEMP 40°C	Yellow LED ON indicates an overtemperature warning (system remains operational).
TEMP 45°C	Red LED ON indicates an overtemperature condition and system shutdown.

Options

- CIO Terminal Expander Bay (Model 850S/855S/860S/870S only). This option provides supplemental terminal IO capability to the Model 850S, 855S, 860S, or 870S SPU. If this option is to be included with a standard system, it is recommended that the system hardware be installed and verified first. Refer to the *CIO Terminal Expander Bay Installation and Configuration Guide* (HP P/N A1122-90001) for installation instructions.

2

Environmental, Installation, Preventive Maintenance

This chapter provides product specifications, installation information, and preventive maintenance procedures for the HP 3000 Series 950 Family and HP 9000 Model 850S Family Computer Systems. The HP 3000 Series 950 Family systems run under the MPE-XL operating system and the HP 9000 Model 850S Family systems run under the HP-UX operating system.

This chapter includes information on the following subjects:

- Regulatory Standards
- System Specifications
- System Components
- Preventive Maintenance

Regulatory Standards

The HP 3000 Series 950 Family and HP 9000 Model 850S Family computers comply with the following regulatory standards:

- UL 478, Electronic Data Processing Units and Systems
- CSA C22.2 No. 220, Information Processing and Business Equipment
- IEC 380/435, Electrically Energized Office Machines/Safety of Data Processing Equipment
- FCC Part 15 Subpart J for a Class A Computing Device
- VCCI Level 1
- FTZ 1046 Manufacturers Declaration
- SABS (South African Bureau of Standards)

System Specifications

The following pages contain the electrical, physical, and environmental specifications for the HP 3000 Series 950 Family and HP 9000 Model 850S Family computers, as follows:

- Table 2-1. Electrical Specifications
- Table 2-2. Physical and Environmental Specifications
- Table 2-3. 950/955/960 and 850S/855S/860S Power Consumption and Heat Dissipation Specifications
- Table 2-4. 980 and 870S Power Consumption and Heat Dissipation Specifications
- Table 2-5. Line Current Specifications
- Table 2-6. 950/850S Configurations for Line Current, Power Consumption, and Heat Dissipation Specifications
- Table 2-7. 955/960/855S/860S Configurations for Line Current, Power Consumption, and Heat Dissipation Specifications
- Table 2-8. 980/870S Configurations for Line Current, Power Consumption, and Heat Dissipation Specifications

Following the system specification tables, the specifications for the CIO Terminal Expander Bay (Model 850S Family only) are listed, as follows:

- Table 2-9. CIO Terminal Expander Bay Electrical Specifications
- Table 2-10. CIO Terminal Expander Bay Physical Specifications
- Table 2-11. CIO Terminal Expander Bay Environmental Specifications

Specifications for Series 950 Family and Model 850S Family Computers

Table 2-1. Electrical Specifications

Description	Specification
Nominal voltage	208V/60Hz, 380V/50Hz, 415V/50Hz
Configuration	3-phase Wye (only)
Voltage tolerance	±10% of nominal voltage
Phase-to-phase imbalance	< 5%
Line frequency tolerance	50Hz or 60Hz ±2%
Voltage waveform harmonic distortion	< 5%
Power fail carry through (maximum)	20 msec
Power fail recovery (standby power)	15 minutes (minimum)
Maximum input line current (AC)	(Refer to Table 2-5)
Turn-on inrush current	370A @ 208V, 200A @ 380V, 185A @ 415V
Time for inrush current to decay to 25%	10 ms
Power consumption (max configuration)	(Refer to Tables 2-3 and 2-4)
Power line transients	IEEE 587 Category B
Power factor	0.91 Watts/Volt-Amp
Power cord length	10 feet
Electrical receptacle required (208V/60Hz)	NEMA L21-30R (30A twist lock)
Service panel circuit breaker required	30A for 60Hz, 16A for 50Hz (motor-start rating)

Table 2-2. Physical and Environmental Specifications

Description	Specification	
Dimensions:		
Height	39.4 inches (100 cm)	
Width	51.2 inches (130 cm)	
Depth	27.9 inches (71 cm)	
Uncrated weight	808 lb (366.5 kg)	
Crated weight	Padded van, 840 lb (381 kg) Air freight, 1005 lb (455.9 kg)	
Maximum point floor loading	400lb (182kg)	
Minimum service access:		
Front	36 inches (91.5 cm)	
Sides	0 inches (0 cm)	
Rear	36 inches (91.5 cm)	
Shock Reqnirements:		
End use handling	4-inch, free-fall drop	
Transportation	30 g	
Vibration:		
Sinusoidal sweep	5 to 500Hz @ 0.5 g (0 peak)	
Random operational	5-350Hz	0.0001 g^2/Hz
	350-500Hz	−6 dB/Octave
	500Hz	0.00005 g^2/Hz ($\approx$0.21 G_{rms})
Random non-operational	5-100Hz	0.015 g^2/Hz
	100-137Hz	−6 dB/Octave
	137-350Hz	0.0080 g^2/Hz
	350-500Hz	−6.0 dB/Octave
	500Hz	0.0039 g^2/Hz ($\approx$2.09 G_{rms})

Table 2-2. Physical and Environmental Specifications (Continued)

Description	Specification
Operating temperature range	41.0° to 104.0° F (5.0° to 40.0° C)
Recommended operating temperature range	68.0° to 86.0° F (20.0° to 30.0° C)
Overtemperature shutdown at ambient temperature	>107.6°F (>42° C)
Maximum operating rate of temperature change	36° F (20° C) per hour
Non-operating temperature range (storage)	−40.0° to 158.0° F (−40.0° to 70.0° C) Anytime the computer is subjected to a non-operating temperature less than 0° C, it must be allowed to stabilize at its operating temperature range for a period of four hours. This is to allow condensation to evaporate before the computer is turned on.
Operating humidity	15 to 80% R.H. @ 104.0° F (40.0° C)
Recommended operating humidity	40 to 60% R.H. @ 68.0° to 86.0° F (20° to 30.0° C)
Non-operating humidity (storage)	90% R.H. @ 149.0° F (65.0° C)
Operating altitude	15,000 feet (4,572 meters). Note: Derate maximum operating temperature −1.98° F per 1,000 feet over 7,500 feet (−1.1° C per 304.8 meters over 2,286 meters).
Non-operating altitude (storage)	50,000 feet (15,240 meters)
Electrostatic discharge	0 to 15 kV, no effect; 15 kV to 25kV, non-destructive (possible system interruption)
Magnetic field immunity (Maximum level without affecting functionality)	1 Gauss
Radiated field immunity	No frequencies at a field strength of 10 V/m cause any functional anomalies
Heat dissipation (maximum)	(Refer to Tables 2-3 and 2-4)
Sound power	7.3 Bels (A weighted)

Note

The line current, power consumption, and heat dissipation specifications have been revised for all of the Series 950 Family and Model 850S Family Computer Systems.

Table 2-3.
950/955/960 and 850S/855S/860S Power Consumption and Heat Dissipation Specifications

	950/850S			955/960/855S/860S		
	Minimum	Typical	Maximum	Minimum	Typical	Maximum
Heat Dissipation (BTU/Hr)	3458	3599	6086	3835	4897	7016
Power Consumption (Watts)	1021	1055	1783	1124	1435	2056

Table 2-4.
980 and 870S Power Consumption and Heat Dissipation Specifications

	Minimum	Typical				Maximum
		/100	/200	/300	/400	
Heat Dissipation (BTU/Hr)	3578	4545	5638	6913	8079	8768
Power Consumption (Watts)	1048	1332	1652	2026	2367	2569

Note

The line current values listed in Table 2-5 include an approximate 1.1 Amp current to account for the DC current to recharge the batteries; however, the power consumption and heat dissipation values are derived from a steady-state mode (no battery recharge occurring).

Table 2-5. Line Current Specifications

		950/955/960/850S/855S/860S		980/870S	
		Minimum	Maximum	Minimum	Maximum
Current at:	208V	3.1	6.3	3.2	7.8
(Amps)	380V	1.6	3.1	1.6	3.9
	415V	1.4	2.9	1.5	3.6

Table 2-6, Table 2-7, and Table 2-8 list the **Minimum**, **Typical**, and **Maximum** configurations used to determine the line current, power consumption, and heat dissipation specifications in Table 2-3, Table 2-4, and Table 2-5. Note that the configurations listed in the following tables are field configurations; they do not represent what is shipped from the factory.

Note

The configurations listed in Table 2-6, Table 2-7, and Table 2-8 are field configurations; they do not represent what is shipped from the factory.

Table 2-6.
950/850S Configurations for Line Current, Power Consumption, and Heat Dissipation Specifications

PCA	Minimum Configuration	Typical Configuration	Maximum Configuration
Processor card	1	1	1
PDH, PSM, Clock cards	1 each	1 each	1 each
Bus Converters	2	2	2
Channel adapters	2	2	2
Memory controllers	1	1	2
16MB Memory arrays	4	8	16
PSI cards	0	1	8
Access port	1	1	1
MUX cards (6 port/16 port)	1/0	1/0	1/0
HP-IB cards	2	3	6
HP-FL cards	0	1	8
LANIC cards	1	1	4

Table 2-7.
955/960/855S/860S Configurations for Line Current, Power Consumption, and Heat Dissipation Specifications

PCA	Minimum Configuration	Typical Configuration	Maximum Configuration
Processor card	1	1	1
PDH, PSM, Clock cards	1 each	1 each	1 each
Bus Converters	2	2	2
Channel adapters	2	2	2
Memory controllers	1	2	2
16MB Memory arrays	6	11	16
PSI cards	0	2	8
Access port	1	1	1
MUX cards (6 port/16 port)	1/0	1/0	1/0
HP-IB cards	2	4	2
HP-FL cards	0	2	12
LANIC cards	1	2	4

Table 2-8.
980/870S Configurations for Line Current, Power Consumption, and Heat Dissipation Specifications

PCA	Minimum Configuration	Typical Configuration	Maximum Configuration
Processor card	1	1	4*
PDH, PSM, Clock cards	1 each	1 each	1 each
Bus Converters	2	2	2
Channel adapters	2	2	4
Memory controllers	2	2	2
16MB Memory arrays**	0	2	0
64MB Memory arrays**	2	2	16
PSI cards	0	3	8
Access port	1	1	1
MUX cards (6 port/16 port)	1/0	1/0	1/0
HP-IB cards	2	4	2
HP-FL cards	0	2	12
LANIC cards	1	2	4

*At the time of publication, 3- and 4-processor systems have not been announced or released, and are not supported.
**Current draw for 64MB arrays is the same as for 16MB arrays.

Specifications for CIO Terminal Expander Bay

Table 2-9. CIO Terminal Expander Bay Electrical Specifications

Description	Specification
EXPANDER BAY CABINET:	
Input Power Requirements:	
Voltage	198 to 264Vac
Frequency	47 to 67Hz
Current	8.0A
Power Consumption	1664W
	5674 BTU/Hr
Signal Requirements	None
Battery Backup	None
EXPANDER MODULE:	
Input Power Requirements:	
Voltage	207 to 253Vac
Frequency	47 to 67Hz
Current	1.3A maximum
Power Consumption	300W
	1023 BTU/Hr
Display Requirements:	
Voltage	+5VS
Current	200mA
Power	1W

Table 2-10. CIO Terminal Expander Bay Physical Specifications

Description	Specification
A1122A EXPANDER BAY (with 1 module):	
Height	39.0 inches (100 cm)
Width	23.4 inches (60 cm)
Depth	31.2 inches (80 cm)
Weight	350 pounds (159 kg)
A1124A EXPANDER BAY (with 1 module):	
Height	39.0 inches (100 cm)
Width	23.4 inches (60 cm)
Depth	31.2 inches (80 cm)
Weight	200 pounds (91 kg)
A1123A EXPANDER MODULE:	
Height	11.0 inches (26.8 cm)
Width	17.0 inches (42.5 cm)
Depth	20.0 inches (50.0 cm)
Weight	40 pounds (18 kg)
A1125A Cable Management Rack:	
Height	63.0 inches (160 cm)
Width	23.4 inches (60 cm)
Depth	31.2 inches (80 cm)
Weight	240 pounds (108 kg)

Table 2-11. CIO Terminal Expander Bay Environmental Specifications

Description	Specification	
Ambient Temperature Requirements:		
Operating	41.0° to 104.0° F (5° to 40° C)	
Maximum operating rate of change	36° F (20° C) per hour	
Non-Operating (storage)	−40° to 158° F (−40° to 70° C)	
Humidity Requirements:		
Operating	15% to 80% relative humidity at 104° F (40° C)	
Non-Operating (storage)	90% relative humidity at 149° F (65° C)	
Altitude Requirements:		
Maximum operating	15,000 feet (4,572 meters). Note: Derate maximum operating temperature −1.98° F per 1,000 feet over 7,500 feet (−1.1° C per 304.8 meters over 2,286 meters).	
Maximum non-operating	50,000 feet (15,240 meters)	
Vibration Requirements:		
Sinusoidal sweep	5 to 500Hz @ 0.5 g (0 peak)	
Random operational	5-350Hz	0.0001 g^2/Hz
	350-500Hz	−6 dB/Octave
	500Hz	0.00005 g^2/Hz
		(≈0.21 G_{rms})
Random non-operational	5-100Hz	0.015 g^2/Hz
	100-137Hz	−6 dB/Octave
	137-350Hz	0.0080 g^2/Hz
	350-500Hz	−6.0 dB/Octave
	500Hz	0.0039 g^2/Hz
		(≈2.09 G_{rms})

Table 2-11. CIO Terminal Expander Bay Environmental Specifications (Continued)

Description	Specification
Shock Requirements:	
End use handling	4 inch free-fall drop
Transportation	30 *g*
Susceptibility Requirements:	
Electrostatic discharge	0 to 15 KV no effect 15 to 25 KV no damage

System Components

Major system components are the power and processor bays; a brief description of both follows.

Power Bay Layout

The power bay contains the power supply modules, cooling fans, power supply cables, and busses. The control panel attaches to the top of the bay. Components and modules contained in the power bay are shown in Figure 2-1 and Figure 2-2.

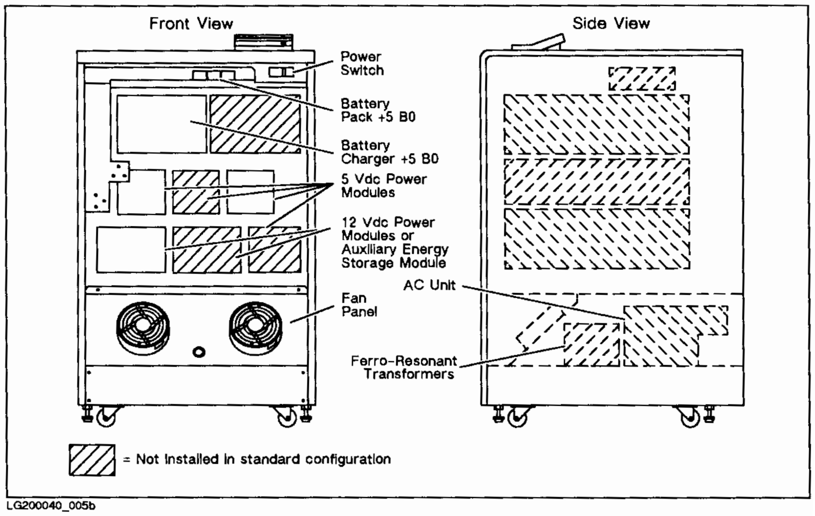


Figure 2-1. Power Bay Modules and Locations

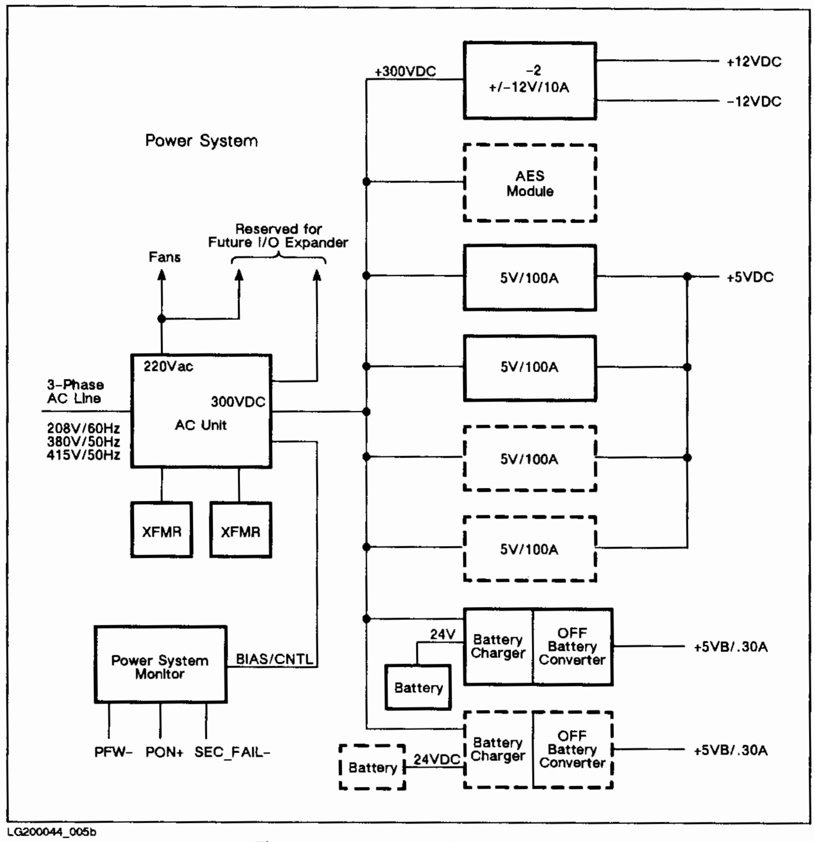


Figure 2-2. Power Bay Block Diagram

Processor Bay Layout

The processor bay contains all cards and three cooling fan assemblies. Cardcage locations and bus relationships are shown in Figure 2-3 and Figure 2-4.

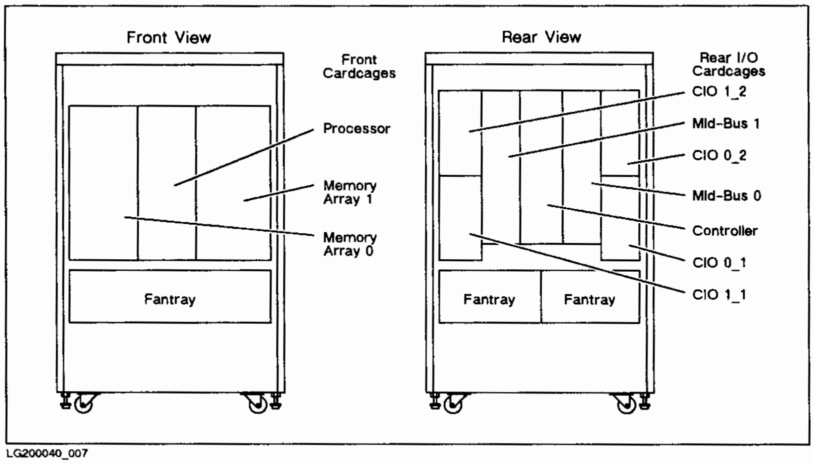


Figure 2-3. Processor Bay Cardcages and Components

Backplanes

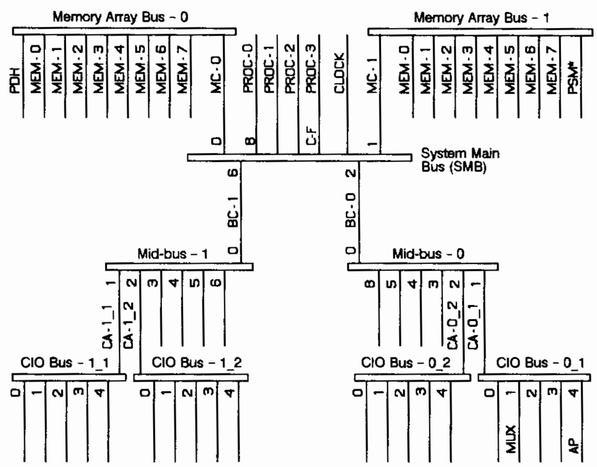
There are two backplanes: Processor and I/O.

Processor Backplane — This includes the System Main Bus (SMB) and memory busses 0 and 1.

Note

Bus Converter (0 & 1) and Memory Controller (0 & 1) cards attach to the SMB bus through connectors on the rear of the Processor backplane. They occupy slots BC(0), BC(1), MC(0) and MC(1).

I/O Backplane — This contains 4 CIO busses and 2 Midbus busses. It bolts to the processor backplane for positive alignment.



NOTES:

PROC = Processor
MC = Memory Controller
BC = Bus Converter
MEM = Memory Array Card
*PSM = Power System Monitor, PSM only terminates the MA-Bus1.
PDH = Processor Dependent Hardware
CA = Channel Adapter
MUX = CIO Mux Card
AP = Access Port Card
LAN = Network Services CIO Card
DTC = Distributed Terminal Controller (950 only)

The numbers marked next to buses are HPA fixed on power-up; SMB addresses change depending on the boards present.

LG200044_018c

Figure 2-4. Processor Bay Bus and Card Relationships

Preventive Maintenance

This section describes Preventive Maintenance (PM) schedules and procedures. Preventive maintenance consists of carrying out specific tasks at 12 month intervals.

Caution

Before performing maintenance tasks, verify that the system files are properly backed-up.

Make sure users are logged off and shut down the system prior to performing maintenance.

The preventive maintenance procedures in this section are only for the HP 3000 Series 950 Family and HP 9000 Model 850S Family System Processor Unit (SPU). For preventive maintenance procedures for specific system peripherals, refer to appropriate peripheral documentation.

Required Tools

- Standard CE handtools.
- Flashlight.

Preventive Maintenance Schedule

Table 2-12 lists the recommended annual preventive maintenance schedule:

Table 2-12. Recommended Preventive Maintenance Schedule

Assembly	Every 12 Months
Fans	Inspect and Replace, as necessary
Air Filters	Replace
Processor Batteries (lithium)	Measure voltage, replace as necessary.
PDH Batteries (lithium)	Measure voltage, replace as necessary.
Power Fail Recovery circuitry	Verify

Preventive Maintenance Procedures

Detailed preventive maintenance (PM) procedures are provided for the following system assemblies:

- Fans.
- Air Filters.
- Processor Board Batteries.
- Processor Dependent Hardware Board (PDH) Batteries.
- Power Fail Recovery Circuitry.

Warning **Hazardous voltages are present inside the computer enclosure. Observe and adhere to all "WARNING - HAZARDOUS VOLTAGE" labels. Failure to comply could result in injury or death!**

Caution Computer memory is lost when the main power switch and the battery switch are OFF. Contact the site System Administrator to arrange for a normal shutdown, to ensure that the system has been properly backed up. The System Administrator should inform the CE when the system is available for PM.

Inspecting the Fans

The system uses eight (8) fans for cooling.

- The Power Bay contains two (2) fans mounted at an angle in the lower front of the bay (each power module has a self-contained fan).
- The Processor Bay contains six (6) fans; four (4) in the front of the bay, and two (2) fans at the rear.

Inspect the fans as follows:

1. Remove the front panels of both bays, along with the rear panel of the Processor Bay.
2. Remove the two (2) screws securing each I/O fan tray. Refer to Figure 2-5.
3. Slide each tray out so that the fan is visible.

Caution Fans are accessible during this procedure; keep fingers and tools clear.

4. Refer to a clock with a sweep second hand to observe the amount of time it takes for individual fans to come to a complete stop. A fan that stops in less than approximately 30 seconds may have worn bearings and likely will fail in the near future; replacement of the fan is therefore recommended. Also, any fan that spins in the opposite direction should be replaced.
5. Replace any fans that spin irregularly.

Replace the fan tray as follows:

1. Push each fan tray back until it seats firmly in the cabinet.
2. Secure all fan trays with screws.

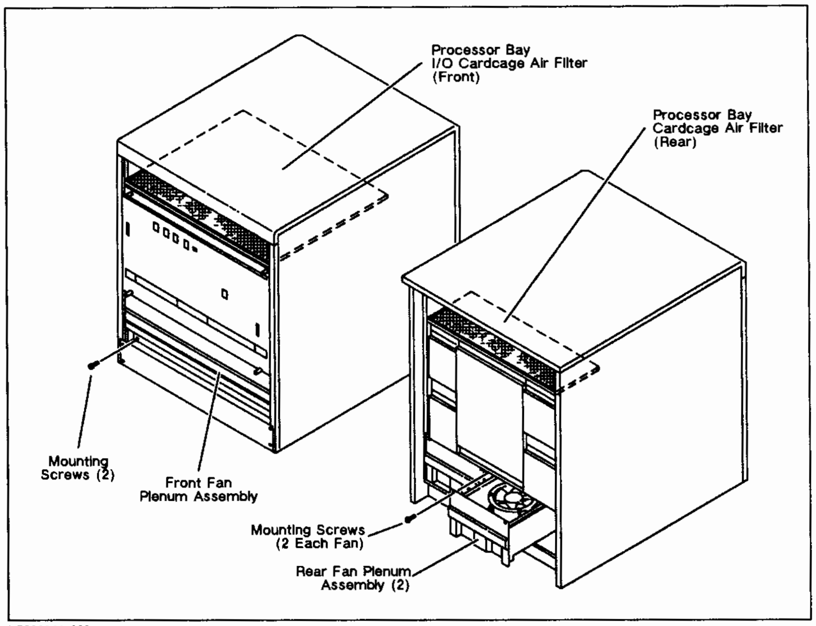


Figure 2-5. Fan Tray and Filter Locations

Inspecting the Air Filters

The Processor Bay has two (2) air filters located on the top of the bay above the front and rear cardcages (refer to Figure 2-5).

Visually inspect the air filters. If they have accomulated dirt so that air flow through them is restricted, it is recommended that they be replaced.

Inspecting the Processor and PDH Batteries

There are two lithium batteries located on the Processor board and two on the Processor Dependent Hardware (PDH) board. The Processor and PDH boards are located in the front cardcage of the Processor Bay.

Inspect the lithium batteries as follows:

1. Open the front panel to the Processor Bay cabinet.
2. Locate the boards:
   a. The Processor board (purple) is in the center section between the Memory (0) and Memory 1 sections of the processor cardcage.
   b. The PDH board (yellow) is on the left side of the Memory (0) section of the processor cardcage.
3. Measure the decay in each of the batteries by measuring across the battery holders on each board.
4. Replace any lithium battery when the voltage measures less that 2.7 Volts.

Caution The real time clock depends on the lithium batteries. Replace the batteries one at a time. See the procedure given below.

Caution Lithium batteries may explode if mistreated. Do not recharge, disassemble, or dispose of in fire. If replacement of the lithium batteries is necessary, use HP Part Number 1420-0353.

Battery Removal and Replacement

1. Turn off the main power switch and press the BATTERY OFF button on the control panel.
2. Remove the Processor or PDH board from the processor bay.
3. Remove the battery cover.

Caution Do not use metal pliers when removing or replacing lithium batteries. These batteries may explode if mistreated. Use of any other replacement batteries other than the ones recommended, may present a risk of fire or explosion.

4. Remove the first battery.
5. Install the replacement battery.
6. Repeat the procedure for the next battery.
7. Replace the battery cover.
8. Replace the board in the processor bay.
9. Measure the battery voltage as described above.
10. Turn on the main power switch and verify the system performs a normal boot up.
11. Replace any covers removed during the procedure and proceed with any PM remaining.

Verify Power Fail Recovery

Power fail recovery occurs after primary power has been lost but main memory state is still valid. During power fail recovery, all processors conduct self-test and the master processor launches designated recovery software.

To manually test the power fail recovery system, first ensure that the battery is fully charged, then turn the main power switch OFF. After approximately five minutes, switch it back to ON; the system should automatically restart.

Cleaning

The computer has been painted with a long lasting, water based paint designed to preserve its appearance for years. The paint is both non-toxic and environmentally safe.

Warning **Hazardous voltages are present inside the computer enclosure. Observe and adhere to all "WARNING - HAZARDOUS VOLTAGE" labels. Failure to comply can result in injury or death!**

Note Chemical spray on cleaners used for appliances and other household or industrial applications may damage the cabinet's finish. Do not use detergents that contain ammonia, benzenes, chlorides, or abrasives.

Clean the computer as follows:

1. Tnrn OFF the main power breaker, located on the front of the cabinet.
2. Press the Battery OFF switch on the control panel.
3. Remove the AC power cord from the wall outlet.
4. Dampen a clean, soft, lint free cloth in a solution of clean water and mild soap.
5. Wipe the soiled areas on the outside of the cabinet, ensuring no soap solution gets inside the cabinet.

Note Use an 80% clean water with 20% isopropyl solution to wipe any heavily soiled areas on the cabinet. Once the cabinet is clean, use a clean, soft cloth to dry the surface. A non-abrasive eraser can also be used to remove pen and pencil marks on the cabinet.

6. Clean any dust or dirt from inside the cabinet with a vacuum cleaner.
7. Replace the AC power cord.
8. Upon completion of the PM, inform the System Administrator that the system is ready for a normal boot-up.

3

Configuration

This chapter provides configuration procedures for the HP 3000 Series 950 Family and HP 9000 Model 850S Family Computer Systems. This chapter includes information on the following subjects:

- Power Configuration
- System Configuration
- Memory Configuration
- I/O Configuration
- Initial System Verification
- Operating System Installation
- Writeable PDC
- Completing System Installation

Power Bay Configuration

AC Power Requirements

See Chapter 2 for electrical requirements.

Power Systems

Systems may have either an ACDC or ITT manufactured front end (AC unit and transformers), and either Yokogawa or ITT power modules.

Caution All +5V power modules installed in a system must be from the same manufacturer (i.e., either all Yokogawa or ITT). +5V power modules from the two manufacturers cannot be used together in a system. Either set of power modules can be used with either ACDC or ITT front ends.

Front End Identification

Differences between the Yokogawa and ITT transformers are described under "Strapping Transformers for Input Voltage/Frequency" later in this chapter.

To identify the AC Unit installed in your system, look for one of the following features:

- **ITT:** The AC power cord cover plate is attached to the AC unit by **three** screws, while the ferro-resonant transformers and terminal blocks are separate components.
- **ACDC:** The AC power cord cover plate is attached to the AC unit by **four** screws, while the ferro-resonant transformers and terminal blocks are integrated as a single component.

Power Module Identification

To identify the power modules installed in your system, look for one of the following features:

- **ITT:** The front of an ITT power module has four status LEDs.
- **Yokogawa:** The front of a Yokogawa power module has two LEDs and a connector (J3).

Power Cord and Plug

Power cords and plugs are supplied for North America (US and Canada), 60Hz installations only. Product shipped to North American customers has the power cord and plug already connected to the system.

50Hz systems are shipped without power cords and plugs, and require that the customer furnish the appropriate cord and plug. In this case, it is recommended that a qualified electrician familiar with local electrical codes determine the proper cord and plug.

Caution

Make sure that the AC line voltage agrees with the voltage requirements specified on the rear of the computer. Incorrect power may cause permanent damage to the computer.

Check the power outlet used to supply AC power to the computer to ensure that it furnishes the proper voltage. The power outlet and associated wiring and fuses (or circuit breakers) must be capable of carryiug the specified AC voltage.

Power Cord Installation

This following procedure describes power cord installation, and is applicable to both 50Hz and 60Hz systems.

Caution

All connections must be firmly tighteued. Loose connections overheat, restrict current flow and may burn! Double check all connections. Before proceeding, make sure the cord rating is adequate to carry system load.

Install the cord as follows:

ITT AC Unit Power Cord Installation

1. Remove the access plate cover from the terminal block TB1 housing, as shown in Figure 3-1.
2. Slide cord into entry bushing and tighten bushing around cord.
3. Strip wires 1/2-inch.
4. Insert wires into TB1 according to the color code chart (Table 3-1) given below (color codes may not apply at all installation sites).

Table 3-1. ITT—TB1 Color Code Designations (USA Only)

Wire Color	Usage	TB1 Designator
Black	Phase A	X or L1 or R
Red	Phase B	Y or L2 or S
Blue or Violet	Phase C	Z or L3 or T
White	Neutral	N
Green/yellow	Safety Gnd	G

5. Secure all connections.
6. Close the access cover.

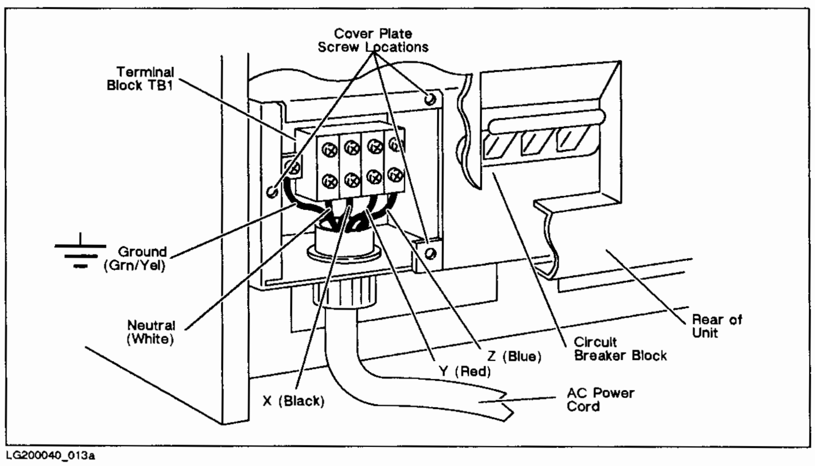


Figure 3-1. Power Cord Installation - ITT AC Unit

ACDC AC Unit Power Cord Installation

1. Remove the access cover plate, as shown in Figure 3-2.
2. Detach the terminal block from the cover plate.
3. Attach the strain relief to the AC unit.
4. Insert the power cord into the AC unit through the strain relief.
5. Connect the leads of the power cord to the terminal block according to the chart (Table 3-2) below (color codes may not apply at all installation sites).

Table 3-2. ACDC—TB1 Color Code Designations (USA Only)

Wire Color	Usage	TB1 Designator
Black	Phase A (1)	R
Red	Phase B (2)	S
Blue or violet	Phase C (3)	T
White	Neutral	N
Green/yellow	Safety Gnd	G

6. Connect the ground lead (green/yellow) to the ground lug.
7. Attach the terminal block to the cover plate.
8. Adjust the length of the power cord within the AC unit to avoid excess bunching, and tighten the strain relief.
9. Replace the cover plate.

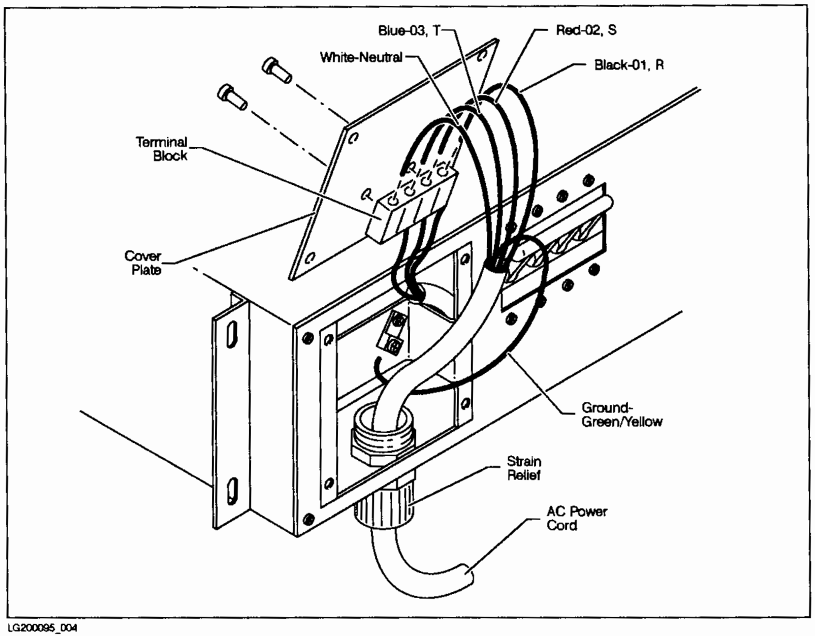


Figure 3-2. Power Cord Installation - ACDC AC Unit

Power Plug Installation

Connect a suitable plug at the power end. Electrical codes specified by each country determine the proper attachment plug, receptacle and wiring convention. The type of plug should be determined by a qualified electrician familiar with the electrical codes for the site location. The power plug should be supplied by the customer.

Warning **The plug can only be inserted into a power source (outlet) provided with a protective earth ground. The protective earth terminal on the computer must be connected to the protective conductor of the AC line (mains) power cord before the computer is switched on. The protective action must not be defeated by using a power extension cord that does not have a protective grounding conductor.**

Strapping Transformers for Input Voltage/Frequency

Warning **Make sure input power is disconnected before proceeding. Turn off the front power switch, the circuit breaker in the rear, and unplug the system from the power source.**

The procedure for strapping the ferro-resonant transformers varies according to the kind of power system (ITT or ACDC/Yokogawa) installed. Confirm the power supply, and strap the transformers accordingly.

Remove and disconnect the fan panel from the power bay, as shown in Figure 3-3.

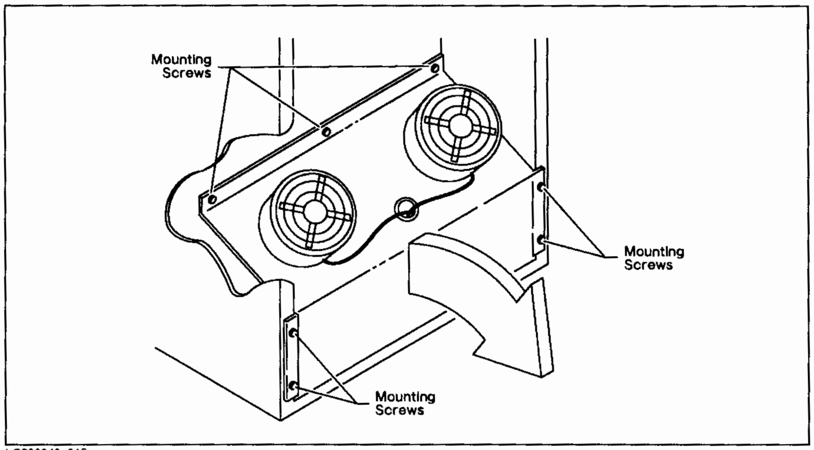


Figure 3-3. Removing Fan Assembly to Access Strapping Blocks

Caution

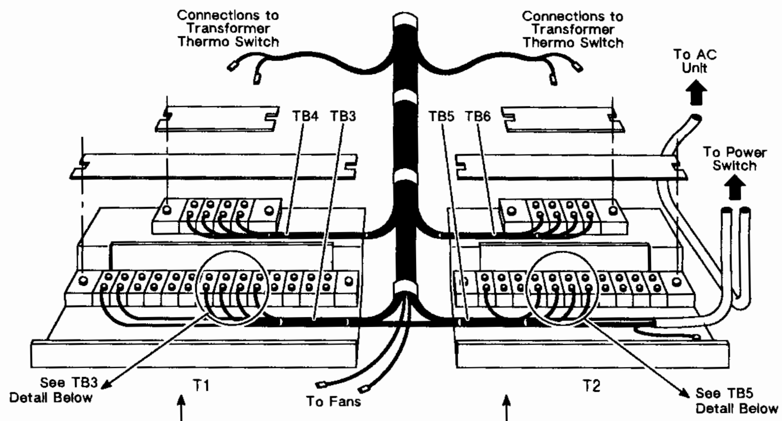
1. Do not attempt combinations of line voltage and frequency other than those prescribed in Figure 3-4 and Figure 3-5.
2. All connections must be tight; loose connections generate heat and may cause fire.

ITT Transformers. Configure the transformers to match the line voltage and frequency by strapping blocks TB3 and TB5. TB3 is located in front of the left transformer (T1), and TB5 is located in front of the right transformer (T2). Refer to Figure 3-4.

Note

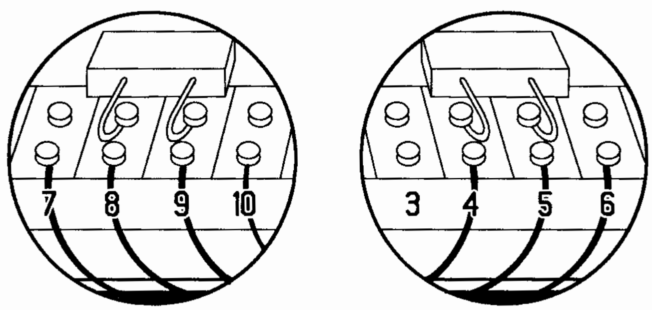
In Figure 3-4 a capacitor (0.01 UF 20%, HP Part Number 0160- 4713) is shown installed on both TB3 and TB5. These capacitors were introduced in computers having ITT power systems, to meet conducted emissions criteria. Some early computers systems do not have these capacitors installed. However, if a system uses these capacitors, they should be installed according to the following guidelines.

1. **TB3**. Mount capacitor on 208 V ac, 60 Hz systems between terminals 8 and 9; on 380/415 V ac, 50 Hz systems between terminals 12 and 13.
2. **TB5**. Mount capacitor on 208 V ac, 60 Hz systems between terminals 4 and 5; on 380/415 V ac, 50 Hz systems between terminals 8 and 9.



	1	2	3	4	5	6	7	8	9	10	11
	L3	L3	L3	H	J	K	L	H	J	K	L
TB5	208Vac	380Vac	415Vac	208Vac				380/415Vac			
	60Hz	50Hz	50Hz	60Hz				50Hz			

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	L1	L2	L1	L2	L1	L2	D	E	F	G	D	E	F	G
TB3	208Vac		380Vac		415Vac		208Vac				380/415Vac			
	60Hz		50Hz		50Hz		60Hz				50Hz			



TB3 Detail TB5 Detail

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Figure 3-4. Terminal Block Configuration - ITT Transformers

Yokogawa Transformers. Strap the transformer terminal blocks according to the diagram in Figure 3-5 that matches the site's power configuration.

Caution

Although the strapping for 208V 60Hz is identical to the strapping for 415V 50Hz, the transformers are not the same. Before strapping, be sure to identify the transformers as either 60Hz or 50Hz (refer to transformer part numbers in Chapter 8).

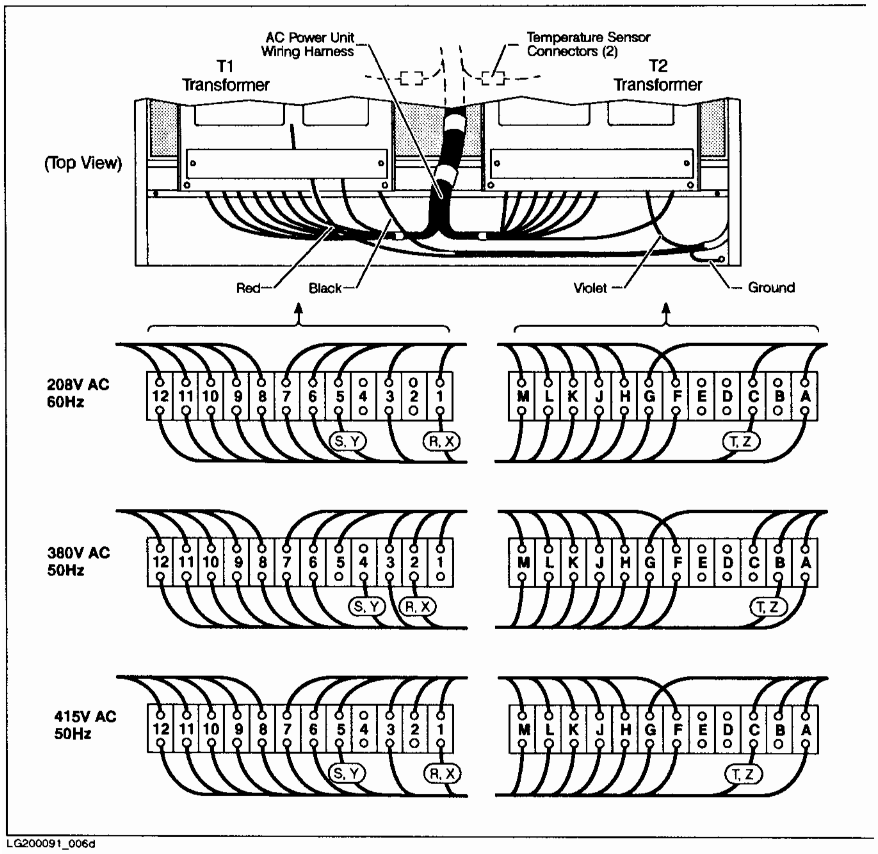


Figure 3-5. Terminal Block Configuration - ACDC Transformers

System Configuration

The hardware configuration of the processor bay cardcage for a typical HP 3000 Series 950 Family or HP 9000 Model 850S Family computer is shown in Figure 3-6.

Processor Bay

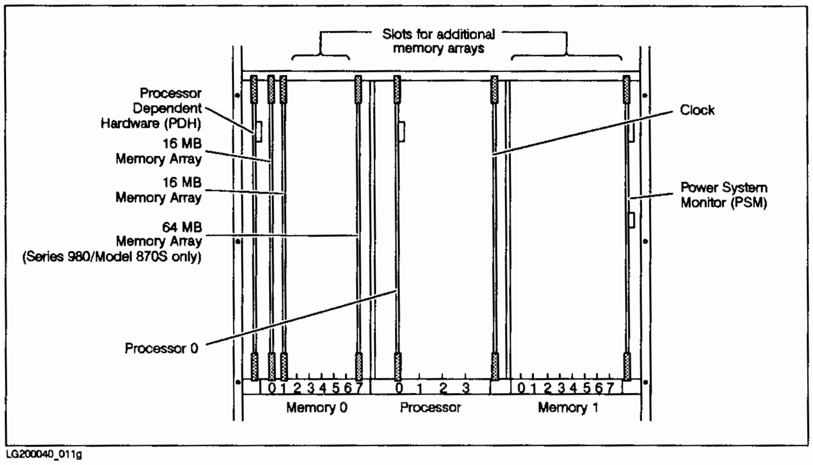


Figure 3-6. Processor Cardcage Configuration

Note

Newer systems have a modified processor cardcage which accepts a processor card in any of the four processor slots. However, earlier cardcages cannot accept the Series 980/Model 870S processor card in the **Processor 0** slot.

To identify which cardcage is installed in a system, refer to the serial number prefix on the general information label (located on the rear of the power bay). If the prefix is 3007 or higher, the new cardcage is installed. A prefix lower than 3007 indicates that the system has the earlier cardcage, and will not accept the Series 980/Model 870S processor card in slot 0.

Generally, the newer cardcage can be identified by the following label at the bottom of the processor cardcage: **This cardcage accepts a double-sided processor board in Processor Slot 0.** However, not all systems with the newer cardcage have this label. For positive identification, refer to the serial number prefix described above.

I/O Cardcage

Figure 3-7 and Figure 3-8 show typical I/O cardcage configurations for the Series 950 Family and Model 850S Family computers.

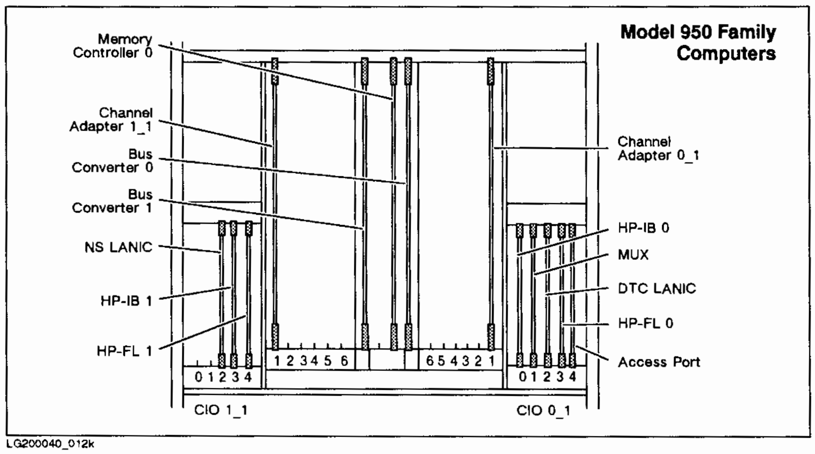


Figure 3-7. I/O Cardcage Configuration (Series 950 Family Systems)

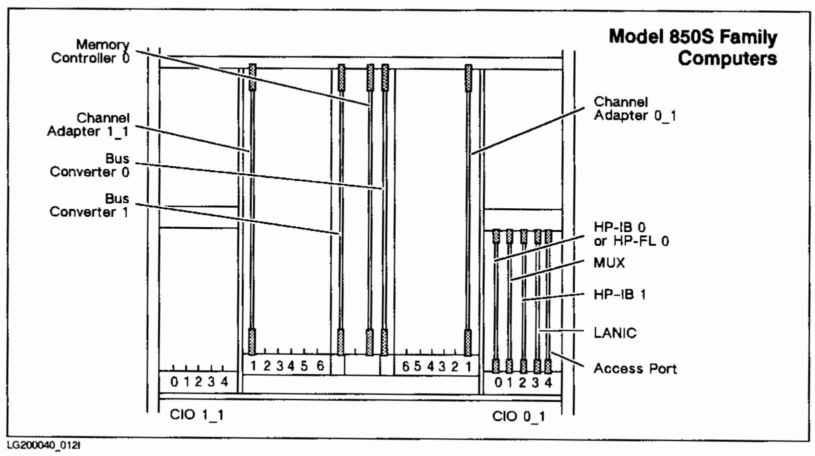


Figure 3-8. I/O Cardcage Configuration (Model 850S Family Systems)

Module Numbering

In addition to cardcage slot numbers, each slot in the Processor and I/O cardcages has one or more "module numbers". Module numbers appear in error messages and are used to define communication paths between peripheral devices and the kernel. Module numbers are enclosed in parentheses when shown on cardcage labels.

Module numbers for MPE/XL are identical to the path numbers.

Module numbers for HP-UX are calculated using the following formula:

```
(Bus Converter No. X 64) + (Midbus Slot No. X 4) = Module Number
```

For example: A channel adapter at path 6/8 on BC 1, Midbus slot 2, has a module number of (1 X 64) + (2 X 4) = 72. Also, a CA board at path 2/4 on BC 0, Midbus slot 1, has a module number of (0 X 64) + (1 X 4) = 4.

Refer to Table 3-3 for MPE/XL and HP-UX module numbering relationships. Slot and module number relationships are given in Table 3-4 and Table 3-5.

Note

The Midbus 0 and 1 cardcages are separately addressed through the BC-0 and BC-1 Bus Converters, so module numbers for each Midbus slot correspond to a separate device in the kernel.

Table 3-3. CIO Module Numbers for MPE/XL and HP-UX

Cardcage	MPE/XL Module Numbers	HP-UX Module Numbers
CA 0_1	2/4	4
CA 0_2	2/8	8
CA 1_1	6/4	68
CA 1_2	6/8	72

Table 3-4. SMB Slot/Module Assignments

Cardcage	Slot Number	SMB Module Number(s)
Processor	0	8
	1	9
	2	A, B
	3	C thru F
I/O	MC-0	0
	BC-0	2
	MC-1	1
	BC-1	6, 4

Table 3-5. Midbus Slot/Module Assignments

Cardcage	Slot Number	Midbus Module Number(s)
I/O	1	4 thru 7
	2	8 thru 11
	3	12 thru 15
	4	16 thru 19
	5	20 thru 23
	6	24 thru 27

Memory Configuration

Memory configurations for Series 950 Family and Model 850S Family systems vary with the particular system, depending on how many memory controllers are installed, and whether the system can accept 64MB memory arrays in addition to the 16MB memory arrays.

Caution

Series 980/Model 870S systems have a new memory controller that is incompatible with earlier systems. The memory controller for Series 950, 955, 960 and Model 850S, 855S, 860S systems cannot be used in Series 980/Model 870S systems; the Series 980/Model 870S memory controller cannot be used in the earlier systems.

Series 950/955/960 and Model 850S/855S/860S Memory Configuration Guidelines

Series 950, 955, 960 and Model 850S, 855S, 860S computers can accept 16MB memory arrays, and one or two memory controllers. Memory configuration for these systems must conform to the following rules:

With one memory controller (MC0):

All memory arrays are installed in Memory 0 cardcage.

Memory arrays are installed sequentially from left to right, starting with slot 0 (0, 1, 2, etc.). Do not leave any empty slots between memory array cards.

With two memory controllers (MC0, MC1):

The amount of memory (in MB) in the Memory 0 cardcage must be equal to a power of two (i.e., 16MB, 32MB, 64MB, etc.), as described in "Non-Interleaved Memory Configuration" (refer to Table 3-6).

The amount of memory in Memory 0 cardcage must equal or exceed the amount of memory in the Memory 1 cardcage.

In each cardcage (Memory 0 and Memory 1) memory arrays are installed sequentially from left to right, starting with slot 0 (0, 1, 2, etc.). Do not leave any empty slots between memory array cards.

Memory Interleaving (Series 980/Model 870S Only)

Series 980 and Model 870S systems allow memory interleaving, which maximizes CPU and memory efficiency for increased system performance. For interleaving to function properly, you must configure memory according to the "Series 980/Model 870S Memory Configuration Guidelines" for systems **with two memory controllers, and interleaving turned ON** (next page).

Note

Model 870S Systems Only:

Interleaving is supported on Model 870S systems with HP-UX Release 8.0; interleaving is not supported on Model 870S systems with HP-UX Release 7.06. After the operating system has been upgraded to Release 8.0, interleaving can be turned on by using the **C I** PDC command, and then rebooting the system.

Memory Interleaving and Configuration PDC Commands

The following PDC commands are used to configure memory and control the memory interleaving function in Series 980 and Model 870S systems. Note that after entering any of the following commands, the system must be rebooted for the command to take effect.

C I	Configure Interleaving (turn interleaving ON).
R I	Remove Interleaving (turn interleaving OFF).
C xy	Configure an array (x = MC#, y = memory array #)
R xy	Remove an array (x = MC#, y = memory array #)

Series 980/Model 870S Memory Configuration Guidelines

Series 980 and Model 870S computers accept both 16MB and 64MB memory arrays, and have two memory controllers. Memory configuration for Series 980/Model 870S computers must conform to the following rules:

With two memory controllers, and interleaving not present or turned OFF:

The amount of memory (in MB) in the Memory 0 cardcage must be equal to a power of two (i.e., 16MB, 32MB, 64MB, etc.), as described in "Non-Interleaved Memory Configuration" (refer to Table 3-6).

The amount of memory in Memory 0 cardcage must equal or exceed the amount of memory in the Memory 1 cardcage.

Memory arrays are installed in Memory 0 and Memory 1 cardcages according to the "Series 980/Model 870S Memory Array Installation Rules" below.

With two memory controllers, and interleaving turned ON:

You must install the same amount of memory in each cardcage (the "power of two" rule for Memory 0 cardcage does not apply).

Memory arrays are installed in Memory 0 and Memory 1 cardcages according to the "Series 980/Model 870S Memory Array Installation Rules" below.

Series 980/Model 870S Memory Array Installation Rules

Both 16MB and 64MB arrays can be installed in each memory cardcage (Memory 0 and Memory 1) according to the following rules:

- **16MB** memory arrays are installed sequentially from **left to right**, starting with slot 0 (0, 1, 2, etc.) in each cardcage. Do not leave any empty slots between 16MB memory array cards.
- **64MB** memory arrays are installed sequentially from **right to left**, starting with slot 7 (7, 6, 5, etc.) in each cardcage. Do not leave any empty slots between 64MB memory array cards.

Non-Interleaved Memory Configuration

Table 3-6 lists the allowable memory configurations for any Series 950 Family or Model 850S Family system with two memory controllers installed and interleaving not present or turned off. For this case, the amount of memory (in MB) installed in Memory 0 cardcage must equal a power of two (i.e., 16MB, 32MB, 64MB, etc.).

In Table 3-6, the amount of memory in each cardcage (Memory 0 and Memory 1) is expressed in 16MB blocks. For those systems that support 64MB memory arrays (Series 980/Model 870S), a set of four 16MB blocks represents either four 16MB arrays or one 64MB array.

Table 3-6. Non-Interleaved Memory Configuration (Two Memory Controllers)

Total Memory Installed (in MB)	Number of 16MB Blocks in Memory 0	Number of 16MB Blocks in Memory 1
32	1	1
48	2	1
64	2	2
80	4	1
96	4	2
112	4	3
128 (Maximum for 850S, 855S at HP-UX Release 7.0)	4	4
144	8	1
160	8	2
176	8	3
192 (Maximum for 950 at MPE-XL Release 2.2)	8	4
208	8	5
224	8	6
240	8	7
256 (Maximum for 955, 960, 980/100 at MPE-XL Release 2.2; maximum for 860S, 870S/100 at HP-UX Release 7.06)	8	8
272	16	1
288	16	2
304	16	3
320	16	4
336	16	5
352	16	6
368	16	7
384	16	8
400	16	9
416	16	10
432	16	11

Table 3-6.
Non-Interleaved Memory Configuration (Two Memory Controllers) (continued)

Total Memory Installed (in MB)	Number of 16MB Blocks in Memory 0	Number of 16MB Blocks in Memory 1
448	16	12
464	16	13
480	16	14
496	16	15
512	16	16
528	32	1
544	32	2
560	32	3
576	32	4
592	32	5
608	32	6
624	32	7
640	32	8
656	32	9
672	32	10
688	32	11
704	32	12
720	32	13
736	32	14
752	32	15
768 (Maximum for 870S/200 at HP-UX Release 8.0)	32	16
784	32	17
800	32	18
816	32	19
832	32	20
848	32	21
864	32	22
880	32	23
896	32	24
912	32	25
928	32	26
944	32	27
960	32	28
976	32	29
992	32	30
1008	32	31
1024 (Maximum for 980/200 at HP-UX Release 3.0)	32	32

I/O Configuration

Standard configuration settings for basic system peripherals are given below.

Device Adapters

The device adapters supported by the Series 950 Family and Model 850S Family computers are shown in Table 3-7.

Table 3-7. Supported Device Adapters

Commercial		Technical	
HP 27113A	HP-IB device adapter	HP 27110B	HP-IB device adapter
HP 27115A	HP-FL Optical Fiber Link device adapter	HP 27111A	HP-FL Optical Fiber Link device adapter
HP 27125B	LAN (IEEE 802.3) interface card	HP 27112A	General purpose I/O (GPIO) card
HP 27140A	Six channel multiplexer	HP 27114A	Asynchronous FIFO Interface (AFI) card
HP 27251A	HP-CS (SCSI) Host Adapter card	HP 27125B	LAN (IEEE 802.3) interface card
HP 36923A	LAN 3000/XL Link interface card	HP 27140A	Six channel multiplexer
		HP 27147A	HP-CS (SCSI) Host Adapter card

HP-IB Device Adapter Card Switch Settings

The HP-IB card is the only device adapter with onboard configuration (address) switches. These address switches not used by the SPU; the address and priority of the HP-IB (or any I/O card) are set by the CIO slot position. Each HP-IB card contains eight switches in a DIP package. The switch functions and normal operating settings are listed in Table 3-8.

Table 3-8. HP-IB Switch Settings (HP27110B/27113A)

Switch	Function	Settings
S8	No Listener Detection	Down - Disabled
S7	Data Settliug Time Selection	UP - Medium/slow speed DOWN - High speed
S6	System Controller Selection	UP - System controller DOWN - Not system controller
S1-S5	HP-IB Address Selection (NOT USED)	Doesn't matter

```
Recommended Switch Settings:          S1   S2  S3  S4  S5  S6  S7   S8
                                      DOWN  X   X   X   X  UP  DOWN DOWN
   X = either setting ok
  UP = relative to component side
```

Note

Ensure the resistor pack on the HP-IB is installed at location U123 (HP P/N 1810-0081).

CIO Cardcage Configuration Guidelines

Physically, any CIO card can go in any CIO slot in the SPU. (The one exception is the Access Port card, which must go in slot 4 of CIO cardcage 0_1.) However, the slot number of a CIO card determines the service priority of the card, as described in "CIO Priority" below.

To tell the HP-UX operating system which card is in which slot, edit the S800 file and run the **uxgen** program to recompile the HP-UX kernel.

For MPE-XL, use the SYSGEN program to change the configuration files.

Refer to Table 3-9 and Table 3-10 for information about the maximum configuration for each system.

CIO Priority

The service priority for a CIO card depends on its slot number. The lower the slot number, the higher the service priority. For example, the HP-IB card for the system disk installed in CIO 0_1, slot 1 has a higher priority (lower slot number) than any cards installed in CIO 0_1, slots 2 through 6.

The CIO priority, from highest to lowest, is:

1. Disk drives
2. Console MUX card
3. LANIC cards
4. Tape drives
5. Printers
6. HP-FL disk drives
7. PSI cards

Note the following guidelines when installing CIO cards:

- Printers are at a lower priority than tapes on the same HP-IB cards.
- With IODC 4.0, do not attach tape drives or printers to the same HP-IB card as disks if installing a maximum system configuration. (If tape drives or printers are attached to the same HP-IB card as disks, HP-IB lockups can result.) This restriction does not apply with IODC 5.0.

Note

Model 850S Family Computers Only

If a CIO terminal expander is attached to a Model 850S Family system, all CIO cards in the expander bay(s) have a lower priority than any card in the SPU. Disk drives, LANIC cards, and tape drives can be spread across CIO busses (that is, on both the CIO expander, if present, and on the CIO bus in the SPU). Note that only 6-port MUX cards are supported in the CIO terminal expander.

Maximum Configuration

Table 3-9 and Table 3-10 list the maximnm configurations for Series 950 Family and Model 850S Family computers.

Table 3-9. Series 950 Family Computers Maximum Configurations

Card, Device, or Peripheral	Maximum Quantity				
	950	955	960	980/100	980/200
MPE-XL Release Level	2.0	2.0	2.0	2.2	*
Main SPU Cards:					
Processor	1	1	1	1	2
PDH card	1	1	1	1	1
Bus Converter	2	2	2	2	2
PSM card	1	1	1	1	1
Clock card	1	1	1	1	1
Midbus Cards:					
PSI card	8	8	8	8	8
Channel Adapter	4	4	4	4	4
CIO Cards:					
HP-CS (SCSI)**	0	0	0	0	3**
HP-IB	12	12	12	12	12
MUX	1	1	1	1	1
LANIC	2	2	2	2	4
HP-FL	12	12	12	12	12
Access Port	1	1	1	1	1
Peripherals:					
Disks (HP-CS)**	n/a	n/a	n/a	n/a	n/a
Disks (HP-IB)	24	24	24	24	24
Disks (HP-FL)	48	64	64	64	64
Tape Drives (HP-IB)	8	8	8	8	8
Printers (HP-IB/RS-232)	12/32	12/48	12/64	12/>64	12/>64
Terminals	400	600	600	600	850
Optical Drives**	0	0	0	0	3**
Plotters (HP-IB)	4	4	4	4	4
Memory:					
950/955/960 Mem. Controller	2	2	2	n/a	n/a
980 Mem. Controller	n/a	n/a	n/a	2	2
16MB Memory Arrays	16	16	16	16	16
64MB Memory Arrays	n/a	n/a	n/a	8	16
Amount of memory	192MB	256MB	256MB	256MB	1024MB
Power System:					
+5V Power Modules	2	2	2	2	3
±12V Power Module	1	1	1	1	1
+5B Battery Charger	1	1	1	1	1
AES Module***	n/a	n/a	n/a	0***	0***

Notes to Table 3-9:

* The Series 980/200 will be supported at a later release of MPE-XL. All numbers listed in this column are estimates only, and are subject to change.

** The HP-CS (SCSI) interface will be supported at a later release of MPE-XL. The number of HP-CS (SCSI) cards and peripherals listed in Table 3-9 are estimates only, and are subject to change.

*** The AES Module is required only for 3- and 4-processor systems. At the time of publication, 3- or 4-processor systems have not been announced or released, and are not supported.

Table 3-10. Model 850S Family Computers Maximum Configurations

Card, Device, or Peripheral	Maximum Quantity				
	850S	855S	860S	870S/100	870S/200
HP-UX Release Level	7.0	7.0	7.06	7.06	*
Main SPU Cards:					
Processor	1	1	1	1	2
PDII card	1	1	1	1	1
Bus Converter	2	2	2	2	2
PSM card	1	1	1	1	1
Clock card	1	1	1	1	1
Midbus Cards:					
PSI card	8	8	8	8	8
Channel Adapter (base SPU)	4	4	4	4	4
CIO Cards:					
HP-CS (SCSI)**	0	0	0	0	12**
HP-IB	12	12	12	12	12
MUX (base SPU)	16	16	16	16	16
LANIC	5	5	5	5	5
HP-FL	12	12	12	12	12
Access Port	1	1	1	1	1
Peripherals:					
Disks (HP-CS)**	0	0	0	0	42**
Disks (HP-IB)	12	12	12	12	12
Disks (HP-FL)	32	32	32	64	64
Tape Drives (HP-IB)	8	8	8	8	8
Printers (HP-IB/RS-232)	20/80	20/80	20/80	20/80	20/80
Terminals	300	400	400	400	1000
Optical Drives**	0	0	0	0	8**
Plotters (HP-IB)	20	20	20	20	20
Memory:					
850S/855S/860S Mem. Controller	1	1	2	n/a	n/a
870S Mem. Controller	n/a	n/a	n/a	2	2
16MB Memory Arrays	16	16	16	16	16
64MB Memory Arrays	n/a	n/a	n/a	4	12
Amount of memory	128MB	128MB	256MB	256MB	768MB
Power System:					
+5V Power Modules	2	2	2	2	3
±12V Power Module	1	1	1	1	1
+5B Battery Charger	1	1	1	1	1
AES Module***	n/a	n/a	n/a	0***	0***
CIO Expander Modules:	2	4	4	4	4

Notes to Table 3-10:

* The Model 870S/200 will be supported at a later release of HP-UX. All numbers listed in this column are estimates only, and are subject to change.

** The HP-CS (SCSI) interface will be supported at a later release of HP-UX. The number of HP-CS (SCSI) cards and peripherals listed in Table 3-10 are estimates only, and are subject to change.

*** The AES Module is required only for 3- and 4-processor systems. At the time of publication, 3- or 4-processor systems have not been announced or released, and are not supported.

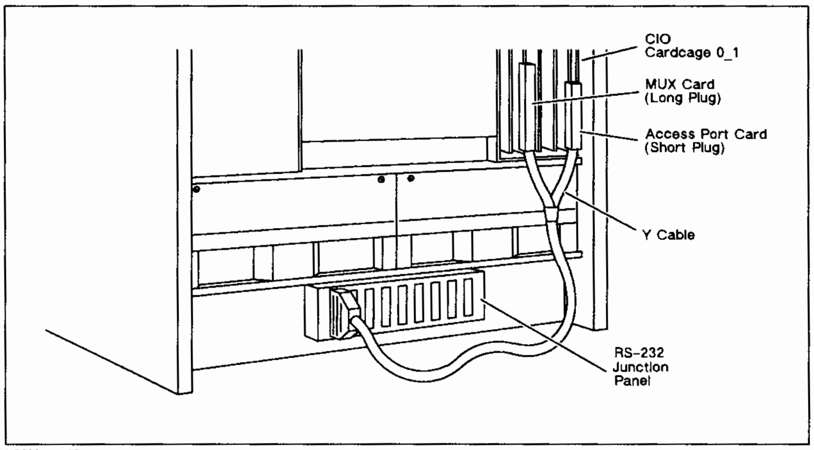
Installing RS-232C Junction Panel Cable

In the standard configuration, the Processor Bay has one RS-232C junction panel (6 port) mounted at the bottom center of the cabinet rear. It attaches to both the system MUX and the Access Port card.

This panel, shown in Figure 3-9, interfaces to the system console, the remote support modem, and other serial peripherals.

To connect it to the system, proceed as follows:

1. Verify that a 6 port MUX card (27140-60001) is in the CIO cardcage 0_1, slot 1.
2. Verify that an Access Port (AP) card is in CIO cardcage 0_1, slot 4.
3. Connect the 50 pin connector of the Y cable to the junction panel.
4. Connect the longer CIO card connector to the 6 port MUX card in CIO cardcage 0_1, slot 1.
5. Connect the short CIO card connector to the AP card in CIO cardcage 0_1, slot 4.



LG200040_021

Figure 3-9. RS-232C Junction Panel Installation

Installing DTC (Series 950 Family Systems Only)

The Distributed Terminal Controller (DTC) is standard on the HP 3000 Series 950 Family computers only. Verify that the DTC LANIC card occupies CIO cardcage 0_1, slot 2. Connect cables as per Figure 3-10.

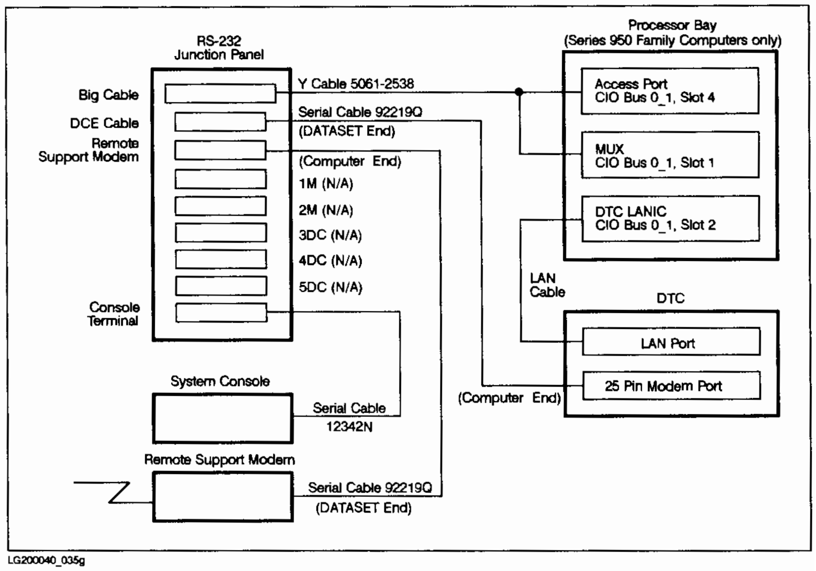


Figure 3-10. Installing DTC (Series 950 Family Systems Only)

For details of configuring the DTC cabinet, interconnect cable or initializing the DTC, refer to the installation guide supplied with the DTC.

Installing HP-FL Optical Fiber Cables

This section describes the color keying and connection procedure for the fiber cables used with the HP-FL boards.

The duplex fiber cables (i.e., two fibers, one transmit, one receive) are color-keyed for connection to the HP-FL board. One of the two fibers at each end of the duplex fiber cable has a colored band around it. The band is located near the optical connector of each fiber. The white-banded fiber connects to the optical transmitter of the HP-FL board; the fiber with no band connects to the optical receiver of the board. See Figure 3-11 for the location of colored bands on the fiber cable.

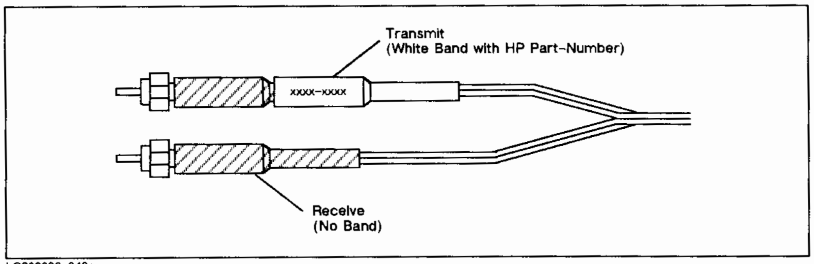
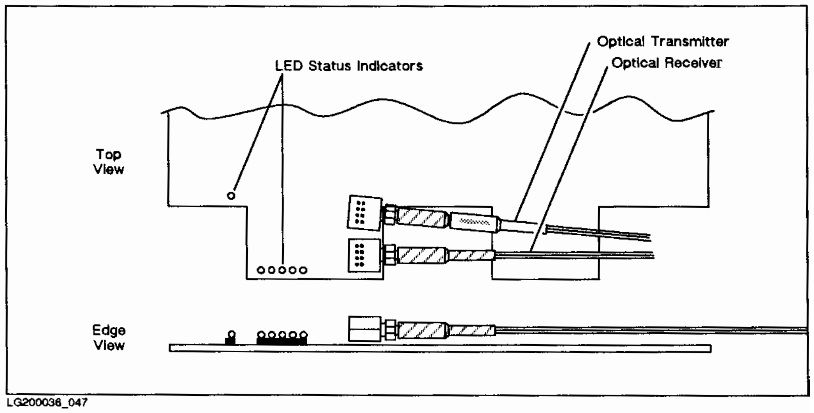


Figure 3-11. Keyed Duplex Optical Fiber Cable

Note The ends of the fiber optic cable are dust-sensitive. Retain the dust covers provided with the cables for future use.

The location of the Transmit (Tx) and Receive (Rx) optical connectors of the HP-FL board are shown in Figure 3-12. The barrel housings of the HP-FL board's optical connectors are also color-keyed. The Transmitter housing is light-gray and the Receiver housing is dark-gray. To attach the fiber cable connectors to the optical barrel housings on the HP-FL board:

1. Grasp the metal housing of the Transmit fiber cable connector (white band) and insert the fiber into the light-gray Transmitter barrel housing on the board.
2. Grasp the metal housing of the Receive fiber cable connector (no band) and insert the fiber into the dark-gray Receiver barrel housing.
3. Tighten both cable connectors by rotating the metal housings CLOCKWISE.



LG200036_047

Figure 3-12. HP-FL Board Connections

Caution Place cables so that the screw side of the strain relief is toward the system cabinet.

Installing System Console

To install the system console, proceed as follows:

1. Verify that the console is a 2392A (with Option 012), 700/92, or 700/94.
2. Connect the console to the RS-232C junction panel using the RS-232C interface cable. If the cable is a filtered cable, connect the end with the filter to the console; connect the other end of the cable to the RS-232C junction panel connector marked Console Terminal.
3. Connect the AC power cord to the console.
4. Plug the console power cord into a power outlet. Consult console documentation for power requirements.
5. Turn console on.
6. Configure the console data communications parameters as listed below:

```
Baud Rate:          9600
Parity/Databits:    None/8
Chk Parity:         NO
EnqAck:             YES
CS (CB)Xmit:        NO
RecvPace:           Xon/Xoff
XmitPace:           Xon/Xoff
```

Configuration parameters that are not mentioned can be set to any value and do not affect the operation of the Access Port card or the system.

Installing System Disk

Connect the system disc to the HP-IB card in CIO cardcage 0_1, slot 0. Configure the disc as HP-IB address unit 0 (path = 2/4.0.0).

Installing System Tape

Series 950 Family Systems Only: Connect the system tape to the HP-IB card in CIO cardcage 1_1, slot 3. Configure the tape as HP-IB address unit 0 (path = 6/4.3.0).

Model 850S Family Systems Only: Connect the system tape to the HP-IB card in CIO cardcage 0_1, slot 2. Configure the tape as HP-IB address unit 3 (path = 2/4.2.3).

Initial System Verification

This section verifies that the power system is operating correctly and that the SPU has passed its self test. This section also provides the procedure for loading the Initial System Load (ISL) program and verifying the boot path.

Initial Power Up Checks

This procedure verifies correct operation of the ferro-resonant transformers, AC Unit, power modules, fans, PSM, and SPU.

Caution

Before proceeding, verify that the AC voltage at the wall outlet is within specifications before powering up the SPU.

1. Set the Control Panel key switch to "Console/Reset Enabled".
2. Verify that AC breaker (rear of AC Unit) and front panel Power switch are off.
3. Connect power cord to AC source.
4. Turn on the AC breaker and front panel Power switch. The system begins it's self-test.

Note

For approximately 2 seconds, all front panel LEDs (except the REMOTE ENABLED indicator) are turned on, and the hexadecimal display is set to 0000.

A sequence of 4 digit status codes appear on the control panel, as shown below. The complete sequence takes about 30 seconds.

STATUS CODE	SELF-TEST STAGE
0000	Initial power on
1000	PDH/CP Self-test complete
C200	PDC self-test - PDC boot
C401	Self-test complete

5. Verify that Processor Bay, Power Bay and Control Panel indicators are normal.
   a. Control Panel Indicators

INDICATOR	STATUS
RUN	Green
CHECK	Yellow
FAULT	off
LINE	Green
PWR	Green
BATT CHG	off (or on, depending on battery state)
BATT PWR	off
TEMP	off
REMOTE	off

   b. 300 V dc power indicator on the AC Unit is on
   c. Power module green "on" indicators are the only indicators lit
   d. PSM display shows normal operation code (alternating 00/FF)
   e. PDH display shows normal operation code (alternating 00/FF)
   f. Processor 0 display shows normal operation code (green LED on and single character hexadecimal display equals F)
   g. Control Panel Display: C401

   If the display matches that shown above, the system has passed the Initial System Self-Test.

   The system console now displays the following messages:

Note Do not enter anything at the console keyboard at this time.

```
Processor Dependent Code (PDC) revision X.X

Console path        = 2/4.1.0.0.0.0.0
Primary boot path   = 2/4.0.0.0.0.0.0
Alternate boot path = 6/4.3.0.0.0.0.0

64MB of memory configured and tested.

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

6. Verify 300 V dc and 220 V ac fan voltages at AC Unit connector J2, as shown in Figure 3-13.

MEASUREMENT POINTS	VOLTAGE
J2-2 <—> J2-1	290 V dc to 330 V dc
J2-3 <—> J2-5	210 V ac to 240 V ac

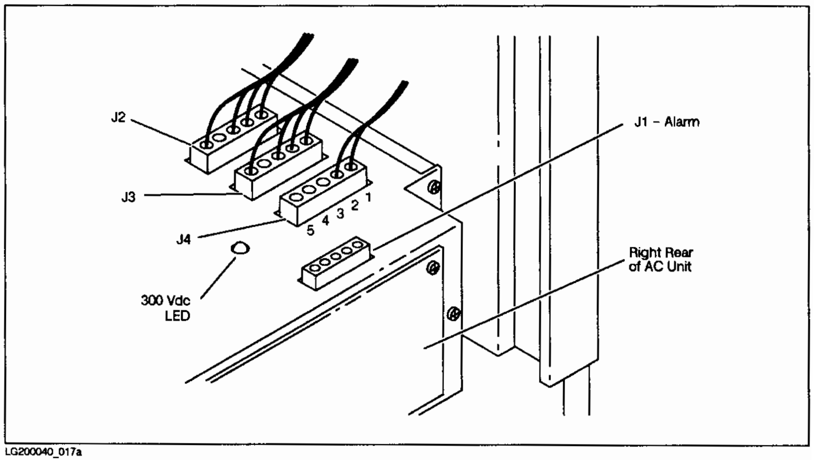


Figure 3-13. AC Unit Test Points

If measurements are incorrect, the AC Unit may be faulty. See Section 4, Troubleshooting.

7. Check all fans for correct airflow direction:

   a. Large cooling fans on lower front of power bay are pulling air downward.

   b. Power module fans are pulling air inward.

   c. Processor cardcage fans are pulling air downward.

   d. I/O cardcage fans are pulling air downward.

Set Boot Path

This procedure sets the boot path for loading the operating system.

Proceed as follows:

1. Mount the System Load Tape on to the mag tape drive and be sure the tape is loaded and the drive is on line.
2. Press the RESET button on the system control panel if power is already ON, or turn SPU ON.

Note

All boot path numbers shown in the following console screen messages are typical for the standard configuration, and may differ depending on the actual system configuration.

In the following screen messages, user input is shown underlined.

Determine Default Configuration

The system firmware contains the default device configuration data listed in Table 3-11 and Table 3-12. The I/O Path is the hardware address of the devices, which is a combination of card slots, port numbers and device addresses defined as follows:

Example:

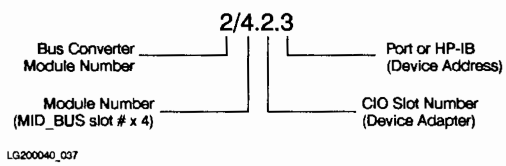


Table 3-11. MPE-XL Default Device Configuration (950 Family Systems)

Logical Device Number	I/O Path	Device
1	2/4.0.0	system disc
7	6/4.3.0	system tape
20	2/4.1.0	system console
6	6/4.3.6	system printer

Table 3-12. HP-UX Default Device Configuration (850S Family Systems)

Driver Name	Logical Unit	I/O Path	Device
disc0	0	2/4.0.0	system disc
tape0	0	2/4.2.3	system tape
mux0	0	2/4.1.0	system console
lpr0	0	2/4.2.0	line printer

Verify that the primary and alternate boot paths listed on the console match the disc0 and tape0 I/O paths listed in the appropriate table.

- If they match, proceed to "Load ISL Program", below.
- If they do not match, proceed to "Change Default Path", below.

Change Default Path

The following messages appear on the console screen:

Note The following message sequence applies only to single-processor systems; the message sequence will be different for multiprocessor systems.

```
Processor Dependent Code (PDC) revision X.X

Console path        = 2/4.1.0.0.0.0.0
Primary boot path   = 2/4.0.0.0.0.0.0
Alternate boot path = 2/?.?.?.0.0.0.0 (some incorrect address)

64MB of memory configured and tested.

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

1. Refuse the primary boot path. At the console, enter n.

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

2. Refuse the alternate boot path. At the console, enter n.

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

3. Enter the correct alternate boot path for the tape drive. For the standard MPE-XL configuration: 6/4.3.0; for the standard HP-UX configuration, enter 2/4.2.3.

   ```
   Enter boot path, command or ?> 6/4.3.0
   ```

4. Interact with IPL, thereby loading the ISL program. Enter y.

   ```
   Interact with IPL (Y or N)?> y
   ```

   The ISL> prompt appears.

5. Update and verify the default alternate boot path.

   ```
   ISL> ALTPATH 6/4.3.0
   ISL> DISPLAY
   ```

   The system displays the alternate boot path just entered.

6. Verify autoboot is set to ON.

   ```
   ISL> autoboot
   ```

   The system responds with:

   ```
   Autoboot is ON (enabled)
   ```

If autoboot is OFF, enable it. The operating system can now be loaded.

Load ISL Program

The following messages appear on the console screen:

```
Processor Dependent Code (PDC) revision X.X

Console path        = 2/4.1.0.0.0.0.0
Primary boot path   = 2/4.0.0.0.0.0.0
Alternate boot path = 6/4.3.0.0.0.0.0 (for MPE-XL; 2/4.2.3.0.0.0.0 for HP-UX)

64MB of memory configured and tested.

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

1. Refuse the primary boot path. At the console, enter n.

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

2. Boot from the alternate (tape) boot path, enter y.

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

3. Interact with IPL, enter y.

   ```
   Interact with IPL(Y or N)?> y
   ```

   The ISL> prompt appears.

4. Verify autoboot is set to ON.

   ```
   ISL> autoboot
   ```

   The system responds with:

   ```
   Autoboot is ON (enabled)
   ```

If autoboot is OFF, enable it. The operating system can now be loaded.

Installing the MPE-XL Operating System

Refer to the *HP 3000 MPE-XL Installation and Update Manual* (HP P/N 36123-90001) that accompanies the installation tapes.

Installing the HP-UX Operating System

Refer to the manual *Installing and Updating HP-UX: HP 9000 Series 800* (HP P/N 92453-90019) that accompanies the installation tapes.

Writeable PDC (Series 980/Model 870S Only)

For Series 980 and Model 870S systems (only), the PDC updating facility has been revised to allow a new version of the Processor Dependent Code to be installed (writeable PDC). An update is made into PDC from a LIF device in a manner similar to loading ISL.

Each processor contains two banks of PDC storage (128kB to 256kB each); only one bank is active at a time. The new version of PDC is checked, written into the inactive bank, and verified. The inactive bank is then switched to active status, and the active bank to inactive status. Future updates will simply switch back and forth between banks.

The following three PDC commands are provided to facilitate the update process:

Update <PDC filename> Initiates the update process and requires the user to specify the name of the update file.

Verify Verifies the PDC banks. Although an updated bank is always verified before control is transferred to it, the Verify command allows the user to reverify it whenever PDC commands are executable.

This command checksums both banks and displayes the results in the following format:

PDC BANK#	REV#	LOAD DATE	ACTIVATION DATE	CHECKSUM P0	P1	P2	P3	ACTIVE BANK
0	1.12	03/15/90	03/15/90	OK	OK			*
1	1.13	05/27/90		ERR	OK			

Note that **P0, P1, P2,** and **P3** (in the **CHECKSUM** column) represent processor numbers.

Xchange Allows the user to switch back to the previous version of PDC. All processors are affected, and all secondary banks are verified first. The process will abort if verification fails.

PDC Update Procedure (Single-Processor SPU)

The procedure for updating PDC on a single-processor system is:

1. Ready the disk or tape drive that the new PDC is to be read from. The PDC file must be in LIF format and of type 0xCF40 (-30300 octal).
2. Reset the system and wait for the message:

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

3. Answer `No` to this prompt and to the next one, until you get to the following message:

   `Enter boot path, command, or?>`

4. Type `Update <PDC filename>` (for example, `Update PDC113`).
5. The system will then ask for the path to the update device in a manner similar to that for the boot path. The first message will be:

   `Update from primary path (Y orN)?>`

   If you answer `No`, then the next question will be:

   `Update from alternate path (Y orN)?>`

   If you answer `No`, then tbe last question will be:

   `Enter update>`

6. A search is then made for the specified PDC file on the specified device.

   If the file is not found, the message is:

   `PDC file not found on specified device`

   If the file is found, it is loaded into memory and checksummed. If this test fails, the following message appears:

   `Checksum error in PDC image from IO device`

7. If the load to memory is successful, each processor is directed to write the new PDC into their secondary (inactive) PDC bank. Each processor checksums the the contents of its secondary bank, and one of the following messages is displayed for each active processor:

   `Processor 1 secondary FEPROM checksum test passed`

   or

   `Processor 1 secondary FEPROM checksum test failed`

8. If the load fails for any processor, the update is aborted and the following message will appear:

   `Update aborted. old PDC still active`

9. If all active processors load successfully, all processors are directed to switch banks. The slave processors then return to RENDEZ, and the following message appears:

   `Update successful, PDC revision 1.13 now active in Bank 1`

10. At this point, the PDC update is completed, and the PDC prompt will appear.

PDC Update Procedure (Multiprocessor SPU)

The procedure for updating PDC on a multiprocessor SPU is exactly the same as for a single-processor system, except when another processor is being added. In this case, a slightly different procedure is required to ensure that all processors start off executing the same version of PDC out of the same bank. For the following procedure, it is assumed that the new processor is set at the factory so that both PDC banks contain the latest PDC and that Bank 0 is active.

1. Perform the previously described single-processor PDC update procedure twice. Doing the procedure twice ensures that both banks in each active processor contain the latest version of PDC (i.e., the same version as in the processor board to be added).
2. Use the Xchange command, if necessary, to make Bank 0 active.
3. Turn power off and install the new processor board.
4. Turn power back on, and boot the system to the PDC prompt.
5. Use the Verify command to check PDC status.
6. If there is any doubt about which version of PDC is on the new processor, power down the system and remove all processor except for the new one. Use the Verify command to check the PDC version and active bank numbers for the new processor. If either the PDC version or bank number is different from the other processors, then update as necessary.

Completing System Installation

This procedure completes installation so that the System Administrator can take over the system.

Remote Support Modem

The remote support modem installations for the Series 950 Family and Model 850S Family systems are diagrammed in Figure 3-14 and Figure 3-15. Connect the remote support modem to the system, as follows:

1. Perform the installation and verification procedures outlined in the documentation that is supplied with the modem.
2. Connect a 92219Q cable between the modem and the RS-232C Junction Panel connector marked M (Remote Support Modem).
3. For a Series 950 Family system, connect the other 92219Q cable between the RS-232C Junction Panel connector marked DCE (Session Port) and the DTC (see Figure 3-14).
4. For a Model 850S Family system, connect the other 92219Q cable between the RS-232C Junction Panel connector marked DCE (Session Port) and connector 1M or 2M (see Figure 3-15).

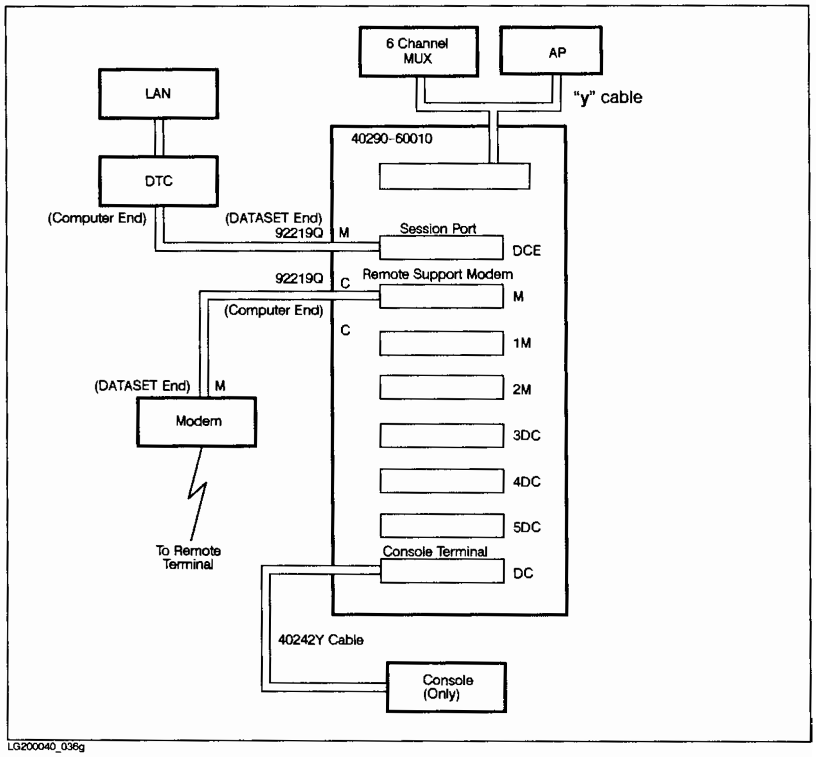


Figure 3-14. Remote Modem Cabling (Series 950 Family Systems)

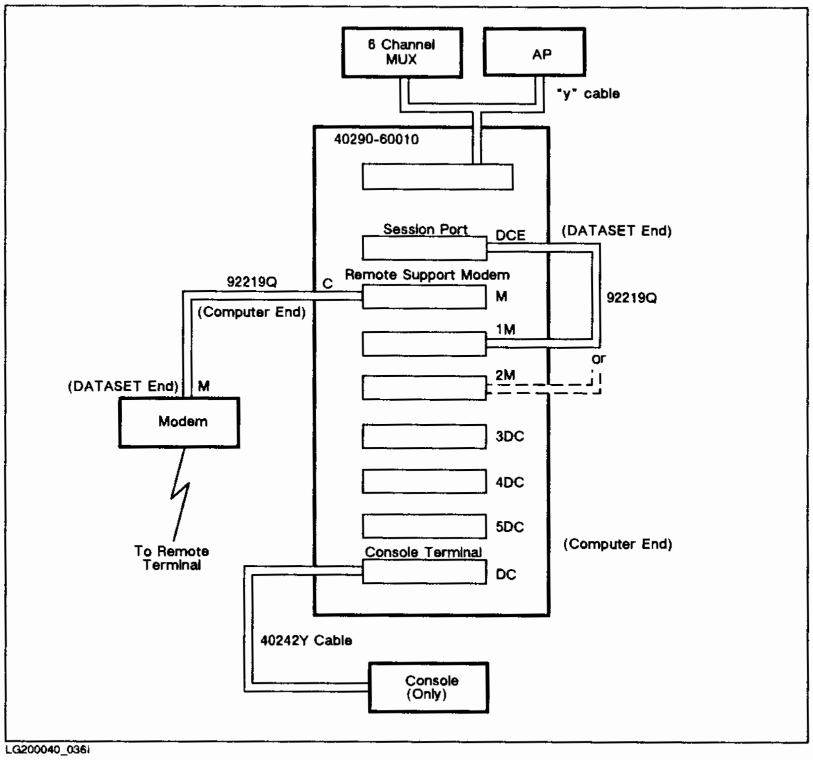


Figure 3-15. Remote Modem Cabling (Model 850S Family Systems)

Access Port Configuration

Note In the following display examples, user input is shown underlined.

Configure the Access Port (AP) as follows:

1. Enable the AP by turning the key switch on the control panel to CONSOLE ENABLED.
2. Press the CTRL and B keys simultaneously, on the system console, to obtain the CM> prompt.
3. From the system prompt CM> , enter the configure system remote support modem port command ca, as shown:

```
CM> ca
```

4. The system responds with the following display:

```
Current remote support modem port configuration:

   Bit rate                  1200 bits/sec
   Rate Select/CCITT 111     High rate (ON)
   System identification:   (name of system)

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

5. Enter Y in response to the prompt. The system displays a change menu as shown:

```
Enter your change.  <CR> retains the current value.

Current bit rate is 1200 bits/sec.  Select the new bit rate.
   (0=300, 1=1200, 2=2400, 3=4800, 4=9600): 1
Rate select (CCITT 111) is currently High rate (ON).  Choose the
new setting

   (H=high or ON, L=low or OFF): h
Current System identification: (name of system)
New system identification (limited to 1 to 24 displayable
characters or space for none): (name of system)

New configuration (takes effect at next remote connection):

   Bit rate                  1200 bits/sec
   Rate Select/CCITT 111     High rate (ON)
   System identification:   (name of system)
```

6. An N response to the prompt in step 2 returns the CM> prompt.

7. From the system prompt CM> , enable remote access by a remote console command `er`, as shown:

```
CM> er
```

8. The system responds with the following display:

```
Current remote console access configuration:

   Mode:               Multiple
   Password:          (current password)
   Password faults:    03

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

9. Enter Y in response to the prompt. The system displays a change menu as shown:

```
Enter your changes.  <CR> retains the current value.

Current mode: Multiple
  Select the new setting (S=single, M=multiple): m
Current password: (current password)
  New password (1 to 24 displayable characters or space if no
  password is to be required): (new password)
Current password fault limit: 03
  New number of password faults (Range: 099 or space, space or 0
  will permit unlimited password faults.): 03

New remote console access configuration:

   Mode:               Multiple
   Password:          (new password)
   Password faults:    03

Remote console access is now enabled
CM>
```

10. Disable remote console access by entering `dr`.

```
CM> dr
```

11. Next enter co. This command returns the console back to the console mode.

Contacting The System Administrator

At this point of the installation, all system hardware and the core system software are installed. The involvement of the installer is technically complete. The System Administrator (SA) should be contacted and informed that the system is ready for the following SA functions:

HP 3000 Series 950 Family Systems, MPE-XL (refer to the following manuals):

- *Startup and Shutdown* (P/N 32650-90034)
- *System Configuration* (P/N 32650-90042)
- *Localizing and Customizing System Information* (P/N 32650-90046)
- *Volume Management* (P/N 32650-90045)
- *Account Structure and Security* (P/N 32650-90041)
- *Managing Jobs and Sessions* (P/N 32650-90035)
- *Managing Peripherals* (P/N 32650-90037)

HP 9000 Model 850S Family Systems, HP-UX (Refer to the following chapters in the *HP 9000 Series 800 HP-UX System Administration Tasks Manual*, P/N 92453-90004):

- Chapter 4 - Customizing the HP-UX System
- Chapter 5 - General SA Tasks
- Chapter 6 - System Accounting
- Chapter 7 - System Reconfiguration

4

Troubleshooting

Introduction

This chapter provides procedures for troubleshooting the SPU and isolating failures to a single Field Repairable Unit (FRU).

Safety Considerations

Before proceeding with any maintenance or service on the system which requires physical contact with electrical or electronic components, ensure that power is removed and safety precautions are followed to protect against shock. Observe all "WARNING" labels on equipment and all electric discharge (ESD) precautions used for sensitive equipment. All service work must be done by qualified personnel.

Minimum Configuration

Verify that the system meets the minimum configuration stated in Table 4-1 below. In addition to the printed circuit assemblies (PCAs) and peripherals listed, the cabinet must contain a complete power system and control panel.

Note The minimum listed is the minimum system that will boot, not the minimum stated in any particular operating system specification or datasheet.

Table 4-1. Minimum Troubleshooting Configuration (950 Family/850S Family Systems)

Component	Minimum Quantity
SPU	1
Memory	16MB (HP-UX), 32MB (MPE-XL)
Memory Controller (MC)	1
Bus Converter (BC) and Channel Adapter (CA)	1 each
HP-IB Device Adapter	1
Access Port (AP)	1
6-port MUX (connected to system console via RS-232C junction panel)	1
System tape drive	1

Minimum Configuration for Series 980/Model 870S

For troubleshooting purposes, Series 980/Model 870S systems can be configured with one memory controller and all memory arrays installed in one memory cardcage, as listed in Table 4-1. In this case, memory interleaving, if present, has no effect (i.e., if interleaving is turned on, it is ignored).

Note

Model 870S Systems Only:

Interleaving is supported on Model 870S systems with HP-UX Release 8.0; interleaving is not supported on Model 870S systems with HP-UX Release 7.06. After the operating system has been upgraded to Release 8.0, interleaving can be turned on by using the **C I** PDC command, and then rebooting the system.

Memory Interleaving and Configuration PDC Commands

For troubleshooting Series 980/Model 870S systems that support interleaving, use the following PDC commands to configure memory and control the memory interleaving function. Note that after entering any of the following commands, the system must be rebooted for the command to take effect.

C I	Configure Interleaving (turn interleaving ON).
R I	Remove Interleaving (turn interleaving OFF).
C xy	Configure an array (x = MC#, y = memory array #)
R xy	Remove an array (x = MC#, y = memory array #)

Hardware Status Reporting

The system reports hardware status at several locations, as shown in Figure 4-1, below.

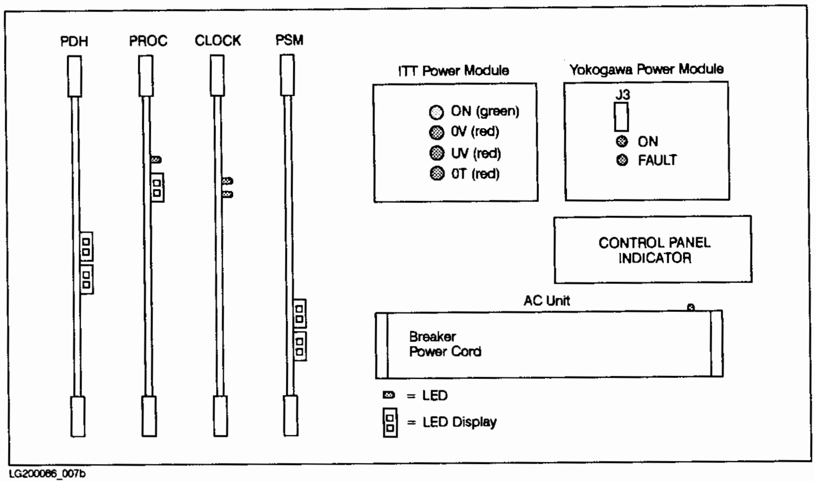


Figure 4-1. Status Display Locations

Interpreting ITT Power Module LEDs

ITT power modules have four LEDs that display status information as listed in Table 4-2.

Table 4-2. Interpreting ITT Power Module LEDs

Green ON	Red OV	Red UV	Red OT	Interpretation
1	0	0	0	Normal operation.
0	0	0	0	No input power, or not connected. Input fuse blown.
0	0	1	0	Unit latched off due to output undervoltage. Converter shut-down signal asserted by PSM.
0	0	1	1	Unit latched off due to overtemperature.
0	1	1	0	Unit latched off due to output overvoltage. Connector interlock open.
0	1	1	1	Overvoltage during overtemperature time-out; improbable.

Interpreting Yokogawa Power Module LEDs

The Yokogawa power modules have two LEDs (as shown in Figure 4-1). The green LED displays power status, and the red LED displays fault status, as listed in Table 4-3.

Note The BC/OBC has four LEDs, because it is a dual module.

Table 4-3. Interpreting Yokogawa Power Module LEDs

Green LED (Power)	Red LED (Fault)	Interpretation
On	Off	Normal operation.
On	On	Should never occur.
Off	On	Faulty Module (Overtemperature, under voltage, overvoltage).
Off	Off	No input of fault module.

Note A flashing or blinking LED indicates the supply has been shut off remotely (alarm control interface interlock open).

Interpreting Processor, PDH, and PSM LED Displays

For interpretation of the Processor, PDH, and PSM LED displays (see Figure 4-1), refer to the following tables:

Processor LEDs	Refer to Chapter 4A, Table 4A-3. (Note that Table 4A-3 applies only to Series 950/955/960 and Model 850S/855S/860S systems. Series 980/870S systems do not have a DIP Support Processor).
PDH LEDs	Refer to Chapter 4A, Table 4A-2.
PSM LEDs	Refer to Chapter 4A, Table 4A-1.

Interpreting Memory Array and Controller LEDs

The 16MB and 64MB memory arrays, and the Series 980/Model 870S memory controller, each have a green LED to indicate the card power status (not shown in Figure 4-1). The LED is normally ON to indicate that power from the battery backup unit (BBU) is turned on.

Caution The power-on LED will remain ON after main power has been turned off if the battery backup has not also been turned off. Be sure to turn off main power AND the battery backup unit before removing or installing cards.

Interpreting Auxiliary Energy Storage Module LEDs

The Auxiliary Energy Storage (AES) Module has one green LED which is ON during normal operation. The LED turns off if the 300VDC fuse is blown or if the voltage discharges below 40V (the brightness of the LED will start to dim slowly at about 55VDC as discharge continues to lower voltages).

Troubleshooting Flowcharts

To begin troubleshooting, proceed as follows:

1. Check the control panel hex display for any error code information.
2. Proceed through the following flowcharts, beginning with Figure 4-2.

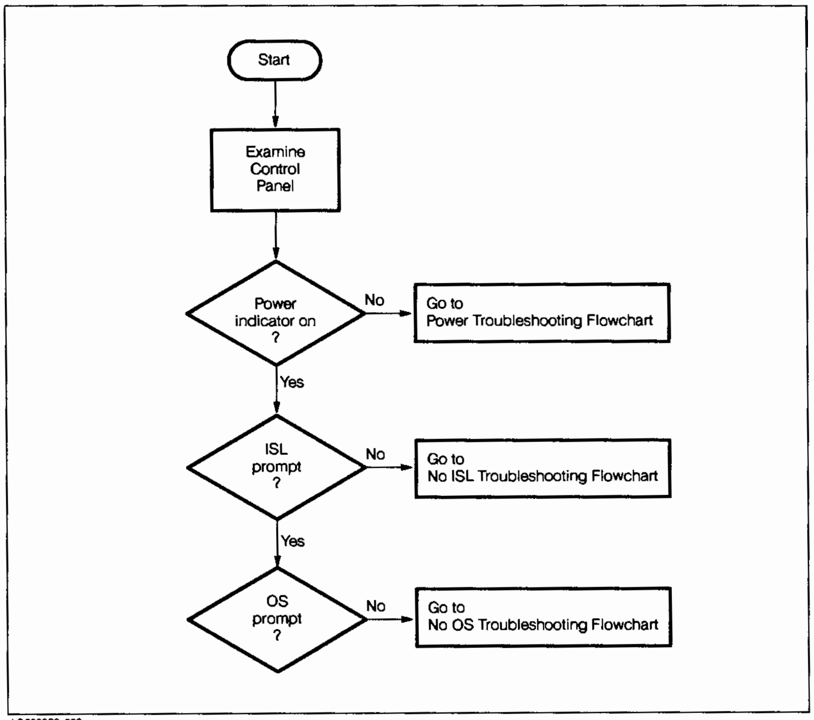


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Figure 4-2. Main Troubleshooting Flowchart

Unable to Power Up

The primary components of the power system are the ferro-resonant transformers, AC Unit, Power Modules and Power Supply Monitor card. To isolate the FRU, follow the steps given in Figure 4-3, Figure 4-4, and Figure 4-5.

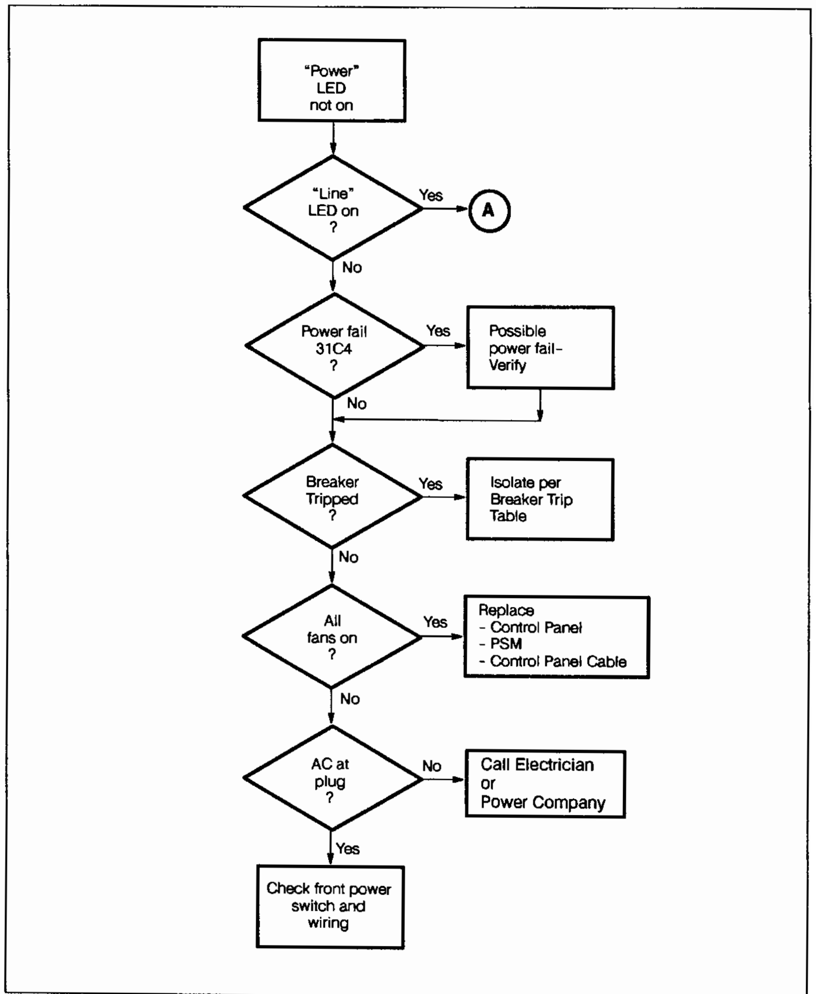

Figure 4-3. Power Troubleshooting Flowchart, Part 1 of 3

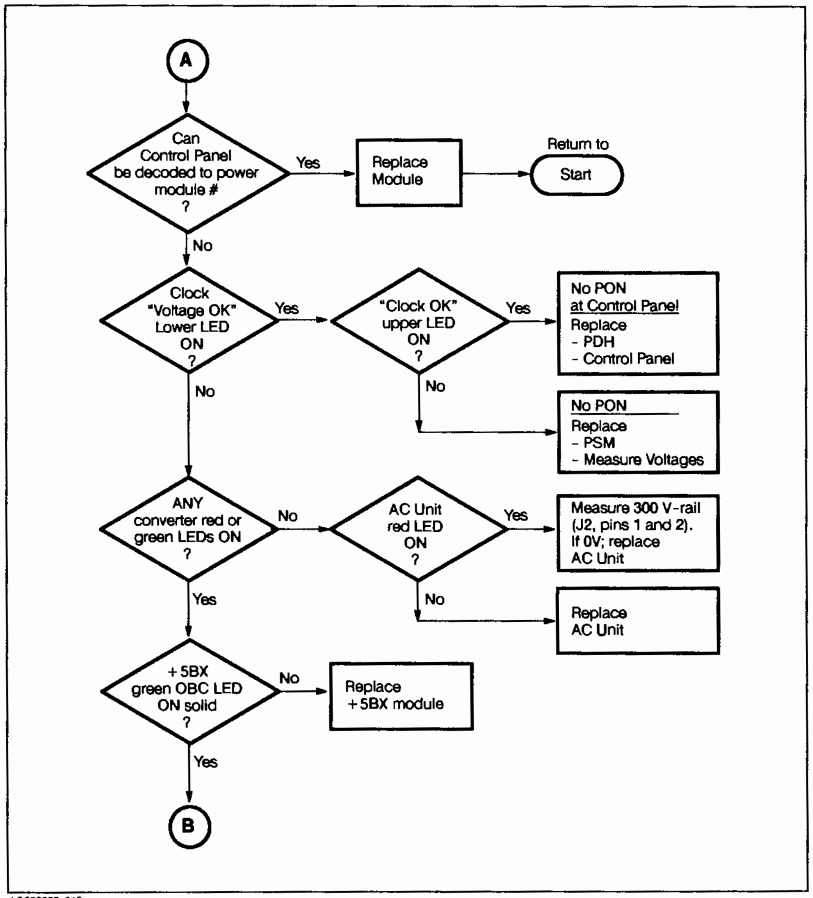

Figure 4-4. Power Troubleshooting Flowchart, Part 2 of 3

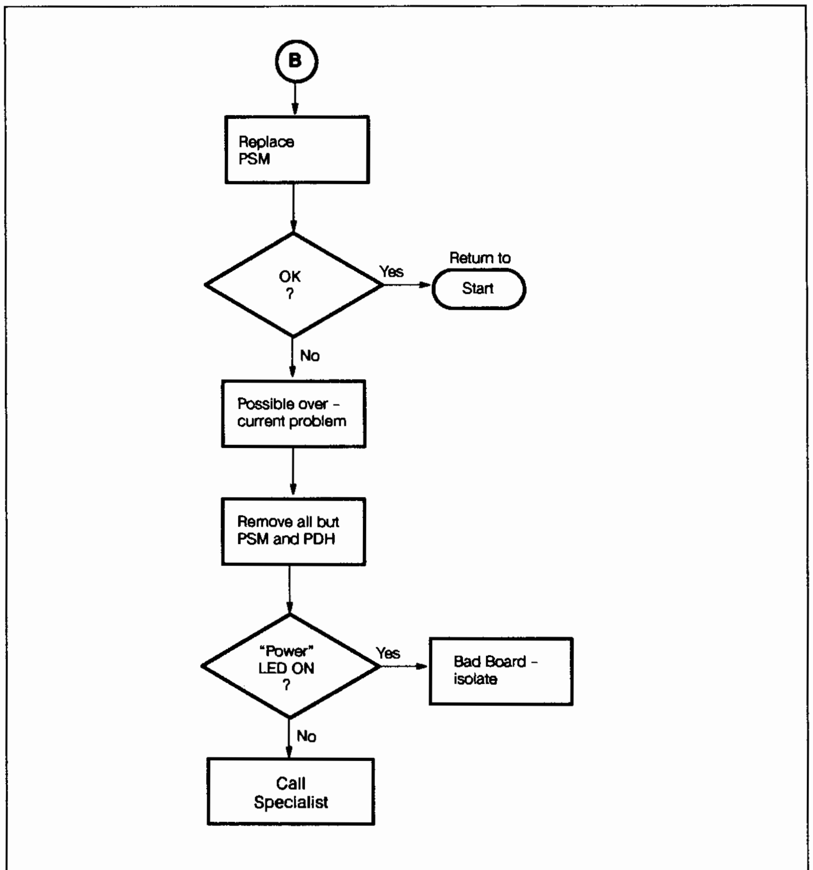

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Figure 4-5. Power Troubleshooting Flowchart, Part 3 of 3

System initialization events map to the hexadecimal displays and status indicators, as shown in Table 4-5. To identify error codes, refer to Chapter 4A.

Isolating Breaker Trip Faults

The following Table 4-4 identifies possible FRU faults that will cause the power breaker to trip.

Table 4-4. Isolating Breaker Trip Faults

Fault	Fault Isolation
PSM	A faulty PSM will cause the power breaker to trip—verify that the PSM is functional.
Transformer/Rectifier Overtemperature	Error 31C7. Verify that all phases of input power are available. Make sure that phase wiring is correct and that all connections are tight. Check fans in Power Bay.
300 V Undervoltage	Error 31C4. Verify power source—if the input power is low, the 300 V dc level may fall below 170 V dc.
300 V Overvoltage	Error 31C4. Verify the 300 V dc level—normal operating range is 240 to 330 V dc.
Alarm PCA	AC Unit faulty. Replace.

Table 4-5. System Initialization Events

Event	Observation
Main (front) power switch\AC power breaker switched to on.	Control Panel AC Line LED is on.
Bias voltage and fans come up.	PSM self-test begins with `A0` display.
PSM microcontroller chip self-test passes.	+/-12V module green LED is on, PSM Status Code `A3`, if the voltage is correct.
PSM allows +5V to turn on.	+5V module green LED is on.
PSM checks Vbg for correct voltage range.	PSM Status Code `C2/3`, if faulty.
PFW- and PON+ are generated.	PSM Status Code `AF`.
PFW- negated, then VLSI clock circuits start.	Clock PCA green LED is on.

Power-Fail Recovery Failure

If the Run, Check, Fault, red and yellow Temp, and Battery indicators on the control panel do not light during the control panel check portion of the self-test, check the 28V fuse on the battery backup unit.

Parallel Power Module Fault Isolation

Observe the LEDs on the power modules, then refer to Table 4-6 below, to isolate the faulty module.

Table 4-6. Power Module Fault Isolation Using Power Module LEDs

Module 1 LEDs				Module 2 LEDs				Condition
CNV-ON	**OV**	**UV**	**OT**	**CNV-ON**	**OV**	**UV**	**OT**	
ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	Normal Operation
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	No input power or fuse
OFF	OFF	ON	OFF	OFF	ON	OFF	OFF	Overcurrent: Module 1 bad
OFF	ON	OFF	OFF	OFF	OFF	ON	OFF	Overcurrent: Module 2 bad
OFF	ON	ON	OFF	OFF	ON	ON	OFF	OV Interlock

With parallel power modules, if the LEDs are not conclusive in isolating a defective module, proceed with the following steps. When one parallel modules fails, rail voltage will drop because the remaining functional module can not carry the system load.

1. Power OFF the SPU and remove all I/O, memory, processor, and clock boards. This will reduce overall system load so that one functional module is adequate to carry the load.
2. Disconnect the alarm control interface connector and the bus bar from one of the modules. Also disconnect the 300 V rail DC inputs.

Caution Failure to disconnect the module as described may result in damage to the module.

3. Power ON the SPU and measure the +5 V level on the PSM PCA (acceptable range: 4.85 to 5.05 V). Observe that the Green LED is blinking on the disconnected module.
4. If the voltage measurement is within the acceptable range, the disconnected module is probably defective; if the measurement falls outside the acceptable range, then the module being tested is probably defective. This may be verified by repeating these steps with the modules in swapped positions.
5. Replace the defective module and return the system to normal operation.

Verify Power Supply Components

The PSM card hex display and voltage test points provide valuable status information. Examine the PSM status display to determine failed power supply FRUs. Refer to Chapter 4A to identify error and status codes. Voltage test points are shown in Table 4-7.

Table 4-7. PSM Voltage Test Points

Test Point	Voltage Range	Source Description
PFW-	<0.8V DC	Power Fail Warning (true low)
PON+	>2.4V DC	Power On (true high)
GND		Digital Ground on PSM Board
+28X(0)	28.2V to 28.8V	+28V 0-section battery/battery charger voltage
+28Y(1)	28.2V to 28.8V	+28V 1-section battery/battery charger voltage
+5BX(0)	4.85V to 5.05V	+5V 0-section battery backup voltage
+5BY(1)	4.85V to 5.05V	+5V 1-section battery backup voltage
+5	5.05V to 5.15V	+5V Processor Bay backplane voltage
+12	11.8V to 12.2V	+12V Processor Bay backplane voltage
GND		Digital Ground on PSM Board
-12	-11.8V to -12.2V	-12V Processor Bay backplane voltage
-2	-1.5V to -2.7V	-2 Volt Vbg bias PSM regulator voltage
+5A	5.05V to 5.15V	+5V auxiliary I/O backplane voltage
+12A	11.8V to 12.2V	+12V auxiliary I/O backplane voltage
-12A	-11.8V to -12.2V	-12V auxiliary I/O backplane voltage

Cardcage Buildup

Starting with all cards removed, a faulty card may be determined by systematically adding one card after another until an error code is displayed or a breaker trips. Follow Table 4-8 beginning with the PSM.

Note

Without the PSM installed, the power breaker will trip; this is a normal condition. The PSM must be installed and functional to proceed through the following table.

Table 4-8. Isolating a Faulty Card by Cardcage Buildup

Card Installed	PSM	PDH	Display Clock	Proc	CP	Section Tested
PSM	0/F				Line	Power, PSM
PDH	0/F	0/F			3200	PDH internal test
Clock	0/F	0/F	ON		1000	Clock
Proc	0/F	0/F	ON	D/E	7000	Proc, DSP*
MC0	0/F	0/F	ON	F	7030	Proc-PDC data path
MA0	0/F	0/F	ON	F	9023	Memory
BC0+AP	0/F	0/F	ON	F	C400	Access Port, Banner
CA+HPIB	0/F	0/F	ON	F	C400	Boot ISL
MUX	0/F	0/F	ON	F	C401	Boot OS

* No DSP on Series 980/Model 870S SPUs.

Unable to Load ISL

This procedure assumes that the SPU passes self-test. Refer to Figure 4-6, Figure 4-7, Figure 4-8, and the Error Codes listed in Chapter 4A for steps to isolate the failed FRU.

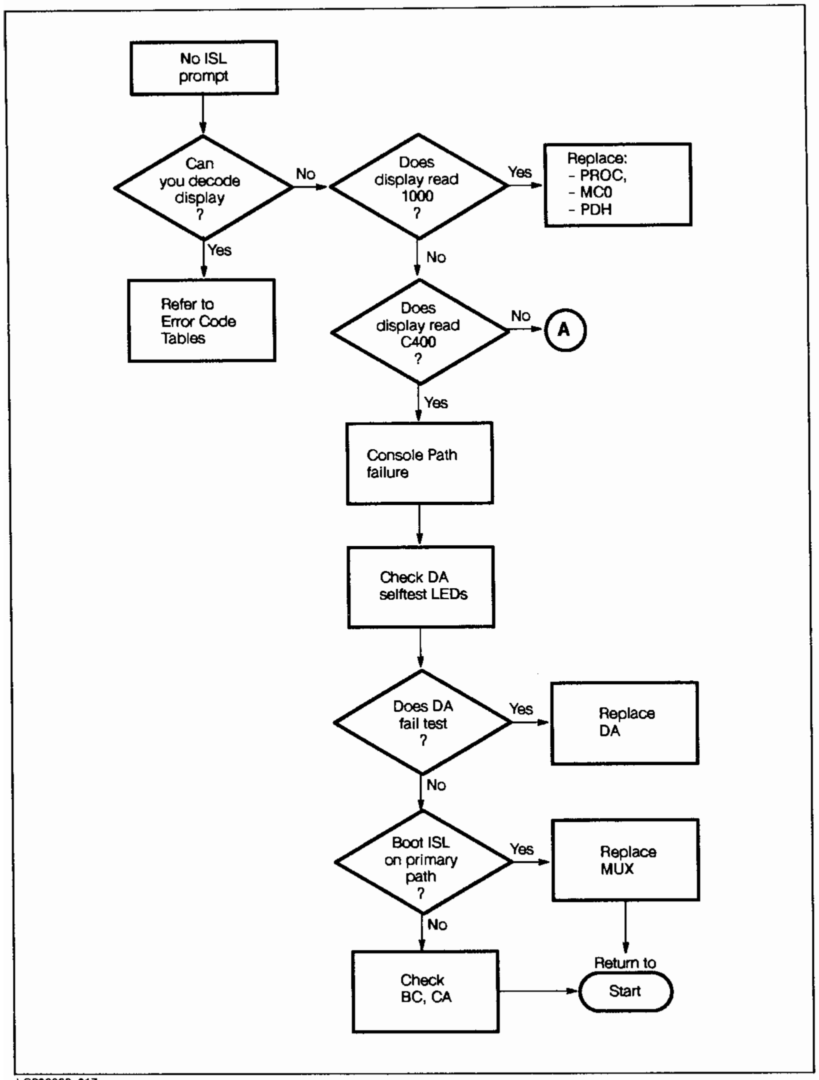

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Figure 4-6. No ISL Prompt Troubleshooting Flowchart, Part 1 of 3

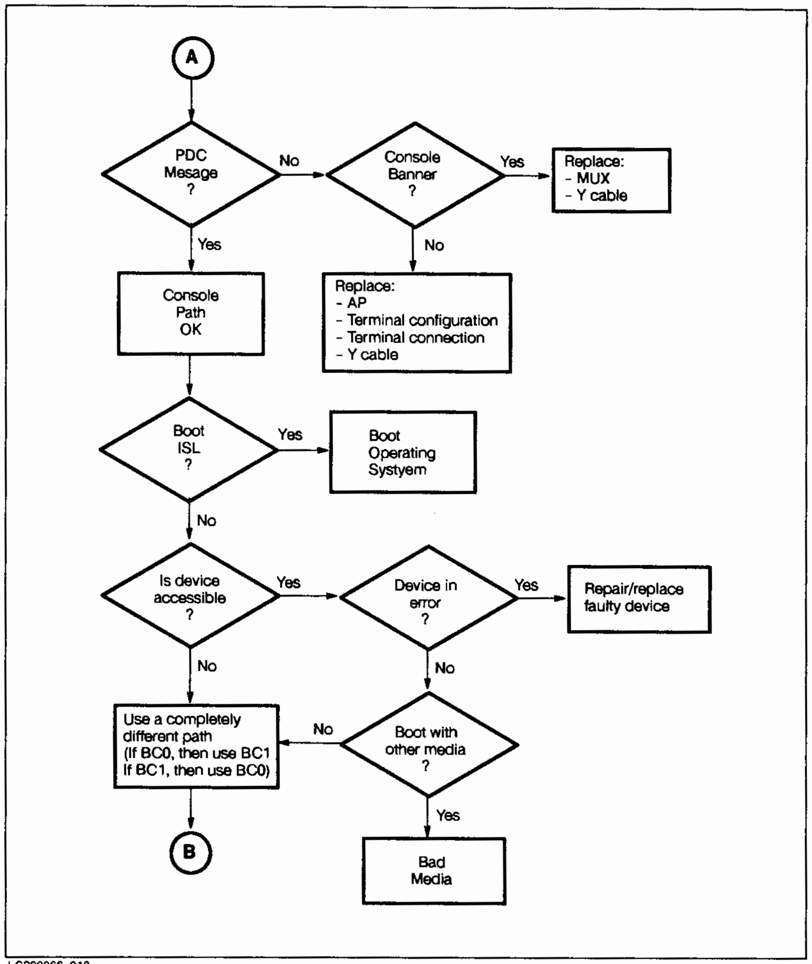

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Figure 4-7. No ISL Prompt Troubleshooting Flowchart, Part 2 of 3

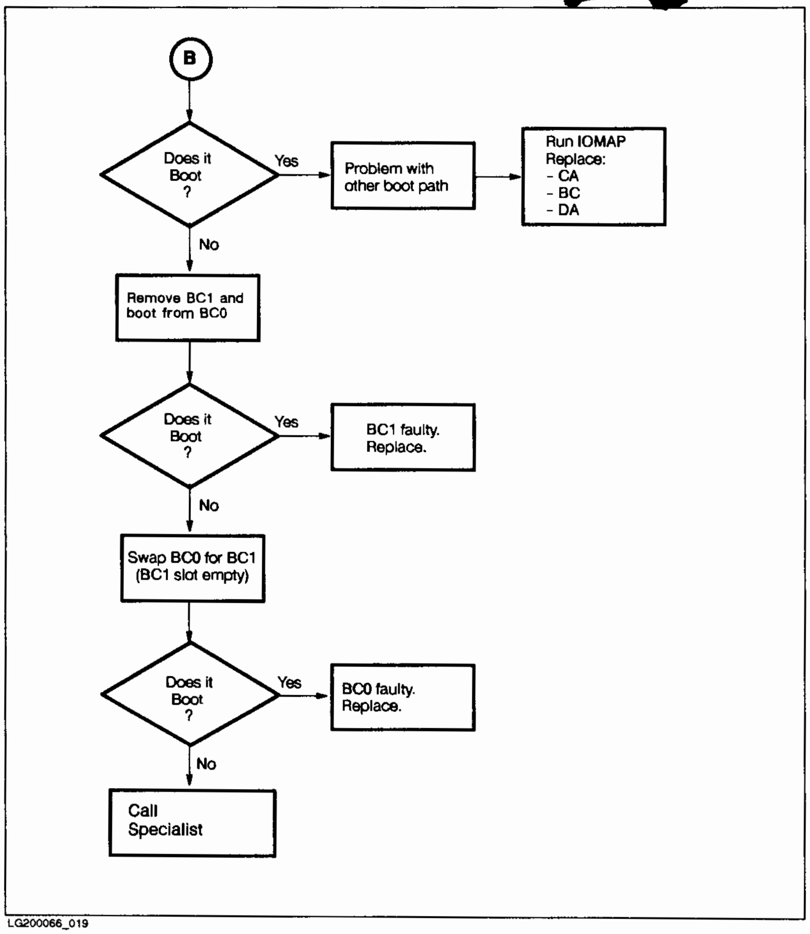


Figure 4-8. No ISL Prompt Troubleshooting Flowchart, Part 3 of 3

Unable to Load Operating System

If the system can execute the ISL diagnostics, use them to check the disk and memory subsystems. Once these subsystems operate correctly, run the Online diagnostic system for further troubleshooting. Refer to Figure 4-9, Figure 4-10, and the Error Codes listed in Chapter 4A for steps to isolate the failed FRU.

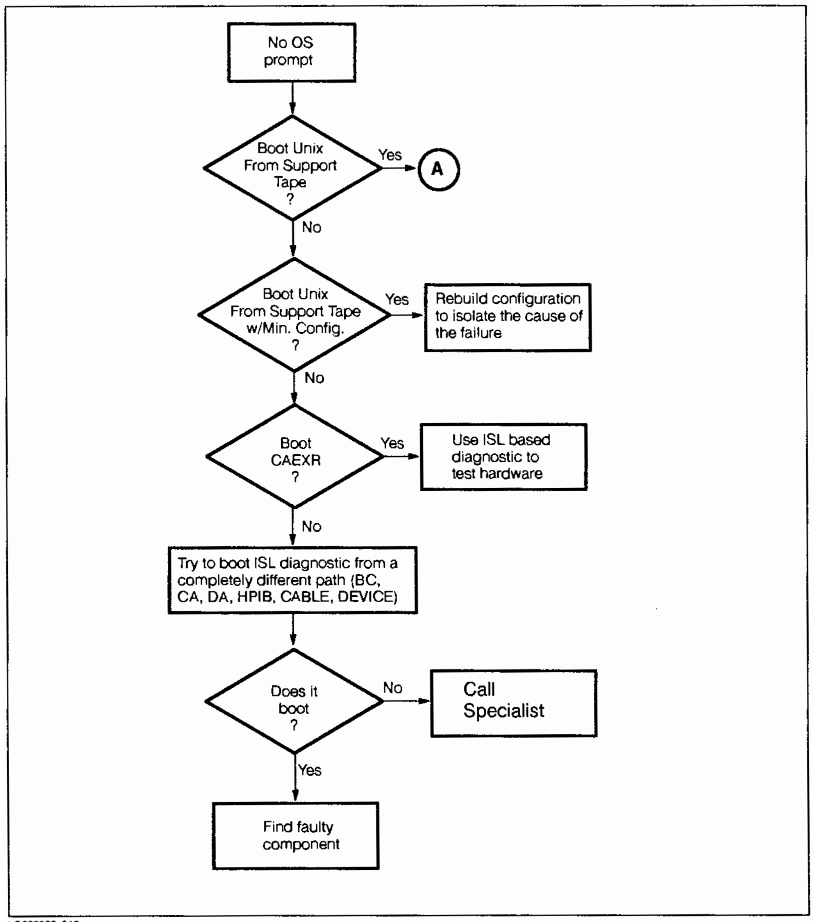


Figure 4-9. No OS Prompt Troubleshooting Flowchart, Part 1 of 2

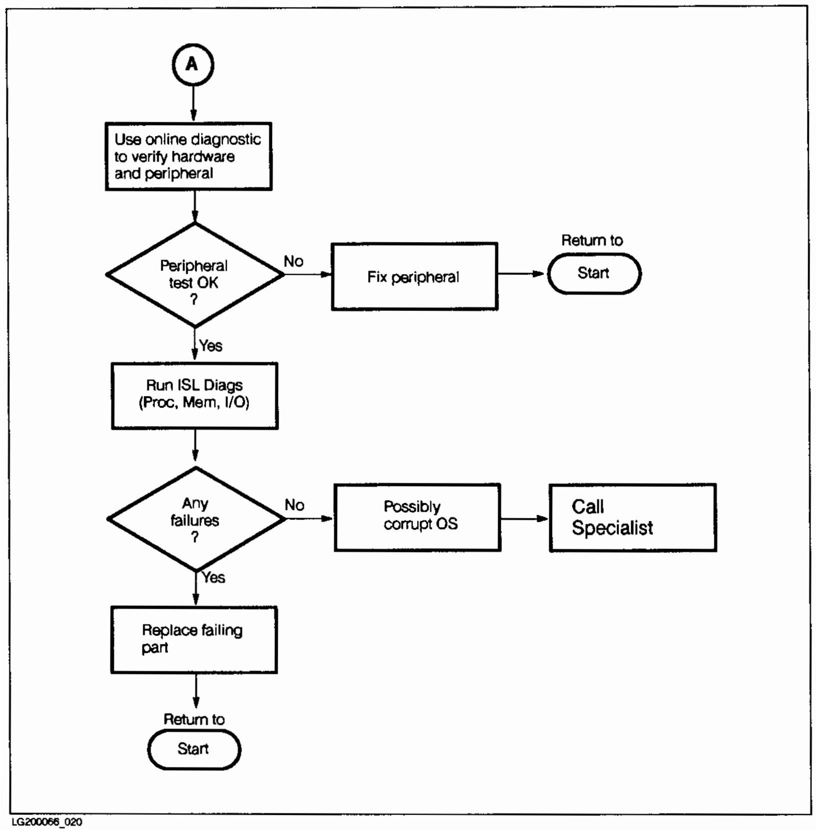


Figure 4-10. No OS Prompt Troubleshooting Flowchart, Part 2 of 2

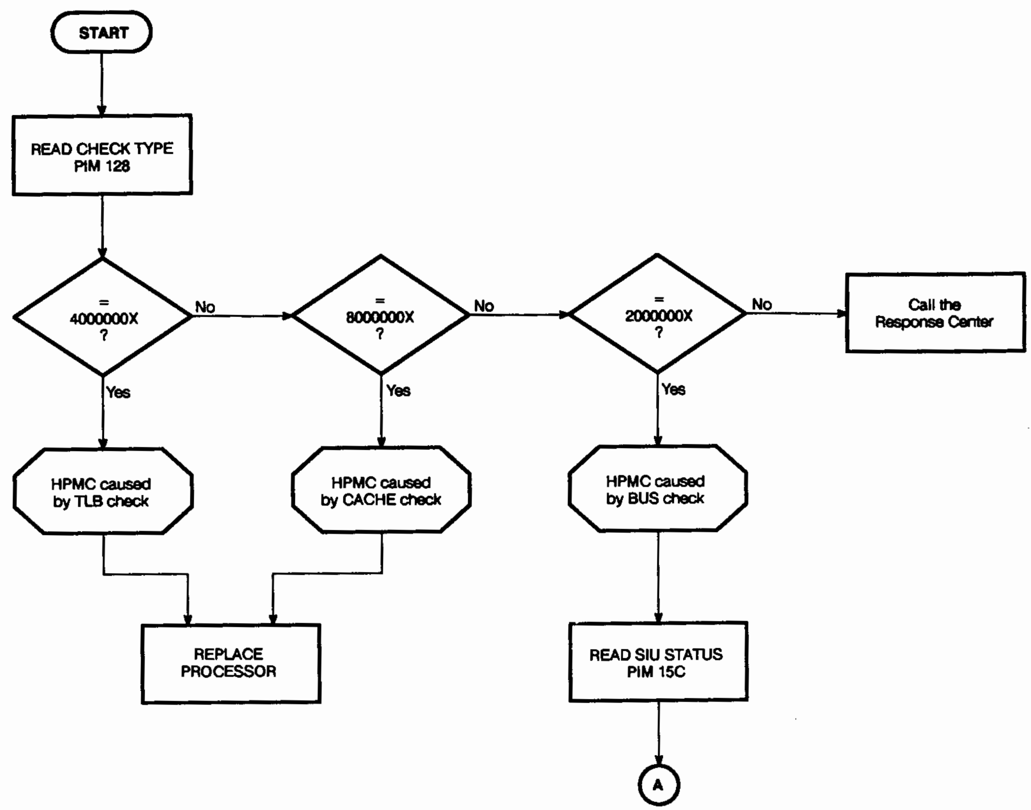
HPMC Troubleshooting

The High Priority Machine Check troubleshooting flowcharts are used to decode tombstone message information. Following the set of HPMC flowcharts is a listing of address cross-references for determining the module at the indicated address.

Note that the notation **Go To Decode** refers to the subroutine flowchart shown in Figure 4-16. If using the HPMC flowcharts does not solve the problem, call the nearest Responsė Center for assistance.

Note

The HPMC troubleshooting flowchart shown in Figure 4-11 through Figure 4-16 applys only to Series 950/955/960 and Model 850S/855S/860S systems.



Note:

This flowchart applies only to Series 950, 955, 960 and Model 850S, 855S, 860S systems

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Figure 4-11. HPMC Troubleshooting Flowchart, Part 1 of 6

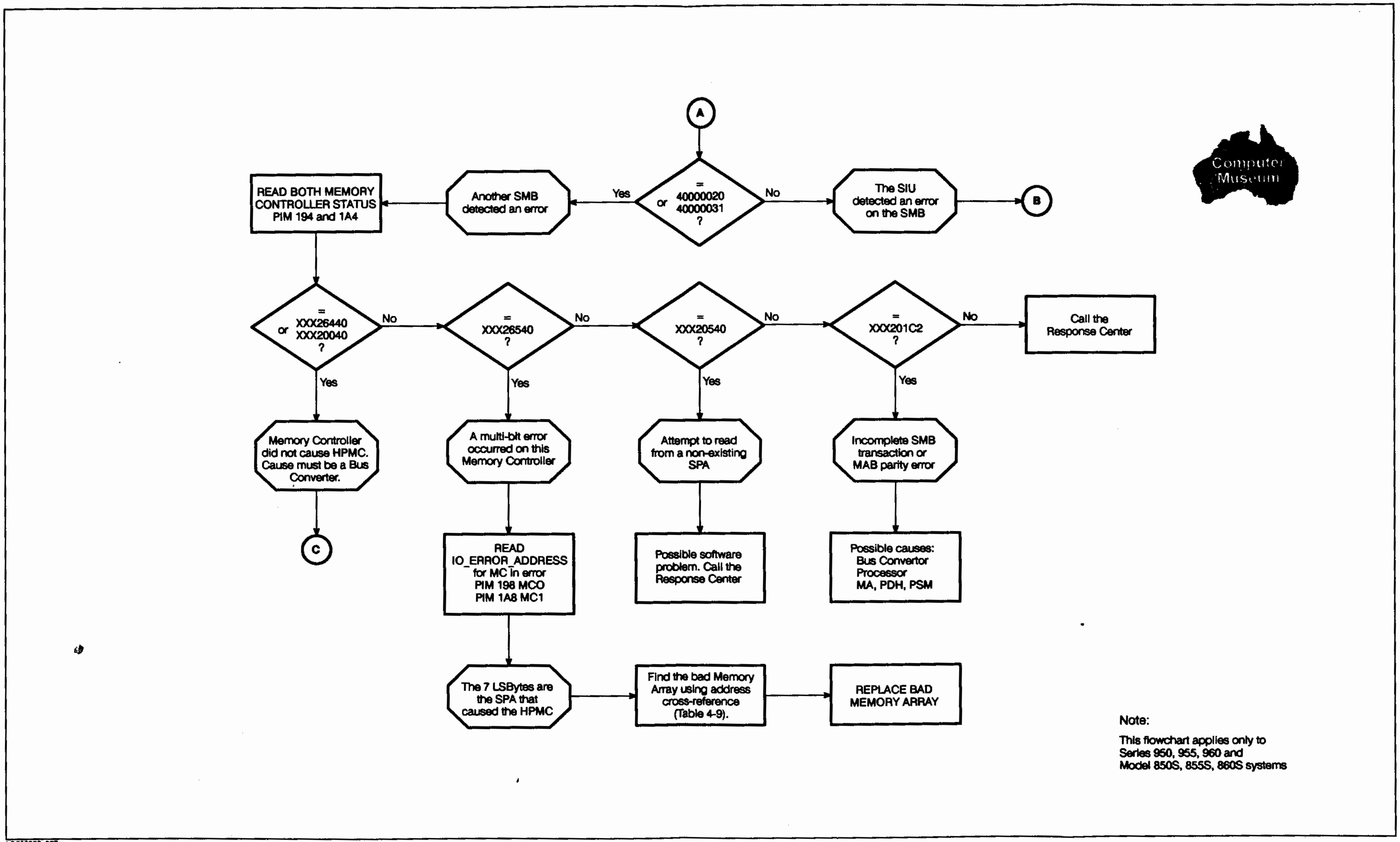


Figure 4-12. HPMC Troubleshooting Flowchart, Part 2 of 6

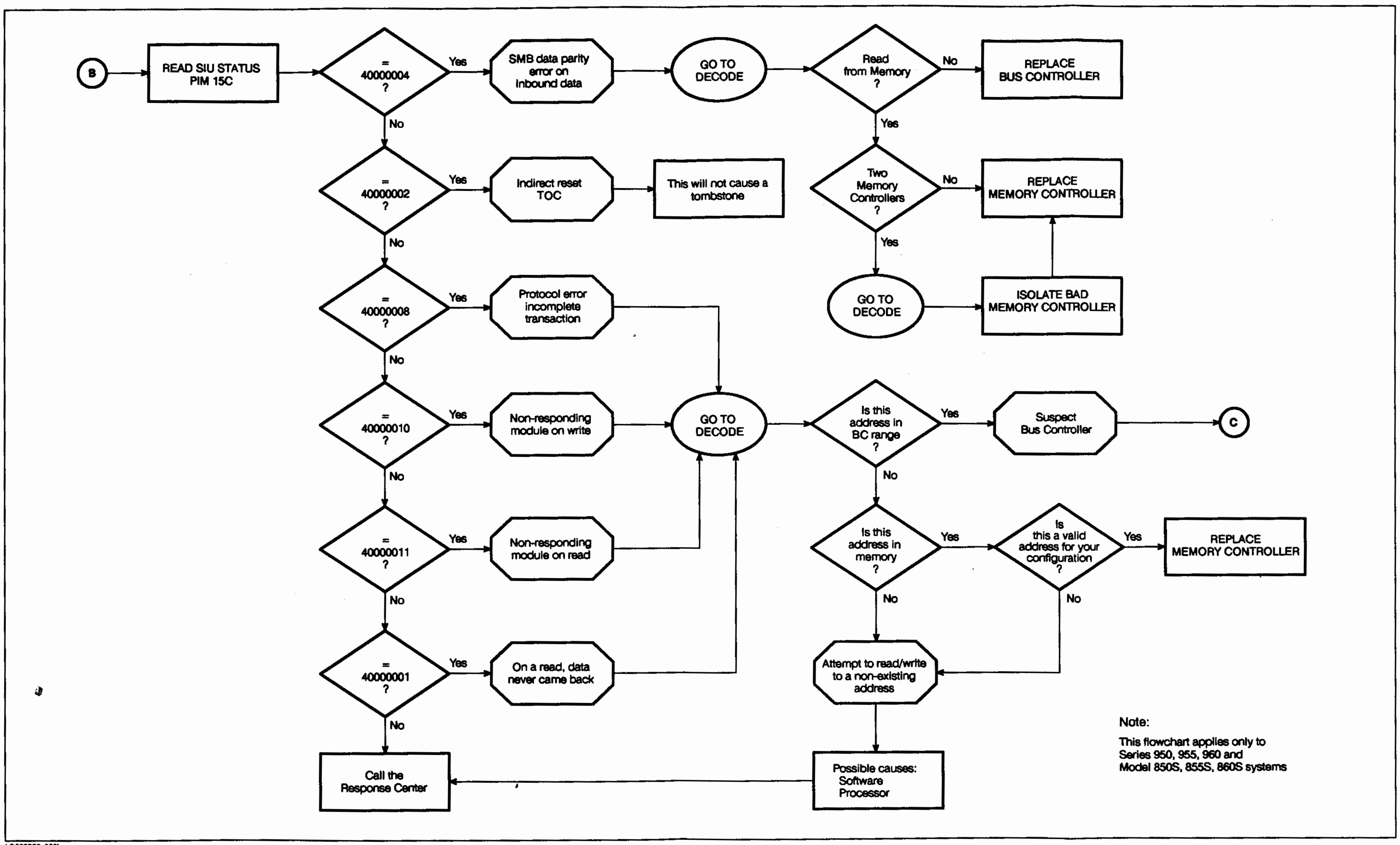


Figure 4-13. HPMC Troubleshooting Flowchart, Part 3 of 6

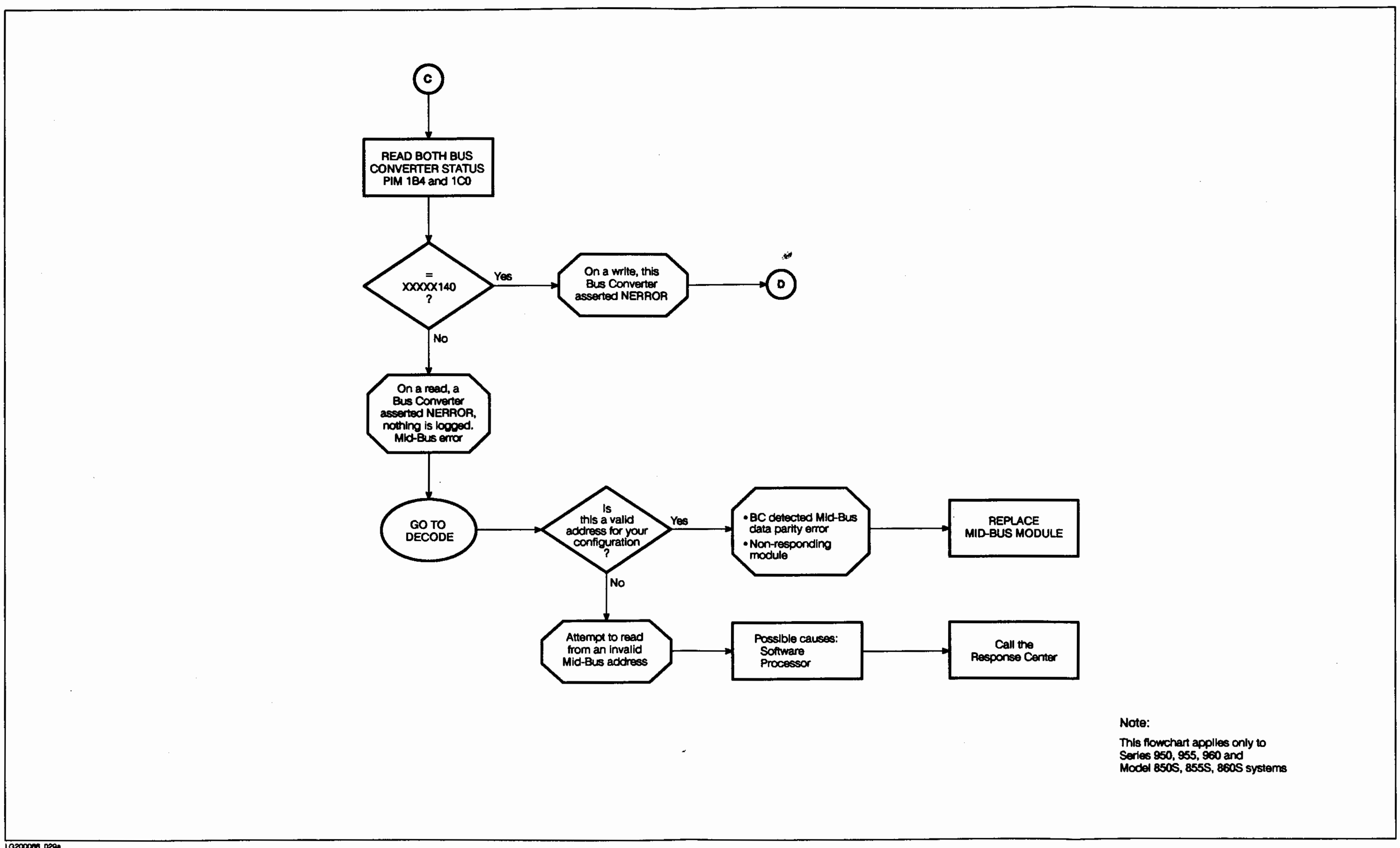


Figure 4-14 HPMC Troubleshooting Flowchart, Part 4 of 6

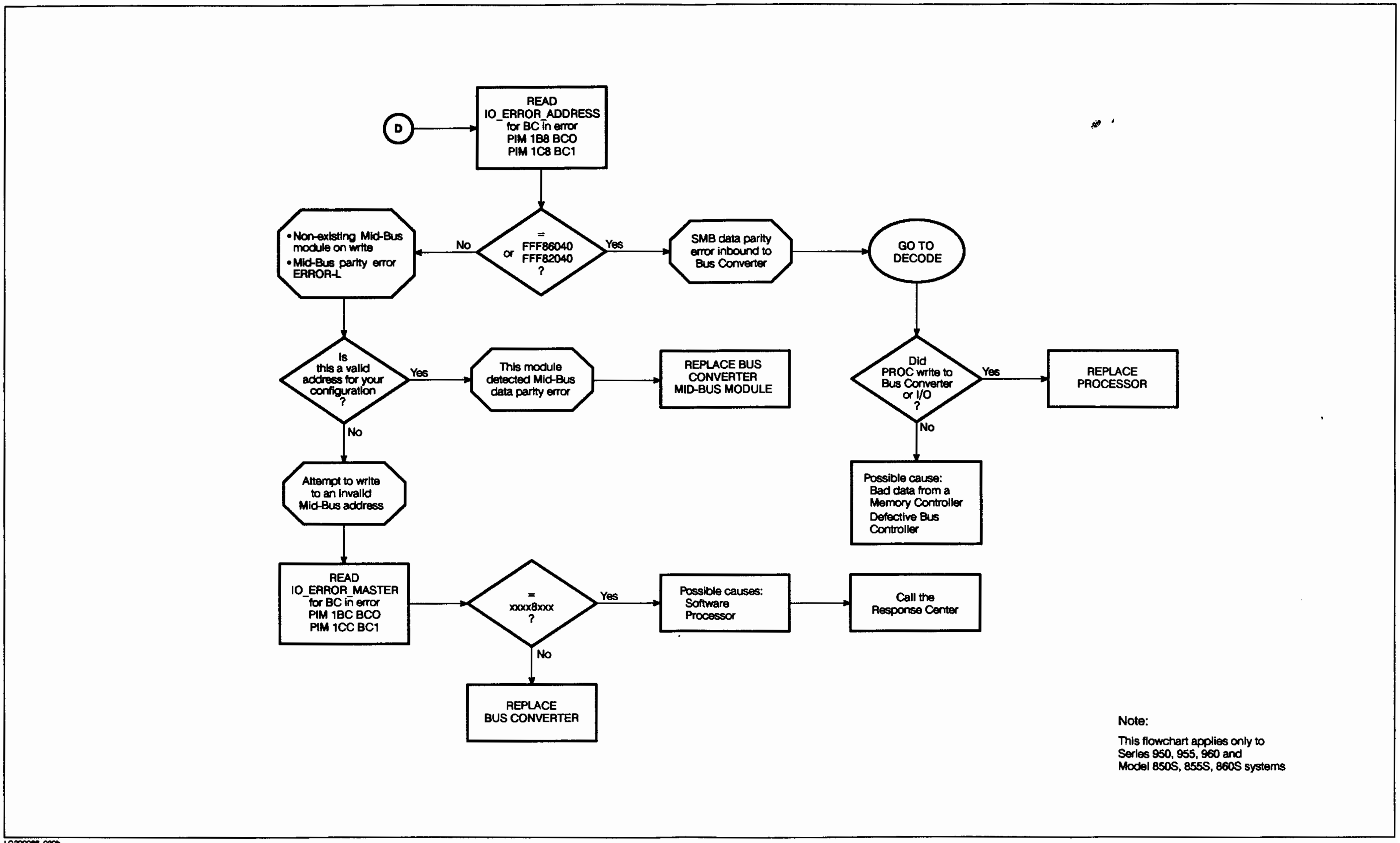


Figure 4-15. HPMC Troubleshooting Flowchart, Part 5 of 6

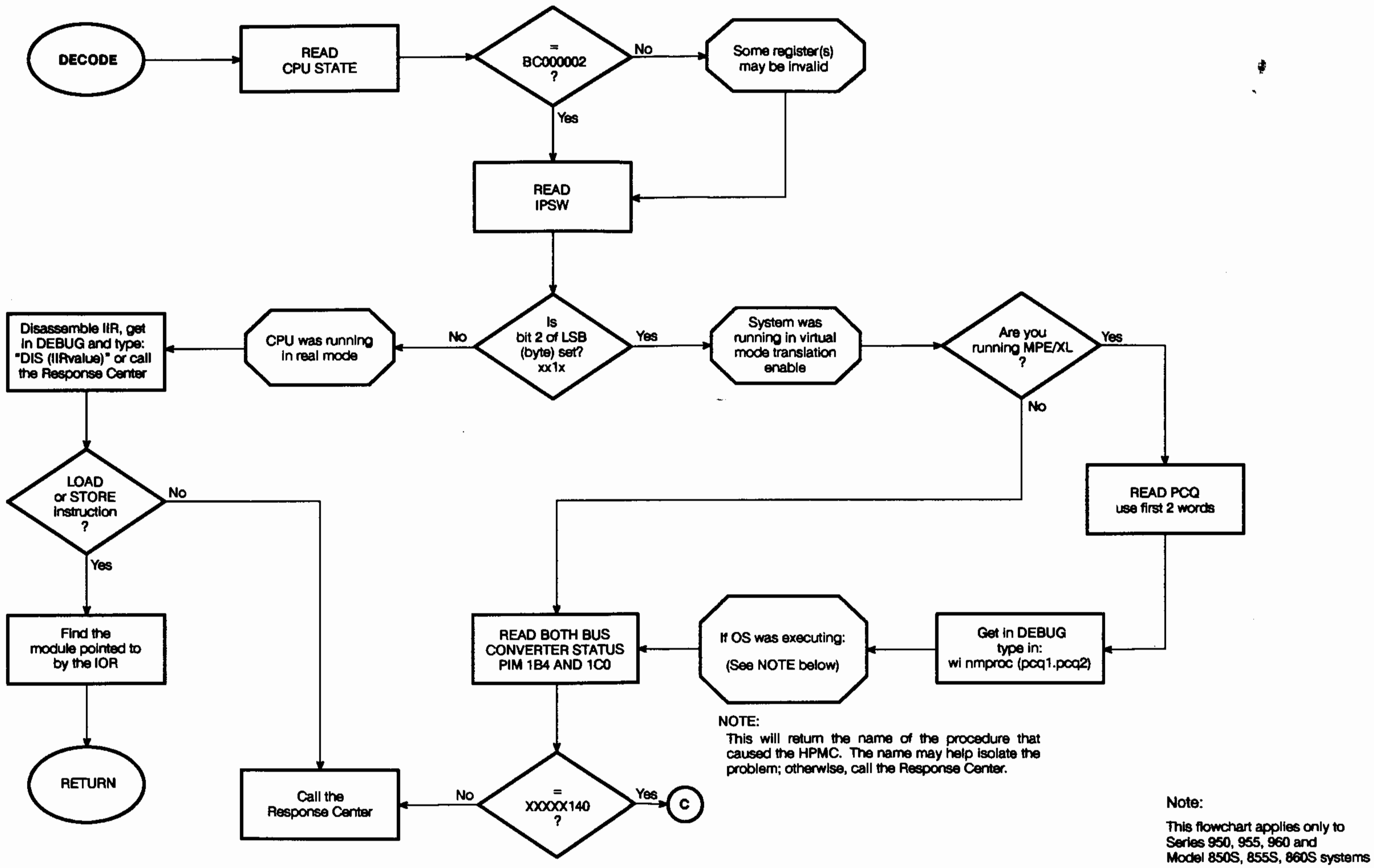


Figure 4-16. HPMC Troubleshooting Flowchart, Part 6 of 6

Table 4-9. Address Cross-Reference

Address	Module
00000000 - 00FFFFFF	Memory Array 0 address range
01000000 - 01FFFFFF	Memory Array 1 address range
02000000 - 02FFFFFF	Memory Array 2 address range
03000000 - 03FFFFFF	Memory Array 3 address range
04000000 - 04FFFFFF	Memory Array 4 address range
05000000 - 05FFFFFF	Memory Array 5 address range
06000000 - 06FFFFFF	Memory Array 6 address range
07000000 - 07FFFFFF	Memory Array 7 address range
08000000 - 08FFFFFF	Memory Array 8 address range
09000000 - 09FFFFFF	Memory Array 9 address range
0A000000 - 0AFFFFFF	Memory Array 10 address range
0B000000 - 0BFFFFFF	Memory Array 11 address range
0C000000 - 0CFFFFFF	Memory Array 12 address range
0D000000 - 0DFFFFFF	Memory Array 13 address range
0E000000 - 0EFFFFFF	Memory Array 14 address range
0F000000 - 0FFFFFFf	Memory Array 15 address range
1F000000 - 23000000	PDC code branch to HPMC handler
1F000004	PDC code branch to selftest
F1000000 - FFFFFFFF	I/O space
FFF30000 - FFF80000	BC0 address range on MPEXL
FFF40000 - FFF43FFF	BC0 register range (MID BUS side):
20	flex
34	io status
40	io error address
48	io error master
FFF44000 - FFF447FF	CA slot 1 HPA range:
04	io eim
08	iodc addr\data
20	flex
24	io spa
30	io command
34	io status
40	interrupt
48	chain ram base
4C	sub mask clr
50	sub mask set
58	diagnostic
5C	reset address
60	reset data

Table 4-9. Address Cross-Reference (continued)

Address	Module
FFF48000 - FFF487FF	CA slot 2 HPA range:
04	io eim
08	iodc addr\data
20	flex
24	io spa
30	io command
34	io status
40	interrupt
48	chain ram base
4C	sub mask clr
50	sub mask set
58	diagnostic
5C	reset address
60	reset data
FFF4C000 - FFF4C7FF	CA slot 3 HPA range:
04	io eim
08	iodc addr\data
20	flex
24	io spa
30	io command
34	io status
40	interrupt
48	chain ram base
4C	sub mask clr
50	sub mask set
58	diagnostic
5C	reset address
60	reset data
FFF50000 - FFF507FF	CA slot 4 HPA range:
04	io eim
08	iodc addr\data
20	flex
24	io spa
30	io command
34	io status
40	interrupt
48	chain ram base
4C	sub mask clr
50	sub mask set
58	diagnostic
5C	reset address
60	reset data

Table 4-9. Address Cross-Reference (continued)

Address	Module
FFF54000 - FFF547FF	CA slot 5 HPA range:
04	io eim
08	iodc addr\data
20	flex
24	io spa
30	io command
34	io status
40	interrupt
48	chain ram base
4C	sub mask clr
50	sub mask set
58	diagnostic
5C	reset address
60	reset data
FFF58000 - FFF587FF	CA slot 6 HPA range:
04	io eim
08	iodc addr\data
20	flex
24	io spa
30	io command
34	io status
40	interrupt
48	chain ram base
4C	sub mask clr
50	sub mask set
58	diagnostic
5C	reset address
60	reset data
FFEC0000 - FFF30000	BC1 address range on MPEXL
FFEC0000 - FFEC3FFF	BC1 register range (MID BUS side):
20	flex
34	io status
40	io error address
48	io error master

Table 4-9. Address Cross-Reference (continued)

Address	Module
FFEC4000 - FFEC47ff	CA slot 1 HPA range:
04	io eim
08	iodc addr\data
20	flex
24	io spa
30	io command
34	io status
40	interrupt
48	chain ram base
4C	sub mask clr
50	sub mask set
58	diagnostic
5C	reset address
60	reset data
FFEC8000 - FFEC87FF	CA slot 2 HPA range:
04	io eim
08	iodc addr\data
20	flex
24	io spa
30	io command
34	io status
40	interrupt
48	chain ram base
4C	sub mask clr
50	sub mask set
58	diagnostic
5C	reset address
60	reset data
FFECC000 - FFECC7FF	CA slot 3 HPA range:
04	io eim
08	iodc addr\data
20	flex
24	io spa
30	io command
34	io status
40	interrupt
48	chain ram base
4C	sub mask clr
50	sub mask set
58	diagnostic
5C	reset address
60	reset data

Table 4-9. Address Cross-Reference (continued)

Address	Module
FFED0000 - FFED07FF	CA slot 4 HPA range:
04	io eim
08	iodc addr\data
20	flex
24	io spa
30	io command
34	io status
40	interrupt
48	chain ram base
4C	sub mask clr
50	sub mask set
58	diagnostic
5C	reset address
60	reset data
FFED4000 - FFED47FF	CA slot 5 HPA range:
04	io eim
08	iodc addr\data
20	flex
24	io spa
30	io command
34	io status
40	interrupt
48	chain ram base
4C	snb mask clr
50	snb mask set
58	diagnostic
5C	reset address
60	reset data
FFED8000 - FFED87FF	CA slot 6 HPA range:
04	io eim
08	iodc addr\data
20	flex
24	io spa
30	io command
34	io status
40	interrupt
48	chain ram base
4C	sub mask clr
50	sub mask set
58	diagnostic
5C	reset address
60	reset data

Table 4-9. Address Cross-Reference (continued)

Address	Module
FFF80000 - FFF80FFF	MC0 HPA range:
08	iodc Addr/Data
20	flex
24	SPA address
30	io command
34	io status
38	io control
40	io error adress
44	io error syndrome
80	io mbmask0
84	io mbmask1
88	io mbconf0
8C	io mbconf1
90	io spamask
C0	io memconf
E0	io merrhpa
E4	io merradr
E8	io rfwptag
EC	io wfwptag
FFF81000 - FFF81FFF	MC1 HPA range:
08	iodc Addr/Data
20	flex
24	SPA address
30	io command
34	io statns
38	io control
40	io error address
44	io error syndrome
80	io mbmask0
84	io mbmask1
88	io mbconf0
8C	io mbconf1
90	io spamask
C0	io memconf
E0	io merrhpa
E4	io merradr
E8	io rfwptag
EC	io wfwptag

Table 4-9. Address Cross-Reference (continued)

Address	Module
FFF82000 - FFF82FFF	BC0 HPA range:
08	iodc addr/data
30	io command
34	io status
38	io control
40	io error address
48	io error master
78	io io lo
7C	io io hi
FFF86000 - FFF86FFF	BC1 HPA range:
08	iodc addr/data
30	io command
34	io status
38	io control
40	io error address
48	io error master
78	io io lo
7C	io io hi
FFF88000	Proc 0 HPA
FFF89000	Proc 1 HPA
FFF8A000	Proc 2 HPA
FFF8B000	Proc 2 HPA
FFF8C000	Proc 3 HPA
FFF8D000	Proc 3 HPA
FFF8E000	Proc 3 HPA
FFF8F000	Proc 3 HPA
FFF90000	Direct port HPA
FFFC0000 - FFFDFFFF	local broadcast

DSP Processor Self-Test

Note The DSP processor is not present on Series 980/Model 870S systems.

The DIP Support Processor (DSP) uses the Processor Card hex display to report self-test error information. If the DSP itself fails self-test, either an E2 or E3 code appears on the hex display. The single character LED display alternates between "E", indicating an error, and the functional code number. A catastrophic DSP failure may be indicated by a blank display, or an unchanging display.

When the processor and DSP pass the DSP Self-Test, the Hex display shows "F". After the processor has executed additional PDC test code from the PDH board, the green LED on the processor lights. The DSP Self-Test consists of the following tests:

1. Self-Contained Processor Register Test.
2. RAM Test.
3. ROM Test.
4. DIP I/O Test.

The DSP fault codes identify status and are listed in Chapter 4A.

Caution The DSP fault codes are displayed on the processor PCA only. They are **not** accessible remotely, such as via Access Port.

PDH Error Reporting

The PDH display provides information about SPU self-test failures. Fatal and non-fatal errors are treated differently, as described below.

Fatal Errors: Errors E0 through E6, EF, D0, D1, D5, and D6 are fatal errors. A fatal error results in the microprocessor looping infinitely. During each loop, it drives the PDH display to show all errors found. The error codes appear in sequence at one second intervals. Since the processor does not reset the watchdog timer during the loop, the PDH sets the FAIL bit. This notifies external processors that the PDH is unavailable. During this transaction, the Control Panel hexadecimal display is set to 0000.

Non-Fatal Errors: PDH main code continues to execute, since the board is still considered operational. The main code checks the appropriate error flags to determine which tasks are not operational.

PDH error codes are listed in Chapter 4A.

Clock Board Faults

Refer to Table 4-10 for Clock card error codes. Replace the Clock card if either of the green LEDs are off, a fault condition exists.

Table 4-10. Clock Card Error Codes

Clock OK (upper)	Volts OK (lower)	Cause	Action
off	on	SYNC HIGH or LOW out of range	Replace Clock Card
off	off	V10.4, V9, V3R or V-3 out of range	Replace Clock Card

Whenever the "Volts OK" LED goes out, the "Clock OK" LED does also. The voltage test points are located in front of the stiffener bar in the 12-pin connector.

Access Port Self-Test and Troubleshooting

Self-Test Procedure

Troubleshoot the Access Port (AP) and cables by using the self-test procedures listed below:

- System Console Self-Test.
- AP Self-Test.
- Verifying Cables and Connections.
- Interpreting Self-Test Results.
- AP Self-Test Messages.

System Console Self-Test

AP Frontplane Self-Test can be executed from the Access Port's command interpreter (CI) at the `CM>` prompt. The command used for this complete self-test is the `TA` command. When self-test is invoked from the console through the CI, results and test progress are reported to the console.

Console Data Display Format

Various banners are printed to notify the user of the progress of self-test when invoked from the CI. The ST_START_BANNER appears on the console:

```
Console and frontpanel data arriving during self-test execution will be lost.

Type Y to confirm your intention to execute AP self-test (Y/N): Y

Starting AP self-test.  Last subtest will be 30.

Executing test number:
```

As the tests are executed, the subtest codes appear successively starting under ST_START_BANNER.

```
00  01  02  03  04  05  06  07  08  09
10  11  12  13  14  15  16  17  18  19
20  21  22  23  24  25  26  27  28  29
30
```

If the test passes, the ST_PASS_BANNER is displayed as:

```
AP self-test passed.
```

If the test fails, the ST_FAIL_BANNER is displayed as:

```
AP self-test failed subtest xx (APERR 05).
```

Where `xx` is the code of the subtest that detected the failure.

During the execution of self-test, some test numbers may have the mnemonics NC, NT1H, SESS, NFPH, or NS1H appended to them. Appearance of the mnemonics is determined by the exact test hood configuration present at the time of test execution. Their exact meaning is shown in Table 4-11:

Table 4-11. Access Port Test Descriptions

Test	Description
N:	Subtest is executed.
NC:	T1 is not connected and subtest 20 is not being run.
FPH:	Subtest is executed only if there is a hood on the frontplane.
T1H:	Subtest is executed only if there is a hood on port T1.
S1H:	Subtest is executed only if there are hoods on ports T1 and S1.
SESS:	There is a current session which is active and Subtest 20 is not being run.

Self-Test Commands

When the Access Port is in Control Mode, the console operator has access to the AP Command Interpreter (CI). The CI accepts data strings up to 80 characters. If the data string is larger than 80 characters, any characters beyond 80 will be lost and the bell will sound. Data strings are terminated by a carriage return (<CR>), and then passed to the parser.

If it is necessary to edit the data string, use the backspace (<BS>) key to move the cursor to the left. Characters that are backspaced over are not erased from the screen but are deleted from the buffer.

Characters 00 through 1F HEX are non-displayable control characters, and are not echoed by the Command Interpreter or entered into the buffer. Attempts to enter non-displayable characters sound the bell. All ROMAN 8 characters (ASCII and international symbols) are accepted by the CI.

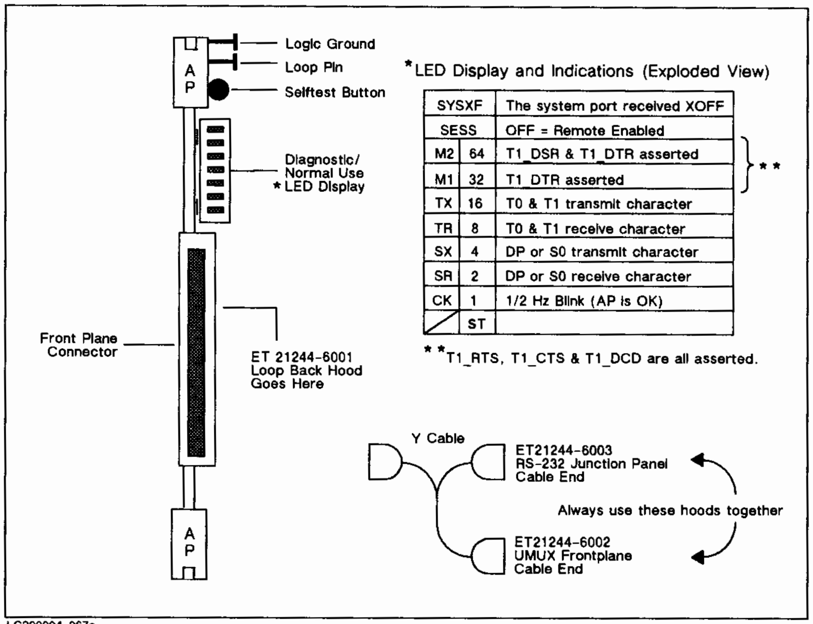
Any leading or trailing spaces in data strings are ignored by the CI. Such spaces are also ignored on input during the password verification process. If the first two characters in a command line are not found to correspond to a legal Access Port (AP) Control Mode command, the following error message is displayed:

```
Illegal command, type HE for help.
```

AP Self-Test

The AP self-test is executed from the AP frontplane (refer to Figure 4-17). The AP frontplane consists of a connector, self-test button, loop pin, and an LED array of ten indicators.

The LEDs are directly controlled by the microprocessor. The top two LEDs are not used during self-test, but the lower eight have a dual usage. During self-test they report the self-test section being executed; otherwise, when not in self-test they display the status of the AP subsystem. This display arrangement clearly identifies when the LED array is to be interpreted as a self-test error code, and when it is to be interpreted as a status indicator.



SYSXF		The system port received XOFF
SESS		OFF = Remote Enabled
M2	64	T1_DSR & T1_DTR asserted **
M1	32	T1_DTR asserted **
TX	16	T0 & T1 transmit character
TR	8	T0 & T1 receive character
SX	4	DP or S0 transmit character
SR	2	DP or S0 receive character
CK	1	1/2 Hz Blink (AP is OK)
	ST	

Figure 4-17. Access Port (AP) Frontplane Layout

AP Frontplane Self-Test Execution and Readout

Press the AP frontplane self-test button to execute AP self-test. The AP executes the full set of self-tests in order, and displays test progress on the AP frontplane LEDs. If test hoods are present, they are detected and the associated circuitry is tested.

Self-Test sequence is reported on the lower eight LEDs in this way.

Test 0 is an LED test; it turns on the eight lower LEDs for 100ms, then off for 100ms. The ST LED is then illuminated, and kept on throughout the remainder of the self-test. The other seven LEDs (labeled 1, 2, 4, 8, 16, 32, and 64) display the number of the subtest being executed in sequence.

If a fault is encountered, the self-test stops, leaving the code of the failed test displayed for 20 seconds. Copy the decimal values displayed, and add them to derive the number of the test that failed. If self-test passes, only the ST LED is illuminated; all the numbered LEDs are off. This pass code remains in the display for only five seconds.

It is occasionally desirable for self-test to execute continuously.

If the self-test switch is held down, self-test executes continuously until an error is encountered. In the event of a failure, test execution stops, and the LEDs are left with the failed subtest code on the display until the button is released.

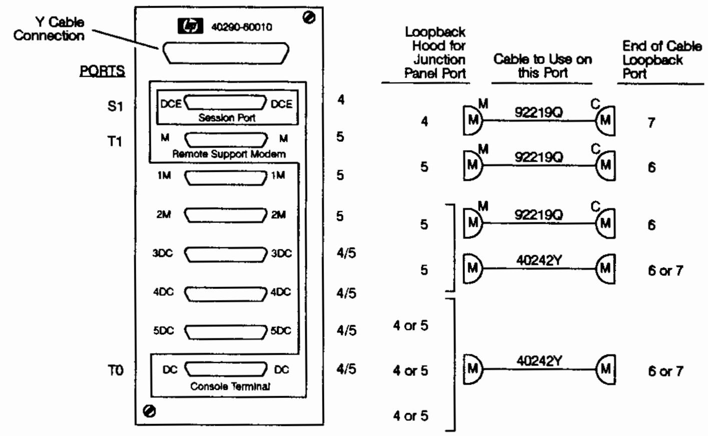
AP Cable Test Hoods

The AP self-test automatically detects the installation of test hoods attached to the AP or its cabling.

Almost any combination of test hoods is possible. For example:

- A 1M or 2M hood can be installed on port T0 to verify the port during self-test.
- A 2M hood can be installed on port T1 to verify the port.
- A 40242Y cable and a 3F or 4F hood can be installed on port T0 to verify the 40242Y cable.
- A 92219Q cable and port T1 can be verified with a 3F hood installed on port T1.

Access Port (AP) test hood usage is summarized in Figure 4-18. The first three hoods are used on the AP frontplane connector and "Y" cable. The last four hoods are used with either the 92219Q or 40242Y cables. Test hood usage is referenced by the last digit of the loopback hood part number. Seven loopback hoods are available in kit P/N ET21244.



ET21244-6001 - AP front plane hood

ET21244-6002 - Mux cable end hood (use with hood ET21244-6003)

ET21244-6003 - RS-232 Junction Panel cable end hood (use with hood ET21244-6002)

ET21244-6004 - Console (direct connect) hood, and DCE port only

ET21244-6005 - Modem port hood (may also be used on console or direct ports)

ET21244-6006 - Terminal end of 40242Y cable and modem end of 92219Q cable loopback hood

ET21244-6007 - Computer connector end of 92219Q for DCE port loopback

LG200004_066a

Figure 4-18. Test Hood Identification

Interpreting Self-Test Results

Once a failed self-test subtest code has been observed and recorded, it may be interpreted by referring to Table 4-12. The first two columns indicate the subtest code number and corresponding name. The last six columns denote the type of self-test called, along with what subtests are run, and if a loopback hood is required.

Failure of any one of the first fourteen subtests (00 through 13) indicates an Access Port hardware fault. Failure of the remaining subtests (14 through 30) indicates either a configuration error or a cabling/connection problem.

Table 4-12. Self-Test Results

Subtest No.	Subtest Name	PON_ST	Button_ST	CI_ST		SO_ST	DP_ST	IDLE_ST
				T0	T1			
00	LEDTEST	X	X	X	X	X	X	
01	Z80TEST1	X	X	X	X	X	X	X
02	Z80TEST2	X	X	X	X	X	X	X
03	ROMTEST	X	X	X	X	X	X	X
04	RAMTEST	X	X	X	X	X	X	X
05	Z80TEST3	X	X	X	X	X	X	
06	RAMALIAS	X	X	X	X	X	X	
07	NVMTEST	X	X	X	X	X	X	X
08	CTRL1	X	X	X	X	X	X	
09	CIO_TIMER	X	X	X	X	X	X	
10	FPREG	X	X	X	X	X	X	
11	S0LOOP	X	X	X	X	X	X	
12	T0LOOP	X	X	X	X	X	X	
13	DPLOOP	X	X	X	X	X	X	
14	ST_CONFIG	X	X	X	X	X	X	
15	SESS_INDCATR	FPH	FPH				FPH	
16	T1_CONN	X	X	X	X	X	X	
17	Y_T1LOOP_IDLE	X	X	X		X	X	
18	S1_HOOD_ORNC	X	X	X		X	X	
19	CONSOLE	X	X	X	X	X	X	
20	FPLOOP_TEST_S0	FPH	FPH				FPH	
21	T1LOOP	X	X	X	X	X	X	
22	FPLOOP_TEST_T1	FPH	FPH				FPH	
23	NFPTEST_T1	FPH	FPH				FPH	
24	NFTTEST_T1	FPH	FPH				FPH	
25	D_CONLOOP_T1	T1H	T1H	T1H		T1H	T1H	
26	TERM_TEST_T1		X	X	X	X	X	
27	FPLOOPTESTS1	FPH	FPH				FPH	
28	NFPTEST_S1	FPH	FPH				FPH	
29	NFSTEST_S1	FPH	FPH				FPH	
30	D_CONLOOP_S1	S1H	S1H	S1H		S1H	S1H	

Legend: X = Subtest executed.
FPH = Subtest executed if hood installed on frontplane.
T1H = Subtest executed if hood installed on T1.
S1H = Subtest executed if hoods installed on T1 and S1.

Selftest, when invoked by any available method, tests the AP core electronics, plus all items marked with X in the table for each of the configurations of the console port.

1. AP Electronics associated with Console Port
2. Connections in AP to RS-232 Junction Panel to Mux Cable which are in the console terminal path.
3. Connections for console port in RS-232 Junction Panel. Also verifies Transzorbs are not shorted.
4. 40242Y cable attached between RS-232 Junction Panel and console terminal.
5. Basic console terminal functions, including in Remote, ENQ/ACK, bit rate, drivers and receivers, etc.

	1	2	3	4	5
1 Configured for use with console terminal.	X	X	X	X	X
2 Configured with 3F or 4F hood on terminal end of 40242Y cable.	X	X	X	X	
3 Configured with 1M or 2M hood on RS-232 Console Port.	X	X	X		
4 Configured with both hoods on AP to RS-232 Junction Panel to Mux cable.	X	X			
5 Configured with frontplane loopback hood.	X				

LG200004_061

Figure 4-19. Console Port T0

Selftest, when invoked by any available method, tests the AP core electronics, plus all items marked with X in the table for each of the configurations of the remote support modem port.

1. AP Electronics associated with remote support modem
2. Connections in AP to RS-232 Junction Panel to Mux Cable which are in the remote support modem port path.
3. Connections for support modem in RS-232 Junction Panel. Also verifies Transzorbs not shorted.
4. 92219Q cable attached between RS-232 Junction Panel and remote support modem.
5. Usability of support modem, phone connection and remote modem as a system for data transfer.
6. Basic console terminal functions, including remote, ENQ/ACK, bit rate, drivers and receivers, etc.

	1	2	3	4	5	6
1 Configured for use. Port in session mode. Line established to remote modem. Terminal on modem.						
2 Configured for use. Port NOT in session mode. Line established to remote modem. Terminal on modem.	X	X	X	X	X	X
3 Configured for use. Port NOT in session mode. Line established to remote modem. Remote modem set to loop data received from phone line back to line.	X	X	X	X	X	

LG200004_062

Figure 4-20. Remote Support Modem Port T1

Selftest, when invoked by any available method, tests the AP core electronics, plus all items marked with X in the table for each of the configurations of the remote support modem port.

1. AP Electronics associated with remote support modem
2. Connections in AP to RS-232 Junction Panel to Mux Cable which are in the remote support modem port path.
3. Connections for support modem in RS-232 Junction Panel. Also verifies Transzorbs not shorted.
4. 92219Q cable attached between RS-232 Junction Panel and remote support modem.
5. Usability of support modem, phone connection and remote modem as a system for data transfer.
6. Basic console terminal functions, including remote, ENQ/ACK, bit rate, drivers and receivers, etc.

	1	2	3	4	5	6
4 Configured with 3F hood on modem end of 92219Q cable	X	X	X	X		
5 Configured with 2M hood on RS-232 Junction Panel Remote Support Modem port.	X	X	X			
6 Configured with both hoods on AP to RS-232 Junction Panel to MUX cable.	X	X				
7 Configured with frontplane loopback hood.	X					

LG200004_063

Figure 4-21. Remote Support Modem Port T1 (continued)

Selftest, when invoked by any available method, tests the AP core electronics, plus all items marked with X in the table for each of the configurations of port S0.	1 AP Electronics associated with port S0.	2 Connections in AP to RS-232 Junction Panel to Mux Cable which are in the port S0 path.
1 Configured for use.		
2 Configured with both hoods on AP to RS-232 Junction Panel to MUX cable.	X	X
3 Configured with frontplane loopback hood.	X	

LG200004_064

Figure 4-22. Port S0

Selftest, when invoked by any available method, tests the AP core electronics, plus all items marked with X in the table for each of the configurations of the session port, provided that port T1 is in one of configurations 4-7 in Table 8-6. If port T1 is not in one of configurations 4-7, no tests of port S1 will be performed.

1. AP Electronics associated with session port
2. Connections in AP to RS-232 Junction Panel to Mux Cable which are in the session port path.
3. Connections for session port om RS-232 Junction Panel. Also verifies Tranzsorbs are not shorted.
4. 92219Q cable attached between RS-232 Junction Panel and user session port.

	1	2	3	4
1 Configured for use with user session port.				
2 Configured with 4F hood on user session port end of 92219Q cable	X	X	X	X
3 Configured with 1M hood on RS-232 Junction Panel Session port.	X	X	X	
4 Configured with both hoods on AP to RS-232 Junction Panel to MUX cable.	X	X		
5 Configured with frontplane loopback hood.	X			

LG200004_065

Figure 4-23. DCE (Session) Port S1

Remote Maintenance

Remote maintenance is accommodated through the Access Port in conjunction with the modem connection at the computer site. The procedure outlined in this chapter assumes that the hardware and cable connections required to support remote maintenance are already installed, and that the system console terminal is correctly configured. Refer to Figure 4-24 and Figure 4-25 for cable configurations.

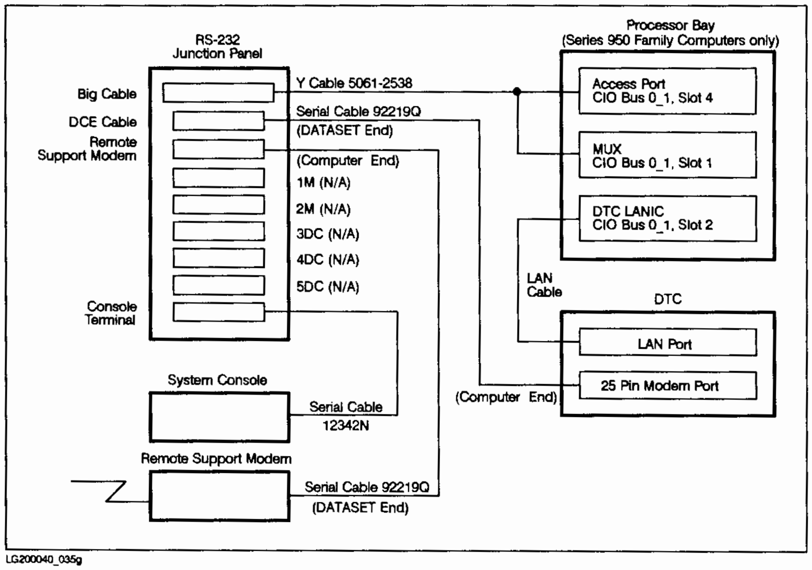


Figure 4-24. Cable Configuration Diagram (Series 950 Family Computers)

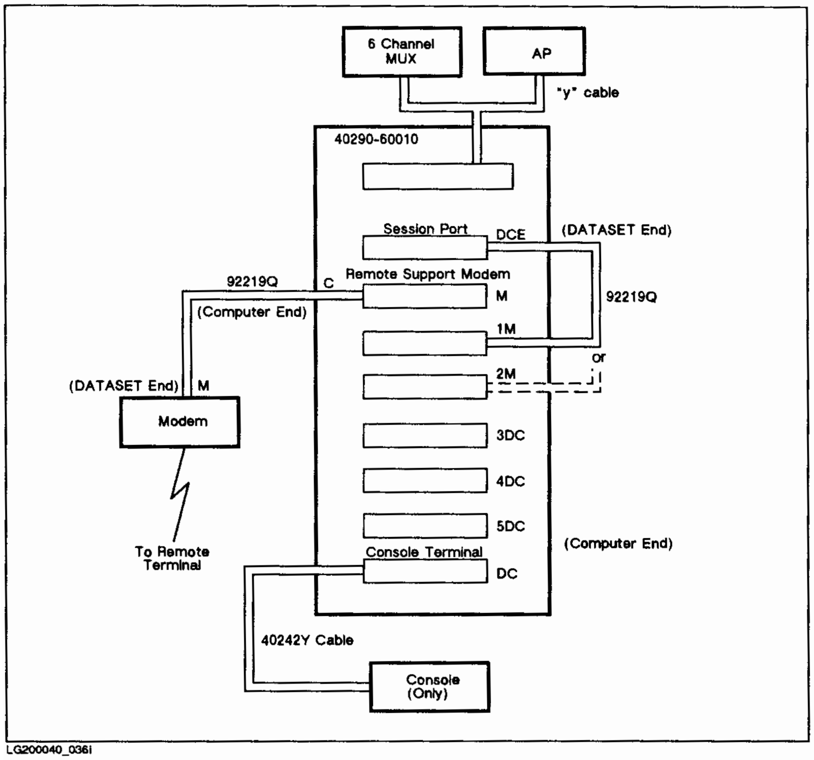


Figure 4-25. Cable Configuration Diagram (Model 850S Family Computers)

To establish remote maintenance connection and validate the configuration of the remote support port, perform the following steps:

1. On the Control Panel, if the Remote Enabled LED is not On, turn the key switch to the Console Enabled position. See Figure 4-26 for the Control Panel layout.
2. Press CNTL and B simultaneously to put the system console into the AP Control Mode.
3. The `CM>` prompt should be displayed on the system console, and the user softkey area should now display remote status.

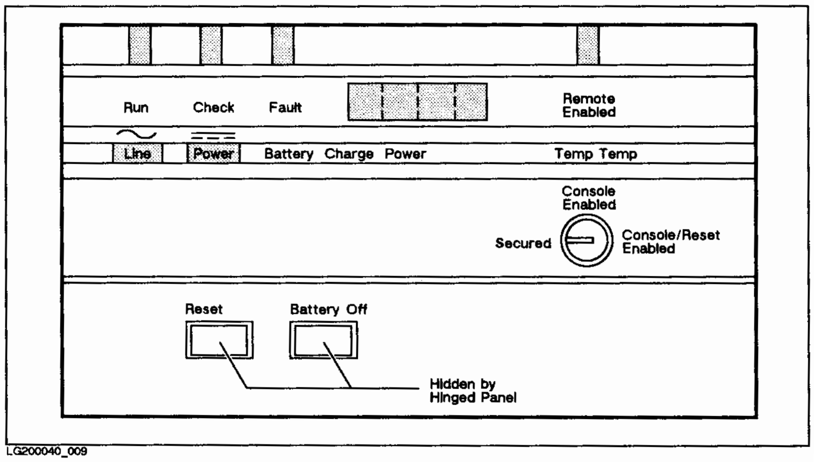


Figure 4-26. Control Panel Layout

1. To configure or validate the configuration of the Remote Support Port, type `ca` at the `CM>` prompt.

```
CM> ca

Current remote support modem port configuration:

     Bit rate:                  1200 bits/sec
     Rate select/CCITT:         High rate (ON)
     System Identification:     Enter name (up to 24
characters)

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

Possible bit rate and rate select values and maximum number
of characters for system identification:

Bit rates:  0 = 300, 1 = 1200, 2 = 2400, 3 = 4800, 4 = 9600

Rate select (CCITT 111): H = high, L = low

System identification: 1 to 24 characters, or a space for none
```

2. Type `er` at the `CM>` prompt to enable remote access. If the AP is already configured, answer `NO` to the configuration change request. The Remote Enabled LED on the Control Panel is lit after the `er` command has been issued. The console displays either `Pending Inactive`, (the Remote Support port has an active session in progress), or `Enabled Inactive`, (the `er` command has successfully executed and is ready for remote console activity).

```
CM> er

Current remote console access configuration:

     Mode:              Multiple
     Password:          Secret
     Password faults:   5

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

Possible mode, password and password faults parameters:

Mode:  S = Single; for one try into AP remotely.
       M = Multiple; to allow 0 to 99 tries before deciding
       the user is not authorized for remote use depending on
       the number of tries configured for password faults.
```

```
Password:  0 to 24 alpha-numeric characters, including spaces
           (except a space in the first character position
           clears any password previously stored).

Password Faults:  0 = unlimited access (no faults);
                  1 to 99 = the number of password faults
                  before disabling remote access into the AP
                  port mode and only allowing session access
                  to a user port.
```

3. When remote console is not desired, type dr (disable remote) at the `CM>` prompt, or put the key switch to the Secured position. The Remote Enabled LED on the front panel should go out.

Processor Dependent Code (PDC) Boot Error Messages

An error status display may appear on the console of the HP 3000 Series 950 Family or HP 9000 Model 850S Family computer if the system fails to boot. The display only appears if the boot process has properly initialized the console.

When a boot error occurs, IODC supplies 32 words of status. To decode these words, refer to the example below and to the appropriate section of this chapter.

Example:

The following is an example of a boot error display. In this example, an incorrect HP-IB disk address was specified in an otherwise correct path:

```
Enter boot path, command, or ?> 2/4.0.5
Interact with IPL (Y or N)?> y


Booting.

Boot error on path 2/4.0.5.0.0.0.0


Boot device fails ENTRY_INIT, Status = -7, Ret [16] = -9
                                        |             |
         (Driver returned status)-------+             |
                                                      |
                              (IODC Status Word)-----+

Ret [#]:
[ 0-7 ] 10000040 00000000 00000000 00000000 00000000 00000000 00000000 00000000
[ 8-15] 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
[16-23] FFFFFFF7 000000E0 00100010 00000000 00000000 00000000 00000000 00000000
[24-31] 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
```

The driver returned status is the key status returned by IODC. Refer to the topic *IODC Driver Returned Status* for its meaning.

The IODC Status word returned decimal -9 is the same as the Hex value in Ret [16]. Refer to the topic *IODC Status Word* for decoding information.

The 32 other status words returned by IODC and printed by PDC and ISL are described below:

Ret [0] If ENTRY_INIT is executing, this word contains the Channel Adapter I/O status word. If ENTRY_IO is executing, this word will contain the DMA byte count. It will be 0 in any other case.

Ret [1] If ENTRY_INIT is executing, this word is the device class. It will be 0 in all other cases.

Ret [2] - Ret [15] Are reserved.

Ret[16] is the IODC Status word. A table of all possible IODC Status word values can be found in Table 4-14. From Table 4-14, the status refers to an invalid HP-IB address. Note that the system also displays this error if the specified address is out of range or if hardware is not present at that address.

Ret [17] is the Device Adapter sense register for the DA in the specified path. See the topic *CIO Device Adapter Read Sense Register* for decoding information.

Ret [18] is the Subchannel status register. See the topic *Channel Adapter Subchannel Status Register* for decoding information.

Ret [19] is the Channel Adapter's IO_Status word, returned only by IODC Entry_io routine, not by Entry_init, as above. Refer to the topic *Channel Adapter I/O Status Register* for decoding information.

Ret [23] - Ret [31] Contain Device Specific Status information. Refer to the topic *Peripheral Device Status* for the format appropriate to the boot device.

IODC Driver Returned Status

Refer to Table 4-13 for IODC driver returned status.

Table 4-13. IODC Driver Returned Status

Byte	Error	Description
(Dec.)		
0	OK	No error
1	WARN_PART	Partial Data Transfer
2	WAR_USE	Error Detected, but module still usable
-2	ERR_OPT	Invalid Option passed to IODC
-3	ERR_CANT	IODC could not complete without error
-4	ERR_HW	Unrecoverable H/W error
-5	ERR_DATA	Unrecoverable data error
-6	ERR_MADDR	Invalid module address
-7	ERR_MEXIST	Non-existant module
-8	ERR_MUNAV	Module non-available
-9	ERR_LOC	Cannot locate module
-10	ERR_PARM	Invalid parameter passed to IODC
-11	ERR_SMALL	Data buffer too small
-12	ERR_SIZE	Non-supported record size

IODC Status Word

Table 4-14. IODC 4.0 Status Codes

IODC Status Ret[16]	Function	Problem
FFFFFFFE [-2]	Doing a CIO Identify	UNSUPPORTED_DA Device Adapter.
FFFFFFFD [-3]	HP-IB Amigo Identify or AMUX device IDY (entry_init)	UNSUPPORTED_DEVICE Did not return a valid AMIGO IDY number.
FFFFFFFC [-4]	Checking Unit type in CS/80 describe table	UNSUPPORTED_UNIT Not; 0/fixed disk 1/removable disk or 2/tape in table.
FFFFFFFB [-5]	Checkiug specified request size for data transfer	UNSUPPORTED_SIZE [< 0 for disk/tape] or [< 0 or > 255 bytes for console.]
FFFFFFF8 [-8]	Checking CIO slot field of path specification	INVALID_SLOT < 0 or > 8 for VLSI Channel Adapter, or >16 for TTL CA.
FFFFFFF7 [-9]	Checking HP-IB Address, or PORT for MUX/ALINK of path	INVALID_PORT HPIB addr < 0 or >=8 or MUX port < >0 or AMUX < 0 or >=8.
FFFFFFF6 [-10]	Checking Unit Field of path	INVALID_UNIT CS/80 unit < 0 or >=8 or tape unit < >0.
FFFFFFF5 [-11]	Checking Volume field of path specification	INVALID_VOLUME CS/80 unit < 0 or >=8 or volume < >0 for AMUX CS80.
FFFFFFEE [-18]	Testing Channel Adapt. before phys. module initialization	CA failed RAM test, DIO test, or SRQ test.
FFFFFFBE [-66]	Checking CIO Device Adapter sense register	DA_NOT_READY The RFC bit of the sense register is not set.
FFFFFFBD [-67]	Checking CIO Device Adapter sense register	DA_ST_FAIL The ST bit of the sense register was not set.
FFFFFF7F [-129]	Doing a CIO DA Identify	IDY + DMA_TIMEOUT The DMA chain did not complete on time.
FFFFFF7E [-130]	Doing a CIO DA Identify	IDY + DMA_ABORT In trying to do DMA abort, DA RFC,PST,PRE bits not set.
FFFFFF71/8 [-143] [-136]	Doing a CIO DA Identify	IDY + DMA_NON_ZERO_RESIDUE Quad used to perform funct, not return all data.
FFFFFF3F [-193]	Sending HP-IB initialize command to HP-IB CIO Card	HPIB_INIT + DMA_TIMEOUT The DMA chain did not complete on time.
FFFFFF3E [-194]	Sending HP-IB initialize command to HP-IB CIO Card	HPIB_INIT + DMA_ABORT DMA abort with DA RFC, PST, PRE bits off.
FFFFFF31/8 [-207] [-200]	Sending HP-IB initialize command to HP-IB CIO Card	HPIB_INIT + DMA_NON_ZERO_RESIDUE Quad used for funct not ret. all data.

Table 4-14. IODC 4.0 Status Codes (continued)

IODC Status Ret[16]	Function	Problem
FFFFFF0F [-241]	Sending HP-IB initialize command to HP-IB CIO Card	HPIB_INIT + TSTAT TSTAT < >0
FFFFFEFF [-257]	Doing data loopback to HP-IB CIO Card	HPIB_DLOOP + DMA_TIMEOUT The DMA chain did not complete on time.
FFFFFEFE [-258]	Doing data loopback to HP-IB CIO Card	HPIB_DLOOP + DMA_Abort DMA abort with DA RFC, PST, PRE bits off.
FFFFFEF1/8 [-271] [-264]	Doing data loopback to HP-IB CIO Card	HPIB_DLOOP + DMA_NON_ZERO_RESIDUE Quad used for funct not ret. all data.
FFFFFED0 [-304]	Doing data loopback to HP-IB CIO Card	HPIB_DLOOP + DATA Data compare error.
FFFFFECF [-305]	Doing data loopback to HP-IB CIO Card	HPIB_DLOOP + TSTAT TSTAT < >0.
FFFFFEBF [-321]	Sending HP-IB Configure Cmnd. to HP-IB DA	HPIB_CONFIG + DMA_TIMEOUT The DMA chain did not complete in time.
FFFFFEBE [-322]	Sending HP-IB Configure Cmnd. to HP-IB DA	HPIB_CONFIG + DMA_ABORT DMA abort with DA RFC, PST, PRE bits off.
FFFFFEB1/8 [-355] [-328]	Sending HP-IB Configure Cmnd. to HP-IB DA	HPIB_CONFIG + DMA_NON_ZERO_RESIDUE Quad used did not return all data.
FFFFFE8F [-369]	Sending HP-IB Configure Cmnd. to HP-IB DA	HPIB_CONFIG + TSTAT TSTAT < >0.
FFFFFE7F [-385]	Doing HP-IB AMIGO Identify	HPIB_AMIDY + DMA_TIMEOUT The DMA chain did not complete on time.
FFFFFE7E [-386]	Doing HP-IB AMIGO Identify	HPIB_AMIDY + DMA_ABORT DMA abort with DA RFC, PST, PRE bits off.
FFFFFE71/8 [-399] [-392]	Doing HP-IB AMIGO Identify	HPIB_AMIDY + DMA_NON_ZERO_RESIDUE Quad used did not return all data.
FFFFFE4F [-433]	Doing HP-IB AMIGO Identify	HPIB_AMIDY + TSTAT TSTAT < >0.
FFFFFE3F [-449]	Reading or writing from/to console	MUX6_IO + DMA_TIMEOUT The DMA chain did not complete on time.
FFFFFE3E [-450]	Reading or writing from/to console	MUX6_IO + DMA_ABORT DMA abort with DA RFC, PST, PRE bits off.
FFFFFE31/8 [-463] [-456]	Reading or writing from/to console	MUX6_IO + DMA_NON_ZERO_RESIDUE Quad used for funct not return all data.

Table 4-14. IODC 4.0 Status Codes (continued)

IODC Status Ret[16]	Function	Problem
FFFFFE10 [-496]	Reading or writing from/to console	MUX6_IO + DATA cannot echo back char during read or Attribute not ok.
FFFFFDFF [-513]	Reading CIO MUX status during data ontput operation	MUX6_RSTAT + DMA_TIMEOUT The DMA chain did not complete on time.
FFFFFDFE [-514]	Reading CIO MUX status before writing to console	MUX6_RSTAT + DMA_ABORT DMA Abort with DA RFC, PST, PRE bits not set.
FFFFFDF1/8 [-527] [-520]	Reading CIO MUX status during a data output operation	MUX6_RSTAT + DMA_NON_ZERO_RESIDUE Quad used did not return all data.
FFFFFDBF [-577]	Enabling device controlled XON/XOFF handshaking on MUX	MUX6_DEVX_EN + DMA_TIMEOUT The DMA chain did not complete on time.
FFFFFDBE [-578]	Enabling device controlled XON/XOFF handshaking on MUX	MUX6_DEVX_EN + DMA_ABORT DMA Abort with DA RFC, PST, PRE bits not set.
FFFFFDB1/8 [-591] [-584]	Enabling device controlled XON/XOFF handshaking on MUX	MUX6_DEVX_EN + DMA_NON_ZERO_ RESIDUE Quad used did not return all data.
FFFFFD7F [-641]	Restarting MUX transmitter for data output on port 0	MUX6_XMIT_ + DMA_TIMEOUT The DMA chain did not complete on time.
FFFFFD7E [-642]	Restarting MUX transmitter for data output on port 0	MUX6_XMIT + DMA_ABORT DMA Abort with DA RFC, PST, PRE bits not set.
FFFFFD71/8 [-655] [-648]	Restarting MUX transmitter for data output on port 0	MUX6_XMIT + DMA_NON_ZERO_RESIDUE Quad used did not return all data.
FFFFFD50 [-688]	Restarting MUX transmitter for data output on port 0.	MUX6_XMIT + DATA Transmit buffer on MUX card not becoming ready.
FFFFFBBF [-1089]	Downloading Device Adapter Program (DAP) to HP-IB CIO DA	DAP_DOWN_ + DMA_TIMEOUT The DMA chain did not complete on time.
FFFFFBBE [-1090]	Downloading Device Adapter Program (DAP) to HP-IB CIO DA	DAP_DOWN + DMA_ABORT DMA abort with DA RFC, PST, PRE bits not set.
FFFFFBB1/8 [-1103] [-1096]	Downloading Device Adapter Program (DAP) to HP-IB CIO DA	DAP_DOWN + DMA_NON_ZERO_RESIDUE Quad used did not return all data.
FFFFFB8F [-1137]	Downloading Device Adapter Program (DAP) to HP-IB CIO DA	DAP_DOWN + TSTAT TSTAT < > 0.

Table 4-14. IODC 4.0 Status Codes (continued)

IODC Status Ret[16]	Function	Problem
FFFFFB7F [-1153]	Sending an AMIGO Device Clear to tape device	TAPE_CLEAR + DMA_TIMEOUT The DMA chain did not complete on time.
FFFFFB7E [-1154]	Sending an AMIGO Device Clear to tape device	TAPE_CLEAR + DMA ABORT DMA abort with DA RFC, PST, PRE bits not set.
FFFFFB71/8 [-1167] [-1160]	Sending an AMIGO Device Clear to tape device	TAPE_CLEAR + DMA_NON_ZERO_RESIDUE Quad used did not return all data.
FFFFFB4F [-1201]	Sending an AMIGO Device Clear to tape device	TAPE_CLEAR + TSTAT TSTAT < > 0.
FFFFFB4D [-1203]	Sending an AMIGO Device Clear to tape device	TAPE_CLEAR + HSTAT HSTAT < > 0.
FFFFFB3F [-1217]	Data loopback to tape drive	TAPE_WLOOP + DMA_TIMEOUT The DMA chain did not complete in time.
FFFFFB3E [-1218]	Data loopback to tape drive	TAPE_WLOOP + DMA_ABORT DMA abort with DA RFC, PST, PRE bits not set.
FFFFFB31/8 [-1231] [-1224]	Data loopback to tape drive	TAPE_WLOOP + DMA_NON_ZERO_RESIDUE Quad used did not return all data.
FFFFFB10 [-1264]	Data loopback to tape drive	TAPE_WLOOP + DATA Data compare error.
FFFFFABF [-1345]	Rewinding tape; requested device address to read is 0	TAPE_REWIND + DMA_TIMEOUT The DMA chain did not complete in time.
FFFFFABE [-1346]	Rewinding tape; requested device address to read is 0	TAPE_REWIND + DMA_ABORT DMA abort with DA RFC, PST, PRE bits not set.
FFFFFAB1/8 [-1359] [-1352]	Rewinding tape; requested device address to read is 0	TAPE_REWIND + DMA_NON_ZERO_ RESIDUE Qnad used did not return all data.
FFFFFA8F [-1393]	Rewinding tape; requested device address to read is 0	TAPE_REWIND + TSTAT TSTAT < > 0.
FFFFFA8D [-1395]	Rewinding tape; requested device address to read is 0	TAPE_REWIND + HSTAT HSTAT < > 0.
FFFFFA7F [-1409]	Reading from tape device	TAPE_IO + DMA_TIMEOUT The DMA chain did not complete on time.
FFFFFA7E [-1410]	Reading from tape device	TAPE_IO + DMA_ABORT DMA abort with DA RFC, PST, PRE bits not set.
FFFFFA71/8 [-1423] [-1416]	Reading from tape device	TAPE_IO + DMA_NON_ZERO_RESIDUE Quad used did not return all data.

Table 4-14. IODC 4.0 Status Codes (continued)

IODC Statns Ret[16]	Function	Problem
FFFFFA50 [-1456]	Reading from tape device	TAPE_IO + DATA Number of bytes read larger that maxsize requested.
FFFFFA4F [-1457]	Reading from tape device	TAPE_IO + TSTAT TSTAT < > 0.
FFFFFA4D [-1459]	Reading from tape device	TAPE_IO + HSTAT HSTAT < > 0.
FFFFF7BF [-2113]	Doing a CS/80 Selected Device Clear	CS80_CLEAR + DMA_TIMEOUT The DMA chain did not complete in time.
FFFFF7BE [-2114]	Doing a CS/80 Selected Device Clear	CS80_CLEAR + DMA_ABORT DMA abort with DA RFC, PST, PRE bits not set.
FFFFF7B1/8 [-2127] [-2120]	Doing a CS/80 Selected Device Clear	CS80_CLEAR + DMA_NON_ZERO RESIDUE Quad used did not return all data.
FFFFF78F [-2161]	Doing a CS/80 Selected Device Clear	CS80_CLEAR + TSTAT TSTAT < > 0.
FFFFF78E [-2162]	Doing a CS/80 Selected Device Clear	CS80_CLEAR + QSTAT QSTAT < > 0.
FFFFF77F [-2177]	Doing a CS/80 Read Loopback	CS80_RLOOP + DMA_TIMEOUT The DMA chain did not complete on time.
FFFFF77E [-2178]	Doing a CS/80 Read Loopback	CS80_RLOOP + DMA_ABORT DMA abort with DA RFC, PST, PRE bits not set.
FFFFF771/8 [-2191] [-2184]	Doing a CS/80 Read Loopback	CS80_RLOOP + DMA_NON_ZERO_RESIDUE Quad used did not return all data.
FFFFF750 [-2224]	Doing a CS/80 Read Loopback	CS80_RLOOP + DATA Data compare error.
FFFFF74F [-2225]	Doing a CS/80 Read Loopback	CS80_RLOOP + TSTAT TSTAT < > 0.
FFFFF74E [-2226]	Doing a CS/80 Read Loopback	CS80_RLOOP + QSTAT QSTAT < > 0.
FFFFF73F [-2241]	Doing a CS/80 Locate and Read (Read data from device)	CS80_IO + DMA_TIMEOUT The DMA chain did not complete in time.
FFFFF73E [-2242]	Doing a CS/80 Locate and Read (Read data from device)	CS80_IO + DMA_ABORT DMA abort with DA RFC, PST, PRE bits not set.
FFFFF731/8 [-2255] [-2248]	Doing a CS/80 Locate and Read (Read data from device)	CS80_IO + DMA_NON_ZERO_RESIDUE Quad used did not return all data.

Table 4-14. IODC 4.0 Status Codes (continued)

IODC Status Ret[16]	Function	Problem
FFFFF70F [-2289]	Doing a CS/80 Locate and Read (Read data from device)	CS80_IO + TSTAT TSTAT < > 0.
FFFFF70E [-2290]	Doing a CS/80 Locate and Read (Read data from device)	CS80_IO + QSTAT QSTAT < > 0.
FFFFF6FF [-2305]	Sending a CS/80 Describe command to a HP-IB CS/80 device	CS80_DESCRIBE + DMA_TIMEOUT The DMA chain did not complete on time.
FFFFF6FE [-2306]	Sending a CS/80 Describe command to a HP-IB CS/80 device	CS80_DESCRIBE + DMA_ABORT DMA abort with DA RFC, PST, PRE bits not set.
FFFFF6F1/8 [-2319] [-2312]	Sending a CS/80 Describe command to a HP-IB CS/80 device	CS80_DESCRIBE + DMA_NON_ZERO_ RESIDUE Quad used did not return all data.
FFFFF6CF [-2353]	Sending a CS/80 Describe command to a HP-IB CS/80 device	CS80_DESCRIBE + TSTAT TSTAT < > 0.
FFFFF6CE [-2354]	Sending a CS/80 Describe command to a HP-IB CS/80 device	CS80_DESCRIBE + QSTAT QSTAT < > 0.
FFFFEFFF [-4097]	Reading ALINK Device Adapter card status	ALINK_CSTAT + DMA_TIMEOUT The DMA chain did not complete in time.
FFFFEFFE [-4098]	Reading ALINK Device Adapter card status	ALINK_CSTAT + DMA_ABORT DMA abort with RFC, PST, PRE bits not set.
FFFFEFF1/8 [-4111] [-4104]	Reading ALINK Device Adapter card status	ALINK_CSTAT + DMA_NON_ZERO_RESIDUE Quad used did not return all data.
FFFFEFD0 [-4144]	Reading ALINK Device Adapter card status	ALINK_CSTAT + DATA Card stat not ok. Used to see if Fiber link is up.
FFFFEFCF [-4145]	Reading ALINK Device Adapter card status	ALINK_CSTAT + TSTAT TSTAT < > 0.
FFFFEFBF [-4161]	Sending a device identify to the specified AMUX device	ALINK_DEVIDY + DMA_TIMEOUT The DMA chain did not complete in time.
FFFFEFBE [-4162]	Sending a device identify to the specified AMUX device	ALINK_DEVIDY + DMA_ABORT DMA abort with DA RFC, PST, PRE bits not set.
FFFFEFB1/8 [-4175] [-4168]	Sending a device identify to the specified AMUX device	ALINK_DEVIDY + DMA_NON_ZERO_ RESIDUE Quad used did not return all data.

Table 4-14. IODC 4.0 Status Codes (continued)

IODC Status Ret[16]	Function	Problem
FFFFEF8F [-4209]	Sending a device identify to the specified AMUX device	ALINK_DEVIDY + TSTAT TSTAT < > 0.
FFFFEF7F [-4225]	Sending a Configure Clear to the ALINK Device Adapter	ALINK_CONFCLR + DMA_TIMEOUT The DMA chain did not complete in time.
FFFFEF7E [-4226]	Sending a Configure Clear to the ALINK Device Adapter	ALINK_CONFCLR + DMA_ABORT DMA abort with DA RFC, PST, PRE bits not set.
FFFFEF71/8 [-4239] [-4232]	Sending a Configure Clear to the ALINK Device Adapter	ALINK_CONFCLR + DMA_NON_ZERO_ RESIDUE Quad used did not return all data.
FFFFEF4F [-4273]	Sending a Configure Clear to the ALINK Device Adapter	ALINK_CONFCLR + TSTAT TSTAT < > 0.
FFFFEF4E [-4274]	Sending a Configure Clear to the ALINK Device Adapter	ALINK_CONFCLR + QSTAT QSTAT < > 0.
FFFFEF3F [-4289]	Sending a Reset Clear to the ALINK Device Adapter	ALINK_RSTCLR + DMA_TIMEOUT The DMA chain did not complete on time.
FFFFEF3E [-4290]	Sending a Reset Clear to the ALINK Device Adapter	ALINK_RSTCLR + DMA_ABORT DMA abort with DA RFC, PST, PRE bits not set.
FFFFEF31/8 [-4303] [-4296]	Sending a Reset Clear to the ALINK Device Adapter	ALINK_RSTCLR + DMA_NON_ZERO_ RESIDUE Quad used did not return all data.
FFFFEF0F [-4337]	Sending a Reset Clear to the ALINK Device Adapter	ALINK_RSTCLR + TSTAT TSTAT < > 0.
FFFFEEFF [-4353]	DMA data loopback to ALINK Device Adapter	ALINK_CLOOP + DMA_TIMEOUT The DMA chain did not complete in time.
FFFFEEFE [-4354]	DMA data loopback to ALINK Device Adapter	ALINK_CLOOP + DMA_ABORT DMA abort with DA RFC, PST, PRE bits not set.
FFFFEEF1/8 [-4367] [-4360]	DMA data loopback to ALINK Device Adapter	ALINK_CLOOP + DMA_NON_ZERO_ RESIDUE Quad used did not return all data.
FFFFEED0 [-4400]	DMA data loopback to ALINK Device Adapter	ALINK_CLOOP + DATA Data compare error.
FFFFEECF [-4401]	DMA data loopback to ALINK Device Adapter	ALINK_CLOOP + TSTAT TSTAT < > 0.
FFFFEEBF [-4417]	Data loopback to the AMUX-CS/80 device	ALINK_DLOOP + DMA_TIMEOUT The DMA chain did not complete in time.
FFFFEEBE [-4418]	Data loopback to the AMUX-CS/80 device	ALINK_DLOOP + DMA_ABORT DMA abort with DA RFC, PST, PRE bits not set.

Table 4-14. IODC 4.0 Status Codes (continued)

IODC Status Ret[16]	Function	Problem
FFFFEEB1/8 [-4431] [-4424]	Data loopback to the AMUX-CS/80 device	ALINK_DLOOP + DMA_NON_ZERO_RESIDUE Quad used did not return all data.
FFFFEE90 [-4464]	Data loopback to the AMUX-CS/80 device	ALINK_DLOOP + DATA Data compare error.
FFFFEE8F [-4465]	Data loopback to the AMUX-CS/80 device	ALINK_DLOOP + TSTAT TSTAT < > 0.
FFFFEBFF [-5121]	Reading data from the AMUX-CS/80 disk	ACS80_IO + DMA_TIMEOUT The DMA chain did not complete in time.
FFFFEBFE [-5122]	Reading data from the AMUX-CS/80 disk	ACS80_IO + DMA_ABORT DMA abort with DA RFC, PST, PRE bits not set.
FFFFEBF1/8 [-5135] [-5128]	Reading data from the AMUX-CS/80 disk	ACS80_IO + DMA_NON_ZERO_RESIDUE Quad used did not return all data.
FFFFEBCF [-5169]	Reading data from the AMUX-CS/80 disk	ACS80_IO + TSTAT TSTAT < > 0.
FFFFEBCE [-5170]	Reading data from the AMUX-CS/80 disk	ACS80_IO + QSTAT QSTAT < > 0.
FFFFEBBF [-5185]	Requesting extended describe from AMUX-CS/80 device	ACS80_EXTDESC + DMA_TIMEOUT The DMA chain did not complete in time.
FFFFEBBE [-5186]	Requesting extended describe from AMUX-CS/80 device	ACS80_EXTDESC + DMA_ABORT DMA abort with DA RFC, PST, PRE bits not set.
FFFFEBB1/8 [-5199] [-5192]	Requesting extended describe from AMUX-CS/80 device	ACS80_EXTDESC + DMA_NON_ZERO_RESIDUE
FFFFEB90 [-5232]	Requesting extended describe from AMUX-CS/80 device	ACS80_EXTDESC + DATA did not get all requested data or data invalid.
FFFFEB8F [-5233]	Requesting extended describe from AMUX-CS/80 device	ACS80_EXTDESC + TSTAT TSTAT < > 0.
FFFFEB8E [-5234]	Requesting extended describe from AMUX-CS/80 device	ACS80_EXTDESC + QSTAT QSTAT < > 0.

CIO Device Adapter Read Sense Register

This register (Ret [17]) resides on the CIO Device Adapter Card.

0 23	24	25	26	27	28	29	30	31
Reserved	RFC	PST	PRE	NMI	LVI	ARE	R	ARQ

Decoding Information:

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

PST - Passed Self Test: Asserted if selftest passed

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

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

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

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

R - Reserved

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

Channel Adapter Subchannel Status Register

The subchannel status register (Ret [18]) resides on the Channel Adapter. This register contains:

- The last error detected on this subchannel (SSTAT),
- The subchannel Ready bit, and
- The number of the Log channel (if any) currently active on this subchannel.

```
0                   1                   2                   3 3
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
```

SSTAT	Reserved	RDY	Current Log Channel	Res

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Decoding Information

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

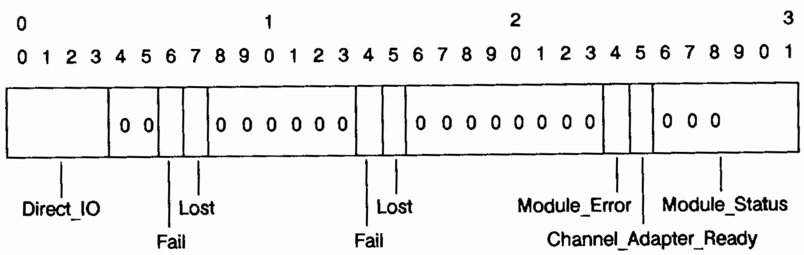
AES, LCD, ERT, or an undefined RTS Op Code

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

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

Channel Adapter I/O Status Register (VLSI Version)

The Channel Adapter I/O status word is shown below. Note that this status word (Ret[19]) is only returned by entry_io.



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Decoding Information:

The *DIRECT I/O field* contains status information about the last direct I/O operation:

Bit	Label	Definition
0	DBYTE	DA asserted DBYTE
1	DEND	DA asserted DEND
2	BR	BR was asserted
3	MYAD	DA asserted MYAD

The *STTS* register provides software with information about Module Errors, Channel Adapter command completion, and the results of the latest Direct I/O.

The STTS register is read by software through the Channel Adapter's HPA, and it is modified only by the Channel Adapter chip. The Direct I/O field contains information about the latest Direct I/O operation. The bits in this field are loaded at the end of each Direct I/O operation.

The *Fail* and *Lost* bits are repeated in bits 6-7 and bits 14-15. These two bits show the present and past status of the CIO power supply. Both bits are set when the CIO PPON pad goes low, but only the Fail bit is cleared when PPON returns high. The Lost bit is only cleared when software writes a CMD_RESET to the IO_COMMAND register.

The *Module Error* and *Module Status Fields* describe any Channel Adapter error that cannot be blamed on a single Subchannel. These fields may be cleared under software control by writing a CMD_CLEAR command to the IO_COMMAND register.

The *Channel Adapter Ready* bit is cleared by the chip each time a command is written to the IO_COMMAND register and is set by the chip when it has completed the command. The

Channel Adapter Ready bit remains cleared for a maximum of 20 microseconds in the absence of Midbus activity.

The Channel Adapter is capable of reporting only three Module Error Codes:

Number	STTS [26:31]	Cause
0	000000	Parity error during DMA
5	000101	Midbus Data Error while Channel Adapter was master
7	000111	Midbus Address Error while Channel Adapter was master

Peripheral Device Status

Figure 4-27 shows the IODC status format for HP-IB CS/80 disk devices, Figure 4-28 shows the status format for AMUX CS/80 disk devices, and Figure 4-29 shows the status format for HP-IB 7974/78/79/80 magnetic tape drives. Decoding information is provided in the following sections:

- HP-IB Device Adapter TSTAT Codes
- TSTATs for Read Terminations
- CS/80 Timeout Status Values
- ALINK Device Adapter TSTAT Codes
- QSTAT Codes
- DSJ/HSTAT Codes
- CS/80 Disk Drive Status Words
- HP 7936 and HP 7937 AMUX Status Format
- HP 7974/78/79/80 Magnetic Tape Drive Status Bytes

For further information, consult the appropriate peripheral CE handbook or the Response Center Organization.

	0 7	8 15	16 23	24 31
Ret[0]	CA status (entry_init) DMA byte count (entry_io)			
Ret[1]	Device class (entry_init)			
Ret[3...15]	Reserved			
Ret[16]	IODC status			
Ret[17]	Reserved			Sense
Ret[18]	Subchannel status			
Ret[19]	CA I/O status (entry_io)			
Ret[20...23]	Reserved			
Ret[24]	TSTAT	QSTAT	ID	
Ret[25]	Reject		Fault	
Ret[26]	Access		INFO	
Ret[27]	P1	P2	P3	P4
Ret[28]	P5	P6	P7	P8
Ret[29]	P9	P10	Extended QSTAT	
Ret[30...31]	Reserved			

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Figure 4-27. IODC Status Format for HP-IB CS/80 Devices

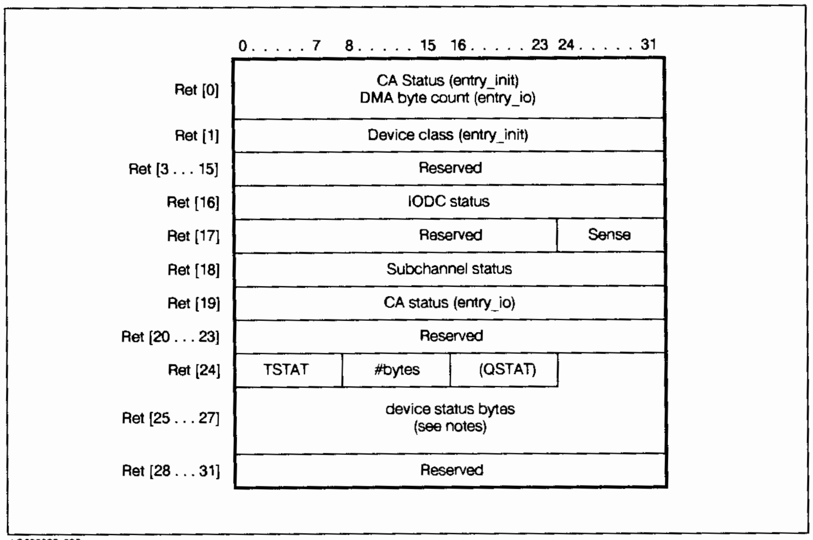

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Figure 4-28. IODC Status Format for AMUX CS/80 Disk Devices

Notes:

Ret[24].[16..23] contains the QSTAT value only if the IODC status indicated a QSTAT error (see IODC status values Ret[16]

Ret[24].[8..15] indicates the number of device status bytes excluding the QSTAT byte (if there is a QSTAT).

In other words, the device status bytes start at Ret[24].[24..31] if Ret[16] indicated a QSTAT error and Ret[16].[16..23] contains the QSTAT. But if Ret[16] does not indicate a QSTAT error, the device status bytes start at Ret[24].[16..23] and there is no QSTAT byte.

	0 7	8 15	16 23	24 31
Ret[0]	CA status (entry_init) DMA byte count (entry_io)			
Ret[1]	Device class (entry_init)			
Ret[2...15]	Reserved			
Ret[16]	IODC status			
Ret[17]	Reserved			Sense
Ret[18]	Subchannel status			
Ret[19]	CA I/O status (entry_io)			
Ret[20...23]	Reserved			
Ret[24]	TSTAT	HSTAT	DSJ	0
Ret[25]	S1	S2	S3	S4
Ret[28]	S5	S6	Byte count	
Ret[27...31]	Reserved			

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Figure 4-29. IODC Status Format for HP-IB 7974/78/79/80 Tape Drives

HP-IB Device Adapter TSTAT Codes

TSTAT provides status information about the transaction. The meaning of a particular value of TSTAT is the same for all transactions. Some meanings, however, are not applicable to all transactions and hence will never be returned for particular transactions.

TSTAT values and descriptions are listed below. The range of the values is 0 to 254. The value 255 is reversed for purposes of extending the range of values if the need should arise.

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

(hex) **TSTAT**	**Description**
00	No exceptional conditions. (Does not mean QSTAT = 0)
01	Read transaction was terminated by EOI
02	Read transaction was terminated by EOI; Count was odd
03	Read transaction was terminated by count
04	Read transaction was terminated by count; Count was odd
05	Read transaction was terminated by LF
06	Read transaction was terminated by LF; Count was odd
07	Read transaction was terminated by MSA
08	Read transaction was terminated by MSA; Count was odd
09	Transaction was terminated by host - data transfer to host was terminated by CEND instead of DEND

TSTATs for Read Terminations

Additional TSTATs for Read terminations are described below:

(hex) TSTAT	Description
QA	Transaction FCODE is not supported by the 27110B
0B	Transaction requires 27110B to be SC and it is not
0C	Transaction requires 27110B to be CIC and it is not
0D	Transaction requires 27110B to not be CIC and it is
0E	Transaction requires 27110B to be either addressed or not CIC (so some one else can address it) and it is not
26	Same as 25 only the count was odd
27	End of a FIFO disabled transfer occurred with a match byte
28	Same as 27 only the count was odd
29	A write transfer was terminated by a byte arriving in the device adapter inbound FIFO when the 27110B was not the CIC
2A	A read or write transfer was terminated by the 27110B receiving an DCL or SDC when it was not the CIC. For reads an extra byte is sent to the host in order to terminate the transfer. This byte is counted in the odd/even sense of the status.
2B	Same as 2A for a read, only the byte count was odd
2C	reserved
2D	Download _error. This condition occurs when the contents of the data block to be stored on the 27110B is inconsistent with the indicated byte count for the download.
2E	reserved
2F	No DAP downloaded. This error will be given when an execute downloaded DAP transaction is attempted before the DAP has been downloaded.

CS/80 Timeout Status Values

CS/80 Timeout status values are as follows:

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

ALINK Device Adapter TSTAT Codes

ALINK Device Adapter TSTAT codes are as follows:

(hex) TSTAT	Description
00	No error
01	Reserved (formerly link down before request started)
02	Device signaled error(IMS)
03	Illegal adapter request code
04	Illegal adapter request subfunction
05	Incompatible link handshake (RTS vs RQS)
06	Request aborted by link resyncronization
07	Request aborted by Virtual Circuit reset
08	Residue count: looped back less then requested length of data
09	Requested while in incompatible state
0A	Message sequencing error in received link header
0B	Bad tag received in link header
0C	Host aborted transaction indirectly (DSC or VC reset)
0D	Short request block length: missing parameters

QSTAT Codes

CS/80 Transactions are as follows:

0 - NORMAL COMPLETION

Indicates normal completion of the requested operation

1 - HARD ERROR

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

2 - POWER ON

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

3 - INTERFACE ERROR

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

DSJ/HSTAT Codes

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

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

Decoding Information:

HSTAT Codes are as follows:

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

CS/80 Disk Drive Status Words

A 20-byte status report is returned with the Request Status command. The report contains a summary of all transactions since the last report was cleared. Table 4-15 provides information for decoding the status bytes. The left column (Identification Errors Field) decodes the first 2 bytes. The next four columns decode the 8 bytes of the error reporting field. The last column describes the final 10 bytes of the parameter field.

Table 4-15. CS/80 Disk Drive Status Words

ERROR REPORTING FIELDS [1]

Identification Errors Field	Reject Errors Field	Fault Errors Field[2]
<VVVVUUUU> <SS SS SS SS>	0 7 8 15 <0 0 2 0 0 5 6 7> <8 9 10 0 12 0 0 0>	16 23 24 31 <0 17 0 19 0 0 22 0> <24 0 26 27 28 0 30 31>
VVVV= Volume Number **UUUU=** Unit Number **SSSSSSSS=** Value of the lowest numbered unit with status pending (all ones if no units have status pending) Notes: 1. Error bit positions correspond to bit positions in Set Status Mask command. A "1" indicates presence of an error. Unused bit positions must be zeroes. 2. All Fault Errors are unmaskable. 3. Error uses parameter field. 4. • Parameter field configuration is dependent of reported errors. • Highest priority is given to lowest numbered errors. • Masked errors relinquish their priority.	**2 = CHANNEL PARITY ERROR** A channel command was received without odd parity. **5 = ILLEGAL OPCODE** An unrecognizable opcode was received. **6 = MODULE ADDRESSING** An illegal volume or unit number was specified for this device. **7 = ADDRESS BOUNDS** The target address has exceeded the bounds for this device. **8 = PARAMETER BOUNDS** A parameter (other than unit, volume, or target address) is not allowed for this device. **9 = ILLEGAL PARAMETER** A parameter field was the wrong length for the opcode preceding it. **10 = MESSAGE SEQUENCE** The message sequence has been violated. (Error supressed if any reject or fault errors have occurred prior to sequence error.) **12 = MESSAGE LENGTH** The total length of the execution message differs from the current default value.	**17 = CROSS-UNIT[3]** An error has occurred during a Copy Data operation. **19 = CONTROLLER FAULT** A hardware fault occurred in the controller. **22 = UNIT FAULT** A hardware fault has occurred in the unit addressed. **24 = DIAGNOSTIC RESULT[3]** The hardware failed the diagnostic indicated in the parameter field. **26–28 = RELEASE REQUIRED** This command cannot be executed until after release is granted to the device. Device requires release for indicated reason. **26 = OPERATOR REQUEST** Release required for operator request (e.g. load/unload, restore). **27 = DIAGNOSTIC REQUEST** Release required for diagnostics initiated from control panel (e.g. HIO, self test). **28 = INTERNAL MAINTENANCE** Release required for internal maintenance (e.g. head alignment, error log). **30 = POWER FAIL** The power to the unit failed, a diagnostic destroyed configuration, or a pack was loaded. Device should be reconfigured. **31 = RETRANSMIT** The preceding transaction should be retried.

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Table 4-15. CS/80 Disk Drive Status Words (Continued)

ERROR REPORTING FIELDS

ACCESS ERRORS FIELD	INFORMATION ERRORS FIELD	PARAMETER FIELD [4]
32 39 40 47 <32 33 34 35 36 37 0 0> <40 41 0 43 44 0 0 0>	48 55 56 63 <48 49 50 51 52 0 0 55> <0 57 58 59 0 6 1 0 0>	<P1>.........<P10>
32 = ILLEGAL PARALLEL OPERATION The requested operation cannot be executed in parallel with some other operation(s) currently in progress. **33 = UNINITIALIZED MEDIA** The host attempted to access unformatted media, or unusable media has been loaded. **34 = NO SPARES AVAILABLE** Spare Block cannot be executed due to lack of spare media. **35 = NOT READY** The selected unit is not ready for access at this time (e.g. heads or media not yet fully loaded). **36 = WRITE PROTECT** The selected volume is write protected. **37 = NO DATA FOUND** A block accessed during a read has not been written. **40 = UNRECOVERABLE DATA OVERFLOW** The previous transaction generated more than 1 unrecoverable data error. The entire transfer should be considered in error. **41 = UNRECOVERABLE DATA**[3] Unrecoverable data at indicated block(s). **43 = END OF FILE** End of file encountered on file structure device. **44 = END OF VOLUME** The host attempted to access across a volume boundry. *** EXCEPTIONS FOR HP 794X.**	**48-50 = REQUEST RELEASE**[3] Device requests release for indicated reason. **48 = OPERATOR REQUEST**[3] Release requested for operator request (e.g. load/unload, restore). **49 = DIAGNOSTIC REQUEST**[3] Release request initiated from diagnostic control panel (e.g. HIO, self test). **50 = INTERNAL MAINTENANCE**[3] Release requested for internal maintenance (e.g. head alignment, error log). **51 = MEDIA WEAR** Only one spare track (disc) or one spare block (tape). **52 = LATENCY INDUCED** A latency was induced during the transfer due to slow transfer rate or seek retry. **55 = AUTO SPARING INVOKED** A defective block has been automatically spared by the device. **57 = RECOVERABLE DATA OVERFLOW** The previous transaction generated more than 1 recoverable data error. **58 = MARGINAL DATA**[3] Data was recovered, but with difficulty. **59 = RECOVERABLE DATA**[3] A latency was introduced in order to correct a data error. **61 = MAINTENANCE TRACK OVERFLOW**[3] Error and fault log area is full.	No errors: P1 thru P6 indicate new Target Addr. The address format, which is used any time P1 thru P6 contain addr. information is defined by the Set Return Addressing Command. No Errors: P7 thru P10 contain run-time drive error codes (DERRORS) except after a Spare Block command. The errors are arranged chronologically. P7 contains the most recent of the four errors recorded. P10 contains the oldest of the four recorded. Note: Error codes 40H and CBH will always be followed by a single byte containing fault latch information. After a **Spare Block** command, P1 thru P6 contain the beginning address of the reformatted area. (Disc operation only). After a **Spare Block** command, P7 thru P10 indicate the length in blocks of the reformatted area. The length is a four-byte unsigned binary number. (Disc operation only) Error Bit No. 17 **Cross-unit:** P1 through P6 contain the encoded values of each unit which has experienced an error. A byte of all ones indicates no additonal units. Error Bit No. 24 **Diagnostic Results:** P1 through P6* contain the following information: P1 = most suspect component P2 = next most suspect component P3 = test error (TERROR) associated with P1 P4 = test error (TERROR) associated with P2 P5-P6 = not used P7-P10 contain DERROR information (format described above) Error Bit No. 41 **Unrecoverable Data:** P1 through P6 indicate address of bad block. Error Bit No. 48 - No. 50 **Request Release:** P1 through P6 contain the encoded values of each unit requesting release. A byte of all ones indicates no additional units. Error Bit No. 58 **Marginal Data:** P1 through P6 indicate address of the marginal block. Error Bit No. 59 **Recoverable Data:** P1 through P6 indicate address of recoverable block.

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HP 7936 and 7937 AMUX Status Format

byte 0	byte 1	byte 2	byte 3	byte 4	byte 5	byte 6-12
0 = Cancel						
1 = Command Error	1 = illegal opcode					
	2 = module addressing					
	3 = address bounds					
	4 = parameter bounds					
	5 = illegal parameter					
	6 = message sequence					
2 = Message Length						
3 = Reset	1 = power on	QSTAT				
	2 = initiate diagnostics	QSTAT				
4 = Resource Info	1 = resource available					
	2 = non responding host					
	3 = resource unavailable					
5 = Hardware Error	1 = parity disk to host	device ID				
	2 = parity host to disk					
	3 = diagnostic failure					
	4 = unit fault	derror	derror			
	5 = controller fault	derror	derror			
6 = Link Protocol	1 = illegal fram attribute					
	2 = illegal message type					
	3 = parameter/length field					
	4 = message sequence					
7 = Port Events	1 = link error overflow					
	2 = pronto protocol error					
8 = Access Error	1 = no spares					
	2 = defective spare					target addr
	3 = unrecoverable data flow	derror	derror	derror	derror	target addr
	4 = unrecoverable data	derror	derror	derror	derror	target addr
	5 = end of volume					
9 = Information Error	1 = almost out of spares					target addr
	2 = marginal data	derror	derror	derror	derror	target addr

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Figure 4-30. AMUX Status Format for HP 7936 and 7937 Disk Drives

HP 7974/78/79/80 Magnetic Tape Drive Status Bytes

The following is a description of the bit definitions for status bytes 1 through 6.

Bit No.	Interpretation
BYTE_S1	(Word 9.[0..7])
0	End of file (tape mark)
1	BOT (load point)
2	EOT (end of tape)
3	Recovered error check (see retry count)
4	Command rejected (see reject codes A1/BE)
5	File write protected (no write ring)
6	Unrecovered (data/format) error (see reject codes 29/49)
7	Unit on-line
BYTE_S2	(Word 9.[8..15])
0	GCR format (6250 BPI) (7978B)
1	Unknown tape format/density
2	Data parity error (transport electronics)
3	Data timing error (should not happen on 7974A/7978B)
4	Tape run-away
5	Door open
6	Long records supported (7978B)
7	Immediate response mode enabled
BYTE_S3	(Word 9.[16..23])
0	PE format (1600 BPI)
1	NRZI format (800 BPI)(7974A)
2	Power restored or device cleared
3	HP-IB command parity error
4	Tape position lost or loss of tension (see reject codes 51/5E)
5	Formatter error (see reject codes 65/6E)
6	Servo error (see reject codes 51/5E)
7	Controller error (see reject codes 79/8C)

Bit No.	Interpretation
BYTE_S4	(Word 9.[24..31])
0 \ 1 > 2 /	Command error code: 0 : Null code; 1 : reserved; 2 : Device reject (see reject codes); 3 : Protocol reject; 4 : reserved; 5 : Prior error abort; 6 : reserved; 7 : Error selftest and on-line
3	Retry count
	Retry count
4	Retry count
5	Retry count
6	Retry count
7	Retry count

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

Decimal Value	HEX Value	**REJECT CODE Meaning**
5	5	File protected on write
6	6	Tape not tensioned
7	7	Tape format option not present on write density command
9	9	Cannot identify format from media on read
10	A	Write command and format not identified (do write format command)
11	B	Drive not on-line
16	10	Write format but media not at BOT
19	13	At BOT and command backwards received
23	17	Protocol not synchronized
24	18	Command byte not recognized
31	1F	Write record length too long for buffer
33	21	Selftest failure
37	25	Tape positioning failure after EOT sensed
40	28	Door opened after EOT sensed

(Unrecovered data/format errors)

41	29	Tape speed out of spec
45	2D	MTE (multiple track error during write)
47	2F	Verify or write failed on TM or IDB
48	30	Noise read from media (data not valid)
49	31	Data format error
50	32	Failure to identify tape after rewind
51	33	Media failure on data portion of block (drop out)
52	34	Media failure on pre/post-amble of block (drop out)
53	35	Redundancy check character error
54	36	Uncorrected read parity error (7978B)
55	37	Abnormal command abort (door opened) (7974A)
57	39	Maximum skew exceeded (7974A)
58	3A	False pre/post-amble detected (7974A)
59	3B	Write data error corrected (7974A)
60	3C	Buffer overrun
61	3D	Data block timeout: no gap after data block
62	3E	Media fail on Tape Mark (EOF) (drop out)
63	3F	Tape mark not verified (does not meet ANSI)
64	40	Tape mark timeout

(Servo errors or loss of tension)

81	51	Servo controller unresponsive
82	52	Servo failed to reach desired state
83	53	Unexpected servo shutdown (tension lost)
84	54	Servo controller hard failure
85	55	Servo portocol error
86	56	Servo run-time error
87	57	"In position" interrupt not received by master controller
88	58	No GAP detected after Read block, Write block, or TM
89	59	Safety shutdown of motor driver
90	5A	No BOT detected on load/rewind
91	5B	Speed out of specifications
92	5C	Invalid request from master controller
94	5E	Tape positioning failure

(Formatter errors)

101	65	No "end of record" after data (7978B)
102	66	Formatter HW error (7978B)
103	67	Bad block type detected on write
104	68	Erase failed (flux transitions detected on erased area)
105	69	No data detected on write (read after write)
106	6A	Tracks out of sync on write verify
107	6B	Formatter HW error (7974A)
108	6C	Formatter unresponsive (7974A)
109	6D	Gap timer failed
110	6E	Formatter byte count <> data buffer byte count

(Controller errors)

121	79	Transaction ID mismatch (command Vs status)
122	7A	No pending command for the status received
123	7B	Invalid status received from device program
124	7C	Status queue overflow
125	7D	Unknown command received by device program
126	7E	Command queue overflow
128	80	End of record missing in data buffer
129	81	Data buffer parity error
130	82	Data buffer underrun during write
131	83	Write byte count <> read buffer byte count
132	84	Bad message type received by channel program from device program
133	85	CPU handshake abort (between HP-IB I/F and channel program)
134	86	Unknown HP-IB condition detected
137	89	Illegal access to servo controller registers detected
138	8A	Device program firmware error
139	8B	Hardware utilities firmware error
140	8C	Channel program firmware error
141	8D	ON-line encoder inoperative

(Command reject errors)

161	A1	Command queue not empty (request denied)
162	A2	Reqnest DSJ expected
163	A3	Request status expected
165	A5	Unknown unit selected
166	A6	Tape command secondary expected
167	A7	Data byte expected
168	A8	Missing parameter EOI on COMMAND, selftest#, or END
170	AA	Protocol error for "write record" command in command phase
172	AC	Protocol error for "read record" command in status phase
173	AD	Protocol error in "status" request phase
174	AE	Protocol error in "Cold load sequence"
176	B0	END "complete" or "complete idle" expected
178	B2	END "data" expected
180	B4	Unknown secondary command
181	B5	Misplaced data byte
184	B8	Protocol error (loopback)
185	B9	Protocol error (selftest)
188	BC	Parity error in HP-IB command
189	BD	Operator reset during protocol sequence
190	BE	Device clear received (internal)

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

4A

Error Codes

The following tables list the error and display codes for individual boards and for the control panel. In most cases, the **Action** is to replace the failed FRU.

PSM Board Display Error Codes

In Table 4A-1, an asterisk (*) indicates: Successful self-test, displays codes A0-A3 and AF sequentially. All CP reported PSM faults are prefixed with 31.

Table 4A-1. PSM Error Codes

Display Code	Failed FRU	Cause	Action
*A0	PSM	RAM Internal faulting	Replace failed FRU for all PSM error codes in this table.
*A1	PSM	PSM firmware Checksum fault	
*A2	PSM	PSM microcontroller Port 1 or Data Bus fault	
*A3	none	Reserved	
A4	PSM	PSM A/D Converter time out fault	
A5	PSM	PSM microcontroller fault (PSMOK-deasserted)	
A6	+5V module	Turn-on time out fault on +5 volt modules	
A7	±12V module	Turn-on time out fault on ±12 volt modules	
A8	PSM	PSM Watchdog timer fault	
A9	PSM	PSM V5BIAS regulator fault	
AA-AE	none	Reserved	
*AF	Information	PON+ is asserted	

Table 4A-1. PSM Error Codes (continued)

Display Code	Failed FRU	Cause	Action
B0-B3	none	Reserved	Replace failed FRU for all PSM error codes in this table.
B4	+5V module 1	Converter alarm test fault on +5 volt module 1	
B5	+5V module 2	Converter alarm test fault on +5 volt module 2	
B6	+5V module 3	Converter alarm test fault on +5 volt module 3	
B7	+5V module 4	Converter alarm test fault on +5 volt module 4	
B8	+5V module 5	Converter alarm test fault on +5 volt module 5	
B9	+5V module 6	Converter alarm test fault on +5 volt module 6	
BA	±12V module 1	Converter alarm test fault on ±12 volt module 1	
BB	±12V Module 2	Converter alarm test fault on ±12 volt module 2	
BC	±12V module 3	Converter alarm test fault on ±12 volt module 3	
BD-BF	none	Reserved	

Table 4A-1. PSM Error Codes (continued)

Display Code	Failed FRU	Cause	Action
C0	+5V module	Proc. backplane (V+5) overvoltage	Replace failed FRU for all PSM error codes in this table.
C1	+5V module	Proc. Backplane (V+5), fault detected	
C2	PSM	Vbg bias overvoltage for VLSI chips	
C3	PSM	Vbg bias undervoltage for VLSI chips	
C4	Information	Power Fail Alarm—from ACFE	
C5	Fan #1, Fuse	Fan Power Alarm #1 from bias XFMR1, Fuse 2	
C6	Fan #2, Fuse	Fan Power Alarm #2 from bias XFMR2, Fuse 1	
C7	AC Unit	AC Overtemperature Alarm (Rectifiers/Xfmrs)	
C8	Information	Reset-X pressed on CP or via AP	
C9	Information	Manufacturing test invoked	
CA-CF	none	Reserved	

Table 4A-1. PSM Error Codes (continued)

Display Code	Failed FRU	Cause	Action
D0	PDH	PDH overtemperature	Replace failed FRU for all PSM error codes in this table.
D1	PROC #1, Fan	slot #10 Processor overtemperature	
D2	PROC #2, Fan	slot #11 Processor overtemperature	
D3	PROC #3, Fan	slot #12 Processor overtemperature	
D4	PROC #4, fan	slot #13 Processor overtemperature	
D5	Clock, fan	Clock board overtemperature	
D6	PSM, fan	PSM overtemperature	
D7	BC0, fan	slot #24 Bus Converter overtemperature	
D8	MC0, fan	slot #25 Memory Controller overtemperature	
D9	MC1, fan	slot #26 Memory Controller overtemperature	
DA	BC1, fan	slot #27 Bus Converter overtemperature	
DB		Reserved	
DC		Reserved	
DD	Fans	PDH/PSM temperature difference fault	
DE	none	Reserved	
DF	none	Reserved	

Table 4A-1. PSM Error Codes (continued)

Display Code	Failed FRU	Cause	Action
E0	PROC #1	slot #10 Processor regulator	Replace failed FRU for all PSM error codes in this table.
E1	PROC #2	slot #11 Processor regulator	
E2	PROC #3	slot #12 Processor regulator	
E3	PROC #4	slot #13 Processor regulator	
E4	BC0	slot #24 Bus Converter #0 regulator	
E5	MC0	slot #25 Memory Controller #0 regulator	
E6	MC1	slot #26 Memory Controller #1 regulator	
E7	BC1	slot #27 Bus Converter #1 regulator	
E8	Clock	Clock board regulator	
E9-EF	none	Reserved	
F0	Batt. Charger 0	0 section battery charger	
F1	OBC 0	0 section off battery converter	
F2	Batt. Charger 1	1 section battery charger	
F3	OBC 1	1 section off battery converter	
F4	+5V module 1	+5 volt module 1	
F5	+5V module 2	+5 volt module 2	
F6	+5V module 3	+5 volt module 3	
F7	+5V module 4	+5 volt module 4	
F8	none	Reserved	
F9	none	Reserved	
FA	±12V module 1	±12 volt module 1	
FB	±12V module 2	±12 volt module 2	
FC	none	Reserved	
FD	AES Module	Powerfail holdup time too short	
FE-FF	none	Reserved	

PDH Board Display Error Codes

*Some error codes are echoed to the CP display and are then prefixed with 30.

Table 4A-2. PDH Self-Test Error Codes

Error Code	Fatal	Cause	Action
D0	Y	Failed DONE bit test	Replace PDH
D1	Y	Failed FREE bit test	Replace PDH
D2	N	Failed SECFAIL bit test	Replace PDH
D3	N	Failed NVM and Stable Storage Address Bus test	Replace PDH
D4	N	Failed PDHOK bit test	Replace PDH
D5	Y	Failed Microprocessor Instruction Set test	Replace PDH
D6	Y	Failed Microprocessor Data Memory test	Replace PDH
E0	Y	Microprocessor register error	Replace Processor Card
E1	Y	Stack operation error	Replace PDH
E2	Y	Program memory checksum error	Replace PDH
E3	Y	Bus and/or PDH data register error	Replace PDH
E4	Y	Residual Control Register error	Replace PDH
E5	Y	Interrupt capability error	Replace PDH
E6	Y	Watchdog timer error	Replace PDH
E7	N	Stable Storage data path error	Replace PDH
E8	N	Stable Storage data correction	Replace PDH
E9	N	Stable Storage data inconsistency	Replace PDH
EA	N	Real-time Clock write/read error	Replace PDH
EB	N	Real-time Clock not operational	Replace PDH
EC	N	Non-volatile Memory error	Replace PDH
ED	N	Revision Port error	Replace PDH
EE	N	Control Panel interface error	Replace PDH, CP, or CP cable
EF	Y	Watchdog timer has FAIL bit set	Replace PDH

Processor Error and Self-Test Codes

Note

The DSP functional and fault codes listed in Table 4A-3 and Table 4A-4 do not apply to the Series 980 and Model 870S systems; these systems do not have a DIP Support Processor.

Table 4A-3. DSP Functional Codes

Code	Test Passed
0	Ready state (PON is false)
1	Active state
2	DSP self-test
3	DIP I/O test
4	DSP is loading cache memory
5	(Series 950 & Model 850S): DSP is loading Diagnose Register 0 (Series 955/960 & Model 855S/860S): Verifying PDC loaded into cache RAM
6	DSP is starting CCU0
7	DSP is starting CPU and waiting for self-test completion
D	Waiting for result of extended processor test
F	Idle state (Processor is running)

Table 4A-4. DSP Fault Codes

Code (alternating)	Cause	Action
E/2	DSP self-test failed	Replace Processor Card
E/2/0	DSP self-test failed	Replace Processor Card
E/2/1	DSP Eprom checksum test failed	Replace Processor Card
E/3	DIP I/O test failed	Replace Processor Card
E/3/0	No PON = 1	Replace Processor Card
E/3/1	No NSTP = 1 after reset	Replace Processor Card
E/3/2	NMICROSTB Loopback failed	Replace Processor Card
E/3/4	DSP could not talk to the CPU VLSI	Replace Processor Card
E/3/5	DSP could not talk to the ICCU VLSI	Replace Processor Card
E/3/6	DSP could not talk to the DCCU VLSI	Replace Processor Card
E/3/7	DSP could not talk to the TCU VLSI	Replace Processor Card
E/3/8	DSP could not talk to the SIU VLSI	Replace Processor Card
E/3/9	DSP could not talk to the FPC VLSI	Replace Processor Card
E/3/A	DSP could not talk to any VLSI	Replace Processor Card
E/3/B	NSTP = 0 was not received from TCU	Replace Processor Card
E/3/C	NSTP = 1 was not received from TCU	Replace Processor Card
E/5/0	ICCU VLSI test (SCAN PATH 2) failed	Replace Processor Card
E/5/1	ICCU VLSI test (SCAN PATH 9) failed	Replace Processor Card
E/8/1	I-Cache TAG1 Read failed	Replace Processor Card
E/8/2	I-Cache DATA1 Read failed	Replace Processor Card
E/8/3	I-Cache TAG2 Read failed	Replace Processor Card
E/8/4	I-Cache DATA2 Read failed	Replace Processor Card
E/9	Processor failed to start	Replace Processor Card
E/9/2	Processor failed to start	Replace Processor Card

Table 4A-4. DSP Fault Codes (continued)

Code (alternating)	Cause	Action
E/A	CPU failed self-test	Replace Processor Card
E/A/1	PDC failed checksum test	Replace Processor Card
E/A/2	No NSTP = 1 after PDC checksum test	Replace Processor Card
E/B	CCU0 failed self-test	Replace Processor Card
E/B/2	No NSTP = 1 after CCU self-test	Replace Processor Card
E/C	SIU failed self-test	Replace Processor Card
E/C/2	No NSTP = 1 after SIU self-test	Replace Processor Card
E/D	PDH access failed	Replace Processor Card
E/D/2	No NSTP = 1 after PDC Access test	Replace Processor Card
E/F	Extended Processor test failed (CPU and SIU)	Replace Processor, PDH Cards

Control Panel Error/Status Codes

Error/Status Code Legend. In the **Code** column:

x = Number of failing PCA or slot number on local bus.
z = Slot number on Memory Array Bus (MAB).
t = Trap number.

Table 4A-5. Control Panel Hexadecimal Display Codes

Code	Type	Cause	Action
0000	Fatal	Unknown PDH failure	Replace PDH
0001-0FFF		Reserved, except as described below	
1000	Fatal	Unknown Processor failure	Replace Processor
1x01	Fatal	CPU GR failure	Replace processor
1x02	Fatal	CPU ALU failure	Replace processor
1x03	Fatal	CPU branch failure	Replace processor
1x04	Fatal	CPU Shifter failure	Replace processor
1x05	Fatal	CPU extract/desposit failure	Replace processor
1x06	Fatal	CPU arithmetic condition failure	Replace processor
1x07	Fatal	CPU carry/borrow failure	Replace processor
1x08	Fatal	CPU CR failure	Replace processor
1x50	Fatal	SIU/SPI register failure	Replace processor
1x51	Fatal	SIU/SPI register crosstalk failure	Replace processor
1x52	Fatal	SIU/SPI interval timer failure	Replace processor
1x53	Fatal	SIU/SPI I/O register failure	Replace processor
1x54	Fatal	SIU/SPI external interrupt failure	Replace processor
1x55	Fatal	SIU/SPI SMB transaction failure	Replace processor
1x56	Fatal	SIU/SPI TMOUT register failure (possibly CPU)	Replace Processor
1x57	Fatal	SIU/SPI SMB error detection failure	Replace Processor
1x61	Fatal	SIU/SPI Memory semaphore failure (possibly MC)	Replace Processor, MC
1x62	Fatal	SIU/SPI Copyout failure (possibly CPU)	Replace Processor

Table 4A-5. Control Panel Hexadecimal Display Codes (continued)

Code	Type	Cause	Action
1xEt	Fatal	Unexpected trap #t in processor slot x	Call Response Center
1xFt	Fatal	Unexpected trap #t + 16 in processor slot x	Call Response Center
1xF1	Fatal	Instruction TLB Parity error	Replace Processor
1xF2	Fatal	Data TLB Parity error	Replace Processor
1xF3	Fatal	SMB Address error on a Read Transaction	Replace Processor, MC, BC
1xF4	Fatal	SMB Data error on a Read Transaction	Replace Processor, MC, BC
1xF5	Fatal	MC Data Read error	Replace MC, MA, PDH
1xF6	Fatal	MC Data Write Transaction error (non-responding module)	Replace MC, MA, PDH
1xF7	Fatal	MC Data Read Transaction error (time-out)	Replace MC, MA, PDH
1xFC	Fatal	BC error	Replace BC
1xFD	Fatal	SMB Protocol error	Replace Processor, MC, BC
1xFF	Fatal	HPMC with uninitialized or corrupt handler	Record PIM data from console; call Response Center
1F00	Warning	Processor failure in MP system	Replace Processor

Table 4A-5. Control Panel Hexadecimal Display Codes (continued)

Code	Type	Cause	Action
2x00	Fatal	CCU/CMUX Register Test failed	Replace Processor
2x01	Fatal	CCU/CMUX Address Line Test failed	Replace Processor
2x02	Fatal	CCU/CMUX RAM Test failed	Replace Processor
2x05	Fatal	CCU/CMUX Dirty Bit Test failed	Replace Processor
2x06	Fatal	CCU/CMUX Purge Test failed	Replace Processor
2x07	Fatal	CCU/CMUX Parity Error Test failed	Replace Processor
2x08	Fatal	CCU/CMUX Instruction Fetch Test failed	Replace Processor
2x45	Warning	LPMC Handler failed	Replace Processor
2x50	Warning	TCU/CPU Diagnose Register failure	Replace Processor
2x52	Warning	TCU/CPU Space/PID Register failure	Replace Processor
2x53	Warning	TCU/CPU PCS Queue Register failure	Replace Processor
2x54	Warning	TCU/CPU PCS RAM TAG Parity failure	Replace Processor
2x55	Warning	TCU/CPU PCS RAM RPN failure	Replace Processor
2x56	Warning	D-TCU/CPU PCS RAM SID failure	Replace Processor
2x57	Warning	D-TCU/CPU PCS RAM SID failure	Replace Processor
2x58	Warning	D-TCU/CPU RAM Access Rights failure	Replace Processor
2x59	Warning	D-TCU/CPU RAM Valid Bit/Flags failure	Replace Processor
2x5A	Warning	I-TLB RAM SID failure	Replace Processor
2x5B	Warning	I-TLB RAM VPN failure	Replace Processor
2x5C	Warning	I-TLB RAM PID failure	Replace Processor
2x5D	Warning	I-TLB RAM Access Rights failure	Replace Processor
2x5E	Warning	I-TLB RAM Valid bit/flags failure	Replace Processor
2x5F	Warning	TCU/CPU Hash Function failure	Replace Processor

Table 4A-5. Control Panel Hexadecimal Display Codes (continued)

Code	Type	Cause	Action
2x60	Warning	TCU/CPU Purge Function failure	Replace Processor
2x61	Warning	TCU/CPU Lock Function failure	Replace Processor
2x62	Warning	TCU/CPU TLB Parity Error Test failure	Replace Processor
2x63	Warning	TCU/CPU RPN Parity Error Test failure	Replace Processor
2x64	Warning	TCU/CPU Virtual Translation Test failure	Replace Processor
2x65	Warning	TCU/CPU Access Rights Function failure	Replace Processor
2x6B	Warning	TCU/CPU Test - Unexpected Trap	Replace Processor
2x6C	Warning	TCU/CPU Test - Illegal Trap	Replace Processor
2x6D	Warning	TCU/CPU Test - Unexpected Trap	Replace Processor
2x6E	Warning	TCU/CPU Test - Unexpected HPMC	Replace Processor
2x6F	Warning	TCU/CPU Test - Illegal HPMC	Replace Processor
2x88	Fatal	Self-Test Code Checksum error	Replace Processor
2F30	Warning	Cache set failure	Replace Processor
2F31	Warning	Multiple Cache Line failure	Replace Processor

Table 4A-5. Control Panel Hexadecimal Display Codes (continued)

Code	Type	Cause	Action
3000-3FFF		Reserved, except as described below	
3000	Fatal	PDH not receiving valid commands	Replace PDH, Processor, or MC
3001	Warning	Single bit error in PDC	Replace PDH
3002	Warning	Front Panel Access failure	Replace PDH
3003	Warning	Real Time Clock Access failure	Replace PDH
3004	Warning	Revision Port Access failure	Replace PDH
3005	Warning	Uncorrectable NVM error	Replace PDH
3006	Warning	Correctable NVM error	Replace PDH
3007	Warning	Massive NVM failure	Replace PDH
3008	Warning	Uncorrectable Stable Storage error	Replace PDH
3009	Warning	Correctable Stable Storage error	Replace PDH
300A	Warning	Massive Stable Storage failure	Replace PDH
301z	Warning	PDH Status Register failure	Replace PDH
302z	Warning	PDH Semaphore failure	Replace PDH
303z	Warning	PDH Timeout failure	Replace PDH
304z	Warning	PDH Long Command failure	Replace PDH
3050	Warning	PDH Warn failure	Replace PDH
3051	Warning	PDH Err failure	Replace PDH
3052	Warning	PDH Data or Control Register failure	Replace PDH
305F	Warning	PDH Intermittent failure	Replace PDH
301z	Warning	Bit in PDH Status Register is stuck at logical 1	Replace PDH
302z	Warning	Failure in PDH semaphore function	Replace PDH
303z	Warning	Failure in PDH timeout function	Replace PDH
304z	Warning	Failure in PDH "long command" function	Replace PDH

Table 4A-5. Control Panel Hexadecimal Display Codes (continued)

Code	Type	Cause	Action
31A0	Fatal	PSM RAM fault	Replace PSM
31A1	Fatal	PSM Check-sum fault	Replace PSM
31A2	Fatal	PSM Port1 or Bus fault	Replace PSM
31A4	Fatal	PSM A/D Converter Timed Out	Replace PSM
31A5	Fatal	PSM Microcontroller fault	Replace PSM
31A6	Fatal	Turn-on fault 5V timed out	Replace 5V
31A7	Fatal	Turn-on fault ±12V timed out	Replace 12V
31A8	Fatal	PSM Watch-dog timer fault	Replace PSM
31A9	Fatal	PSM 5V Bias Regulator fault	Replace PSM
31B4	Fatal	Converter alarm test fault 5V#1	Replace 5V #1
31B5	Fatal	Converter alarm test fault 5V#2	Replace 5V #2
31B6	Fatal	Converter alarm test fault 5V#3	Replace 5V #3
31B7	Fatal	Converter alarm test fault 5V#4	Replace 5V #4
31B8	Fatal	Converter alarm test fault 5V#5	Replace 5V #5
31B9	Fatal	Converter alarm test fault 5V#6	Replace 5V #6
31BA	Fatal	Converter alarm test fault 12V#1	Replace 12V #1
31BB	Fatal	Converter alarm test fault 12V#2	Replace 12V #2
31BC	Fatal	Converter alarm test fault 12V#3	Replace 12V #3

Table 4A-5. Control Panel Hexadecimal Display Codes (continued)

Code	Type	Cause	Action
31C0	Fatal	5V Overvoltage	Replace 5V
31C1	Fatal	5V Glitch detected	Replace 5V
31C2	Fatal	Vbg Overvoltage	Replace PSM or ±12 V Module
31C3	Fatal	Vbg Undervoltage	Replace PSM or ±12 V Module
31C4	Fatal	Powerfail alarm	Verify power
31C5	Fatal	Fan Power alarm	Replace Fan #1
31C6	Fatal	Fan Power alarm	Replace Fan #2
31C7	Fatal	AC Overtemperature alarm	Replace AC Unit
31Dx		All 31Dx codes indicate that an overtemperature condition was detected, as described below:	For all 31Dx codes: When temperature returns to normal, cycle the line switch to resume normal operation. If error persists and temperature is normal, replace PCA indicated as **Cause**.
31D0	Fatal	PDH Overtemperature alarm	
31D1	Fatal	Proc #0 Overtemperature alarm	
31D2	Fatal	Proc #1 Overtemperature alarm	
31D3	Fatal	Proc #2 Overtemperature alarm	
31D4	Fatal	Proc #3 Overtemperature alarm	
31D5	Fatal	Clock Overtemperature alarm	
31D6	Fatal	PSM Overtemperature alarm	
31D7	Fatal	BC #0 Overtemperature alarm	
31D8	Fatal	MC #0 Overtemperature alarm	
31D9	Fatal	MC #1 Overtemperature alarm	
31DA	Fatal	BC #1 Overtemperature alarm	
31DD	Fatal	PDH Temp Difference Fault	

Table 4A-5. Control Panel Hexadecimal Display Codes (continued)

Code	Type	Cause	Action
31E0	Fatal	Proc #0 Regulator failure	Replace Proc #0
31E1	Fatal	Proc #1 Regulator failure	Replace Proc #1
31E2	Fatal	Proc #2 Regulator failure	Replace Proc #2
31E3	Fatal	Proc #3 Regulator failure	Replace Proc #3
31E4	Fatal	BC #0 Regulator failure	Replace BC #0
31E5	Fatal	MC #0 Regulator failure	Replace MC #0
31E6	Fatal	MC #1 Regulator failure	Replace MC #1
31E7	Fatal	BC #1 Regulator failure	Replace BC #1
31E8	Fatal	Clock Card Reg failure	Replace Clock
31F0	Fatal	X Sec Batt Chgr alarm	Replace BC/DBC "0"
31F1	Fatal	X Sec Batt Conv alarm	Replace BC/DBC "0"
31F2	Fatal	Y Sec Batt Chgr alarm	Replace BC/DBC "1"
31F3	Fatal	Y Sec Batt Conv alarm	Replace BC/DBC "1"
31F4	Fatal	5V Conv alarm	Replace 5V #A
31F5	Fatal	5V Conv alarm	Replace 5V #B
31F6	Fatal	5V Conv alarm	Replace 5V #C
31F7	Fatal	5V Conv alarm	Replace 5V #D
31F8	Fatal	5V Conv alarm	Replace 5V #E
31F9	Fatal	5V Conv alarm	Replace 5V #F
31FA	Fatal	±12V Conv alarm	Replace 12V #1
31FB	Fatal	±12V Conv alarm	Replace 12V #2
31FC	Fatal	±12V Conv alarm	Replace 12V #3
31A0	Fatal	PSM RAM fault	Replace PSM
31A1	Fatal	PSM Check-sum fault	Replace PSM
3200	Fatal	Clock board failure	Replace Clock board
3x40	Non fatal	Battery low (discharged)	Check battery state

Table 4A-5. Control Panel Hexadecimal Display Codes (continued)

Code	Type	Cause	Action
4000-4FFF		Reserved, except as described below	
4x00-4x0C		Floating Point test failure (where x=processor number)	Replace processor
5001-5FFF		Reserved, except as described below	
5x00	Fatal	Cannot access PDC from processor, slot x	Replace PDH
6000-6FFF		Reserved	
7000-7FFF		Reserved, except as described below	
7000	Fatal	Cannot access PDH through MC	Replace MC #0, PDH
7x10	Fatal	MC IODC Access failure	Replace MC #x or Processor
7x20	Fatal	MC Register failure	Replace MC #x
7x30	Fatal	MC Configuration failure	Replace MC #x or reconfigure MA
7x40	Fatal	MC failure	Reseat Proc #1
7x4z	Fatal	Memory Array Board failure	Replace MA in slot z of MC #x (if z = F, replace MC #x)
7x5z	Fatal	MC Address Decode failure	Replace MA in slot z of MC #x (if z = F, replace MC #x)
7x6z	Fatal	MC Read/Write failure Double bit error	Replace MA in slot z of MC #x (if z = F, replace MC #x)
7x7z	Fatal	MC Configuration, Status, or Command failure	Replace MA in slot z of MC #x (if z = F, replace MC #x)
7x8z	Fatal	MC Address Parity Detection failure	Replace MA in slot z of MC #x (if z = F, replace MC #x)
7x9z	Non fatal	MC error during array test. Detection/Correction failure	Replace MC #x or MA in slot z
7xA0	Fatal	MC, unknown HPMC during pattern test, slot x	Replace MC #x
7xB0	Fatal	MC fails semaphore test	Replace MC #x
7xC0	Fatal	MC fails read adder parity test	Replace MC #x
7xD0	Fatal	MC fails write adder parity test	Replace MC #x
7xE0	Fatal	MC fails single bit error test	Replace MA in slot 0 of MC #x
7xF0	Fatal	MC fails double bit error test	Replace MC #x or MA slot 0

Table 4A-5. Control Panel Hexadecimal Display Codes (continued)

Code	Type	Cause	Action
700F	Warning	Memory Controller 0 failure	Replace MC #0
710F	Warning	Memory Controller 1 failure	Replace MC #1
7F01	Warning	Illegal Memory Configuration	Replace memory array
7F02	Warning	FAST size is less than X'E	No hardware failed
7F04	Warning	Memory Array failure	Replace MA
7F05	Warning	Single Bit error in memory	Replace MA
7F06	Warning	PFR/TOC Aborted due to memory failure	Replace MC
8000-8FFF	Fatal	Reserved	
9000-9FFF		Reserved, except as described below	
9083	Fatal	Default console device failed ENTRY_INIT	Replace or check console
9x10	Fatal	BC in console path does not respond	Replace BC or check DP
9x11	Fatal	Device in console path is not BC (bad path)	Check path
9x13	Warning	BC in console path failed ENTRY_INIT	Replace BC #0
9x20	Warning	Console Device does not respond	Check path
9x21	Warning	Console Device is not bootable (bad path)	Check path
9x22	Warning	NO IODC on Console Device	Check channel adapter
9x23	Warning	Console Device failed ENTRY_INIT	Check DP components or console
9x33	Warning	Console Device failed ENTRY_IO	Check DP components or console
9F00	Warning	Primary console failure	Check console path

Table 4A-5. Control Panel Hexadecimal Display Codes (continued)

Code	Type	Cause	Action
A000-AFFF		Reserved, except as described below	
Ax10	Fatal	BC in Boot Path does not respond	Replace BC #0
Ax11	Fatal	Device in Boot Path is not BC (bad path)	Replace BC #0
Ax13	Fatal	BC in Boot Path failed ENTRY_INIT	Replace BC #0
Ax20	Warning	Boot Device does not respond	Refer to Troubleshooting Flowcharts
Ax21	Warning	Boot Device is not bootable (bad path)	Refer to Troubleshooting Flowcharts
Ax22	Warning	No IODC on Boot Device	Refer to Troubleshooting Flowcharts
Ax23	Warning	Boot Device failed ENTRY_INIT	Refer to Troubleshooting Flowcharts
Ax33	Warning	Boot Device failed ENTRY_IO	Refer to Troubleshooting Flowcharts
B000-BFFF	Info	Operating System dependent	Check OS
C000-CFFF		Reserved, except as described below	No Action
C100	Info	Beginning Processor Arbitration	No Action
C109	Info	Initialized SMB Modules	No Action
C2AB	Info	Initializing Memory Arrays (A = slot # of MC; B = value of testing 0 thru F in progress)	No Action
C300	Info	Testing PDH	No Action
C301	Info	Testing NVM	No Action
C302	Info	Testing stable storage	No Action
C400	Info	Initializing direct port as console	No Action
C4x0	Info	Initializing Primary Console Device	No Action

Table 4A-5. Control Panel Hexadecimal Display Codes (continued)

Code	Type	Cause	Action
C50x	Info	Locating Primary Boot Device	No Action
C54x	Info	Initializing Primary Boot Device	No Action
C58x	Info	Loading IPL from Primary Boot Device	No Action
C5F0	Info	Boot media not in LIF format	No Action
C5F1	Info	IPL not on Primary Boot Device	No Action
C5F8	Info	IPL fails checksum on Primary Boot Device	No Action
C5FF	Info	IPL launched from Primary Boot Device	No Action
C600	Info	Initializing Default Console	No Action
C70x	Info	Locating Alternate Boot Device	No Action
C74x	Info	Initializing Alternate Boot Device	No Action
C78x	Info	Loading IPL from Alternate Device	No Action
C7F0	Info	Boot media not in LIF format	No Action
C7F1	Info	IPL not on Alternate Boot Device	No Action
C7F8	Info	IPL fails checksum on Alternate Boot Device	No Action
C7FF	Info	IPL launched from Alternate Boot Device	No Action
CA00	Warning	Powerfail recovery software aborted	Call Response Center
CA01	Info	Powerfail recovery software launched	No Action
CB00	Warning	Transfer of Control (TOC) aborted—Softboot launched	Call Response Center
CB01	Info	Transfer of Control (TOC) Software launched	No Action

Table 4A-5. Control Panel Hexadecimal Display Codes (continued)

Code	Type	Cause	Action
CE00-CEFF	Info	Software initialization and ISL Diagnostic Information	No Action
CE00	Info	ISL is executing	No Action
CE01	Info	ISL is autobooting from the autoexecute file	No Action
CE02	Info	Cannot find an autoexecute file; Autoboot aborted.	No Action
CE03	Info	No console found, ISL can only autoboot	No Action
CE05	Info	Directory of utilities is too big, ISL reads only 2K bytes	No Action
CE06	Info	Autoexec file is inconsistent: SOM values invalid	No Action
CE07	Info	Autoexecute file input string exceeds 2048 characters; Autoboot aborted	No Action
CE08	Info	ISL command or utility name exceed ten characters	No Action
CE09	Info	ISL has transferred control to the utility	No Action
CE0F	Info		No Action
CE10	Info	Internal inconsistency: Volume label - FATAL	No Action
CE11	Info	Internal inconsistency: Directory - FATAL	No Action
CE12	Fatal	Error reading autoexecute file	Call Response Center
CE13	Fatal	Error reading console - FATAL	Call Response Center
CE14	Fatal	Error writing to console - FATAL	Call Response Center
CE15	Info	Not an ISL command or utility	No Action
CE16	Info	Utility file header inconsistent: Invalid System ID	No Action
CE17	Info	Error reading utility file header	No Action
CE18	Info	Utility file header inconsistent	No Action
CE19	Info	Utility would overlay ISL in memory	No Action
CE1A	Info	Utility requires more memory than is configured	Check FAST size; call Response Center
CE1B	Info	Error reading utility into memory	Call Response Center

Table 4A-5. Control Panel Hexadecimal Display Codes (continued)

Code	Type	Cause	Action
CE1C	Info	Incorrect checksum: Reading utility into memory	Call Response Center
CE1D	Fatal	Console needed - FATAL	Call Response Center
CE1E	Fatal	Internal inconsistency: Boot device class - FATAL	Call Response Center
CE21	Fatal	Destination memory address of utility is invalid	Call Response Center
CE22	Fatal	Utility file header inconsistent: PDC CACHE ENTRY	Call Response Center
CE23	Fatal	Internal inconsistency: IODC ENTRY INIT - console - FATAL	Call Response Center
CE24	Fatal	Internal inconsistency: IODC ENTRY INIT - FATAL	Call Response Center
CE25	Fatal	Internal inconsistency: IODC ENTRY INIT - boot device - FATAL	Call Response Center
CE26	Info	Utility file header inconsistent: Bad AUX_ID	Call Response Center
CE27	Info	Bad utility file type	Call Response Center
CE80	Info	ISL Based diagnostic	Call Response Center
CE81	Info	ISL Based diagnostic console read error	Call Response Center
CE82	Info	ISL Based diagnostic console write error	Call Response Center
CEC0	Info	HPUXBOOT has been loaded and initialization begun	Call Response Center
CED0	Info	HPUXBOOT initialization in process	Call Response Center
CED2	Info	HPUXBOOT is about to configure I/O system	Call Response Center
CED4	Info	HPUXBOOT is about to mount the root file system	Call Response Center
CEDA	Info	HPUXBOOT is about to list the contents of a directory	No Action
CEDB	Info	HPUXBOOT is about to load the kernel into memory	No Action
CEDC	Info	HPUXBOOT is about to start a copy operation	No Action

Table 4A-5. Control Panel Hexadecimal Display Codes (continued)

Code	Type	Cause	Action
CEDD	Info	HPUXBOOT is about to stop (return to rdb)	No Action
CEDE	Info	HPUXBOOT is about to return to ISL	No Action
CEDF	Info	HPUXBOOT is about to launch the kernel	No Action
CEE0	Info	HPUXBOOT kernel has been loaded and initialization has begun	No Action
CEF0	Info	HPUXBOOT kernel has entered main	No Action
CEF2	Info	HPUXBOOT kernel is about to configure the I/O system	No Action
CEF4	Info	HPUXBOOT kernel is about to mount the root file system	No Action
CEF6	Info	HPUXBOOT kernel is about to set up the page-out deamon	No Action
CEF8	Info	HPUXBOOT kernel is about to start the initialization process	No Action
CF00	Info	MPE-XL entering launch	No Action
CF02	Info	MPE-XL completed mapping of system state	No Action
CF04	Info	MPE-XL allocating memory	No Action
CF08	Info	MPE-XL backing out into genesis	No Action
CF0A	Info	MPE-XL entering genesis	No Action
CF30	Info	MPE-XL initializing of genesis completed	No Action
CF40	Info	MPE-XL initializing of resident kernel completed	No Action
CF50	Info	MPE-XL initializing of non-resident kernel completed	No Action
CF60	Info	MPE-XL CM SL binding completed	No Action
CF70	Info	MPE-XL configuring of system I/O completed	No Action
CF80	Info	MPE-XL system volume initialized and mounted	No Action
CF90	Info	MPE-XL initializing of CM OS completed	No Action

Table 4A-5. Control Panel Hexadecimal Display Codes (continued)

Code	Type	Cause	Action
D000-DFFF	Info	Software shutdown in progress (as described below).	No Action
D000	Info	Shutdown begun (Boot has been entered)	No Action
D400	Info	Shutdown in progress (returned from update, buffers to be flushed)	No Action
D600	Info	Shutdown in progress (busy-wait after update has completed)	No Action
D900	Info	Shutdown completed (discs not fully in sync)	No Action
DA00	Info	Shutdown completed (discs fully in sync)	No action
D004	Info	Transfer of Control (TOC) core dump begun	No Action
D904	Info	TOC dump completed (discs not in sync)	No Action
D010	Info	HPMC core dump begun	No Action
D910	Info	HPMC dump completed (discs not in sync)	No Action
E000-EFFF	Info	Software running, hardware in degraded mode, except as described below	No Action
Ex10*	Warning	High overtemperature	Determine cause for overtemperature and repair
Ex20*	Warning	Low overtemperature	Determine cause for overtemperature and repair
Ex40*	Warning	Battery low	No Action
F000-FFFF	Info	Reserved, except as described below	No Action
FxFF*	Info	Normal operation	No Action

* For this display code, "x" denotes system activity level (range is 0 through A).

4B

AP Self-Test Messages

The Access Port provides two classes of messages. Those which are indications of errors are labeled as error messages by the use of the mnemonic `APERRXX`, where `XX` is the error number.

Messages which are only informative, or that may be indicative of errors that the AP cannot determine, are labeled with the mnemonic `APMSGXX` where `XX` is the message number. Numbers are duplicated, both `APERR01` and `APMSG01` exist.

Table 4B-1. AP Error Codes and Messages

Code	Type	Cause	Action
03	Error	PPON not reasserted by SPU after RESET_SYS deassertion (APERR 03).	Replace PSM
04	Error	Unable to verify assertion of TOC_SYS backplane signal (APERR 04).	Replace AP
05	Error	AP self-test failed subtest XX (APERR 05).	Replace AP
06	Error	AP failed subtest XX of idle self-test (APERR 06).	Replace AP
07	Error	AP failed subtest XX of prior idle self-test (APERR 07).	Replace AP
08	Error	Permitted accesses to NVM exceeded (APERR 08).	Replace AP
09	Error	CRC error on NVM (APERR 09).	Replace AP
10	Error	Illegal command, type HE for help (APERR 10).	None
11	Error	Expecting "Y" or "N" (APERR 11).	None
12	Error	Expecting "H" or "L" (APERR 12).	None
13	Error	Command may not be executed by a remote user (APERR 13).	None
14	Info	Your selection is outside of the legal range (APERR 14).	None
15	Info	Command may not be executed by a local user (APERR 15).	None

Table 4B-1. AP Error Codes and Messages (continued)

Code	Type	Cause	Action
16	Info	Expecting "S" or "M" (APERR 16).	None
17	Info	Syntax error (APERR 17).	None
18	Info	Illegal hexadecimal entry (APERR 18).	None
19	Info	Illegal address or address range (APERR 19).	None
01	Info	AP self-test passed (APMSG 01).	None
02	Info	SPU hardware was successfully reset (APMSG 02).	None
03	Info	Console terminal not set to 9600 bits per second. Console port will operate at XXXX bits per second (APMSG 03).	None
04	Info	String was truncated to 24 characters (APMSG 04).	None
05	Info	AP configuration lost. Use CA and ER commands to recover (APMSG 05).	None

4C

MPE-XL Operating System Errors

Factors contributing to system halts can be isolated by referring to the hex display on the SPU control panel. In the hex display, a series of four-character codes will be sequentially displayed; the number of codes in a sequence can vary from one to four.

The first four-character number displayed identifies the source of the halt. When the monitor is the source of the halt (Halt 0 error), the first number is Bx00; a system abort (Halt 7 error) is identified as Bx07 (where x = the processor module number).

Subsequent display numbers identify the reason for the halt. The subsequent numbers are displayed in the form 0xnn, where "x" is a sequence number that begins at 1 and increments, and "nn" is an informational number. The reason for the halt can be interpreted by stringing all the informational ("nn") numbers together to form the hexidecimal error code.

Description of Display Sequence:

```
B800                MONITOR HALT 03A1 (Hex) - Non-functional TLB
0103
02A1
DNZZ

First Number Displayed:         B 8 0 0
                                / | \ \
                   B = OS Fault |   \-\ Halt Number
                                |
                       Processor Module Number

Subsequent Numbers:              0 1 0 3
                                / | \ \
                0 = Continuation |   \-\ Informational Number
                                |
                            Sequence Number

                                 0 2 A 1
                                / | \ \
                0 = Continuation |   \-\ Informational Number
                                |
                            Sequence Number

                                 D N Z Z
                                / | \ \
            D = System Shutdown |   \-\ Informational Number
                                |
                    Forced Shutdown (140% complete)
```

Examples of Display Sequences:

B000 0103 0200 DEAD	MONITOR HALT 0300 (Hex) - A "critical" HPMC occurred.
B007 0103 DEAD	SYSTEM ABORT 0003 (Hex) - Genesis Module Error
B000 018F DEAD	MONITOR HALT 008F (Hex) - Data page fault without RDB, MPE-XL not ready.
B007 0103 0215 DEAD	SYSTEM ABORT 0315 (Hex) - NM Ports Module Error

Note

Leading zeroes are assumed when only a single sequence (01xx) information number is displayed, as shown in the two middle examples above (0003 and 008F). The error codes listed in Table 4C-1 and Table 4C-2 include these leading zeroes, where applicable.

Table 4C-1. MPE-XL Halt 0 Operating System Error Codes

Code	Type	Cause	Action
0001 thru 0019	Info	The breaker handler to (RDB) was re-entered. The last two digits represent the hex number from Section 5 of the processor ACD.	Unless otherwise noted, for all Halt 0 error codes: Call Response Center.
0020	Info	A breaker 0 instruction was encountered without R.	
0021	Info	An unknown HPMC occurred.	
0022	Info	A non-recoverable LPMC occurred.	
0028	Info	Reinit_idoc failed to read entry_init.	
0029	Info	Reinit_idoc failed to read entry_io.	
0030	Info	Image larger than first memory controller.	
0031	Info	Series 800 processor will not function in Series 900 system.	Call Support Organization.
003E	Info	A non-recoverable branch taken or break trap occurred.	
003F	Info	A bad instruction received from RDB.	
0040	Info	A configured module was lost on power fail.	
0041	Info	A bus converter was lost on power fail.	
0042	Info	A bus converter was added on power fail.	
0043	Info	Memory was added on power fail.	
0044	Info	A module was added on power fail and generated an address conflict.	
0045	Info	Memory self-test failed in map_system_state.	
0046 thru 004E	Info	Error on call to entry_init in reinit_IODC (error return number is 0x50).	

Table 4C-1. MPE-XL Halt 0 Operating System Error Codes (continued)

Code	Type	Cause	Action
005B thru 005F	Info	The parallel card driver (RDB communications) encountered something that it could not interpret.	Unless otherwise noted, for all Halt 0 error codes: Call Response Center.
0066 thru 006E	Info	Error on call to entry_io in CONSOLE_READ or CONSOLE_WRITE (error return number is 0x50).	
0080 thru 0099	Info	A trap that neither RDB or MPE-XL could interpret occurred (080n is the hex trap number from Section 5 of the processor ACD.	
00F1	Info	Non-recoverable instruction TLB error.	
00F2	Info	Non-recoverable data TLB error.	
00F3	Info	Non-recoverable bus address error.	
00F4	Info	Non-recoverable bus error on I/O space read.	
00F5	Info	Non-recoverable bus error on memory read or write.	
00F6	Info	Non-recoverable bus error on I/O space write.	
00F7	Info	Non-recoverable bus error with processor slave.	
00F8	Info	Non-recoverable cache tag error.	
00F9	Info	Non-recoverable data cache error.	
00FA	Info	Non-recoverable assist coprocessor error.	
00FB	Info	Non-recoverable instruction cache error.	

Table 4C-1. MPE-XL Halt 0 Operating System Error Codes (continued)

Code	Type	Cause	Action
0300	Info	A "critical" HPMC occurred.	Unless otherwise noted, for all Halt 0 error codes: Submit an SR.
0301	Info	Bad state prevented HPMC recovery.	
0302	Info	Bad reserved bits prevented HPMC recovery.	
0303	Info	HPMC handling corrupted the real mode stack.	
0321	Info	Cache data was corrupted and cannot be located.	
0322	Info	Cache data for a known address was corrupted.	
0340	Info	A bus error resulted in an HPMC.	
0361	Info	A coprocessor other than 0 asserted HPMC.	
0362	Info	An SFU asserted HPMC.	
03A1	Info	The TLB is non-functional.	

Table 4C-2. MPE-XL Halt 7 Operating System Error Codes

Hex Code Range	Decimal Range	OS Module Error	Action
0000 - 0013	0 - 19	Genesis	All Halt 7 error codes: Perform memory dump, then submit SR.
0032 - 0045	50 - 69	Configuration for Genesis	
0046 - 0063	70 - 99	Softdump	
0064 - 00C7	100 - 199	Start	
00C8 - 018F	200 - 399	Update/Install	
01C2 - 01D5	450 - 469	Job/Session	
01F4 - 0212	500 - 530	Storage Management	
0258 - 02BB	600 - 699	File System	
02BC - 0383	700 - 899	NM Ports	
0384 - 03B5	900 - 949	High Level I/O	
03E8 - 0513	1000 - 1299	Memory Manager	
0514 - 0527	1300 - 1319	Switch	
0528 - 053B	1320 - 1339	Clocks	
053C - 054F	1340 - 1359	Traps	
0550 - 0559	1360 - 1369	Support Management and VSM	
0564 - 056D	1380 - 1389	External INT Handler	
0578 - 0581	1400 - 1409	IOSERV	
0582 - 058B	1410 - 1419	System Logging	
058C - 0595	1420 - 1429	Table Management	
05AA - 05DB	1450 - 1499	Process Management	
05DC - 0671	1500 - 1649	Dispatcher	
06A4 - 07CF	1700 - 1999	Virtual Space Management	
07D0 - 0833	2000 - 2099	SEC Storage Management	
0834 - 08C9	2100 - 2249	Transaction Management	
0960 - 09F5	2400 - 2549	CM Ports	
09F6 - 09FE	2550 - 2558	CM Support	
09FF	2559	CM Fatal	
0A00 - 0A13	2560 - 2579	CM Stack Size Management	
0A14 - 0A27	2580 - 2599	CM Object Management	
0A8C - 0A95	2700 - 2709	Command Interpreter	
0AF0 - 0B53	2800 - 2899	Break	
0B54 - 0BB7	2900 - 2999	Turbo Image	
0BB8 - 0BC1	3000 - 3009	QA Testing	
0BCC - 0BD5	3020 - 3029	Network Interface	
0BE0 - 0BE9	3040 - 3049	Internet Protocol	
0BF4 - 0BFD	3060 - 3069	Mapping Table	
0C08 - 0C11	3080 - 3089	Transmission Protocol	
0C12 - 0C1B	3090 - 3099	Buffer Manager	
0FA0 - 1387	4000 - 4999	NS Transport Modules	
1388 - 13EC	5000 - 5100	Bug Cache	

4D

HP-UX Operating System Errors

When HP-UX detects a panic or HPMC, it will automatically execute a Transfer-of-Control (TOC) and save memory contents to the swap area of the disk. Immediately after this memory dump, the system automatically reboots.

The memory contents stored in the swap area are put into a file and directory (usually **/tmp/savecore**), as specified by the **savecore** command, in the **etc/rc** script.

System Panic Codes

The system will display a panic code if the kernel panics, in the following format:

```
B800
||||_______________Panic_types: 0 = General purpose panic
|||                             9 = Dump completed, disks not fully sync'ed
|||                             A = Dump completed, disks fully sync'ed
|||
|||
|||________________Panic_code:  0 = Not known
||                              1 = Transfer-of-Control
||                              2 = High Priority Machine Check
||
||
||_____Processor Module Number: 8-F
|
|
|
|______Operating System Fault Code
```

Refer to Table 4D-1 on the next page for examples of HP-UX system panic codes.

Note

Regardless of the processor module number or the panic_code (the two middle positions in the four-character system panic code), the "Action" in Table 4D-1 will always be to analyze the memory dump to find the cause of the panic.

Table 4D-1. Examples of HP-UX System Panic Codes

Code	Type	Cause	Action
B000	Fatal	Kernal panic	Analyze memory dump to find cause of panic
B009	Fatal	Panic dump completed (disks not fully sync'ed)	Analyze memory dump to find cause of panic
B00A	Fatal	Panic dump completed (disks fully sync'ed)	Analyze memory dump to find cause of panic

IODC STATUS — HPIB CS80 Device

(Dec)				
	RET0	RET1		
	(reserved)			
16	IODC status	SENSE	SubChan status	C.A. IO_status
	(reserved)			
24	T : O : ID	Reject : Fault	Access : Info	P1 : P2 : P3 : P4
28	P5 : P6 : P7 : P8	P9 : P10	(reserved)	

RET0= CA status (entry_init) or DMA byte count (entry_io) or 0

RET1= device class (entry_init) or 0

C.A. IO_status is only from entry_IO

T= TSTAT O= OSTAT ID= Identification

Student Notes:

IODC STATUS HPIB 7974/78/79/80 Device

(DEC)															
	RET0				RET1										
	(reserved)														
16	IODC status								SENSE	SubChan status		C.A. IO_status			
	(reserved)														
24	T	H	DS	J	0x0	S1	S2	S3	S4	S5	S6				
	(reserved)														

RET0= CA status (entry_init) or DMA byte count (entry_io) or 0

RET1= device class (entry_init) or 0

C.A. IO_status is only from entry_IO

T= TSTAT H= HSTAT

Student Notes:

Word	Description
16	CIOA IODC dependent error code
17	Device Adapter sense register
18	Subchannel status register
19-23	Unused
24-31	Device dependent status message

CS80:

Byte	Description
0	HPIB TSTAT (transaction status)
1	CS80 QSTAT (status of intended transaction)
2-3	Identification field
4-5	Reject errors field
6-7	Fault errors field
8-9	Access errors field
10-11	Information errors field
12-21	Parameter field
22	CS80 QSTAT (status of extended status transaction)
23-31	Unused

Tape:

Byte	Description
0	HPIB TSTAT (transaction status)
1	Tape HSTAT (DAP halt status)
2	Tape DSJ (device specified jump)
3	Unused
4	Status register 1
5	Status register 2
6	Status register 3
7	Status register 4
8	Status register 5
9	Status register 6
10-31	Unused

If error number not found use code above given word in table

PD~~S~~C BOOT ERROR CODES

IODC Status

A. MAIN ERROR CODES

PARAMETER RELATED ERRORS		
unsupported device adapter	-2	FFFF FFFE
Unsupported device	-3	FFFF FFFD
Unsupported unit	-4	FFFF FFFC
Unsupported data transfer size	-5	FFFF FFFB
Invalid slot	-8	FFFF FFF8
Invalid HPIB address or Port number	-9	FFFF FFF7
Invalid Unit	-10	FFFF FFF6
Invalid Volume	-11	FFFF FFF5
HPA AND CHANNEL ERRORS		
CIO Channel not ready (io_status.ry = 0)	-17	FFFF FFBF
SUBCHANNEL ERRORS		
Subchannel not ready(subch_status.rdy=0)	-32	FFFF FFE0
DEVICE ADPATER ERRORS		
Device adapter not ready (sense.rfc =0)	-66	FFFF FFBE
Device adapter selftest failed (sense.pst =0)	-67	FFFF FFBD
DEVICE ADAPTER LEVEL TRANSACTION ERRORS		
IDY error	-128	FFFF FF80
HPIB initialize error	-192	FFFF FF40
HPIB data loopback error	-256	FFFF FF00
HPIB configuration error	-320	FFFF FEC0
HPIB amigo identify error	-384	FFFF FE80
6_port mux io error	-448	FFFF FE40
6_port mux read status error	-512	FFFF FE00
6_port mux device controlled Xon/Xoff enabled error	-576	FFFF FDC0
6_port mux forced transmit error	-640	FFFF FD80
TAPE DRIVE DEVICE LEVEL TRANSACTION ERRORS		
Device adapter program download error	-1088	FFFF FBC0
Selected device clear to tape drive error	-1152	FFFF FB80
Tape drive write loopback data error	-1216	FFFF FB40
Tape drive loopback error	-1280	FFFF FB00
Tape drive rewind error	-1344	FFFF FAC0
Tape drive io error	-1408	FFFF FA80
CS80 DEVICE LEVEL TRANSACTION ERRORS		
Selected device clear to CS80 device error	-2112	FFFF F7C0
Read loopback to CS80 device error	-2176	FFFF F780
CS80 io error	-2240	FFFF F740
CS80 describe error	-2304	FFFF F700

IODC Status (Cont.)

ALINK-AMUX ERRORS

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

B. SECONDARY ERROR CODES

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

DMA TRANSACTION ERRORS

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

CIO TRANSACTION STATUS ERRORS

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

(DSC = Disconnect Subchannel)

CIO DA Read Sense Data

0	23	24	25	26	27	28	29	30	31
Reserved		RFC	PST	PRE	NMI	LV1	ARE	R	ARQ

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

25 - PST - Passed Self Test: Asserted if selftest passed.

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

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

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

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

30 - R - Reserved

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

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

Subchannel Status Register

```
0                   1                   2                   3 3
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1

+-------+-------------+-+-----------------------------+-------+
| SSTAT |  Reserved   | |     Current Log Channel     |  Res  |
+-------+-------------+-+-----------------------------+-------+
               RDY ____|
```

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

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

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

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

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

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

HPIB DA TSTAT Codes

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

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

(hex) TSTAT	Description
00	No exceptional conditions. (Does not mean QSTAT =0)
01	Read transaction was terminated by EOI
02	Read transaction was terminated by EOI; Count was odd
03	Read transaction was terminated by count
04	Read transaction was terminated by count; Count was odd
05	Read transaction was terminated by LF
06	Read transaction was terminated by LF; Count was odd
07	Read transaction was terminated by MSA
08	Read transaction was terminated by MSA; Count was odd
09	Transaction was terminated by host - data transfer to host was terminated by CEND instead of DEND

Additional TSTAT's for Read terminations are described below

0A	Transaction FCODE is not supported by the 27110B
0B	Transaction requires 27110B to be SC and it is not
0C	Transaction requires 27110B to be CIC and it is not
0D	Transaction requires 27110B to not be CIC and it is
0E	Transaction requires 27110B to be either addressed or not CIC (so some one else can address it) and it is not

HPIB DA TSTAT Codes (Cont.)

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

HPIB DA TSTAT Codes (Cont.)

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

HPIB DA TSTAT Codes (Cont.)

CS/80 Timeout status values are as follows:

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

QSTAT Codes

CS80 Transactions

0 - NORMAL COMPLETION

Indicates normal completion of the requested operation.

1 - HARD ERROR

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

2 - POWER ON

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

3 - INTERFACE ERROR

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

HSTAT Codes

HSTAT CODES

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

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

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

CS80 Hardware Status

IDENTIFICATION ERRORS (word 8)

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

VVVV = Volume number

UUUU = Unit number

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

Notes:

1. Error bit positions and word numbers correspond to IODC/PDC status data printed on console in 9740A HPPAs.
2. All fault errors are unmaskable.
3. Error uses parameter field.
4. Parameter field configuration is dependent on reported errors.

   Highest priority is given to the lowest numbered error.

   Masked errors relinquish their priority.

REJECT ERRORS (word 9)

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

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

B = ILLEGAL OPCODE
An unrecognizable opcode was received.

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

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

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

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

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

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

CS80 Hardware Status (Cont.)

FAULT ERRORS (word 9) (2)

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

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

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

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

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

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

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

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

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

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

I = RETRANSMIT
The preceding transaction should be retried.

ACCESS ERRORS (word 10)

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

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

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

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

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

E = WRITE PROTECT
The selected volume is write protected.

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

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

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

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

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

CS80 Hardware Status (Cont.)

INFORMATION ERRORS (word 10)

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

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

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

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

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

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

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

continued on next page.

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

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

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

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

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

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

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

CS80 Hardware Status (Cont.)

INFORMATION ERRORS (word 10)

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

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

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

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

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

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

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

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

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

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

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

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

7974/78/79/80 Status Codes

```
Bit#      Interpretation

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

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

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

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

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

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

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

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

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

BYTE 55 (Word 10.[0..7])

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

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

(Servo errors or loss of tension)	
51	Servo controller unresponsive
52	Servo failed to reach desired state
53	Unexpected servo shutdown (tension lost)
54	Servo controller hard failure
55	Servo protocol error
56	Servo run-time error
57	"In position" interrupt not received by master controller
58	No GAP detected after Read block, Write block, or TM
59	Safety shutdown of motor driver
5A	No BOT detected on load/rewind
5B	Speed out of specifications
5C	Invalid request from master controller
5E	Tape positioning failure
(Formatter errors)	
65	No "end of record" after data (7978B)
66	Formatter HW error (7978B)
67	Bad block type detected on write
68	Erase failed (flux transitions detected on erased area)
69	No data detected on write (read after write)
6A	Tracks out of sync on write verify
6B	Formatter HW error (7974A)
6C	Formatter unresponsive (7974A)
6D	Gap timer failed
6E	Formatter byte count <> data buffer byte count
(Controller errors)	
79	Transaction ID mismatch (command Vs status)
7A	No pending command for the status received
7B	Invalid status received from device program
7C	Status queue overflow
7D	Unknown command received by device program
7E	Command queue overflow
80	End of record missing in data buffer
81	Data buffer parity error
82	Data buffer underrun during write
83	Write byte count <> read buffer byte count
84	Bad message type received by channel program from device program
85	CPU handshake abort (between HPIB I/F and channel program)
86	Unknown HP-IB condition detected
89	Illegal access to servo controller registers detected
8A	Device program firmware error
8B	Hardware utilities firmware error
8C	Channel program firmware error
8D	ON line encoder inoperative

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

(Command reject errors)

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

BYTE S6 (word 10.[8..15])

This byte represents the number of commands rejected since the last error, including the command in error. It should be smaller than 14.

5

Diagnostics and Utilities

Introduction

This chapter provides information about supported online and offline diagnostics and utilities for MPE-XL and HP-UX operating systems. Also included is information for booting the system using the HP-UX Support Tape. The HP-UX Support Tape can be used for both MPE-XL and HP-UX systems.

Table 5-1 lists the online diagnostics, and Table 5-2 the utilities available on MPE-XL and HP-UX operating systems. Offline diagnostics are discussed later in this chapter.

Note

The diagnostics in Table 5-1 and the online diagnostics descriptions in this section are arranged in alphabetical order by the diagnostic command name (for example, AFIDAD is listed before CADIAG).

In display examples, user input is shown underlined.

Online Diagnostics and Utilities

Table 5-1. Available Online Diagnostics

Command	Name	System
AFIDAD	AFI Device Adapter Diagnostic	HP-UX
CADIAG	Channel Adapter Diagnostic	MPE-XL
CARTDIAG	Cartridge Tape Drive & Autochanger Diagnostic	MPE-XL, HP-UX
CIPERLPD	Ciper Line Printer Diagnostic	MPE-XL, HP-UX
CS80DIAG	CS/80 Disk Diagnostic	MPE-XL, HP-UX
DIAG7478	HP7974A/7978 Magnetic Tape Drive Diagnostic	MPE XL, HP-UX
FLEXDIAG	HP-FL Disk Diagnostic	MPE-XL, HP-UX
GP3DDIAG	HP98720A Graphics Processor Diagnostic	HP-UX
GS2DDIAG	HP98556A Graphics Subsystem Diagnostic	HP-UX
GS3DDIAG	HP98730A Graphics Subsystem Diagnostic	HP-UX

Table 5-1. Available Online Diagnostics (continued)

Command	Name	System
HPFLDIAG	Fiber Link Device Adapter Diagnostic	MPE-XL, HP-UX
HPIBDDS	HP-IB Digital Data Storage Drive Diagnostic	MPE-XL, HP-UX
HPIBDIAG	HP-IB Device Adapter Diagnostic	MPE-XL, HP-UX
LANDAD	LAN Diagnostic	MPE-XL, HP-UX
MEMDIAG	Memory Diagnostic	HP-UX
MUXDIAG	Six-Port Mux Diagnostic	MPE-XL, HP-UX
OPDIAG	Optical Disk Diagnostic	MPE-XL, HP-UX
PPDIAG	Page Printer Diagnostic	MPE-XL, HP-UX
PSIDAD	PSI Device Adapter Diagnostic	MPE-XL, HP-UX
REELDIAG	HP7979/80 Magnetic Tape Drive Diagnostic	MPE XL, HP-UX
SS80DIAG	SS80 Disk Diagnostic	HP-UX

Table 5-2. Available Online Utilities

Command	Name	System
IOTT	I/O Test Tool	MPE-XL
LOGTOOL	System and Memory Log Analysis Tool	MPE-XL
SYSMAP	System Map	MPE-XL
TERMDSM	Terminal Diagnostic System Monitor	MPE-XL

For detailed information on the diagnostic subsystems and diagnostic utilities, refer to:

- *Online Diagnostics Subsystem Manual, Volume I: SPU* (HP part number 09740-90028)
- *Online Diagnostics Subsystem Manual, Volume II: Device Adapters* (HP part number 09740-90031)
- *Online Diagnostics Subsystem Manual, Volume III: Peripherals* (HP part number 09740-90034)
- *Online Diagnostics Subsystem Utilities Manual* (HP part number 09740-90021).

Using the Online Diagnostics

The implementation of the Online Diagnostics Subsystem is slightly different for the HP-UX and MPE-XL operating systems. Refer to Table 5-3 for system-dependent features.

Use the *HP 9000 Series 800 HP-UX System Administration Tasks Manual* (HP part number 92453-90004) to look up information concerning HP-UX Online Diagnostics Subsystem security, the Online Diagnostics Subsystem directory tree, diagnostic special files, and DUI permissions.

Use the *MPE-XL System Configuration Manual* (HP part number 32650-90042) to look up information concerning MPE-XL system tables and configuration.

System-Dependent Features

Table 5-3. System-Dependent Features

Description	HP-UX	MPE-XL
Maximum USE file nesting level:	10	10
Maximum processes per DUI:	system dependent	10
User Interrupt Key:	CTRL C	CTRL Y
Command (REDO) Stack depth:	10	5
Input/Output Files:	character string (80 max)	80 character records unnumbered
Directory "path":	/dir/dir ... /file	file.group.acct
Monitor Version:	n/a	A.xx.yy

Diagnostic User Interface (DUI)

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

Mini-Operating Instructions:

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

```
:SYSDIAG (for MPE-XL)

/usr/diag/bin/sysdiag (for HP-UX)
```

   The diagnostic responds with the following header and welcome message indicating that access has been gained to the Online Diagnostics Subsystem:

```
                    ONLINE DIAGNOSTIC SUBSYSTEM

             (C) Copyright Hewlett Packard Corp. 1988
                       All Rights Reserved.
              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 appears 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 !        Provides access to operating system interpreter
               (shell).
EXIT/QUIT      Exit from the diagnostic system.
HARDCOPY       Echo data displayed on terminal to printer or
               file.
HELP or ?      Provide help information for DUI or diagnostic
               programs.
INSTALL        Add/update programs that are part of the
               diagnostics (HP-UX only).
LIST           List the programs that are part of the
               diagnostics.
MODE           Display/change current system user access mode.
PURGE          Delete programs from the diagnostic system (HP-UX only).
REDO           Display and edit last DUI command.
RESUME         Allow a suspended program to resume processing.
RUN            Load and execute the specified program.
SHOWACTIVE     Display programs running in diagnostic system.
SUSPEND        Suspend the processing of the specified program.
TEST           Provides the ability to test a diagnostic
               program (MPE/XL only).
UNLOCK         Releases specified device from lock status (MPE/XL only).
USE            Causes DUI commands to be read from a file.
WAIT           Wait for background programs to terminate.
```

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

MPE/XL: Installation, modification, and removal of Online Diagnostics Programs on MPE-XL operating systems is accomplished by using the MPE-XL Online Installer (DIAGINST) facility. Refer to the *Online Diagnostics Subsystem Manuals* (HP Part Numbers 09740-90021, 09740-90028, 09740-90031, 09740-90034) for detailed information regarding MPE-XL.

HP-UX: Installation, modification, and removal of Online Diagnostics Programs on HP-UX operating systems is accomplished by using the HP-UX Online Installer facility. Refer to the *HP 9000 Series 800 HP-UX System Administration Tasks Manual* (HP part number 92453-90004) for detailed information regarding HP-UX.

AFIDAD (AFI Device Adapter Diagnostic)

The AFI (Asynchronous FIFO Interface) Device Adapter Diagnostic (AFIDAD) tests the HP 27114A AFI. This diagnostic runs only on HP 9000 Series 800 computer systems (HP-UX).

Mini-Operating Instrnctions:

1. Enter the following command to the system prompt:

   `/usr/diag/bin/sysdiag`

2. Enter the following command to the DUI prompt:

   `DUI> RUN AFIDAD <RUN Command Options>`

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

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

   Default Section:

   Section 3 Identify

   Additional Sections:

   Section 1 More Help
   Section 2 Reset
   Section 4 Hardware Test
   Section 5 Loopback Test
   Section 6 Status
   Section 7 Control

4. To exit AFIDAD, type `EXIT`.

CADIAG (Channel Adapter Diagnostic)

The Channel Adapter Diagnostic (CADIAG) is a Diagnostics Subsystem program providing the capability to test the online functionality of the CIO Channel Adapter, which is itself a Field Replaceable Unit (FRU). This diagnostic runs only on HP 3000 Series 900 computer systems (MPE-XL).

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>`

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

   If the sections and steps to be run are not specified, the following default sections and steps are executed:

   Default Sections:

   Section 3 Identify
   Section 5 Self-test
   Section 6 Status
   Section 8 Description

   Additional Sections:

   Section 9 Rollcall
   Section 10 Subchannel Status

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

4. Type **EXIT** to exit CADIAG and control returns to the Online Diagnostics Subsystem.

CARTDIAG (Cartridge Tape Drives and Autochanger Diagnostic)

The CARTDIAG diagnostic program will test 1/4-inch cartridge tape drives and autochangers that use the CS/80 protocol. This diagnostic will detect failures down to a field replaceable unit (FRU).

Minimum Configuration

To run the CARTDIAG diagnostic program, a 1/4-inch cartridge tape drive, and the hardware necessary to communicate with the tape drive, must exist on the host system.

Auto-Diagnostics

If CARTDIAG is run as an auto-diagnostic by the system, the default set of sections and steps will be run, as listed in "Default Tests" on the next page.

RUN Command

The CARTDIAG diagnostic can be accessed via the Diagnostic User Interface (DUI). It is initiated using the RUN CARTDIAG command. All parameters associated with the DUI's RUN command will be accepted by CARTDIAG. Refer to the DUI description elsewhere in this chapter for details concerning this command and its parameters.

Note that if the ERRONLY parameter is set ON, only error messages will be output by CARTDIAG. Error messages are distinguished from other messages by three asterisks (`***`) preceding the text of the message (i.e., `***MESSAGE` is an error message, but `Message` is not). Also note that error messages are in all capital letters; non-error messages use some lower case. The CARTDIAG diagnostic can also be run as an auto-diagnostic by the diagnostic system.

Mini-Operating Instructions:

1. Enter the following command to the system prompt:

   ```
   :SYSDIAG (for MPE-XL)

   /usr/diag/bin/sysdiag (for HP-UX)
   ```

2. Enter the following command to the DUI prompt:

   ```
   DUI> RUN CARTDIAG  <RUN Command Options>
   ```

   Enter `HELP` to display a summary of the available RUN commands.

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:

   Default Sections:

Section 2	Clear
Section 3	Identify
Section 4	Loopback
Section 5	Selftest
Section 6	Request and Decode Status
Section 7	Error Logs
Section 8	Common System Operations
Section 9	Status Tests
Section 10	Verification Trouble Tree
Section 11	Hardware Trouble Tree

4. To exit CARTDIAG, type EXIT. Control returns to the DUI upon completion of the current section and step.

CIPERLPD (Ciper Line Printer Diagnostic)

The Control Messages for Intelligent Peripherals (CIPER) Line Printer Diagnostic tests HP 2563A/64B/65A/66A/66B or HP 2567B Line Printers 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 nnit to be tested.

Mini-Operating Instructions:

1. Enter the following command to the system prompt:

   :SYSDIAG, (for MPE-XL)

   /usr/diag/bin/sysdiag (for HP-UX)

2. Enter the following command to the DUI prompt:

   DUI> RUN CIPERLPD <RUN Command Options>

   Enter HELP to display a summary of the available RUN commands.

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:

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:

Section 2	Reset
Section 3	Clear/Identify
Section 5	Self-test
Section 6	Request Device Status (all steps)

   Additional Sections:

Section 10	Ripple Print
Section 12	Request and Decode Environmental Status
Section 14	Request and Decode Job Status

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

CS80DIAG (CS/80 Disk Diagnostic)

CS80DIAG tests the following disk drives:

- HP 7907A
- HP 7911, 7912, 7914
- HP 7933H, 7933XP, 7935H, 7935XP, 7936H, 7936XP, 7937H, 7937XP
- HP 7957A, 7957B, 7958A, 7958B, 7959B
- HP 7961B, 7962B, 7963B
- HP C2200A, C2202A, C2203A

Note

This diagnostic does not test the HP 9122D, 9122S, and the 9127A SS/80 Disk Drives. Refer to the SS/80 Disk Diagnostic (SS80DIAG) in this manual for information about testing those drives.

Also, this diagnostic does not test the HP C2201A, HP C2204A, HP 7936FL, or HP 7937FL Flex Disk Drives. Refer to the Fiber Link Exchange (FLEX) Disk Diagnostic (FLEXDISK) in this manual for information about testing those drives.

Mini-Operating Instructions:

1. Enter the following to the system prompt:

   `:SYSDIAG (for MPE-XL)`

   `/usr/diag/bin/sysdiag (for HP-UX)`

2. Enter the following to the DUI prompt:

   `DUI> RUN CS80DIAG <RUN Command Options>`

   Typing `HELP` causes a summary of the DUI function and its commands to appear on the screen.

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

   If sections and steps to be run are not specified, the default section is executed.

   Execution of the default is dependent on the test mode that has been granted by the system.

   Default Sections:

   Section 10 Diagnostic Trouble Tree

   Additional Sections:

   Section 17 CS/80 External Exerciser (Interactive Section)

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

    `CS80DIAG>`

    Entering **HELP** at the prompt displays a list of the available CS/80 External Exerciser commands.

    `CS80DIAG> HELP`

    The following table describes the commands available to the CS/80 External Exerciser.

Table 5-4. CS/80 External Exerciser Commands

Command	Description
ADDRESS	Allows the user to convert block addresses to 3-vector addresses and vice versa.
AHA	Issues a PRESET command, followed by a Read-Only Error-Rate.
CACHE LOG	Allows the user to access the Cache Memory Error Test Log.
CACHEOFF	Allows the user to disable the disk controller cache memory.
CACHEON	Allows the user to enable the disk controller cache memory.
CACHE SIZE	Allows the host to change the read cache page size.
CACHE STATS	Allows the user to access the Cache Statistic Table.
CLEAR COMMAND	Performs a CLEAR operation on the disk.
CLEAR LOGS	Clears the Run-Time Data Error Log, the Error-Rate Test Data Log and the Drive Fault Log.
DESCRIBE	Obtains a CS/80 describe message from the device being tested and displays the contents to the user in text form.
DIAG	Initiates internal diagnostic tests which reside in the disk drive.
ERRSUM	Lists all test errors that have occurred in the device.
ERT LOG	Allows the user to access the Error-Rate Test Data Error Log.
EXIT	Terminates the External Exerciser.
FAULT LOG	Allows the user to access the Drive Fault Log.
HELP	Provides access to information concerning the commands that are available in the external exerciser.
INIT MEDIA	Allows the user to format the disk media.
LOOPBACK	Performs a write loopback of 256 bytes of data.
MEDIA TEST	Enables the user to test the hardware/data path of the drive.
PRESET	Forces errors stored in the drives RAM to be logged to the maintenance track.
PRINT PHYSICAL	Enables the printing of *physical* addresses in the FAULT logs.
READ	Allows the user to access any data block on the selected device.

Table 5-4. CS/80 External Exerciser Commands (continued)

Command	Description
READCACHEOFF	Allows the user to disable the disk controller read cache memory.
READCACHEON	Allows the user to enable the disk controller read cache memory.
RESET STATS	Resets the Cache Statistics Table.
REV	Allows the user to read the revision numbers of the ROMs.
RFSECTOR	Allows the user to read a full sector of data from the disk starting at any valid address.
RO ERT	Initiates a read only error-rate test.
RUN LOG	Allows the user to access the Run-Time Data Error Log.
SENSE	Allows the user to read the Hardware and Read/Write Fault registers.
SERVO TEST	Executes the drives internal butterfly seek routine.
SET PATTERN	Allows the user to define and edit a pattern to be used in the write-then-read error-rate tests.
SPARE	Allows the nser to spare a block or sector to an address which is reserved for sparing.
SUSPEND	Suspends CS80DIAG and returns to the DUI.
TABLES	Provides access to information tables which reside in the drive.
UNIT	Allows the user to set the unit number within the drive.
WRITECACHEOFF	Allows the user to disahle disk controller write cache memory.
WRITECACHEON	Allows the user to enable disk controller write cache memory.
WTR ERT	Initiates a write then read error-rate test.

5. Type **EXIT** to exit Section 17 and control returns to the Online Diagnostics Subsystem.

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

The HP 7974A and 7978A/B Magnetic Tape Drive Diagnostic (DIAG7478) tests 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 for which tape movement and write/read operations are to be run.
2. Enter the following command to the system prompt:

   `:SYSDIAG (for MPE-XL)`

   `/usr/diag/bin/sysdiag (for HP-UX)`
3. Enter the following command to the DUI prompt:

   `DUI> RUN DIAG7478  <RUN Command Options>`

   Type `HELP` for a summary of the available RUN commands.
4. 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:

   Default Sections:

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

   For the HP 7974A Only:

   Section 34 HP 7974A Self-tests

   For the HP 7978A/B Only:

   Section 38 HP 7978A/B Self-tests

Additional Sections:

Section 10	Set Tape Density Commands
Section 15	Write/Read Comparison Check (NRZI or GCR)
Section 16	Write/Read Comparison Check (PE)
Section 20	Selectable Tape Movement Commands
Section 23	Selectable Tape Read Data Commands
Section 25	Paces
Section 45	Download Diagnostics
Section 60	Interactive Section
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 returns to the Online Diagnostics Subsystem as soon as all requested steps are complete.

FLEXDIAG (Flex Disk Diagnostic)

The Flex Disk Diagnostic (FLEXDIAG) tests the HP-FL fiber link disk drives. This diagnostic can detect failures of one or more Field Replaceable Units (FRUs).

Mini-Operating Instructions:

1. Enter the following to the system prompt:

   `:SYSDIAG` (for MPE-XL)

   `/usr/diag/bin/sysdiag` (for HP-UX)

2. Enter the following to the DUI prompt:

   `DUI> RUN FLEXDIAG  <RUN Command Options>`

   Typing `HELP` causes a summary of the DUI function and its commands to appear on the screen.

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

   If sections and steps to be run are not specified, the default section is executed.

   Execution of the default is dependent on the test mode that has been granted by the system.

   Default Sections:

   Section 10   Diagnostic Trouble Tree

   Additional Sections:

   Section 11   Flex Sparing Trouble Tree
   Section 17   External Exerciser (Interactive Section)

4. To exit FLEXDIAG, type `EXIT`. Control returns to the Online Diagnostics Subsystem.

GP3DDIAG (HP 98720A Graphics Processor Diagnostic)

The HP 98720A Diagnostic (GP3DDIAG) tests the HP 98720A Graphics Display Station. This diagnostic runs only on HP 9000 Series 800 computer systems (HP-UX).

Mini-Operating Instructions:

1. Enter the following to the system prompt:

   `/usr/diag/bin/sysdiag`

2. Enter the following to the DUI prompt:

   `DUI> RUN GP3DDIAG < RUN Command Options >`

   Refer to the DUI section for details concerning RUN command options.

   The diagnostic responds with a header and welcome message. If the user does not specify which section to run, then the default is "all".

   Because all sections are destructive, the diagnostic subsystem requires that all sections be run in single user mode (SUM). Only those users with level 1 or 0 security are able to execute all default sections.

   Default Sections:

Section 11	Refresh Bus
Section 12	Z-Buffer
Section 13	Repeat Pattern
Section 14	Dither
Section 15	Transparency
Section 16	Frame Buffer RAM via LGB
Section 17	Transform Board Registers
Section 18	Simple Test WCS
Section 19	IEEE Writeable Control Store Memory
Section 20	Writeable Control Store Memory Walking Bit
Section 21	Transform Board Sequencer
Section 22	Transform Board ALU
Section 23	Transform Board Pointer RAM
Section 24	Transform Board Data RAM
Section 25	Transform Board Floating Point Chip
Section 26	Command Data RAM Path
Section 27	DC RAM via LGB
Section 28	DC RAM via uCode
Section 29	ACE Register
Section 30	Color Map
Section 31	ID Font/ROM
Section 32	Frame Buffer Controller Shadow RAM
Section 33	Frame Buffer RAM
Section 34	Frame Buffer Controller Write Enable
Section 35	Frame Buffer Controller Folded/Normal Mode Addressing
Section 36	Frame Buffer Controller Window Move
Section 37	Frame Buffer Controller Slow Window Move
Section 38	ACE Chip
Section 39	Real Time Measurements
Section 40	Transform Board Spin

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

```
DUI>
```

4. To exit the DUI, type `EXIT`. Control returns to the Online Diagnostics Subsystem.

GS2DDIAG (Graphics Subsystem Diagnostic)

The A1020A 2D Graphics Subsystem (GS2DDIAG) tests and verifies any A1020As configured as system consoles or workstations on any HP 9000 Series 800 computer system (HP-UX).

Mini-Operating Instructions:

1. Enter the following to the system prompt:

   `/usr/diag/bin/sysdiag` (for HP-UX)

2. Enter the following to the DUI prompt:

   `DUI> RUN GS2DDIAG < RUN Command Options >`

   Refer to the DUI section for details concerning RUN command options.

   The diagnostic responds with a header and welcome message. If the user does not specify which section to run, then the default is "all".

   Because some sections may be either disruptive or destructive, the diagnostic requires that all sections be run in Single User Mode (SUM). Only those users with level 0 security will be able to execute all sections.

   Default Sections:

   Section 10 Cycle Type Register Test
   Section 11 Address Register Test
   Section 13 ID ROM Checksum Test
   Section 14 Word Mode Access Test
   Section 15 Byte Mode Access Test
   Section 16 Long Word Mode Access Test
   Section 22 Register R/W Test
   Section 23 Color Map Initialization
   Section 24 Frame Buffer Read/Write Test
   Section 25 BARC Chip(s) Test
   Section 26 RUG Chip Test
   Section 27 Final Pattern Generation and IRIS Color Map Read/Write Test

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

   `DUI>`

4. To exit the DUI, type `EXIT`. Control returns to the Online Diagnostics Subsystem.

GS3DDIAG (HP 98730A Graphics Subsystem Diagnostic)

The HP 98730A 3D Graphics Subsystem (GS3DDIAG) tests and verifies any HP 98730As configured as system consoles or graphics peripherals on any HP 9000 Series 800 computer system (HP-UX).

Minimum Configuration

The following three assemblies are always required:

- Frame Buffer Controller
- Color Map
- Frame Buffer 1

Some optional assemblies are required only for specific test sections, as indicated in the list of sections below.

Mini-Operating Instructions:

1. Enter the following to the system prompt:

   ```
   /usr/diag/bin/sysdiag
   ```

2. Enter the following to the DUI prompt:

   ```
   DUI> RUN GS3DDIAG dev=crtxx< RUN Command Options >
   ```

   The `dev=crtxx` (device=parameter) must be used, and it must point to one of four device files: crt0, crt1, crt2, crt3.

   Refer to the DUI section for details concerning RUN command options.

   The diagnostic responds with a header and welcome message. If the user does not specify which section to run, then the default is "all".

   Default Sections:

Section 10	Installation
Section 20	Series 800 Interfaces
Section 21	Frame Buffer Controller Logic
Section 22	Strip 7 Buffer Logic
Section 23	Fast 7 Buffer Logic
Section 24	Frame Buffer Board 0 RAM via 1 GB
Section 25	Frame Buffer Board 1 RAM via 1 GB
Section 26	Frame Buffer 2 RAM 2 RAM via 1 GB
Section 27	Fast 7 Buffer RAM
Section 28	Overlay Buffer RAM
Section 29	Color Map Tests
Section 30	Master Board Logic
Section 31	Scan Conversion
Section 32	Transform Engine(s) Tests
Section 40	Visual Tests

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

```
DUI>
```

4. To exit the DUI, type EXIT. Control returns to the Online Diagnostics Subsystem.

```
DUI> EXIT
```

HPFLDIAG (HP-FL Device Adapter Diagnostic)

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

Mini-Operating Instructions:

1. Enter the following to the system prompt:

   ```
   :SYSDIAG (for MPE-XL)

   /usr/diag/bin/sysdiag (for HP-UX)
   ```

2. Enter the following to the DUI prompt:

   ```
   DUI> RUN HPFLDIAG < 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 are executed. The default sections are Sections 10 and 11.

   Default Sections:

   Section 10 Verification Trouble Tree
   Section 11 Diagnostic Trouble Tree

   Additional Sections:

   Section 2 Clear
   Section 3 Identify
   Section 4 Loopback
   Section 6 Status
   Section 12 On-Site Trouble Tree

4. To exit HPFLDIAG, type EXIT. Control returns to the Online Diagnostics Subsystem.

HPIBDDS (HP-IB Digital Data Storage Tape Drive Diagnostic)

The HP-IB Digital Data Storage Tape Drive Diagnostic (HPIBDDS) tests a Digital Data Storage (DDS) tape drive with an HP-IB interface. This diagnostic detects failures down to a field replaceable unit (FRU).

Mini-Operating Instructions:

1. Enter the following command to the system prompt:

   ```
   :SYSDIAG (for MPE-XL)

   /usr/diag/bin/sysdiag (for HP-UX)
   ```

2. Enter the following command to the DUI prompt:

   ```
   DUI> RUN pdev=<physical location of device to be tested>
        <RUN command options>
   ```

   The DDS drive to be tested must be powered up. To enter the correct physical location (pdev) of the drive, type the *ldev* number for MPE-XL or the *devfile* name for HP-UX.

3. The diagnostic responds with a header and day, date, and time display. If specific sections and steps are not specified, the following default sections and steps are executed:

   Default Sections:

   Section 2 Clear
   Section 3 Identify
   Section 4 Loopback
   Section 6 Obtain and Display Device Status
   Section 10 Verification Trouble Tree (non-destructive)
   Section 11 Hardware Trouble Tree (destructive)

   Additional Sections:

   Section 5 Self-test
   Section 7 Display Device Log
   Section 12 Media Trouble Tree (non-destructive)
   Section 13 Media Trouble Tree (destructive)
   Section 50 Interactive External Exerciser

4. Upon completion of all selected sections and steps or when a fatal error condition is encountered, control returns to the DUI program.

HPIBDIAG (HP-IB Device Adapter Diagnostic)

The HP-IB Device Adapter Diagnostic (HPIBDIAG) is a Diagnostics Subsystem program that provides the capability to test the online 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 (for MPE-XL)

   /usr/diag/bin/sysdiag (for HP-UX)
   ```

2. Enter the following command to the DUI prompt:

   ```
   DUI> RUN HPIBDIAG  <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 are executed based on the following diagnostic system modes:

   Default Sections:

   Section 3 Identify
   Section 4 Loopback
   Section 5 Self-test

   Additional Sections:

   Section 6 Status
   Section 12 Rollcall

4. To exit HPIBDIAG, type EXIT. Control returns to the Online Diagnostics Subsystem.

LANDAD (Local Area Network Device Adapter Diagnostic)

The Local Area Network Device Adapter Diagnostic (LANDAD) tests the Local Area Network Interface Controller (LANIC). LANDAD is capable of detecting a failure in one or more Field Replaceable Units (FRUs). An FRU for LANDAD is the LAN interface card, the LANIC connector cable, the attachment unit interface (AUI) cable, the medium attachment unit (MAU), and the coaxial tap or BNC tee.

Mini-Operating Instructions:

1. Enter the following command to the system prompt.

```
:SYSDIAG (for MPE-XL)

/usr/diag/bin/sysdiag (for HP-UX)

              ONLINE DIAGNOSTIC SUBSYSTEM
          (C) Copyright Hewlett-Packard Co. 1988
                 All Rights Reserved.
                    Version xx.yy
```

2. Enter the following command to the DUI prompt:

```
DUI> RUN LANDAD PDEV=BC/CA.CIO SLOT
```

   - where PDEV is the physical device number. The first digit is the Mid_bus 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 requests a routine which allocates the LANIC and displays the following sections which can be run:

   Default Sections:

   Section 3 Identify
   Section 4 Local Loopback (to LANIC and back)
   Section 6 Status

   Additional Sections:

   Section 1 More Help
   Section 2 Reset
   Section 5 Self-Test
   Section 7 Link Statistics
   Section 8 External Loopback
   Section 9 Remote Node Test
   Section 10 Remote XID Test
   Section 11 AUI Cable Fault Isolation Test
   Section 12 Offline MAU Test

Caution

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

4. To access the HELP facility for LANDAD, enter `HELP` at the DUI prompt.

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

5. Type `EXIT` to terminate the LANDAD diagnostic. Control returns to the Online Diagnostics Subsystem.

MEMDIAG (Memory Array Diagnostic)

The Memory Array Diagnostic (MEMDIAG) tests and verifies the memory controllers and memory arrays online.

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

Mini-Operating Instructions:

1. Enter the following commands:

   `:SYSDIAG (for MPE-XL)`

   `/usr/diag/bin/sysdiag (for HP-UX)`

2. Enter the following to the DUI prompt:

   `DUI> RUN MEMDIAG  <RUN Command Options>`

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

   If specific sections and steps are not specified, the following default section is executed based on the diagnostic mode which has been selected by the Online Diagnostics Subsystem.

   Default Sections:

   Section 9 Trouble Tree

   Additional Sections:

   Section 1 Initialize Card
   Section 2 Identify
   Section 3 Status
   Section 4 Memory Tests (1 second page wait)
   Section 5 Memory Tests (5 second page wait)
   Section 6 Verify/Sweeper (currently not implemented)
   Section 7 EDC Logic Test (currently not implemented)
   Section 8 User Interactive

4. To exit MEMDIAG, type `EXIT`. Control returns to the Online Diagnostics Subsystem.

MUXDIAG (Six Channel Mux Diagnostic)

The Asynchronous Six Channel Multiplexer Diagnostic (MUXDIAG) is a diagnostic subsystem program that checks the functionality of the HP 98196A Asynchronous Six Channel Multiplexer Interface card, which is itself a Field Replaceable Unit (FRU).

Minimum Configuration

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

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

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

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

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

Mini-Operating Instructions:

1. Enter the following command to the system prompt:

   ```
   :SYSDIAG (for MPE-XL)

   /usr/diag/bin/sysdiag (for HP-UX)
   ```

   Typing HELP at the prompt displays a summary of the available RUN commands.

2. Enter the following to the DUI prompt:

`DUI> MODE SUM`	*Go into Single User Mode*
`Single User Mode (SUM)`	
`DUI> RUN MUXDIAG`	*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 are executed based on the following diagnostic system modes:

   Default Sections:

   Section 1 State
   Section 3 Identify
   Section 4 Loopback

   Additional Sections:

   Section 2 Clear
   Section 5 Self-test
   Section 10 Write/Read

4. To exit MUXDIAG, type EXIT.

OPDIAG (Optical Disk Diagnostic)

The Optical Diagnostic (OPDIAG) tests optical disk drives that use Command Set 80 (CS/80) message protocol for communication with the SPU. OPDIAG does the following:

- Verifies the integrity of the HP-IB data path to the selected device.
- Identifies the product type of the selected device.
- Performs Write/Read Loopback tests.
- Performs the internal selftest on the device.
- Obtains and decodes status messages from the device.
- Locates and reads a sector of data from the test disk.

Mini-Operating Instructions:

1. Enter the following command to the system prompt:

   ```
   :SYSDIAG (for MPE-XL)

   /usr/diag/bin/sysdiag (for HP-UX)
   ```

2. Enter the following command to the DUI prompt:

   ```
   DUI> RUN pdev=<physical location of device to be tested>
        <RUN command options>
   ```

   The disk drive to be tested must be powered up and on line. To enter the correct physical location (pdev) of the disk drive, type the *ldev* number for MPE-XL or the *devfile* name for HP-UX.

3. The diagnostic responds with a header and day, date, and time display.
4. The diagnostic calls *IO_Path_Test* to test the I/O path to the disk drive. A failure is indicated by the message:

   ```
   *** WARNING -- THE I/O PATH TO THE DEVICE MAY NOT BE FUNCTIONING
       PROPERLY (OPDIAGERR 100)
   ```

5. The diagnostic makes sure it is testing a CS/80 drive. If not, the diagnostic terminates with the message:

   ```
   *** DEVICE FAILED TO RESPOND TO IDENTIFY COMMAND (OPDIAGERR 101)
   ```

6. The diagnostic makes sure it is testing an optical drive. If not, the diagnostic terminates with the message:

   ```
   *** THE SPECIFIED DEVICE IS NOT AN OPTICAL DEVICE -- RETURNED ID%
       CODE WAS XXXX (OPDIAGDGERR 102)
   ```

7. If specific sections and steps are not specified, the following default sections and steps are executed:

   Default Sections:

Section 2	Clear
Section 3	Describe
Section 4	Loopback
Section 5	Self-test
Section 6	Status
Section 8	Common System Operations

8. If the number of errors reaches the limit specified in the *ERRCOUNT* parameter of the run command, the diagnostic displays the following message and terminates:

   ```
   *** THE MAXIMUM NUMBER OF ERROR MESSAGES HAS BEEN EXCEEDED%
       (OPDIAGERR 110)
   ```

   If the *ERRPAUSE* parameter was assigned a value of "on," the diagnostic stops after each error and queries:

   ```
   Do you wish to continue (Y/N)?
   ```

9. Upon completion of all selected sections and steps, control returns to the DUI program.

PPDIAG (Page Printer Diagnostic)

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

Mini-Operating Instructions:

1. Enter the following command to the system prompt:

   ```
   :SYSDIAG
   ```

2. Enter the following command to the DUI prompt:

   ```
   DUI> RUN PPDIAG <RUN Command Options>
   ```

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

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

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

   Default Sections:

   Section 2 Clear
   Section 3 Identify
   Section 4 Loopback
   Section 5 Self-test
   Section 20 Pattern Print

   Additional Sections:

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

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

PSIDAD (PSI Device Adapter Diagnostic)

PSIDAD tests Programmable Serial Interface cards on an PA-RISC computer system which supports the Online Diagnostics Subsystem.

Mini-Operating Instructions:

1. Enter the following command to the system prompt:

   `:SYSDIAG (for MPE-XL)`

   `/usr/diag/bin/sysdiag (for HP-UX)`

2. Enter the following command to the DUI prompt:

   `DUI> RUN PSIDAD  <RUN Command Options>`

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

   If the sections and steps to be run are not specified, the following default sections and steps are executed:

   Default Sections:

   Section 3 Identify
   Section 5 Self-test
   Section 6 Status

   Additional Sections:

   Section 1 More Help
   Section 2 Reset
   Section 8 Internal Hardware
   Section 9 External Hardware
   Section 10 Manufacturing Utilities
   Section 15 EEPROM Failure History (HP-PB) only

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

4. Type `EXIT` to exit CADIAG and control returns to the Online Diagnostics Subsystem.

REELDIAG (Reel Tape Diagnostic)

The Reel Tape Diagnostic (REELDIAG) tests the HP 7979A, HP 7980A, and HP 7980XC Tape Drives. The tape drive under test must contain internal self-tests that are capable of detecting failed Field Replaceable Units (FRUs) in the tape drive. REELDIAG does the following:

- Sets the selected tape drive to a known condition.
- Identifies the tape drive as one of the listed types.
- Tests the HP-IB communication link between the SPU and the device.
- Requests the tape drive to run certain internal self-tests.
- Obtains and decodes hardware status and self-test results.
- Obtains and decodes device internal logs

Mini-Operating Instructions:

1. Enter the following command to the system prompt:

   `:SYSDIAG` (for MPE-XL)

   `/usr/diag/bin/sysdiag` (for HP-UX)

2. Enter the following command to the DUI prompt:

   `DUI> RUN REELDIAG <RUN command options>`

   Enter `HELP` to display a summary of the available RUN command options.

3. The diagnostic responds with a header and day, date, and time display. If specific sections and steps are not specified, the following default sections and steps are executed:

   Default Sections:

Section 2	Clear
Section 3	Identify
Section 4	Loopback
Section 6	Display Device Status
Section 10	Non-destructive I/O path Trouble Tree
Section 11	Drive Electronics Trouble Tree
Section 12	R/W Function Trouble Tree
Section 13	Media Trouble Tree
Section 50	Interactive External Exerciser

   Additional Sections:

Section 5	Self-test
Section 7	Display Log Information

4. Upon completion of all selected sections and steps, control returns to the DUI program.

SS80DIAG (SS/80 Disk Diagnostic)

The SS/80 Disk Diagnostic (SS80DIAG) tests the HP 9122D, 9122S, and the 9127A SS/80 disk drives. This diagnostic can detect failures of one or more Field Replaceable Units (FRUs).

Mini-Operating Instructions:

1. Enter the following to the system prompt:

   :SYSDIAG (for MPE-XL)

   /usr/diag/bin/sysdiag (for HP-UX)

2. Enter the following to the DUI prompt:

   DUI> RUN SS80DIAG <RUN Command Options>

   Typing HELP causes a summary of the DUI function and its commands to appear on the screen.

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 are 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:

Section 2	Clear
Section 3	Identify
Section 4	Loopback (all steps)
Section 5	Self-test
Section 8	Common System Operations (all steps)
Section 9	Status Tests (all steps)

   Additional Sections:

Section 6	Status
Section 17	SS/80 External Exerciser (Interactive Section)

4. If Section 17 is selected, the SS/80 diagnostic prompt appears.

   `SS80DIAG>`

   Entering **HELP** at the prompt displays a list of the available SS/80 External Exerciser commands.

   `SS80DIAG> HELP`

   The following table describes the commands available to the SS/80 External Exerciser.

Table 5-5. SS/80 External Exerciser Commands

Command	Description
ADDRESS	Allows the user to convert block addresses to 3-vector addresses and vice versa.
CICLEAR	Clears the selected device.
DESCRIBE	Obtains a CS/80 describe message from the device being tested and displays the contents to the user in text form.
DIAG	Initiates internal diagnostic tests which reside in the disk drive.
EXIT	Terminates the External Exerciser.
HELP	Provides access to information concerning the commands that are available in the external exerciser.
INIT MEDIA	Allows the user to format the disk media.
READ	Allows the user to access any data block on the selected device.
SDCLEAR	Clears the device to its power-on state.
UNIT	Allows the user to set the unit number within the drive.

5. Type **EXIT** to exit Section 17 and control returns to the Online Diagnostics Subsystem.

Online Utilities

IOTT (I/O Test Tool)

The I/O Test Tool (IOTT) is 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. This utility runs only on HP 3000 Series 900 computer systems (MPE-XL).

Mini-Operating Instructions:

Before attempting to run the utility, ensure that the user has diagnostic level 0 security.

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 is 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 returns to the Online Diagnostics Subsystem as shown by the appearance of the DUI prompt:

   ```
   DUI>
   ```

Command Summary

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

1. **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
   ```

2. **User Program File Commands (UPFC)**

   The following commands are available to utilize user program files:

   ```
   LOAD {file name}
   PURGE {file name}
   SAVE {file name}
   SHOWFILE [file specifier string]
   ```

3. **Program Editing Commands (PEC)**

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

   ```
   DELETE {line number}
   DELETE {line number}/{line number}
   DELETE ALL
   LIST {line number}
   LIST {line number}/{line number}
   LIST ALL
   MODIFY {line number}
   MOVE {line number}/{line number} TO {line number}
   MOVE {line number} TO {line number}
   RENUMBER {value}
   ```

4. **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:

1. **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 number}
   RELDEVICE PDEV={CA#}[.DA#[.Device#]]
   SETDEVICE LDEV={ldev number}
   SETDEVICE PDEV={CA#}[.DA#[.Device#]]
   SETTIMER {value}
   SHOWDEV
   ```

2. **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
```

3. **Predefined I/O Request Instructious (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}[,aux buffer,length]
SETOPTION {option}[,option]
SHOWPARM
```

4. **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}
{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}
```

5. **HP-CIO DMA Chain Instructions (HPCIOI)**

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

```
ADDQUAD {order ID},{buffer name},{length}[:hpcio options]
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
```

LOGTOOL (System and Memory Log Analysis Tool)

The system and memory log analysis tool (LOGTOOL) provides the 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. This utility runs only on HP 3000 Series 900 computer systems (MPE-XL).

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.

   Once LOGTOOL has been invoked the following prompt is displayed indicating an input request:

   ```
   LOGTOOL>
   ```

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

   The three categories of input commands available are:

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

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

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

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

SYSMAP (System Map)

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. This utility runs only on HP 3000 Series 900 computer systems (MPE-XL).

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.

   SYSMAP has no RUN command options. Once SYSMAP has been invoked the following prompt is displayed indicating an input request:

   ```
   ENTER MAP>
   ```

4. Typing `HELP` causes SYSMAP to list a menu of the following global SYSMAP commands:

   ```
   IOMAP
   CPUMAP
   MEMMAP
   MODULEMAP  MAP OF SYSTEM MODULES
   CONFIRM (ON/OFF)
   TIMEOUT
   SUSPEND
   EXIT
   ```

   Respond with one of the eight commands above.

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

TERMDSM (Terminal Diagnostic Support Monitor)

The Terminal Diagnostic Support Monitor (TERMDSM) provides diagnostic services for terminal and serial printer connections on HP 3000 900 Series (MPE-XL) systems. The utility is used when a hardware or software problem is suspected with one or more asynchronous devices. TERMDSM gathers information on ASC software problems and troubleshoots the DTC hardware. TERMDSM can also be used to test hardware connections between devices and the DTC.

Minimum Configuration:

- Properly functioning MPE-XL operating system.
- Minimum mainframe hardware configuration.
- System and each DTC connected as nodes on the LAN.
- At least one pair of serial interface/connector cards installed on each DTC, with at least one port of each connector card connected to an asynchronous device.
- The following loopback connectors, supplied with each DTC:

  25-pin connectors for modem cards (HP part number 30146-60002)

  3-pin connectors for RS-232-C direct-connect cards (HP part number 30148-60002)

  5-pin connectors for RS-422 direct-connect cards (HP part number 30147-60002)

Note

TERMSDSM checks the user's capability list to determine if the user is authorized to use commands at that security level. Users without SM, DI, OP, or AM capabilities at security levels 0, 1, and 2 will not be permitted to use TERMDSM.

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 TERMDSM`

   TERMDSM does not require parameters.

3. The utility responds with a header, a welcome message, and a list of commands that can be used with the utility.
4. The following prompt is displayed indicating an input request:

   `TERMDSM>`

5. To stop the looping of a diagnostic function, enter `CTRL Y`.
6. To exit TERMDSM, type `EXIT`. The `DUI` prompt will then be displayed.

Command Summary:

The capital letters indicate the abbreviations for each command.

Comment	Allows user to type in informational comments for reference. Security level = 2.
DIag	Allows several diagnostic functions to be run on a port. Allows user to initiate a DTC selftest. DTC selftest = security level 0; Port tests = security level 1.
DTc	Lists each DTC on the system, its descriptive name, and the IEEE 802.3 station address. Security level = 2.
DUmp	Allows data area of a port to be copied to a disk file for troubleshooting by HP factory personnel. Security level = 1.
Help	Displays information about TERMDSM and its commands. Security level = 2.
Reset	Allows single port, several ports, or a DTC to accept new sessions. Security level for resetting ports = 1; security level for resetting DTC = 0.
STatus	Lists node name of a specific device's DTC. Security level = 2.

Caution

Some TERMDSM commands abort sessions and cause the loss of data connected with those sessions. If used incorrectly, the commands can unnecessarily disrupt or abort user sessions that are not having problems.

Offline Diagnostics and Utilities

The Offline Diagnostics System provides a means of testing System Processor Unit (SPU) hardware Field Replaceable Units (FRUs) and interrogating low-level hardware register contents. It includes a standard operating environment complete with a library of common procedures, program macros, and command set/feature functionality. For more information about the Offline Diagnostics, read the *Offline Diagnostics System Manual* (HP part number 30190-90010).

Note

The ISL-based Offline Diagnostics and Utilities are implemented via the Support Tape on either an open reel (HP part number 92454-13503) or cartridge tape (HP part number 92452-13303) format. You must boot from the support tape to implement the complete set of ISL-based Offline Diagnostics and Utilities described below. Refer to the procedure "Booting from the Support Tape" at the end of this chapter for information about using the support tape.

Diagnostic Programs

The Diagnostic Programs are a comprehensive set of software to test FRUs for Processor, Memory and I/O functionality on the HP Series 925 Family and Model 825 Family systems. These diagnostics determine which of the field replaceable units (FRUs) need replacement.

Utility Programs

Offline Utility programs cannot isolate defective FRUs, but can verify which functions of a device are operating correctly. Input/Output Map (IOMAP) and Channel Exerciser (CAEXR) help determine the cause of device failure by providing stress simulation and diagnostic information.

Refer to Table 5-6 for a listing of available offline diagnostics.

Note

The diagnostics in Table 5-6 and the offline diagnostics descriptions in this section are arranged in alphabetical order by the diagnostic command name (for example, BCDIAG is listed before CAEXR), except that numbers within a command name are ignored. Thus, the command names for certain functionally similar diagnostics (such as A1002AM and A1100AM) are combined.

Table 5-6. Available Offline Diagnostics and Utilities

Command Name	Systems	Description
A1002AI	825/925/835/935/845/949/922/832/932	SPU I/O Diagnostic
A1100AI	950/955/960/980/850S/855S/860S/870S	SPU I/O Diagnostic
A1002AM	825/925/835/935/845/949	SPU Memory Diagnostic
A1100AM	950/955/960/980/850S/855S/860S/870S	SPU Memory Diagnostic
A1002AP	825/925/835/935/845/949/922/832/932	SPU Processor Diagnostic
A1100AP	950/955/960/850S/855S/860S	SPU Processor Diagnostic
BCDIAG	850S/855S/860S/870S	A1126A Diagnostic
CAEXR	All PA-RISC systems	Channel Exerciser Utility
CLKUTIL	All PA-RISC systems	PDC time-of-day Utility
IOMAP	All PA-RISC systems	Input/Output Map Utility
MPROC	980/870S	Multiprocessor Diagnostic
UNIPROC	980/870S	Single-Processor Diagnostic

Note In display examples, user input is shown underlined.

To find out what offline diagnostics are available, boot the system to the ISL prompt. Ask the program for a description of the commands by typing HELP:

```
ISL> help

?            Help Facility
HELP         Help Facility
LISTF        List ISL Utilities
LS           List ISL Utilities
AUTOBOOT     Set or clear autoboot flag in stable storage
AUTOSEARCH   Set or clear autosearch flag in stable storage
PRIMPATH     Modify primary boot path in stable storage
ALTPATH      Modify alternate boot path in stable storage
CONSPATH     Modify system console path in stable storage
DISPLAY      Display boot and console paths in stable storage
LSAUTOFL     Lists contents of autoboot file
LISTAUTOFL   Lists contents of autoboot file
READNVM      Displays contents of one word of NVM
READSS       Displays contents of one word of stable storage


Utilities on this system are:

HPUX
IOMAP
CAEXR
A1002AI
A1002AM
A1002AP
A1100AI
A1100AM
A1100AP
UNIPROC
MPROC

ISL>
```

Minimum Performance

To run any offline diagnostics, the system must first be able to pass the PDC self-test and boot ISL.

Offline Diagnostics Command Summary

Diagnostic Execution Control Commands

SECTION	Used to specify a diagnostic section other than the default section. Syntax: section 4/8 9 12
LOOP	Defines the number of times a section is to be executed. For example: `loop 100` causes the section to execute 100 times; `loop (blank)` causes independent execution; and `loop 0` causes the diagnostic to stop.
RUN	Causes the diagnostic to restart at the beginning.
RESUME	Resumes the diagnostic after a pause, or starts the diagnostic after parameter selection.
RESET	Returns diagnostic parameters to the default values.
EEPS	Enables a pause after an error.
SEPS	Suppresses a pause after an error.
ENPS	Enables a non-error pause to allow diagnostic command input.
SNPS	Suppresses non-error pause.
EIPS	Enables an isolation pause after detection of an isolation error.
SIPS	Suppresses isolation pause.
ERRPAUSE	Selects the following: EEPS, SIPS, and SNPS.

Diagnostic Output Control Commands

EEPR	Enables error printout.
SEPR	Suppresses error printout.
ENPR	Enables non-error printout.
SNPR	Suppresses non-error printout.
EIPR	Enables isolation printout.
SIPR	Suppresses isolation printout.
ERRONLY	Selects EEPR, SIPR, and SNPR.
HARDCOPY	Not supported.

Diagnostic System Control Commands

STOP	Upon exiting the diagnostic, this command stops ISL from continuing the Auto-Boot sequence.
LISTIO	Lists the I/O path to the primary and secondary boot devices, the console path, and the printer path.
CHANGEIO	Changes the console, the printer, and the Units Under Test (UUTs) displayed by the LISTIO command. This command changes only the memory buffer; to permanently change the boot and console values found in stable storage, you must return to ISL. Syntax: {path name}[C,P,1,2] - where C is the console, P is the printer, and 1 and 2 are the UUTs.
STATE	Displays diagnostic state variables.
EXIT	Exits the diagnostic to ISL.
HELP	Displays detailed information about the diagnostic command. For example; `help section`.
INFORMATION	Displays detailed information about unique diagnostic commands.
Control-Y	Breaks the execution of the diagnostic between steps, similar to the MPE/XL Control-Y function, the RTE Break function, and the HP-UX Control-X (or Control-Y) function. (The Model 825 Family SPU also uses the Control-C function.) Any console command is valid after a Control-Y; the I/O associated with console commands is not suppressible.

A1002AI, A1100AI (SPU I/O Diagnostic)

The SPU I/O Diagnostic tests the internal SPU I/O hardware of the Series 925 Family, Series 950 Family, Model 825 Family, and Model 850S Family Central Processing Unit (CPU), to detect and isolate FRU failures.

Note

After entering the command, the `I/O>` prompt appears:

- Type `help` at the `I/O>` prompt to list all commands available.
- Type `info` at the `I/O>` prompt for information unique to the diagnostic.

Limitations

The tests conducted by the I/O diagnostic are functional only. Intermittent errors require the use of the ISL-based Channel Exerciser utility (CAEXR) to reveal stress-related faults.

Remapping (Series 950 Family and Model 850S Family SPUs only)

The A1100AI diagnostic remaps I/O space as a means of detecting I/O mapping errors. If such an error occurs while the diagnostic executes, the diagnostic will attempt to detect and report the error. However, in this case the integrity of the diagnostic itself cannot be guaranteed, since an I/O device may map over the memory controller where program memory resides.

Unique Commands

The following command information applies to this diagnostic only. Some examples are Bus Converter dependent while others relate to a specific SPU I/O hardware implementation. Refer to Table 5-7.

Table 5-7. SPU I/O Diagnostics Unique Commands

Command	Description

path (A1100AI only)	{SMB fixed field}/{MID_BUS ff}.{HP-CIO slot}.{HP-IB addr.} "path" elements right of MID_BUS fixed field are currently ignored.
	`Example = '2'  : SMB MODULE 2`
	`Example = '2/'  : BC-X`
	`Example = '2/4' : MID_BUS-X, SLOT 1`
	`Example = '2/8' : MID_BUS-X, SLOT 2`
	`Example = '2/4.1.0'   : Same as 2/4.`

EVPR	Enables the verbose report.
SVPR	Suppresses the verbose report.
IORE[GISTERS]{ path}	Displays SMB and MID_BUS device registers.
IODC{ path}	Displays SMB and MID_BUS IODC headers. Displays and decodes the first 16 bytes of the module's IODC.
HPAM[AP]	Displays PROCESSOR's, BC's & CA's pertinent I/O address.

FILL[BUFR]{ function}{ pattern} (A1100AI only)	Fills the Write buffer(W_buf) with a sequence of 256 32 bit data patterns.
	`{function} :`
	`{ ALL0[ S ]}: Fills buffer with all zeros.`
	`{ ALL1[ S ]}: Fills buffer with all ones.`
	`{ ALLS[AME]}{ pat}: Fills buffer with all ones {pat}.`
	`{ RAND[OM]}{ seed}: Fills buffer with a sequence of pseudo random patterns.`
	`{ SEQU[ENCE]}{ [pats=n}{ pat1, .patn}{ [fill]=pat}:}`

COMP[AREBUF] (A1100AI only)	Compares the Read buffer(R_buf) to the Write buffer(W_buf).

Test Sections

The I/O Diagnostic consists of 126 test sections (refer to Table 5-8).

Table 5-8. SPU I/O Diagnostic Test Sets

Sections	Name of Test
1	Bus Converter Reset test
2	Channel Adapter initialization test
3	Channel Adapter register test
4	Channel Adapter RAM stack test
5	Channel Adapter flex field addressing and DIO loopback test
6	Channel Adapter SRQ test
7	Channel Adapter ARQ test
8	Channel Adapter flex field addressing and DMA loopback test
9	Channel Adapter error status test
10	Terminal Mux self-test
11	AP self-test through Terminal Mux (S0) test
12	AP self-test through PDH Direct Port (DP) test
13	Read HEX DISPLAY from AP, through Terminal Mux
14	Read HEX DISPLAY from AP, through PDH Direct Port
15	AP loopback: DP to console to S0
16	AP loopback: S0 to console to DP
17	Logical Module Self-test
123	SPA WRITE scope loop
124	SPA READ scope loop
125	Direct I/O scope loop
126	DMA scope loop

Test Sequence

At the ISL prompt, enter the I/O Diagnostic name (A1002AI for the Series 925 Family and Model 825 Family or A1100AI for the Series 950 Family and Model 850S Family). The system displays:

```
ISL> A1100AI   for 950/850S families
   :
text
   :
I/O>
```

Type **resume** after the `I/O>` prompt to begin the diagnostic. The diagnostic proceeds according to the default parameters listed in Table 5-9.

Table 5-9. SPU I/O Diagnostic Default Parameters

Parameter	State
sections (925 Family/825 Family)	1/8
sections (950 Family/850S Family)	1/126
activity indicators	enabled
error and isolation messages	enabled
pause after error and isolation messages	enabled
looping or hardcopy	no

A1002AM, A1100AM (SPU Memory Diagnostic)

The SPU Memory Diagnostic tests the Memory Controller or Memory Array hardware of the Processing Unit (CPU) for FRU failures.

Note

After entering the command, the `MEM>` prompt appears:

- Type `help` at the `MEM>` prompt to list all commands available.
- Type `info` at the `MEM>` prompt for information unique to the diagnostic.
- Type `resume` to display the diagnostic test menu.

Unique Commands

The memory diagnostic supports two commands not found in the diagnostic subsystem: CARD and DECODE. DECODE is not applicable for the CE. Refer to Table 5-10 for a description of CARD.

Table 5-10. Unique SPU Memory Diagnostic Command

Command	Description
CARD	{*space / integer:0 . . . 31 / integer integer /integer/integer / [integer] [integer/integer]*} Permits selecting the memory array to be tested by setting a 32-bit bit mask. It also performs range checking on the integer(s) supplied. If an out of range integer is supplied, then the command is rejected and the message `Parameter out of range` is displayed. Memory arrays 0-7 correspond to controller 0, 8-15 correspond to controller 1. If the first parameter exceeds the second, the message `Illegal order` is displayed. When no parameter is provided, the card select bit mask value is displayed in hexadecimal.

Test Sections

The organization and coverage of the SPU Memory Diagnostic is arranged by test section number in ascending order (refer to Table 5-11).

Table 5-11. SPU Memory Diagnostic Test Sets

Sections	Hardware Area
1/14	First Memory Controller
15/26	Second Memory Controller
27/29	Not used
30/39	Memory Arrays

Note

Refer to the *Offline Diagnostics System Manual* for the power fail test.

Test Sequence

At the ISL prompt, enter the Memory Diagnostic name (A1002AM for the Series 925 and Model 825 Family or A1100AM for the Series 950 Family and Model 850S Family). The system displays:

```
ISL> A1100AM   for 950/850S families
  :
text
  :
 MEM>
```

Type `resume` after the `MEM>` prompt to begin the diagnostic. The diagnostic will display the following menu:

```
1. Print Memory Card Configuration.
2. Single array test.
3. Comprehensive test of Memory Controllers.
4. Short test of all memory.
5. Medium test of all memory.
6. Comprehensive test of all memory.
7. Exit this menu driven section to diagnostic prompt.
8. Exit this diagnostic and return to ISL.

Enter one of the following numbers (1 - 8)>
```

Tests 2 through 6 on the menu are defined below:

Single array test	Comprehensive test of a single array (sections 30 - 39).
Comprehensive test of Memory Controllers	Complete test of both controllers, but no arrays tested (sections 4 - 10, 14 (MC0);18 - 25 (MC1)).
Short test of all memory	Complete test of both memory controllers and single-address test of arrays (sections 4 - 10, 18 (MC0); 18, 20 - 24 (MC1), 17 (if 2 MCs), 3 (if one MC)).
Medium test of all memory	Complete test of both memory controllers and a moderate test of arrays (sections 1, 3 - 10, 14 (MC0); 2 - 15, 17 - 25, 32 - 34, 37).
Comprehensive test of all memory	Complete test of both memory controllers and parametric test of all arrays (sections 1, 3 - 10, 14 (MC0); 2 - 15, 17 - 25, 30 - 39).

A1002AP, A1100AP (SPU Processor Diagnostic)

The SPU Processor Diagnostic tests the VLSI chip set of the Central Processing Unit (CPU) for FRU failures.

Note

After entering the command, the PROC> prompt appears:

- Type `help` at the PROC> prompt to list all commands available.
- Type `info` at the PROC> prompt for information unique to the diagnostic.

Unique Commands

Three additional commands are available to determine diagnostic information. Refer to Table 5-12.

Table 5-12. Unique SPU Diagnostic Commands

Command	Description
PSTAT	Displays the chip revision number and cache line lockout status.
CREGISTER	Displays the contents of the control registers as of the end of the previously executed test section.
PROCn	Selects 1 to 4 processes to test (A1100AP only)

Test Sections

The processor diagnostic consists of 126 test sections and a control program (refer to Table 5-13). The control program manages execution order and interfacing of common procedures provided by the user interface (UI).

Table 5-13. SPU Processor Diagnostic Test Sets

Sections	Name of Test
1/6	CPU Data Path
7/10	SIU Data Path
11/18	CCU0 Data Path
19/26	CCU1 Data Path
27/40	TCU Data Path
41/93	CPU Instruction
94/102	CPU Extended
103/126	Floating Point

Test Sequence

At the ISL prompt, enter the Processor diagnostic name (A1002AP for the Series 925 Family and Model 825 Family; A1100AP for the Series 950 Family and Model 850S Family). The system displays:

```
ISL> A1100AP for 950/850S families
   :
text
   :
PROC>
```

Type **resume** after the PROC> prompt to begin the diagnostic. The diagnostic proceeds according to the default parameters listed in Table 5-14.

Table 5-14. SPU Processor Diagnostic Default Parameters

Parameter	State
test sections	all sections
activity indicators	enabled
error and isolation messages	enabled
pause after isolation message	enabled
looping or hardcopy	no

BCDIAG (A1126A Bus Converter Diagnostic)

The A1126A Bus Converter Diagnostic tests any HP A1126A Bus Converter installed in an HP 9000 Model 825 Family or Model 850S Family system. It does not test any other standalone or system internal Bus Converter. BCDIAG is launched from the ISL only (which means the operating system is down), thus the system is completely unavailable while BCDIAG is running. BCDIAG can be loaded from the ISL boot directory or from the support tape.

Minimum Configuration:

- A1126A Midbus board, A1126A HP-PB board, and a cable connecting the two
- At least 8 Mbytes memory
- Channel Adapter, MUX card, HP-IB card
- Disk drive or tape drive, and a console
- Support tape

Mini-Operating Instructions:

BCDIAG can be run via one of two user input interfaces:

- Command line
- Interactive

BCDIAG can be run in five different test modes:

- Identify
- Selftest
- Interrupt Test
- FPS Test
- DMA Test

Test modes are defined in Table 5-15.

Table 5-15. BCDIAG Test Modes

Mode	Description
Identify	This test attempts to identify each BUS Converter in every I/O path (or specified path) if the Bus Converter is identifiable. The information printed includes: I/O path to the component, component name, component ID number, component software model number (if applicable), component hardware model number (if applicable), firmware revision (if applicable), and hardware revision (if applicable).
Self-Test	This mode tests the accessibility of the registers on both Midbus and HP-PB cards, pattern-tests the registers, and tests loopbacks on the Midbus card using the shuffle command. The Self-Test should be able to isolate Field Repairable Units.
Interrupt	This test checks the capability of the Bus Converter to synthesize interrupts, and to detect and log errors. This is the only test requiring user intervention to turn the power switch on or off on the A1126A Bus Converter.
FPS Test	This test attempts to test the Forward Progress Screen algorithm. It will test the Pending registers, the Busy Read/Write registers, I/O error MADD/SADD registers on the Midbus port, and the capability of the HP-PB port to send a no-slave acknowledgment to HP-PB modules. It will also exercise the Bus Converter and detect intermittent faults by generating DMA transactions from HP-PB modules to memory. This test requires a TRANSIT MAP/PSI card installed in the HP-PB.
DMA Test	This test checks the ability of HP-PB cards to perform DMA reads and writes while the host CPU reads and writes a register on the A1126A remote port. Data integrity for the DMA write is checked. Various error conditions are tested during DMA. This test requires at least one TRANSIT MAP/PSI card installed in the HP-PB. The test will actively use all such cards installed in the remote port box.

Refer to the two user input interface descriptions on the following pages for information about how to invoke the test modes.

Command Line Interface

To run BCDIAG via the command line, type `bcdiag` at the `ISL>` prompt, followed by desired optional parameters (if no parameters are entered, the interactive user interface is invoked). BCDIAG will use all entered parameter values; values not entered will be set to their defaults.

The keywords that can be entered after the `bcdiag` command are listed below. The keywords can be entered in abbreviated or full-word form (the optional part of the keyword is shown in [brackets]).

def[ault]

errc[ount]=nn (nn=number of errors before halt. Default=1; 0=infinite number of errors)

erro[nly]

h[elp]

l[oop]=nn (nn=number of test repetitions. Default=1; 0=infinite loop)

n[oerrpause]

p[ath]=n or n/n (n=I/O path for Model 825 Family; n/n=I/O path for Model 850S Family. Default=all connected A1126As)

intera[ctive_test]

s[ilent]

t[ests]=[id[entify]] [,s[elftest]] [,f[ps]] [,interr[upt]] [,d[ma]] [a[ll] (Default=Identify Test only)

Interactive Interface

The interactive interface prompts the user for the same information that could be entered at the command line. You may enter "break mode" at any time by pressing (Control) (C) or (Control) (Y). You may press (Control) (X) to erase an entry you just typed in.

1. At the `ISL>` prompt, enter `bcdiag`.

   ```
   ISL> bcdiag
   ```

2. BCDIAG displays test information, then prompts for parameter modifications:

   ```
   Do you wish to modify any program parameters? [y,n] (n):
   ```

3. If you answer `y` to this prompt, you will be prompted for parameter modification in a manner similar to that shown below. Note that defaults are shown in parentheses.

```
Change tests to be executed?  [y,n] (n):  y

    Identify?  [y,n] (y):  y

    Selftest?  [y,n] (y):  y

        Execute Selftest Immediately?  [y,n] (n):  n

    Interrupt?  [y,n] (y):  y

    Fps? [y,n] (y):  y

    DMA? [y,n] (y):  y

Test single path only? [y,n] (n):  n

Enter number of LOOPS [<n>,0=infinite]  (1):  1

Change miscellaneous program parameters? [y,n] (n):  y

   Pause on errors? [y,n] (y):  y

   Maximum error count before returning to ISL? (infinite): 1

   Suppress all messages?  [y,n] (n):  n

   Print error messages only? [y,n] (n):  n

   Display software debug messages?  [y,n] (n):  n
```

BCDIAG Error Codes

The hex display error codes for BCDIAG are shown in Table 5-16 below. Note that some error codes are followed by a parameter value. The values displayed provide additional error information; refer to the individual error descriptions for definitions of these values, and for additional information about console displays.

Table 5-16. BCDIAG Error Codes

Code	Cause
ce90 `stat`	A call to a PDC routine returned a bad status (`stat`).
ce91	An equal sign (=) must follow immediately after the `errcount`, `loop`, `path`, or `test` keyword on the command line.
ce92	A decimal number must follow the equal sign (=) following the `errcount`, `loop`, `path`, or `tests` keyword on the command line.
ce93	The keyword entered on the command line is not a valid keyword.
ce94	The keyword entered after `tests=` is not `all` or a comma-separated list of `identify`, `selftest`, `interrupt`, `fps`, or `DMA` on the command line.
ce95	The command line interface expected `c` as a delimiter, but another character was entered. The `c` parameter is shown as an ASCII value on the hex display.
ce98	Entered data not in a correct or recognizable form.
ce99	The loop count and error count cannot be entered as negative numbers.
ce9d `n`	A PA-RISC module number outside the range of 1-63 was entered (`n` = value entered by user).
ce9e `[bc]n`	PA-RISC module number is valid, bnt the corresponding module is not installed in the system.
cea0 `n`	Device Adapter number entered by the user (`n`) was not between 0 and 15, inclusive. (Model 850S Family only.)
cea8	At least one test mode must be specified for BCDIAG to perform any meaningful test.
cea9	The number entered is too large or too small to be accepted.
ceaa `[bc] ca da`	The DA Sense Register PST bit is not set, indicating that the DA self-test failed last time it was run. (Model 850S Family only.)
cead `n`	A Bus Converter module number outside the range 1-63 was entered (`n` = value entered by user).
ceaf `n`	Module `n` does not exist on HP-PB. A MAP/PSI card must be installed to run the FPS test.
ceb4 `[bc] ca da`	The specified Device Adapter (`da`) number does not correspond with the Device Adapter installed on the specified Channel Adapter. (Model 850S Family only.)

Table 5-16. BCDIAG Error Codes (continued)

Code	Cause
ceb5 [bc] ca da	The Device Adapter (da) specified does not correspond to an HP-PB DA.
cebe n	The specified maximum error count (n) has has been exceeded. Errors associated with the current loop will be displayed and then the program will return to ISL.
cec4 **stat**	A1126A Entry Test failed when called with Return Info option; status returned was **stat**. Cannot continue with self-test.
cec5 **stat**	A1126A Entry Test failed when called with Execute Step option; status returned was **stat**. Cannot continue with self-test.
cec6 **stat**	A1126A Entry Test failed when called with Return Message option; status returned was **stat**.
cec7 **stat**	A1126A Entry Test failed when called with Describe Section option; status returned was **stat**.
cec8	Busy write register on the A1126A Bus Converter HP-PB board failed.
cec9	Busy read register on the A1126A Bus Converter HP-PB board failed.
ceca	The path selected by the user to run the diagnostic on was not a valid path.
ced1	Pending register 0 on the A1126A Bus Converter HP-PB board failed.
ced2	Pending register 1 on the A1126A Bus Converter HP-PB board failed.
ced3	Pending register 2 on the A1126A Bus Converter HP-PB board failed.
ced4	Pending register 4 on the A1126A Bus Converter HP-PB board failed.
ced5	A1126A Bus Converter is losing transactions. Problem cannot be isolated to a particular board.
ced6	The diagnostic located the Midbus board, but could not access the HP-PB board. Probable causes are: bad or no cable connection to A1126A, no power to A1126A, bad A1126A HP-PB board, or bad A1126A Midbus board.
ced8 **estat**	The A1126A Bus Converter HP-PB board failed (refuses to turn itself off).
ced9	Check if MAP/PSI card working. If it is, check the A1126A HP-PB board.
ceda **stat**	Probable bad ROM on the A1126A Midbus board.
cedb	Error isolated to either an 850S Family Bus Converter or the A1126A Midbus board.
cedc	IO Error SADD register on the A1126A Midbus board failed.
cedd	IO Error MADD register on the A1126A Midbus board failed.
cede	Most probably the Power Warn bit on the A1126A Midbus board.
cedf	Most probably the Power Fail bit on the A1126A Midbus board.

Table 5-16. BCDIAG Error Codes (continued)

Code	Cause
cee0	Most probably the Power Lost bit on the A1126A Midbus board.
cee1	If A1126A Midbus port received power fail information as indicated by the status register, it did not generate a broadcast to the external interrupt register on the processor.
cee2	A1126A Midbus port registered data parity error.
cee3	A1126A Midbus port was probably trying to access a memory location that does not exist.
cee5	A1126A Midbus encountered an error while trying to read A1126A HP-PB port register. Either the A1126A HP-PB board is bad, or the link is dead.
cee6	Either the cable connecting the A1126A Midbus board to the HP-PB board is bad, or there is no power to the HP-PB box.
cee7	Replace cable connecting the A1126A Midbus port to the HP-PB port.
cee8	An error was detected while the Model 850S Family Bus Converter was accessing the A1126A Midbus port.
cee9	Check the MAP/PSI card and the HP-PB port of the A1126A.
ceea	Check the MAP/PSI card and the HP-PB port of the A1126A.
ceeb	Check the HP-PB port of the A1126A, or the MAP-PSI card plugged into the HP-PB.
ceec	The A1126A Midbus port is not able to access the HP-PB port. Check the cable or the HP-PB port of the A1126A, and also check power to the A1126A Bus Converter.
ceed	Check the cable connecting the Midbus port and the HP-PB port of the A1126A.
ceee	Check the MAP/PSI card plugged into the HP-PB of the A1126A.
cf01	A MAP/PSI card must be installed for the diagnostic to comprehensively test the A1126A. If card is installed, check that the card is properly seated.
cf02	A Bus Converter was found, but it is not an A1126A.
cf03	The module being looked at is not an A1126A Bus Converter.
cf04	The diagnostic could not talk to the Bus Converter. Possible bad Midbus board or bad ROM.

CAEXR (Channel Exerciser Utility)

The Channel Exerciser Utility (CAEXR) is a diagnostic that exercises the 19744A Channel Adapter (CA), and the DMA function of an HPPB system.

Testing is achieved by sending data from memory to an HPIB DA, then returning the data to memory through a second DA. As a test for validity, return data is compared to resident data.

Caution Before running this test, disconnect any HPIB devices to avoid possible data corruption.

Commands and Syntax

The default run command is shown below:

```
ISL> caexr  <optional parameters/keywords>
```

Default parameters are listed in Table 5-17.

Table 5-17. CAEXR Default Parameters

Parameter	State
busy	8.3 16.3 24.3
debug	not enabled
defaults	false
errcount	infinite (0)
erronly	false
expert	false
help	false
loop	indefinitely (0)
memory	3MB and up
mpx	all
noerrpause	false
noswap	false
pair	8.0,8.2;16.0,16.2;24.0,24.2
silent	false

Break Mode

The user can break the program at certain points by using (Control) (C) or (Control) (Y). These user interrupts are detected after each loop completes, and for one second after any error message completes.

Note

Break mode is not entered by using the console (Break) key.

Caution

The read and write commands represent a true debug facility, which can easily destroy the state of the machine and cause a High Priority Machine Check. These debug commands should only be used by someone with a detailed knowledge of CAEXR and system internals.

With explicit instructions (followed exactly), these commands are useful for examining the state of the DMA data buffers.

Hex/LED Display

Hex codes must appear within the range of CE80 - CEBF, using defined and undefined codes, to meet the specifications in the HP Precision Architecture Chassis I/O standard. Hex/LED codes are followed by descriptive "parameter" values. The "class" code (CE80 - CEBF) is displayed for three seconds, followed by the stated number of "parameter" values displayed for two seconds each.

On the Series 925/Model 825 Family SPU, hex display numbers may only be accessible through the AP. These codes are displayed at different times during the execution of CAEXR.

Table 5-18. CAEXR Hex Codes

Display	Source	Meaning
C580	PDC/IODC	ISL is waiting for the boot media to become ready
CE00	ISL	CAEXR (or any ISL utility) is loading.
CE01	ISL	CAEXR (or another ISL utility) is being loaded automatically, under the control of the autoboot file.
CE13	ISL	Console input error.
CE14	ISL	Console output error.
CE15	ISL	ISL cannot find the specified utility (possibly misspelled).
CE80	CAEXR	CAEXR has begun execution.
CE81 - CE8F	CAEXR	Reserved.
CE90	CAEXR	PDC call error.
CE91 - CEB8, CEBC - CEBD	CAEXR	CAEXR configuration and operation errors. See the Configuration Dialog Error message section for more detailed information.
CEB9	CAEXR	Data compare error. See the Data Compare Error Message section for more detailed information.
CEBA - CEBB	CAEXR	DMA execution errors. See the Execution Error Messages section for more detailed information.

IOMAP (Input/Output Map Utility)

IOMAP displays the configuration of all devices (modules and adapters) attached to a Hewlett-Packard A1408A, 09740A, Series 925 Family, Series 950 Family, Model 825 Family, or Model 850S Family SPU. This utility runs on both the MPE-XL and HP-UX versions of these SPUs. IOMAP provides identification, self-test, and loopback tests on each component capable of such tests.

Test Modes

Test modes are defined in Table 5-19 below.

Table 5-19. IOMAP Test Modes

Mode	Description
Identify	This test attempts to identify each component in every I/O path to the component, component name, component ID number, component software model number(if applicable), firmware revision (if applicable), hardware revision (if applicable), and an indication of which test modes are available for the component. Configuration data is determined by PDC calls. Path information is obtained from PDC calls, direct I/O (DIO), and DMA transactions.
Loopback	This test performs component dependent loopback tests where feasible. The result of this test is reported as a pass, fail, unimplemented or untestable status.
Self-Test	This test initiates the internal self-test of each component where feasible. The result of this test is reported as a pass, fail, unimplemented or untestable status.
View	This test examines the version code of each board on the system (950/850S families only). The display appears on the console only, not the hex display. When running IOMAP in "Silent Mode", no output appears.

Default Tests

The default IOMAP test consists of the following:

1. Display the current configuration of the processor, including the presence of co-processor boards and analyzer cards, cache size, TLB, processor model number, PDC firmware revision, and main memory size.
2. Check all possible I/O paths to determine and identify all components and peripherals present. IOMAP then displays a table showing all components.

Self-Test or loopback diagnostic tests can be specified for all testable components and are performed after mapping. Error messages are printed for any component that fails a test. The user may also limit the identify, self-test, loopback and view tests to a specified path(s).

User Input

While running IOMAP, a user can enter "Break Mode", which suspends program operation. The Break Mode "debug" facility permits trained support personnel to examine and modify status and registers.

Caution While Break Mode can allow the user to harmlessly display IOMAP internal variables, it also invokes a powerful debug facility. If inadvertently used, it may hang the SPU and cause an HPMC.

Commands and Syntax

The default run command is shown below:

```
ISL> iomap <optional parameters/keywords>
```

Default parameters are listed in Table 5-20.

Table 5-20. IOMAP Default Test Settings

Command	State
debug	not enabled
defaults	no (see note below)
errcount	infinite (0)
erronly	false
help	false
loop	once
noerrpause	false
path	all
silent	false
tests	identify only

Note The defaults listed above are *only* enabled if `defaults` is entered on the command line. If one or more commands (other than `defaults`) are input to configure specific settings, the remaining settings take on default values. If no parameter commands are entered, IOMAP automatically invokes the interactive mode.

Hex Display

Table 5-21 through Table 5-24 list and define the IOMAP error codes sent to the Hex Display. Each error message is represented by a pair of hex codes. The first one is the error class number and the second one is the error code within the error class. There are five classes of errors: input, Midbus, HP-PB, DA and other (execution) errors. Within each class, there are different error codes. Because different machines have different hardware configurations, not all error messages are applicable to all machines.

Table 5-21. IOMAP Error Codes (Input Error CE90)

HEX	`Error ce90 cea0`
CONSOLE	`*** Expected '=' after "`*kkk*`" keyword`
CAUSE	An equals sign '=' must follow immediately after the *kkk* keyword. Keyword *kkk* represents one of the following command line keywords: *errcount, loop, path,* or *tests.*
HEX	`Error ce90 cea1`
CONSOLE	`*** Expected number after "`*kkk*`="`
CAUSE	A decimal number must follow after the equals sign '=', following keyword *kkk* on the command line. Keyword *kkk* represents one of the following command line keywords: *errcount, loop, path,* or *tests.*
HEX	`Error ce90 cea2`
CONSOLE	`*** Unrecognized keyword "`*kkk*`"`
CAUSE	This keyword, which was entered on the command line interface, does not match a valid keyword.
HEX	`Error ce90 cea3` *<ASCII value of 'c'>?*
CONSOLE	`*** Expected 'c' as delimiter`
CAUSE	The command line interface expected *c* as a delimiter, but another character was supplied.
HEX	`Error ce90 cea4`
CONSOLE	`*** Syntax error`
CAUSE	This error can occur in many places. It means that the user data entered was not in a correct or a recognizable form. Correct syntax is given in prompt.

Table 5-21. IOMAP Error Codes (Input Error CE90) (continued)

HEX	`Error ce90 cea5`
CONSOLE	`*** Number cannot be negative`
CAUSE	The loop count aud error count cannot be entered as negative numbers.
HEX	`Error ce90 cea6 [bc] ca da`
CONSOLE	`*** [bc/]ca.da are reserved for the console`
CAUSE	Any attempt to configure console will cause this message.
HEX	`Error ce90 cea7` *n*
CONSOLE	`*** Invalid module number` *n*
CAUSE	This means that a Precision Architecture (Spectrum) module number outside the range 1 - 63 was entered. *n* is the module number supplied by the user.
HEX	`Error ce90 cea8 [bc] n`
CONSOLE	`*** Module [bc/] n does not exist`
CAUSE	This means that a Spectrum (PA) module number is valid but the corresponding module is not installed in the system.
HEX	`Error ce90 cea9 [bc/] ca`
CONSOLE	`*** Mid_bus module [bc/] ca is not a Channel Adapter`
CAUSE	The Mid_bus module number, *ca*, is valid but corresponds to a module other than a channel adapter.
HEX	`Error ce90 ceaa` *n*
CONSOLE	`*** Invalid Device Adapter number` *n*
CAUSE	The Device Adapter number entered by the user was not between 0 and 15, inclusive.
HEX	`Error ce90 ceab`
CONSOLE	`*** Number out of range`
CAUSE	The number entered is too large or too small to be accepted. The value must be within the range specified by the prompt.

Table 5-21. IOMAP Error Codes (Input Error CE90) (continued)

HEX	`Error ce90 ceac [bc] ca da`
CONSOLE	`*** On [BC bc,] CA ca, Device Adapter da does not exist`
CAUSE	The specified Device Adapter number does not correspond with a DA installed on the specified Channel Adapter.
HEX	`Error ce90 cead [bc] ca da`
CONSOLE	`*** On [BC bc], CA ca, Device Adapter da is not an HP-IB DA`
CAUSE	The Device Adapter specified does not correspond to an HP-IB DA. The number may correspond to another type of device adapter.
HEX	`Error ce90 ceae`
CONSOLE	`*** Unrecognized TESTS keyword` *kkk*
CAUSE	This keyword entered after *tests=* is not *all* or a comma separated list of *identify*, *selftest*, or *loopback*. This error occurs in the command line interface only.
HEX	`Error ce90 ceaf`
CONSOLE	`*** Revport information is not available on this machine.`
CAUSE	The machine does not have Revision Code EEPROMS and therefore the information is not available.
HEX	`Error ce90 ceb0`
CONSOLE	`*** No tests specified`
CAUSE	At least one test mode (Identify, Selftest, or Loopback) must be specified for `IOMAP` to perform any meaningful testing.
HEX	`Error ce90 ceb1 n[/n]/n`
CONSOLE	`*** Module n[/n]/n does not exist`
CAUSE	This means that the module number is valid but the corresponding module is not installed in the system.
HEX	`Error ce90 ceb2 n`
CONSOLE	`*** Module n does not exist`
CAUSE	This means that the SMB module number is valid but the corresponding module is not installed in the system. This error message applies to CHEETAH only.

Table 5-22. IOMAP Error Codes (Midbus Error CE93)

HEX	`Error ce93 cea0 [bc] ca stat`
CONSOLE	`*** On [BC bc], Channel Adapter ca module error:  Status =` *stat*
CAUSE	The specified Channel Adapter has had a module error. The contents of the module's status register is displayed as *stat*.
HEX	`Error ce93 cea1 [bc] ca stat`
CONSOLE	`*** [On BC bc, ] Channel Adapter ca timeout:  Status =` *stat*
CAUSE	The CA io_stat register ca_ready bit did not become set (ready) with a reasonable interval (currently one second). This prevented a DMA transfer from being started by software.

Table 5-23. IOMAP Error Codes (DA Error CE95)

HEX	`Error ce95 cea0 [bc] ca da`
CONSOLE	`*** Device Adapter 'SLOW' switch (S1-7) must be down`
CAUSE	The Device Adapter speed switch S1-7 must be 'down'(toward the board surface). DIP switch S1 is at the front edge of the board.
HEX	`Error ce95 cea1 [bc] ca da`
CONSOLE	`*** Device Adapter 'SCTL' switch (S1-6) must be up`
CAUSE	The 'SCTL' (system controller) switch must be set 'up' (away from the board surface). 'SCTL' is the DIP switch on the board front edge.
HEX	`Error ce95 cea2 [bc] ca da`
CONSOLE	`*** Device Adapter load resistor pack is missing`
CAUSE	the resistor pack must be in place for the HP-IB card to operate at the maximum speed.
HEX	`Error ce95 cea3 [bc] ca da`
CONSOLE	`*** On [BC bc,] CA ca, Device Adapter da failed selftest`
CAUSE	The DA Sense Register PST bit is not set, indicating that the DA self-test failed last time it was run.
HEX	`Error ce95 cea4 [bc] ca da`
CONSOLE	`*** On [BC bc,] CA ca, Device Adapter da is not 'Ready For Command'`
CAUSE	The DA Sense Register RFC bit is not set, meaning that the DA is not able to accept another command. It should be ready at this time.
HEX	`Error ce95 cea5 [bc] ca da`
CONSOLE	`*** On [BC bc,] CA ca, Device Adapter da timeout error`
CAUSE	A DMA transfer initiated for this DA failed to complete within a reasonable time period.
HEX	`Error ce95 cea6 [bc] ca da stat`
CONSOLE	`*** On [BC bc,] CA ca, Device Adapter da status error:  Status =` *stat*
CAUSE	The Device Adapter status does not match the expected value, after a DMA transfer was performed.

Table 5-23. IOMAP Error Codes (DA Error CE95) (continued)

HEX	`Error ce95 cea7 [bc] ca n stat`
CONSOLE	`*** On [BC bc,] CA ca, subchannel n not ready: Status =` *stat*
CAUSE	On the CA, this subchannel's status register subc_ready bit did not come ready within a reasonable period of time (currently one second). This prevented a DMA transfer from being started by software.
HEX	`Error ce95 cea8 [bc] ca da stat`
CONSOLE	`*** On [BC bc,] CA ca, Subchannel da ARQ timeout: Status =` *stat*
CAUSE	The one second timeout expired before ARQ was seen in the DA sense register.
HEX	`Error ce95 cea9 [bc] ca da stat`
CONSOLE	`*** On [BC bc,] CA ca, Subchannel da was not destroyed: Status =` *stat*
CAUSE	After ARQ was seen in the DA sense register, the attempt to Destroy Sub Channel on the Device Adapter by Direct I/O failed (meaning that no SubChannel Destroyed message was received back from the DA).

Table 5-24. IOMAP Error Codes (Other Execution Error CE96)

HEX	`Error ce96 cea0 stat`
CONSOLE	`*** Error in call to Processor Dependent Code (PDC): Status =` *stat*
CAUSE	A call to a PDC routine returned a bad status. It is possible that printing this line may not be successful, since output to the console requires repeated PDC calls.
HEX	`Error ce96 cea1`
CONSOLE	`*** Fatal error--internal buffer(s) overwritten`
CAUSE	`IOMAP` has suffered an internal data management problem. If it is not a bad copy of `IOMAP`, then there may be a software bug or hardware problem.
HEX	`Error ce96 cea2 n`
CONSOLE	`*** Maximum error count (n) exceeded; program will abort.`
CAUSE	The maximum error count specified n has been exceeded. Errors associated with the current loop will be displayed and then the program will return to ISL.
HEX	`Error ce96 cea7`
CONSOLE	`*** Component failed selftest`
CAUSE	The current component (last one displayed) failed selftest.
HEX	`Error ce96 cea8`
CONSOLE	`*** Component failed loopback test`
CAUSE	The current component (last one displayed) failed loopback.

MPROC (Multiprocessor Diagnostic)

The MPROC diagnostic is designed as a tool for quickly testing and diagnosing the functionality of Series 980/Model 870S processor cards.

Note

After entering the command, the MPROC> prompt appears:

- Type `help` at the MPROC> prompt to list all commands available.
- Type `info` at the MPROC> prompt for information unique to the diagnostic.

Minimum Configuration

The minimum configuration required for running the MPROC diagnostic is:

- An HP 3000 Series 980/200, HP 9000 Model 870S/200
- A system console
- A boot disk or tape
- MPE-XL 3.0 (or later), or HP-UX 8.0 (or later) operating system software.

Unique Commands

Table 5-25. Unique MPROC Diagnostic Commands

Command	Description
CREG	Displays the contents of the control registers as of the end of the previously executed test section.
FREG	Displays the contents of the floating point control registers as of the end of the previously executed test section.
PROCn	Selects number of processors to run diagnostic.
PSTAT	Displays the chip revision number and cache line lockout status.

Test Sequence

At the ISL prompt, enter the diagnostic name (MPROC). The system displays:

```
ISL> mproc
  :
text
  :
MPROC>
```

Type `resume` after the MPROC> prompt to begin the diagnostic.

UNIPROC (Single-Processor Diagnostic)

The UNIPROC diagnostic is designed as a tool for quickly testing and diagnosing the functionality of the Series 980/Model 870S processor card.

Note

After entering the command, the `UNIPROC>` prompt appears:

- Type `help` at the `UNIPROC>` prompt to list all commands available.
- Type `info` at the `UNIPROC>` prompt for information unique to the diagnostic.

Minimum Configuration

The minimum configuration required for running the UNIPROC diagnostic is:

- An HP 3000 Series 980/100 or HP 9000 Model 870S/100 system
- A system console
- A boot disk or tape
- MPE-XL 2.2 (or later), or HP-UX 7.06 (or later) operating system software

Unique Commands

Table 5-26. Unique UNIPROC Diagnostic Commands

Command	Description
CREG	Displays the contents of the control registers as of the end of the previously executed test section.
FREG	Displays the contents of the floating point control registers as of the end of the previously executed test section.
PROCn	Selects number of processors to run diagnostic.
PSTAT	Displays the chip revision number and cache line lockout status.

Test Sections

The UNIPROC diagnostic consists of 122 test sections (refer to Table 5-27).

Table 5-27. UNIPROC Processor Diagnostic Test Sets

Sections	Name of Test
1/6	CPU Data Path
7/10	SPI Data Path
11/17	ICMUX Data Path
18/21	ITLB Data Path
22/29	DCMUX Data Path
30/33	DTLB Data Path
34/38	CPU On-Chip TLB
39/89	CPU Instruction
90/98	CPU Extended
99/122	Floating Point

Test Sequence

At the ISL prompt, enter the diagnostic name (UNIPROC). The system displays:

```
ISL> uniproc
   :
text
   :
UNIPROC>
```

Type `resume` after the `UNIPROC>` prompt to begin the diagnostic. The diagnostic proceeds according to the default parameters listed in Table 5-28.

Table 5-28. UNIPROC Processor Diagnostic Default Parameters

Parameter	State
test sections	all sections
activity indicators	enabled
error and isolation messages	enabled
pause after isolation message	enabled
looping or hardcopy	no
number of processors tested	all

Note that typing `run uniproc` will also work; `run` will always start from the beginning of the tests selected.

The UNIPROC diagnostic will automatically test all processors if there is more than one processor installed. If you want to test only one processor, use the `proc n` command to select which one to test. Typing `resume` will then cause that processor to run the diagnostic.

Booting from the Support Tape

The support tape (HP part number 92452-13503 on 1600 BPI tapes and 92452-13303 on cartridge tapes) provides the capability of diagnosing problems when the operating system cannot be booted from system disk. You must boot from the support tape to implement the complete set of ISL-based Offline Diagnostics and Utilities described earlier in this chapter.

For information on use of the support tape, refer to the *Support Tape Users Manual* (HP part number 92453-90010).

The minimum hardware configuration to use the support tape is:

- 16 MB memory
- Console
- Magtape drive or cartridge tape
- Input/output paths to the console and tape drive

Booting Up

This section describes how to boot from the support tape using the `support` command, or a specialized invocation of the `hpux` command.

Note Once you have booted up, you can get a full explanation of the syntax of these commands by entering the Support Tape Help Menu and requesting a detailed description of each command. Refer to "Support Tape Main/Utilities Menus" at the end of this chapter.

Using the Support Command to Boot

The `support` command is an ISL-based command that automatically builds the correct string to pass to `hpuxboot`, and invokes `hpuxboot` accordingly. If you do not need to modify the kernel I/O configuration, simply type the word `support`. If you do need to modify the kernel I/O configuration, use the `-a` option (refer to "Changing the Kernel I/O Configuration").

For example, to boot the support tape and configure the kernel with a disc0 driver at address 4.2.3, enter the following command at the ISL prompt:

```
ISL> support -a disc0(4.2.3;0x0)
```

The correct `hpux` boot command will be built for you, displayed on the console, and invoked.

Note The `support` command is not available on support tapes prior to the 3.0 release.

Open Reel Tape

If the system has halted and cannot be booted from the system disk, boot up from the support tape, as follows:

1. Select a tape drive to boot from and determine the drive's physical address. (The factory setting for the alternate boot path is 4.2.3 (825/935) or 8.2.3 (845).)
2. Load the support tape on the tape drive and put the drive on line.
3. Press the system reset button and wait about 30 seconds.
4. When prompted by PDC, type the appropriate boot path. For this example, the boot path is 4.2.3.
5. Obtain the `ISL>` prompt. The commands or procedures required to accomplish this may differ for individual processors.
6. Now, the `ISL>` prompt is displayed on the console. To boot up the Support Tape, simply type

   ```
   support
   ```

   The **support** command generates and executes the **hpux** command. In this case, the **hpux** command is in this format:

   ```
   hpux tape1(physical address of tape drive;0xa0000,1)
   ```

   For example, if the physical address of the drive you loaded the support tape onto is 4.2.3, the hpux command would be:

   ```
   hpux tape1(4.2.3;0xa0000,1)
   ```

   The address field of this command is the only part that may vary.

   You could enter the **hpux** command to boot the Support Tape instead of using the **support** command. The **hpux** command must be used on systems with shared disk/cartridge_tape controllers. In all other cases, the **support** command does the job, and is much easier to use.

   Note that the **-a** option can be used with the support command, as described later in this manual.
7. After you enter the **support** or the **hpux** command, the system will take a few minutes to load the appropriate files from the support tape and display the I/O tree, followed by the support tape banner.

Cartridge Tape

The boot procedure for cartridge tapes is similar to that for open reel tapes, but differs in the following ways:

- You must remember to distinguish between CTDs that share a controller with a disk drive and those that do not. The `support` command cannot be used on systems with a shared controller. If the controller is not shared, the support command can be used to boot the Cartridge Support Kernel the same way as it is used to boot an Open Reel Support Tape.

  Assuming the device is located at address 8.0.3, step 4 of the boot procedure would be:

  - For shared controller devices, enter 8.0.3.1 as the boot path. Note that this difference in syntax does not apply to the `hpux` command.
  - For devices that DO NOT share a controller, enter 8.0.3 as the boot path.

- In step 6, replace `tape1` with `disc0` for CIO systems, and delete the `,1` inside the parentheses. The minor number, inside the parentheses following the `;`, depends on whether or not the controller is shared. The complete `hpux` command for unshared controllers is:

  ```
  hpux disc0(8.0.3;0x400001)hp-ux
  ```

  The complete `hpux` command for shared controllers is:

  ```
  hpux disc0(8.0.3;0x400021)hp-ux
  ```

  Note that the only difference is the second to the last digit of the minor number.

  The suffix `hp-ux` indicates that the Support Kernel resides inside a file system, in a file named `hp-ux`.

  Generally, each step will take longer to complete than it would on an open reel tape.

Changing the Kernel I/O Configuration

The Support Kernel is configured to access specific devices at specific physical addresses. For example, it expects to see a tape drive at physical address 8.2.3. The configuration expected by the kernel will not necessarily correspond to the physical configuration of the system being booted, such as a system with a disk instead of a tape drive at address 8.2.3.

The boot and console devices are automatically configured into the kernel during the boot process. However, there may be other peripherals at addresses that are unknown to the kernel. The `-a` option of the `hpux` command allows you to change the kernel's I/O configuration to eliminate such discrepancies.

The `-a` option of the `hpux` command allows you to specify your particular I/O configuration or additional devices to be configured into the kernel. For example:

```
support -a tape1(8.2.5;0xa0000) -a disc2(8.6.0;0x000002)
```

This command does the same thing as the example used in step 6 of the procedure for booting up from an open reel tape, but in addition, forces the kernel to add an HP-FL disk at address 8.2.5 to its I/O configuration. As a result of this run-time reconfiguration of the I/O tree, the correspondence between LUs and device filenames will differ from the LU mapping of the customer's kernel.

Note

In order to determine the correspondence between LUs and device filenames, use the `lssf` command.

The `-a` option is a good method for forcing a match between the physical I/O configuration and the kernel's I/O configuration, but other methods are available. For instance, in some cases it may be easier to change the HP-IB address of the physical path.

Logging In

After successfully booting, the tape will be positioned at the beginning of Section 1. A banner will appear on the system console. After you press (Return), some initialization messages will appear, followed by the Bourne shell prompt, `#`. You can enter the menu system from the Bourne shell by typing `menu`.

For support tapes prior to the 3.0 release, you should login as `root` and enter the password.

Bringing the System Down

You reboot the system by pressing the reset button.

Caution

You must not press the reset button while any disk-based file systems are mounted. Make sure that you unmount all disk-based file systems before you reboot. If using the HP-UX recovery system on an MPE/XL-based system, there are no mountable file systems, and the system may be reset at any time.

Support Tape Main/Utilities Menus

The support tape Main Menu is displayed on the console when you boot from the support tape. To make a selection from the menu, enter one of the single characters listed in the menu (s, l, d, h, u, or x), followed by a carriage return. For example, to select Help, press h, then (Return).

The support tape main menu is:

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

  This menu is for listing and loading the tools contained on the support tape.
  Once a tool is loaded, it may be run from the shell.
  For more information, type "h".

    Select one of the above:
```

The support tape utilities menu is:

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

Select one of the above:
```

Note

HP-UX Releases prior to 3.0:

The tape unit number is determined by the physical address of the tape drive. The system tape drive for MPE-XL systems defaults to unit 0; for HP-UX systems, the system tape drive defaults to unit 3. For releases prior to 3.0 on HP-UX systems, the tape unit number must be changed by selecting u (Utilities) in the support tape main menu.

The support tape utilities menu for releases prior to 3.0 is:

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

Select one of the above:
```

Select c to change the tape unit number to conform to the physical address of the tape drive.

Loading the Diagnostic User Interface

To load the Diagnostic User Interface (DUI), select the option, `d. On-line diagnostics`, from the support tape main menu by typing `d` (Return). The system will display the Online Diagnostic Menu. This menu provides a special interface for Section 6 (`/usr/diag`) of the support tape. When you make a selection, the selected diagnostic, the DUI, and the associated files are automatically loaded. Using this menu, you can load only one diagnostic at a time. If you attempt to load a second diagnostic, the first one will be removed.

6

Adjustments

There are no adjustments for the HP 3000 Series 950 Family or HP 9000 Model 850S Family computer systems.

7

Peripherals

This section lists the peripherals supported by PA-RISC systems running under HP-UX and MPE-XL operating systems. The supported peripherals are disk drives, tape drives, printers, terminals, system consoles, graphics devices, and data communication devices.

Note

Unless otherwise noted, a supported peripheral is supported by all series of a particular PA-RISC system. Exceptions are noted in parentheses next to the peripheral model number. For example, a note such as (825/835) indicates that the peripheral in question is supported only on those two models.

Note

The following terms and acronyms for interface standards are used in this chapter:

HP-IB	Hewlett-Packard Interface Bus
HP-FL	Hewlett-Packard Fiber-Optic Link
HP-CS	Hewlett-Packard Common SCSI (Small Computer Systems Interface)
RS-232	Standard for Serial Communication Interface

Disk Drives

Table 7-1. Supported Disk Drives

Disk Drive	HP-UX	MPE-XL	Description	Interface
7907A	x		20MB Fixed or Removable Media Disk	HP-IB
7914CT	x		132MB Winchester w/ 9144A 1/4in Cartridge Tape	HP-IB
7914ST	x		132MB Winchester w/ 7974A 1/2in Tape Unit	HP-IB
7914R/P	x		132MB Winchester w/ 9140 1/4in Cartridge Tape	HP-IB
7933H/XP*	H only	x	404MB Fixed Disk	HP-IB
7935H/XP*	H only	x	404MB Removable Media Disk	HP-IB
7936A*	x	x	307MB Disk, 8in	HP-IB
7936FL*	x	x	307MB Disk with HP-FL	HP-FL
7936H/XP*	H only	x	307MB Disk	HP-IB
7937A*	x	x	571MB Disk, 8in	HP-IB
7937H/XP*	H only	x	571MB Disk	HP-IB
7937FL*	x	x	571MB Disk with HP-FL	HP-FL
7957A	x	x	81MB Disk, 5.25in OEM	HP-IB
7957B	x	x	81MB Disk, 5.25in	HP-IB
7958A	x		130MB Disk, 5.25in OEM	HP-IB
7958B	x	x	152MB Disk, 5.25in	HP-IB
7959B	x	x	303MB Disk, 5.25in	HP-IB
7961B	x		81MB Disk, 5.25in Wyle	HP-IB
7962B	x	x	152MB Disk, 5.25in Wyle	HP-IB
7963B	x	x	303MB Disk, 5.25in Wyle	HP-IB
9122D	x		Microfloppy Dual Disk, 3 1/2in	HP-IB
9122S	x		Microfloppy Single Disk 3 1/2in	HP-IB
9127A	x		Floppy Single Disk, 5 1/4in	HP-IB
9153C opt 040	x		40MB Disk with Floppy	HP-IB
97962B	x		2x152MB Add-on Disk Option (total 304MB)	HP-IB

Table 7-1. Supported Disk Drives (continued)

Disk Drive	HP-UX	MPE-XL	Description	Interface
97963B	x		3x303MB Add-on Disk Option (total 909MB)	HP-IB
19514A	x		Eagle Drive Peripheral Cabinet	HP-FL
C1700A opt 1AB**	x	x	20.8GB Optical Autochanger in desk-side cabinet	HP-CS
C1700A opt 1AC**	x	x	20.8GB Optical Autochanger in 1.0 meter cabinet w/19 inch rack	HP-CS
C1701A***	x		650MB Stand-Alone Optical Disk Drive	HP-CS
C2200A	x	x	335MB Disk	HP-IB
C2201A	x	x	670MB Disk	HP-FL
C2202A	x	x	670MB HP-IB Disk with cache	HP-IB
C2203A	x	x	670MB Disk	HP-IB
C2204A	x	x	1.34GB Disk	HP-FL
C2212A***	x		332MB Disk	HP-CS
C2213A***	x		664MB Disk	HP-CS

* Supported as the system disk drive.
** Supported on HP-UX Release 8.0 and MPE-XL Release 3.0.
*** Supported on HP-UX Release 8.0.

Table Legend:

x = Supported peripheral.

Blank = Non-supported peripheral.

Tape Units

Table 7-2. Supported Tape Units

Tape Unit	HP-UX	MPE-XL	Description	Interface
7974A	x	x	1/2in Start/Stop/Streaming; 1600cpi (PE), 800cpi (NRZI) Tape Unit	HP-IB
7978A/B		x	6250/1600cpi Tape Unit	HP-IB
7978B	x		1/2in Start/Stop/Streaming; 6250cpi (GCR), 1600cpi (PE) Tape Unit	HP-IB
7979A	x	x	1/2in Streaming; 1600cpi (PE) Tape Unit	HP-IB
7980A	x	x	1/2in Streaming; 6250cpi (GCR), 1600cpi (PE) Tape Unit	HP-IB
7980XC	x	x	1/2in 1600/6250 Tape Unit with data compression	HP-IB
9144A	x		67MB 1/4in Cartridge Tape Unit	HP-IB
9145A	x		134MB 1/4in Cartridge Tape Unit	HP-IB
35401A	x		537MB; Autochanger 1/4in Cartridge Tape Unit	HP-IB
C1502A*	x		1.3GB DDS Cartridge Tape Unit	HP-CS
C1511A	x	x	1.3GB DDS Cartridge Tape Unit	HP-IB

* Supported on HP-UX Release 8.0.

Table Legend:

x = Supported peripheral.

Blank = Non-supported peripheral.

Printers

Table 7-3. Supported Printers

Printer	HP-UX	MPE-XL	Description	Interface
2225D	x		ThinkJet	RS-232
2227A/B	x		QuietJet Plus	RS-232
2228A/B	x		QuietJet	RS-232
2235A/B/C/D	x	x	480cps Draft, 240cps Letter Quality	RS-232, HP-IB
2562C	x	x	300/420 lpm Line Impact Printer	HP-IB
2563A	x		300 lpm	HP-IB
2563A/B opt 049	x	x	300 lpm	RS-232
2563A/B opt 050		x	300 lpm	RS-232
2563A/B opt 393		x	300 lpm Dot Matrix	HP-IB
2564B	x		600 lpm Dot Matrix Line Printer	HP-IB
2564B opt 393		x	600 lpm Dot Matrix	HP-IB
2564B opt 050		x	600 lpm Dot Matrix	RS-232
2564A/B opt 049	x	B only	600 lpm Dot Matrix Line Printer	RS-232
2565A	x		600 lpm Dot Matrix Line Printer	HP-IB
2565A opt 393		x	900 lpm Dot Matrix	HP-IB
2565A/B opt 049	x		600 lpm Dot Matrix Line Printer	RS-232
2566B	x		900 lpm Dot Matrix Line Printer	HP-IB
2566A/B opt 049	x		900 lpm Dot Matrix Line Printer	RS-232
2566A/B opt 393		x	600 lpm Dot Matrix Line Printer	HP-IB
2567B	x		1200 lpm Dot Matrix Line Printer	HP-IB
2567B opt 393		x	1200 lpm Dot Matrix Line Printer	HP-IB
2567A/B opt 049	x		1200 lpm Dot Matrix Line Printer	RS-232
2680A opt 393		x	Intelligent Page Printer	HP-IB

Note

The HP2563C, 2564C, 2566C, and 2567C printers are supported on MPE-XL systems, but must be configured as HP256xB printers during the interim between the introduction of the 256xC printers and the 3.0 Release of the MPE-XL operating system.

Table 7-3. Supported Printers (continued)

Printer	HP-UX	MPE-XL	Description	Interface
2684A	x	x	LaserJet 2000, 20ppm	RS-232
2686A/D		x	8ppm LaserJet	RS-232
2686A	x	x	LaserJet, 8ppm	RS-232
2686A+	x		LaserJet Plus	RS-232
2688A opt 393		x	Page Printer	HP-IB
293x		x	Dot Matrix	RS-232
2932A	x	x	Dot-Matrix, 200cps	RS-232, HP-IB
2934A	x	x	Dot-Matrix, 200cps Near Letter Quality	RS-232, HP-IB
33440A	x	x	Low-Cost Laser Jet	RS-232
33447A*	x		LaserJet Printer	RS-232, HP-IB
33449A*	x		LaserJet Printer	RS-232
33471A*	x		LaserJet Printer	RS-232
3630A (C1602)	x		PaintJet, 180dpi Color	RS-232, HP-IB
41063A	x		Asian Printer, Dot-Matrix	RS-232, HP-IB via NLIO
Vodoo	x		Inkjet Serial Printer	RS-232
C1200A	x	x	Asian System Printer	RS-232
C1202A		x	220/330 CPS Character Printer	HP-IB

* Supported on HP-UX 8.0.

Table Legend:

x = Supported peripheral.

Blank = Non-supported peripheral.

Terminals

Table 7-4. Supported Terminals

Terminal (Product Number)	HP-UX	MPE-XL	Description	Interface
700/22 (C1004)	x		VT 220/100/52 Compatible	RS-232
700/32 (C1017)	x		VT 320/220/100/52 Compatible	RS-232
700/41 (C1003)	x		Wyse 30, Televideo 905, Hazeltine 1500, etc. Compatible	RS-232
700/43 (C1006)	x		Wyse Wy-50, Televideo 950/ADM, etc. Compatible	RS-232
700/44 (C1007)	x		PC Terminal, VT 220/100/52 Compatible	RS-232
700/92 (C1001)	x	x	HP 2392A Compatible	RS-232
700/94 (C1002)	x	x	HP 2394A Compatible; Input Forms, 16 Page Display Memory	RS-232
2392A	x	x	Alphanumeric, Block Mode, ANSI Compatible	RS-232
2393A	x	x	Monochrome Vector Graphics	RS-232
2394A	x		Data Entry, Local Forms	RS-232
2397A	x	x	Color Raster Display w/Vector Graphics	RS-232
Emulators	x	x	HP 150, 110+, 300, IPC, Vectra	RS-232
45945	x		Asian Vectra PC w/Japanese, Korean, or Chinese Language Support	RS-232
3081A	x		Industrial Data Entry	RS-232
3082A	x		Industrial Terminal	RS-232
9666A	x		Industrial 2627 Workcell Minimal	RS-232
HP150B/C	x		Touchscreen PC	RS-232
C2300A	x		LAN Terminal	LAN

Table Legend:

x = Supported peripheral.

Blank = Non-supported peripheral.

System Consoles

Table 7-5. Supported System Consoles

System Console	HP-UX	MPE-XL	Description	Interface
700/92 (C1001)	x	x	Alphanumeric, Block Mode, ANSI Compatible	RS-232
700/94 (C1002)	x	x	Alphanumeric, Block Mode, ANSI Compatible	RS-232
98720A (825/835)	x		High Resolution 3D Color Graphics, wo/ AP function	LGB
98730A (825/835)**	x		High Resolution 3D Color Graphics, wo/ AP function	LGB
A1020A (825/835)	x		98550A High Resolution Color Display	LGB
2392A opt 305		x	Alphanumeric, Block Mode, ANSI Compatible	RS-232
2392A	x	x	Alphanumeric, Block Mode, ANSI Compatible	RS-232
98556A (825/835)	x		2D Graphics w/ Accelerator/825CH	LGB
2225D (850/835)	x		System Console Printer	RS-232

** 98730A System Console supported with A1017A and A1047A.

Table Legend:

x = Supported peripheral.

Blank = Non-supported peripheral.

Graphics Devices

Table 7-6. Supported Graphics Devices

Device	HP-UX	MPE-XL	Description	Interface
2393A	x		Monochrome, Vector Graphics Terminal	RS-232
2397A	x		Color Raster Display, w/Vector Graphics	RS-232
7440A	x		Color Plotter, 8 Pen, A4/A Size	RS-232, HP-IB
7480A opt 001	x		Color Plotter, 8 Pen, A4/A Size	RS-232
7475A	x		Color Plotter, 6 Pen, A3/B Size	RS-232, HP-IB
7550A	x		Color Plotter, 8 Pen, A4/A and A3/B Size, Auto Cut Sheet Feeder	RS-232, HP-IB
7570A	x		8 Pin Plotter	RS-232, HP-IB
7586B	x		Drafting Plotter, 8 Pen, A - E Size, Roll Feeder	RS-232, HP-IB
7595A	x		Draftmaster I Plotter, 8 Pen, A4/A - A0/E Size	RS-232/422, HP-IB
7596A	x		Draftmaster II Plotter, A4 - A0 Rollfeed	RS-232/422, HP-IB
C1600A	x		HP7600 Series Model 240D A1/D size Plotter	RS-232, HP-IB
C1601A	x		HP7600 Series Model 240E A0/E size Plotter	RS-232, HP-IB
C1620A	x		Color Electrostatic Plotter	RS-232, HP-IB
C1625A	x		Mono Electrostatic Plotter	RS-232, HP-IB
98720A (825/835/840)	x		High Resolution 3D Color Graphics Processor	LGB
98730A (825/835/840)	x		High Resolution 3D Color Graphics	LGB
98556A	x		2D Graphics w/ Accelerator/825CH	LGB
A1020A	x		98550A High Resolution Color Display	LGB

Table Legend:

x = Supported peripheral.

Blank = Non-supported peripheral.

Data Communication Devices

Table 7-7. Supported Data Communication Devices

Device	HP-UX	MPE-XL	Description	Interface
2334A	x	x	Multimux, 4 Port Modem Control Interface	RS-232
2335	x	x	Multimux, 4 Port Modem Control Interface	RS-232
3400	x		Racal-Vadic Modem USR Courier Modem 2400	RS-232
37212A	x		300/1200 Baud, 212/V22, Auto Dial/Answer	RS-232
37212B	x	x	212B, Auto Dial, Error Correcting	RS-232
92205A	x		Hayes Smart Modem	RS-232
92205B	x		Hayes 1200/2400 Baud Modem	RS-232
98190A	x		16 Channel MUX Card	RS-232
MPS1222	x		Racal-Milgo Dial-in Modem	RS-232
Robotics	x		Courier 2400 Dialer	RS-232
Bell212A	x		Dial-in Modem	RS-232
Bell103J	x		Dial-up, Auto-answer	RS-232
Bell202T	x		4-Wire Leased Line	RS-232
HP35016A	x	x	Used for Remote Support Compatible	RS-232
HP35141A	x	x	With Bell 103, 212, and Vadic VA3400 Auto-answer	RS-232

Table Legend:

x = Supported peripheral.

Blank = Non-supported peripheral.

8

Replaceable Parts

Introduction

This chapter provides a replaceable parts listing of Field Replaceable Units (FRUs), cables, and other parts included in the HP 3000 Series 950 Family and and HP 9000 Model 850S Family Computer Systems. System diagrams are also included to illustrate the locations of FRUs and other replaceable parts.

Parts are listed as either Exchange Parts (Table 8-1), or Non-Exchange Parts (Table 8-2). Figure 8-1 illustrates the front view of the Processor and Power Bays, Figure 8-2 illustrates the rear view, Figure 8-3 all the panels for the Processor and Power Bays, and Figure 8-4, Figure 8-5, and Figure 8-6 illustrate system cables. Each replaceable part that is illustrated in these diagrams is labeled with a letter or a number callout. Letter callouts correspond to items listed in Table 8-1, and number callouts to items in Table 8-2.

Ordering Information

Order replaceable parts or service kits, as listed in Table 8-1 and Table 8-2, and forward the order to the nearest Hewlett-Packard Sales and Support office in your area. Include the following information when ordering any part or kit:

- Complete model number and serial number of the computer system.
- Hewlett-Packard part number for each part or kit.
- Complete description of each part.

Exchange Program

A defective Printed Circuit Assembly (PCA) or power module assembly can be exchanged for an operating assembly. For information about cost and other details regarding the exchange program, contact the nearest Hewlett-Packard Sales and Support office in your area.

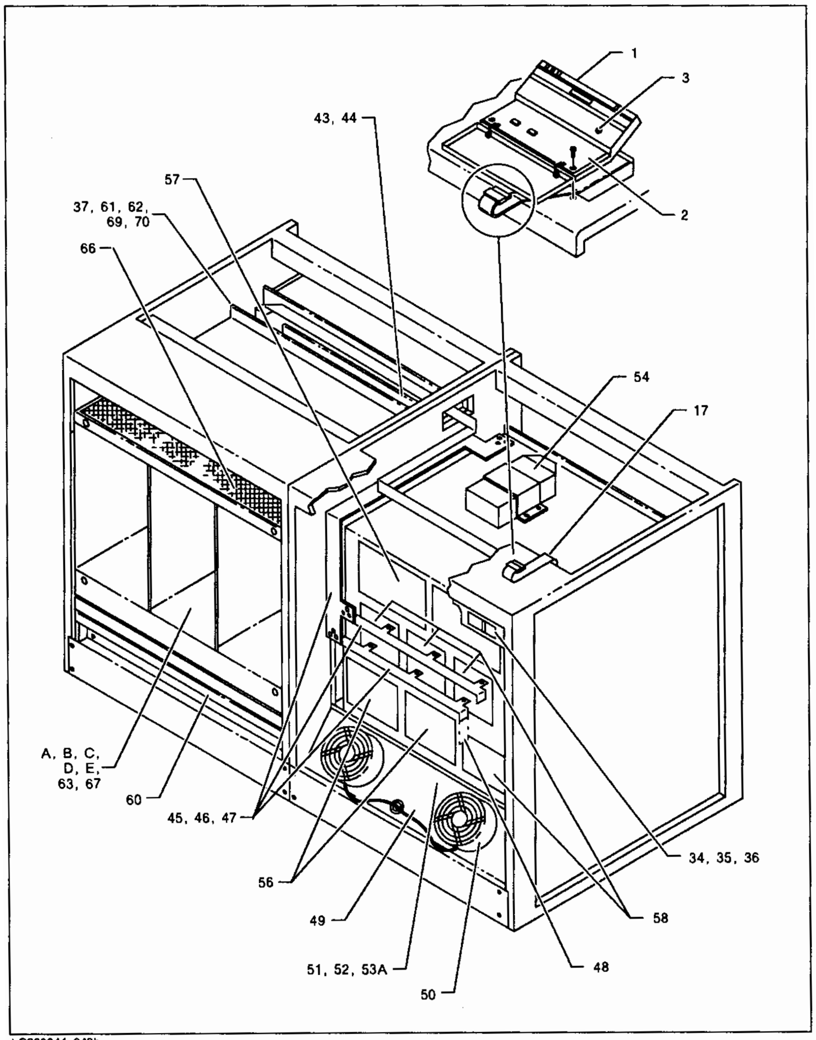

Figure 8-1. Processor Bay and Power Bay (Front View)

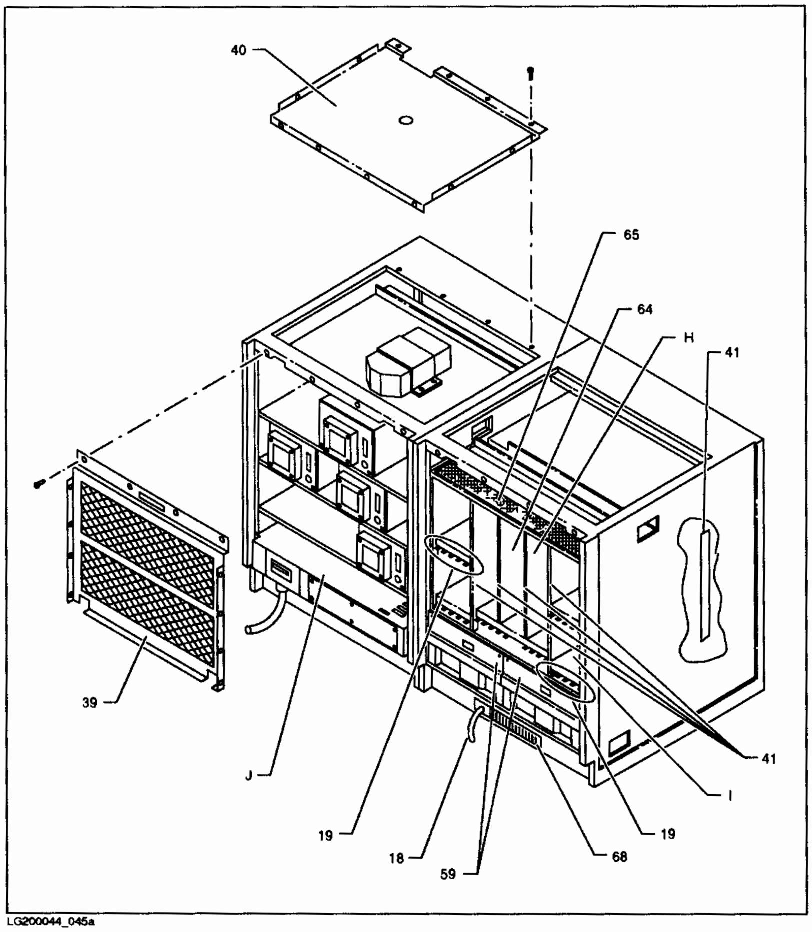

Figure 8-2. Processor Bay and Power Bay (Rear View)

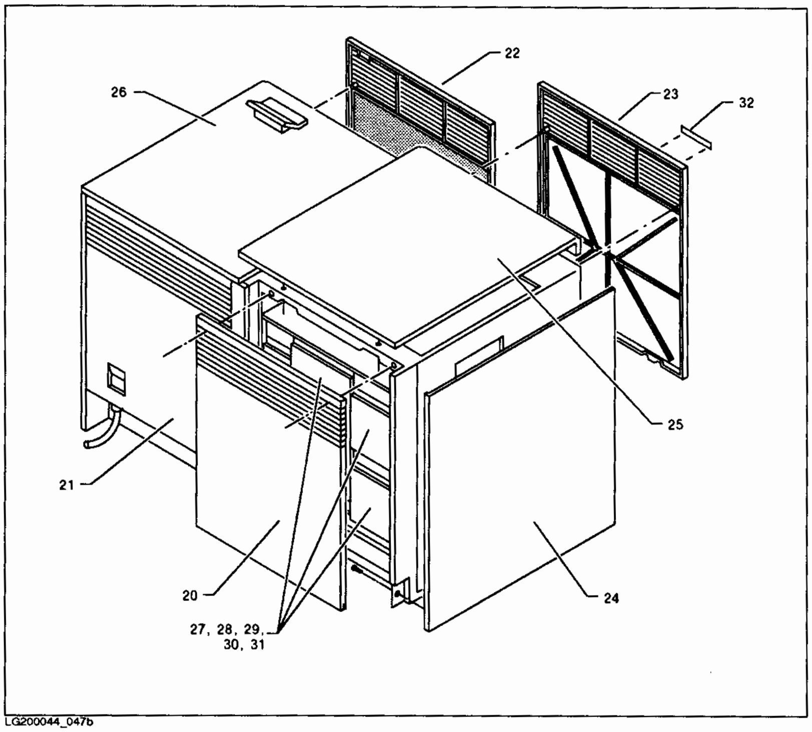

Figure 8-3. Processor Bay and Power Bay Panels

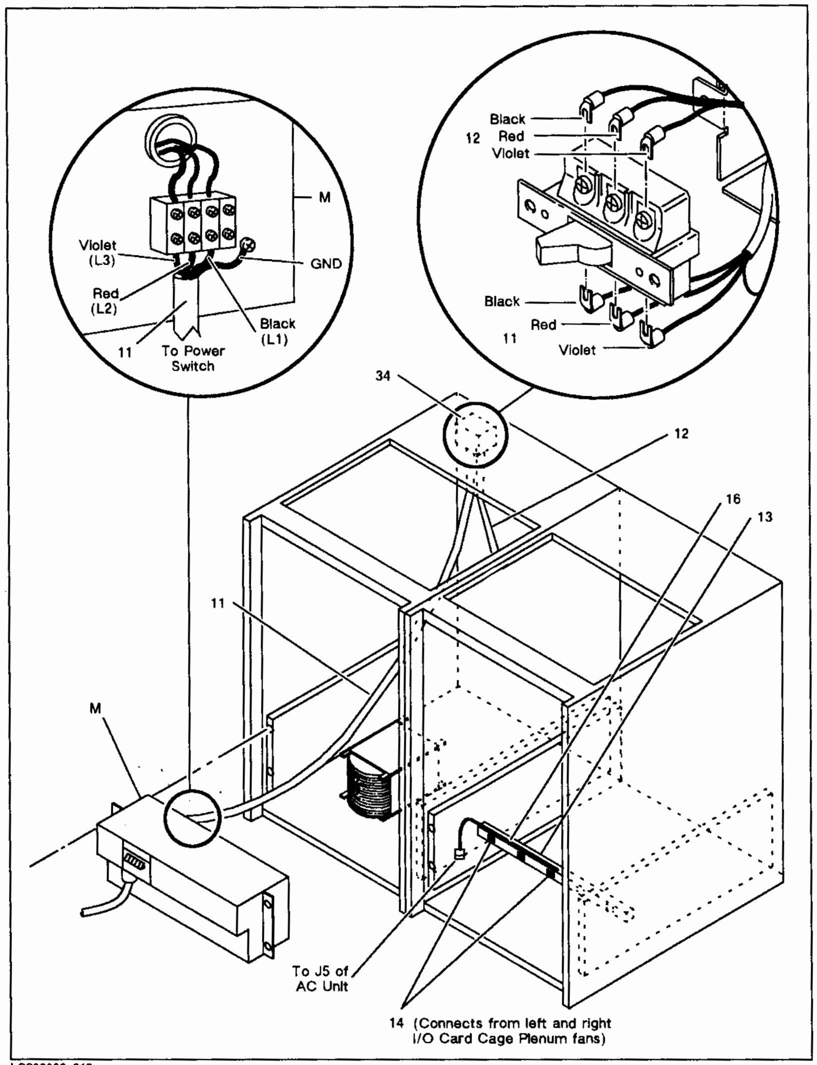

Figure 8-4. System Cables, Part 1 of 3

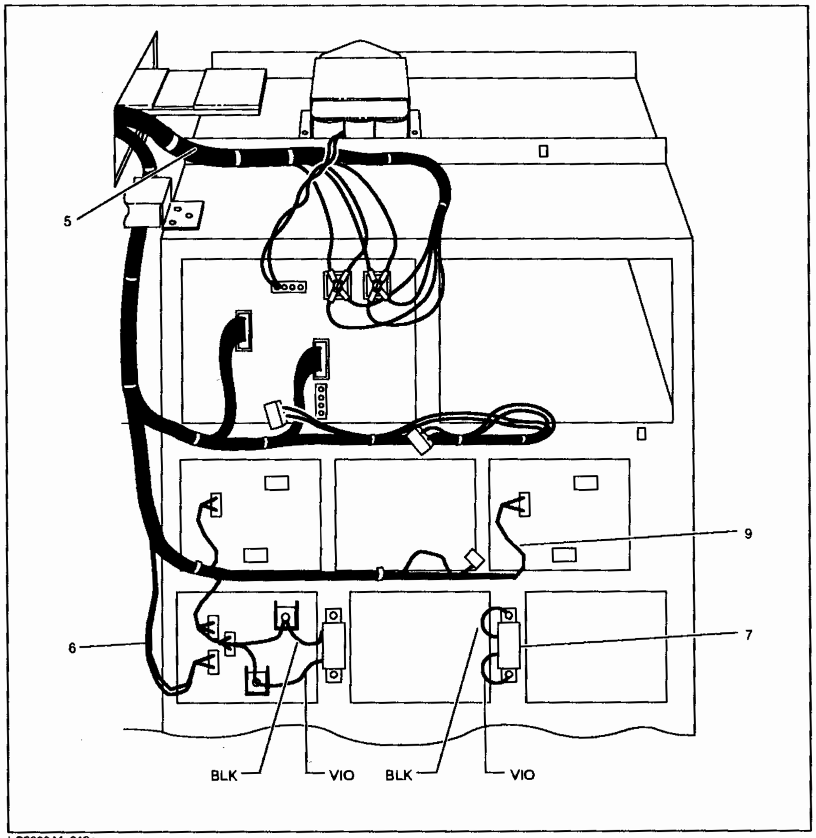

Figure 8-5. System Cables, Part 2 of 3

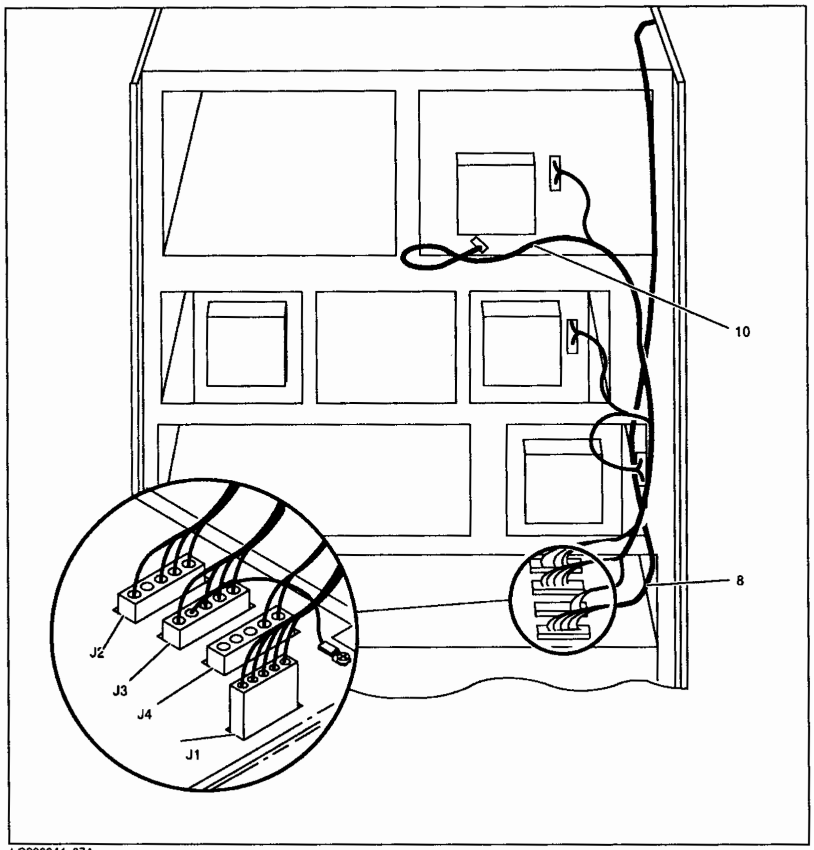

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Figure 8-6. System Cables, Part 3 of 3

Exchange Parts List

Table 8-1. Exchange Parts List

Item	HP Part Number (New)	HP Part Number (Exchange)	Description
			PCAs
A	30190-60001	30190-69001	PCA, Processor (950/850S)
	A1108-60001	A1108-69001	PCA, Processor (850S, faster FP)
	A1112-60001	A1112-69001	PCA, Processor (955/855S)
	A1130-60004	A1130-69001	PCA, Processor (960/860S)
	A1134-60001	A1134-69001	PCA, Processor (980/870S)
B	30190-60002	30190-69047	PCA, PDH (950/850S) See Note 1.
	A1112-60003	A1112-69004	PCA, PDH (955/960/855S/860S) See Note 1.
C	30190-60007	30190-69051	PCA, PSM
D	30190-60008	30190-69008	PCA, Clock
E	30190-60044	30190-69048	PCA, 16MB Memory Array
	A1134-60004	A1134-69004	PCA, 64MB Memory Array
F	30190-60006	30190-69006	PCA, Memory Controller (950/955/960/850S/855S/860S)
	A1134-60003	A1134-69003	PCA, Memory Controller (980/870S)
G	30190-60030	30190-69030	PCA, Bus Converter (BC)
H	A1134-60013	30191-69005	PCA, CIB Adapter
I	5061-2537	5061-2541	PCA, Access Port
J	0950-1946	0950-0038	AC Power Unit. See Note 2.

Table 8-1. Exchange Parts List (continued)

Item	HP Part Number (New)	HP Part Number (Exchange)	Description
			I/O Device Adapters and Cables
Not	27110-60301	5062-3303	HPIB Device Adapter (HP-UX)
Shown	27113-60301	5062-3303	HPIB Device Adapter (MPE-XL)
	27113-63001	N/A	Cable, HPIB Device Adapter
	5062-3313	5062-3331	LANIC Device Adapter (HP-UX)
	27125-60201	27125-69201	LANIC Device Adapter (MPE-XL)
	27125-63009	N/A	Cable, LANIC Device Adapter
	28641-60004	N/A	Thin MAU, LANIC
	30241-60102	N/A	Thick MAU, LANIC
	27140-60001	N/A	MUX (6 port) Device Adapter
	27114-60001	27114-69002	AFI Device Adapter
	27114-63001	N/A	Cable, AFI Device Adapter
	30263-60001	30263-69001	PSI Device Adapter
	30263-63009	N/A	Cable, PSI Device Adapter
	27111-60001	5062-3308	HP-FL Device Adapter (HP-UX)
	27115-60000	5062-3308	HP-FL Device Adapter (MPE-XL)

Note

1. The Series 980/Model 870S systems can operate using either PDH card listed above. The two PDH boards are electrically identical, but the Processor Dependent Code (PDC) has been updated and moved to the processor board on Series 980/Model 870S systems.
2. Transformers and AC power units, when used together in the same system, should be manufactured by a common vendor; do not intermix ITT components with ACDC components. Power modules may be mixed unless they are used in parallel, such as the +5V modules.
3. All Exchange Assemblies include ROMs. ROMs are usually only replaced as part of an update procedure.
4. The ACDC upgrade kit is shipped with one AC unit and two transformers (weight=270 lbs.).

Non-Exchange Parts List

Table 8-2. Non-Exchange Parts

Item	HP Part Number	Description
		Control Panel
1	30190-60016	Assy., Control Panel
2	30190-60009	PCA, Control Panel
3	3131-0483	Key, Control Panel
		Cables
4	30190-60067	Kit, Cables (includes items 5 through 10)
5	30190-60031	Cable, Battery Backup
6	30190-60037	Cable, 12V Power A
7	30190-60038	Cable, 12V Power B
8	30190-60064	Cable, Battery Charge Control
9	30190-60065	Cable, 5V and 12V Module Control
10	30190-60066	Cable, 300V Power Module
11	30190-60025	Cable, Pwr. Switch (AC Power Unit)
12	30190-60026	Cable, Pwr. Switch (Transformer)
13	30190-60027	Cable, Processor Cardcage Plenum
14	30190-60028	Cable, I/O Cardcage Plenum
15	30190-60035	Cable, AC Power
16	30190-60036	Cable, Plenum Power
17	30190-60039	Cable, Control Panel
18	5061-2538	Cable, Access Port (Y)
19	30190-00127	Cable Exit Plugs
		Panels/Doors
20	30190-60054	Panel, Processor Bay (Rear)
21	30190-60055	Panel, Power Bay (Rear)
22	30190-60056	Panel, Power Bay (Front)
23	30190-60057	Panel, Processor Bay (Front)
24	30190-60082	Panel, Side
25	30190-60058	Panel, Processor Bay (Top)
26	30190-60059	Panel, Power Bay (Top)
27	30190-60040	Kit, I/O and Processor Cardcage Doors (includes items 28 through 31)
28	30190-60060	Door, Left I/O Cardcage
29	30190-60061	Door, Middle I/O Cardcage
30	30190-60062	Door, Right I/O Cardcage
31	30190-60063	Door, Processor Cardcage

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

Item	HP Part Number	Description
		Panels/Doors (Continued)
32	30190-80202	Nameplate, Series 950
	A1112-80005	Nameplate, Series 955
	A1130-80005	Nameplate, Series 960
	A1134-80009	Nameplate, Series 980/100
	A1134-80010	Nameplate, Series 980/200
	30190-80211	Nameplate, Model 850S
	A1112-80008	Nameplate, Model 855S
	A1135-80003	Nameplate, Model 870S/100
	A1135-80004	Nameplate, Model 870S/200
33		(Not used.)
		Power Switch
34	30190-60015	Assy., Front Power Switch (switch, cables, and box)
35	30190-40014	Handle, Power Switch
36	3101-2908	Power Switch, Front Panel
		RFI/EMC
37	30190-00100	RFI Plate, Processor Backplane
38	30190-00108	EMC Straps, I/O Cardcage
39	30190-00117	RFI Shield, Rear
40	30190-00118	RFI Shield, Top
41	8160-0607	RFI Strip, Finger (must cut to 16 inches)
		Busbars
42	30190-60019	Kit, Busbars (includes items 43 through 47)
43	30190-80012	Busbar, Jumper Section
44	30190-80013	Busbar, Main
45	30190-80014	Busbar, Tab Section
46	30190-80015	Busbar, Lower
47	30190-80016	Busbar, Upper
48	30190-80019	Busbar (included with optional +5V module)

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

Item	HP Part Number	Description
		Pwr. Bay/Plenum
49	30190-60045	Plenum, Power Bay (includes item 50)
50	3160-0362	Fan; Power Bay Processor I/O Plenum
51	0950-1937	Transformer, T1 (60Hz). See Note 1.
	0950-1939	Transformer, T1 (50Hz). See Note 1.
52	0950-1940	Transformer, T2 (60Hz). See Note 1.
	0950-1938	Transformer, T2 (50Hz). See Note 1.
53A	2110-0303	Fuse, AC Fan (250V, 2A).
53B	2110-0001	Fuse, PDH PCA (1A).
54	1420-0376	Battery, 24V 5AH Assy.
55	30190-60095	AC FE Upgrade Kit (60Hz). Not Shown; See Note 3.
	30190-60094	AC FE Upgrade Kit (50Hz). Not Shown; See Note 3.
56	0950-1947	Power Module, +/-12V. See Note 1.
	0950-2109	Auxiliary Energy Storage Module.
57	0950-1945	Power Module, BC/OBC. See Note 1.
58	0950-1949	Power Module, +5V. See Note 1.
		I/O Bay/Plenum
59	30190-60021	Plenum, I/O Cardcage (assembly, fans, and cable)
60	30190-60023	Plenum, Processor Cardcage (assembly, fans, and cable)
61	30190-60003	Backplane, Processor
62	30190-60004	Backplane, I/O
63	30190-60010	Assy., Processor Cardcage. See Note 4.
64	30190-60014	Assy., I/O Cardcage
65	30190-40016	Air Filter, Processor Bay (Rear)
66	30190-40015	Air Filter, Processor Bay (Front)
67	1420-0353	Battery, Lithium (2 each located on Processor and PDH)
68	40290-60010	RS-232C Junction Panel
69	1252-2102	Backplane pins (SMB, Midbus, Memory Arrays). See Note 2.
70	1252-2113	Backplane pins (I/O Bus). See Note 2.

Note

1. Transformers and AC power units, when used together in the same system, should be manufactured by a common vendor; do not intermix ITT components with ACDC components. Power modules may be mixed unless they are used in parallel, such as the +5V modules.
2. Removal and replacement of backplane pins requires the use of pin insertion/extraction tool, HP P/N 8710-1758.
3. The ACDC upgrade kit is shipped with one AC unit and two transformers (weight=270 lbs.).
4. The 30190-60010 part number represents the new processor cardcage that has been modified to accept the Series 980/Model 870S processor card in Processor Slot 0. This modified cardcage is installed in all Series 950 Family and Model 870S Family systems that have a serial prefix number of 3007 or higher.

9

Diagrams

Introduction

This chapter provides supporting diagrams for the HP 3000 Series 950 Family and HP 9000 Model 850S Family SPUs.

Functional Block Diagrams

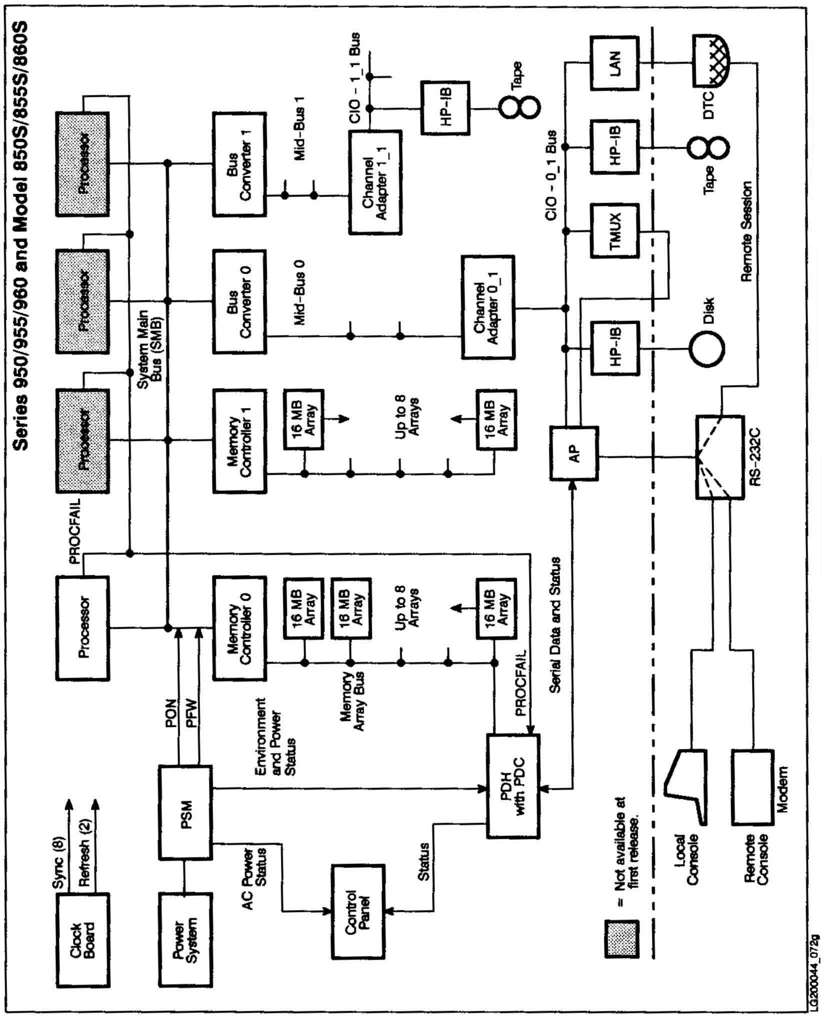

Figure 9-1.
Functional Block Diagram of Series 950/955/960 and Model 850S/855S/860S Systems

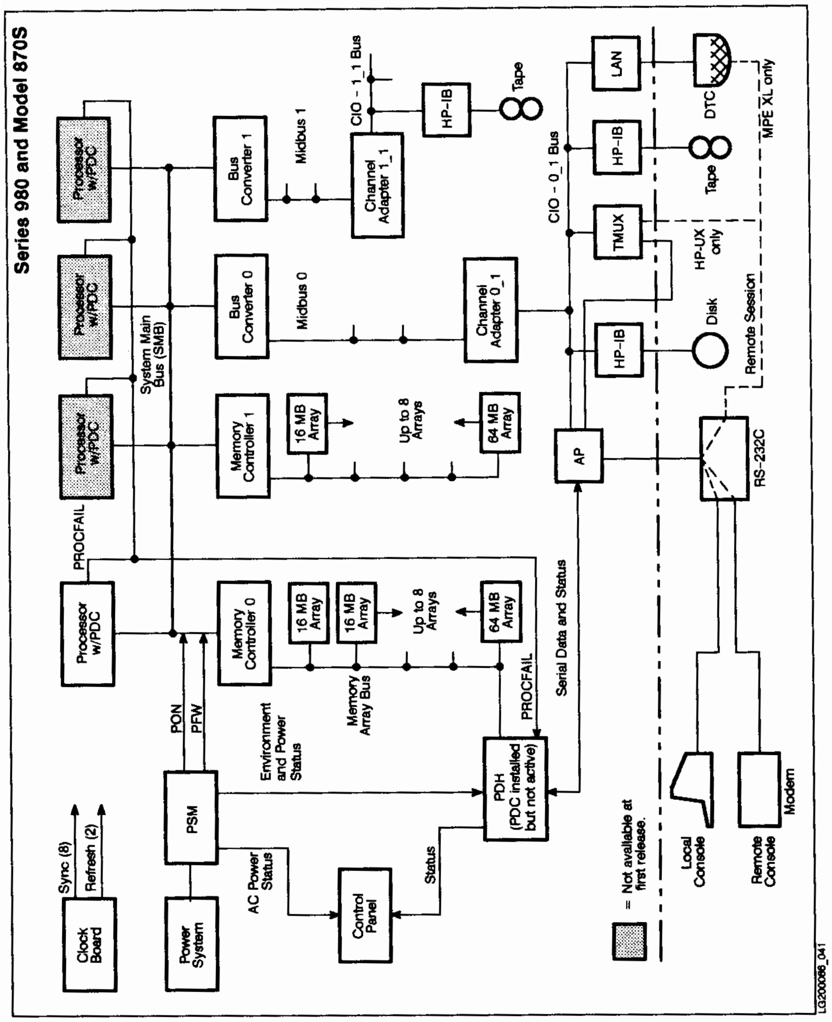

Figure 9-2. Functional Block Diagram of Series 980 and Model 870S Systems

Processor Board Block Diagrams

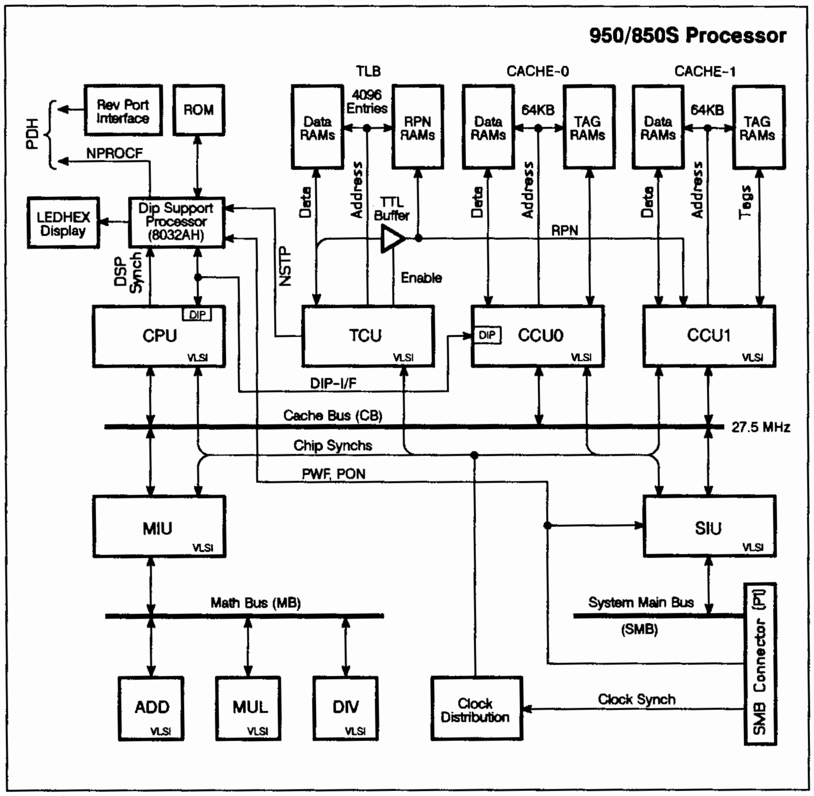

Figure 9-3. Series 950 and Model 850S Processor Board Block Diagram

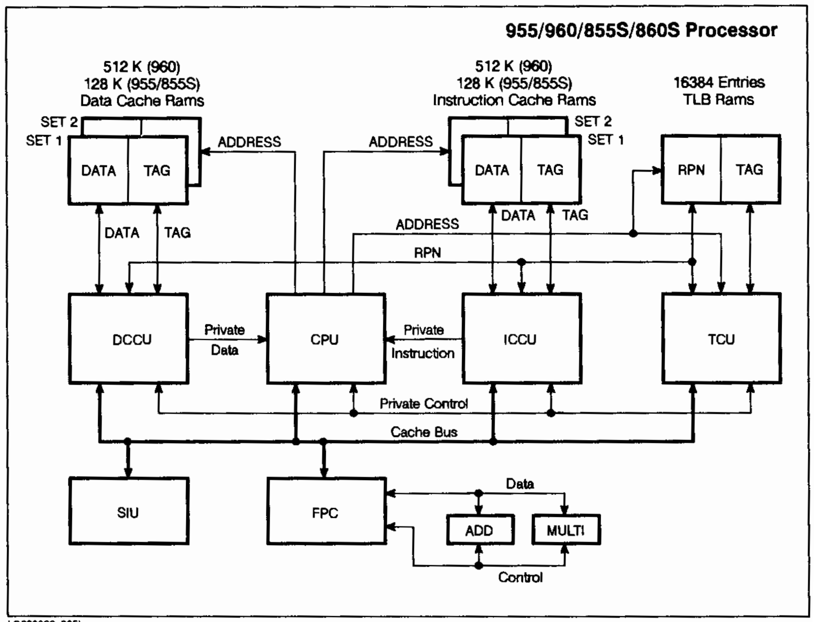

Figure 9-4. Series 955/960 and Model 855S/860S Processor Board Block Diagram

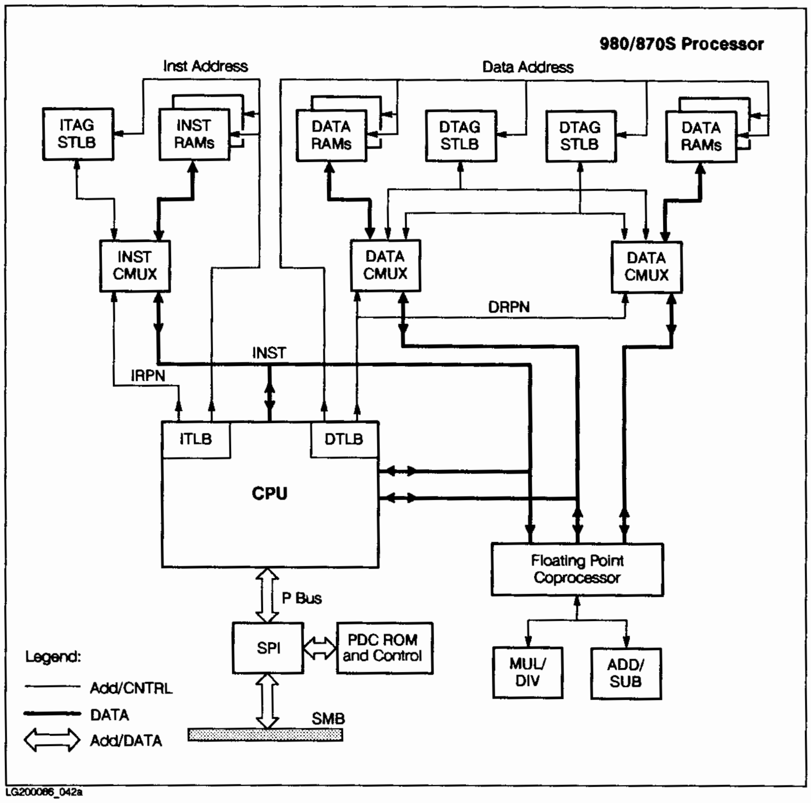

Figure 9-5. Series 980 and Model 870S Processor Board Block Diagram

DIP Support Processor Block Diagram

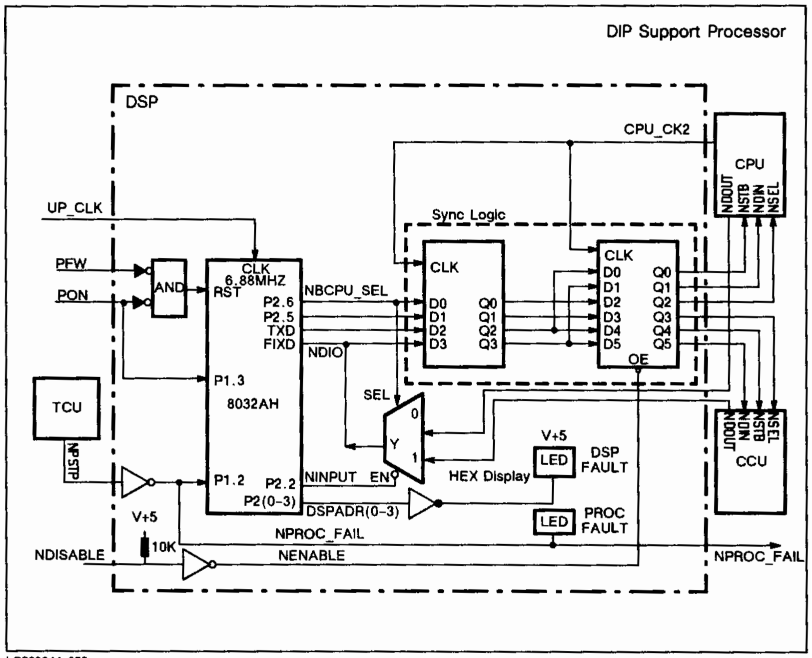

Figure 9-6. DIP Support Processor (DSP) Block Diagram

Note There is no DIP Support Processor on Series 980/Model 870S systems.

Backplane Wiring Color Codes

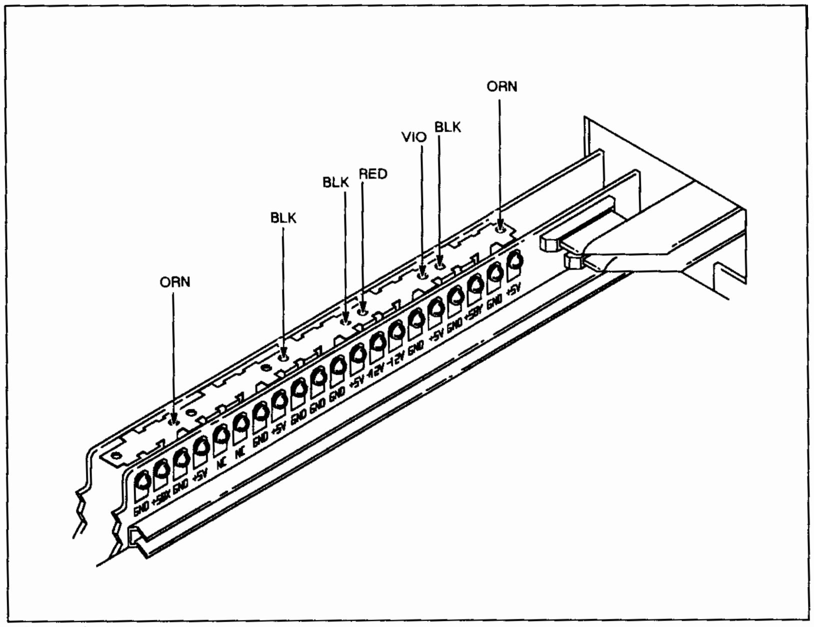

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Figure 9-7. Backplane Wiring Color Codes

ITT Power System Diagram

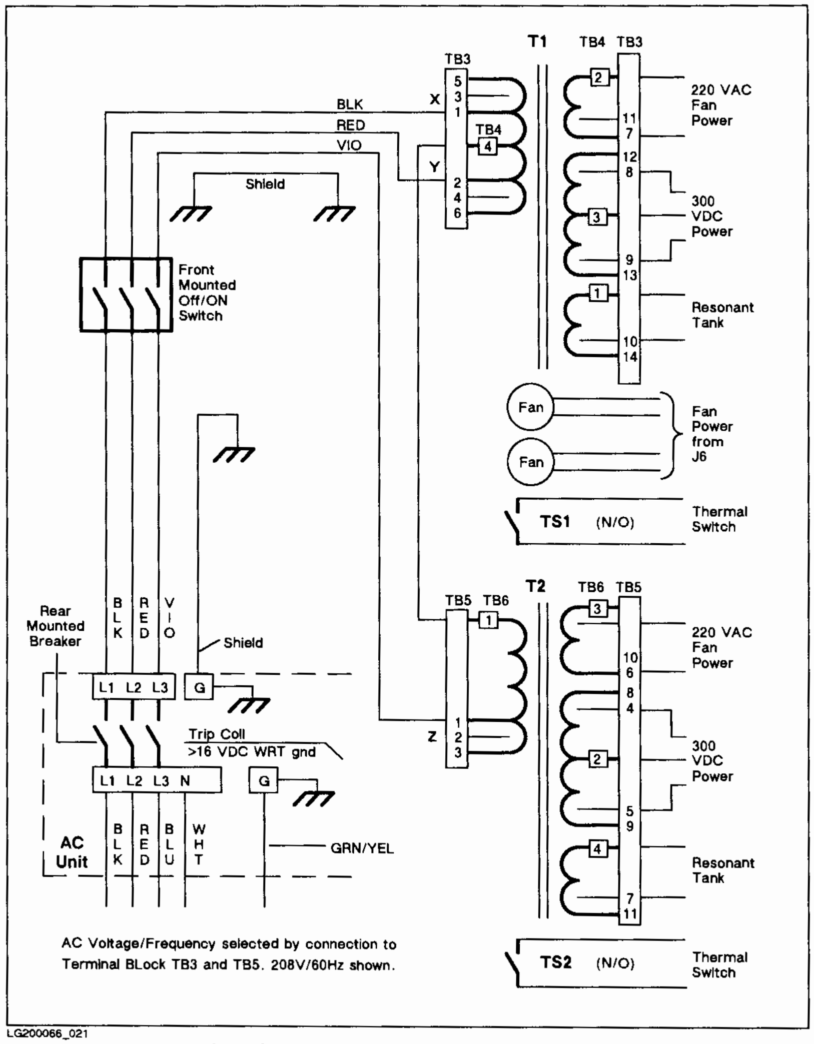

Figure 9-8. ITT Power System Diagram, Part 1 of 2

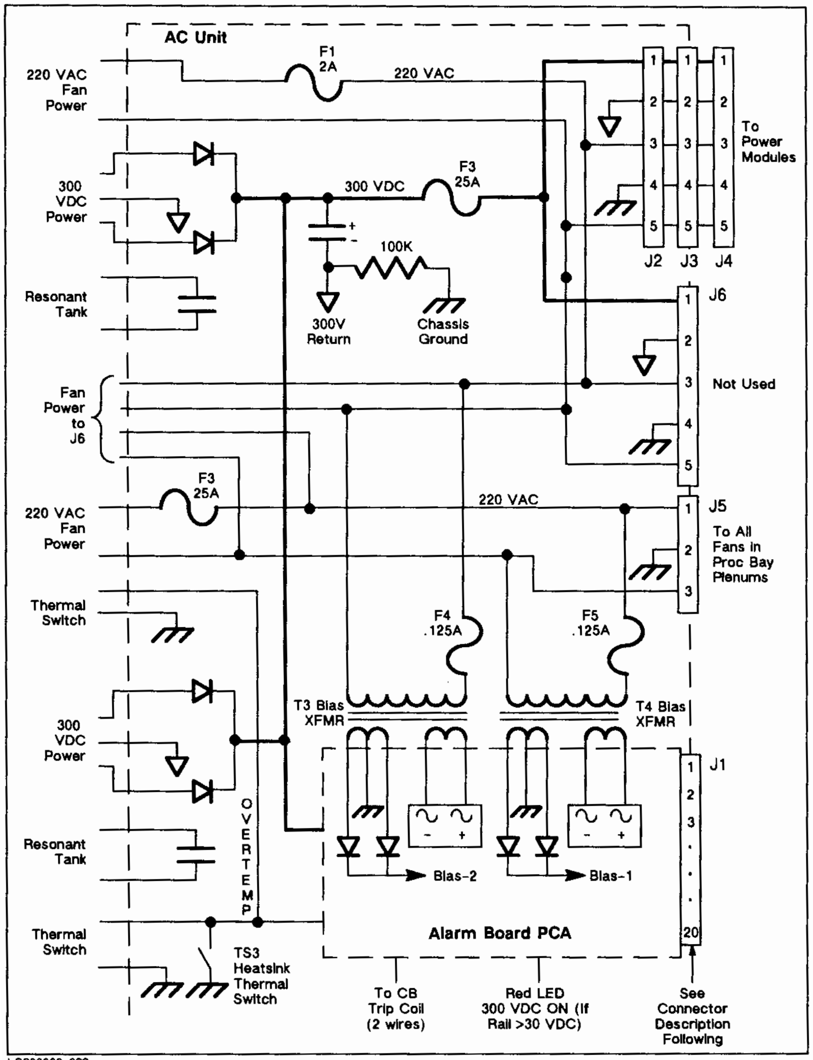

Figure 9-9. ITT Power System Diagram, Part 2 of 2

ACDC Power System Diagram

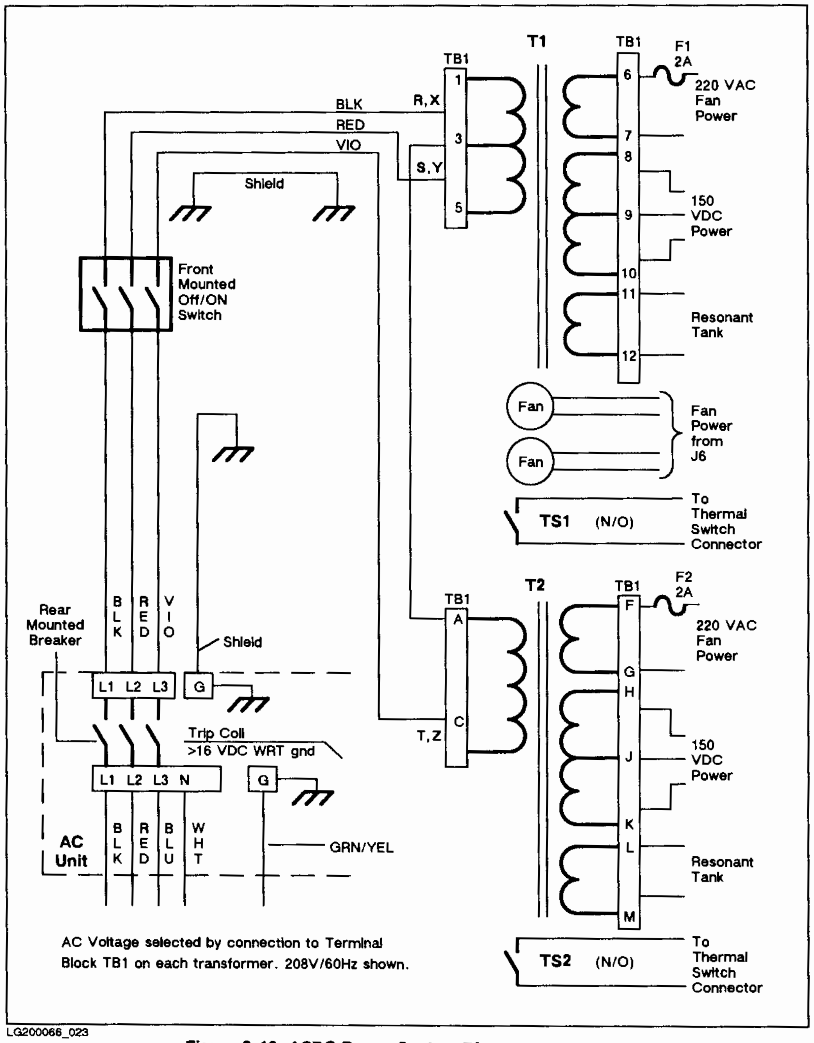

Figure 9-10. ACDC Power System Diagram, Part 1 of 2

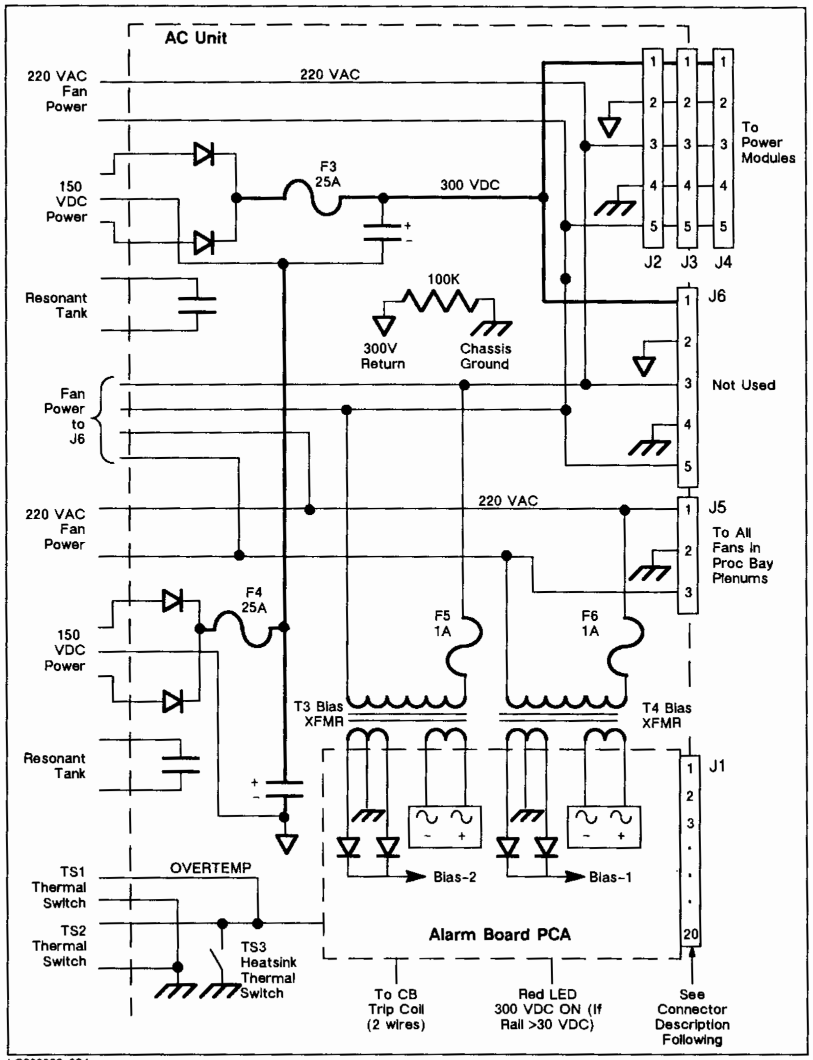

Figure 9-11. ACDC Power System Diagram, Part 2 of 2

Power System Connector J1 Pin Description

Refer to Power System Diagrams.

Table 9-1. Power System Connector J1 Pin Description

Signal	Pinout	Voltage
PFA	9 to 19	0 V dc
PFA RTN	10 to 20	0 V dc
OTA	6 to 16	0 V dc
BIAS-1	2 to 12	Greater than 16 V dc
BIAS-1 RTN	7 to 17	Greater then 16 V dc
BIAS-2	3 to 13	Greater than 16 V dc
BIAS-2 RTN	8 to 18	Greater than 16 V dc
AC ENABLE	5 to 15	Greater than 16 V dc
Spare	4, 14	
Chassis GND	1, 11	

10

Reference Material

This chapter contains a Glossary of Terms to aid the Customer Engineer (CE) in recognizing the terminology used in correcting or solving an SPU problem in HP 3000 Series 950 Family and Model 850S Family Computer Systems.

Glossary of Terms

AP	Access Port. The hardware interface between the system console and the SPU.
BC	Bus Converter. A device connecting the System Main Bus and Midbus.
CA	Channel Adapter. A module that serves as an adapter between the Midbus and the CIO bus.
CADR	Cache address.
CCU	Cache Control Unit. A VLSI chip used to control the cache RAMS and their interaction with the CPU.
CMUX	Cache Multiplexer chip (Series 980/Model 870S systems only). A VLSI chip used to control the cache RAMs and their interaction with the CPU; equivalent to the CCU on earlier systems.
CPU	Central Processing Unit. The VLSI chip that fetches and executes instructions.
Device Path	A term for the hardware address specifying the location of a peripheral device on the system. Also referred to as the boot path or console path.
DIP	Diagnostic Interface Port. Key testability port designed into every single VLSI chip.
DMA	Direct Memory Access. The transfer of data directly between an I/O module and main memory, without the intervention of a processor.
DMA Chain	Chains of four-word blocks of data that reside in the memory of DMA adapters.
DSP	DIP Support Processor. A circuit that loads and starts processor execution of Processor Dependent Code (PDC), and provides a self-contained processor board test. (Not present on Series 980/Model 870S systems).

DUI	Diagnostic User Interface. A software interface through which a user can communicate with the diagnostic system.
Hardwired Path	The direct serial link between the PDH and the AP. When the AP is used in this mode, it is referred to as the hardwired console.
HPMC	High Priority Machine Check. The highest priority interrupt to the processor. An HPMC indicates a serious hardware problem or a Transfer of Control (TOC).
IODC	Input/Output Dependent Code. Firmware (located on each module in the system) that contains data to identify the module, and code to perform functions such as module iuitialization, testing, and system boot.
IPL	Initial Program Loader. The first code loaded into memory from a boot device during boot. This code controls the boot process after PDC has terminated.
ISL	Initial System Load. A program written for current PA-RISC systems to perform the functions of IPL. (For most purposes, the terms "IPL" and "ISL" are interchangeable.
MAB	Memory Array Bus. The bus connecting the memory controllers with the memory arrays.
MA	Memory Array. The board that contains the main memory integrated circuits.
MC	Memory Controller. The board that connects main memory to the System Main Bus. The memory controller performs interface, control, and error-correction fnnctions for main memory.
Midbus	A medium performance, synchronous, high-speed bus used in the Series 950 Family and Model 850S Family Computer Systems.
MIU	Math Interface Unit. A chip that interfaces the CPU with the math chips.
NVM	Non-Volatile Memory. Firmware used to maintain system configuration parameters (such as system interrupt and boot data) during powerfail. This memory is accessed through the Processor Dependent Hardware (PDH).
PA-RISC	Precision Architecture-Reduced Instruction Set Computing.
PDC	Processor Dependent Code. PA-RISC code to conduct the power-on self-test, to boot and reset the system, and to handle HPMCs.
PDH	Processor Dependent Hardware. A board in the SPU containing the PDH ROMs, Stable Storage, LED latches, and other system-dependent circuitry.

PON	Power On signal. The signal indicating that all dc voltages are turned on and are within specification.
Processor	The module that contains the DSP and the VLSI chip set (including the CPU, cache, TLB, and SIU). The processor executes the complete PA-RISC instruction set and can execute standard operating system software.
PSM	Power System Monitor. A printed circuit assembly which monitors the power supply system.
Powerfail Recovery	An attempt to restore the operating system to the state it was in before a power loss occurred.
RISC	Reduced Instruction Set Computer. An architecture that uses a simplified, hardwired instruction set (thus, a smaller number of instructions) to increase the speed of the processor.
SIU	System Interface Unit. The chip that interfaces the CPU and the cache with the SMB (see also SPI).
SMB	System Main Bus. A high performance bus that interfaces the processors, bus converters, and main memory.
SPI	SMB to Processor Interface chip (Series 980/Model 870S systems only). The chip that interfaces the CPU and the cache with the SMB; equivalent to the SIU in earlier systems.
SPU	System Processor Unit. The portion of the computer system that performs the main processing functions. The SPU typically consists of the processor, I/O, and memory subsystems, all enclosed in one cabinet.
Stable Storage	Memory used to maintain critical system parameters during power failure (for example, the primary, alternate, and console paths).
TLB	Translation Lookaside Buffer. A hardware table that translates virtual addresses to physical (real) addresses.
TOC	Transfer of Control. The action forcing a processor to execute selected software, immediately, regardless of the code that the processor is executing at the time of the TOC.

11

Service Notes

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A

HP-UX Quick Reference

The purpose of this appendix is to give experienced HP-UX personnel a quick look-up reference. For more detailed information, refer to the *HP 9000 Series 800 HP-UX System Administration Tasks Manual*, or other associated HP-UX documentation.

Caution

Commands listed in this appendix can seriously effect system performance. Do not execute any commands with which you are unfamiliar.

HP-UX Directory Structure

Table A-1. HP-UX Directories

Directory	Description
/	root
/bin	Public commands
/dev	Special files (device files)
/etc	Commands and files for System Administration
/etc/conf	Contains object code and header files for driver generation and system configuration
/etc/conf/gen	Contains the S800 file
/etc/newconfig	Contains new versions of configuration files and shell scripts after an update.
/lib	Contains frequently used object code libraries and related utilities.
/hp-ux	Contains the HP-UX operating system (kernel). This is a file, not a directory.
/tmp	Contains temporary files
/mnt	User home directories

Table A-1. HP-UX Directories (continued)

Directory	Description
/usr	Contains less frequently used commands and other miscellaneous files
/usr/lib	Overflow for /lib. Additional system material and utility data files
/usr/mail	Mail directory, used for depositing mail files
/usr/man	Manual pages from the HP-UX reference manual
/usr/man/man1 ... man8,man1m	Contains the unformatted version of **man** pages
/usr/man/cat1 ... cat8,cat1m	Contains the formatted version of **man** pages
/usr/spool/uucppublic	Used for free access of files to other systems via uucp or LAN
/usr/spool	Spooled (queued) files for various programs
/usr/spool/uucp	Queued work files, lock files, log files, status files, and other files for uucp
/usr/spool/cron	Spooled jobs for `cron` and `at`
/usr/spool/lp	Control and working files for the `lp` spooler
/usr/tmp	Alternate place for temporary files
/usr/contrib	Contains any contributed files and commands
/usr/contrib/bin	Contains contributed commands
/usr/contrib/lib	Contains contributed object libraries
/usr/contrib/man	Online documentation for any contributed files
/usr/news	Directory that contains news items about your system
/usr/diag/bin/sysdiag	Online diagnostics
/usr/include	High level C language header files
/usr/include/sys	Low level (kernel related) C language header files
/usr/lib/uucp	Configuration files for uucp
/usr/adm	System administrative data files

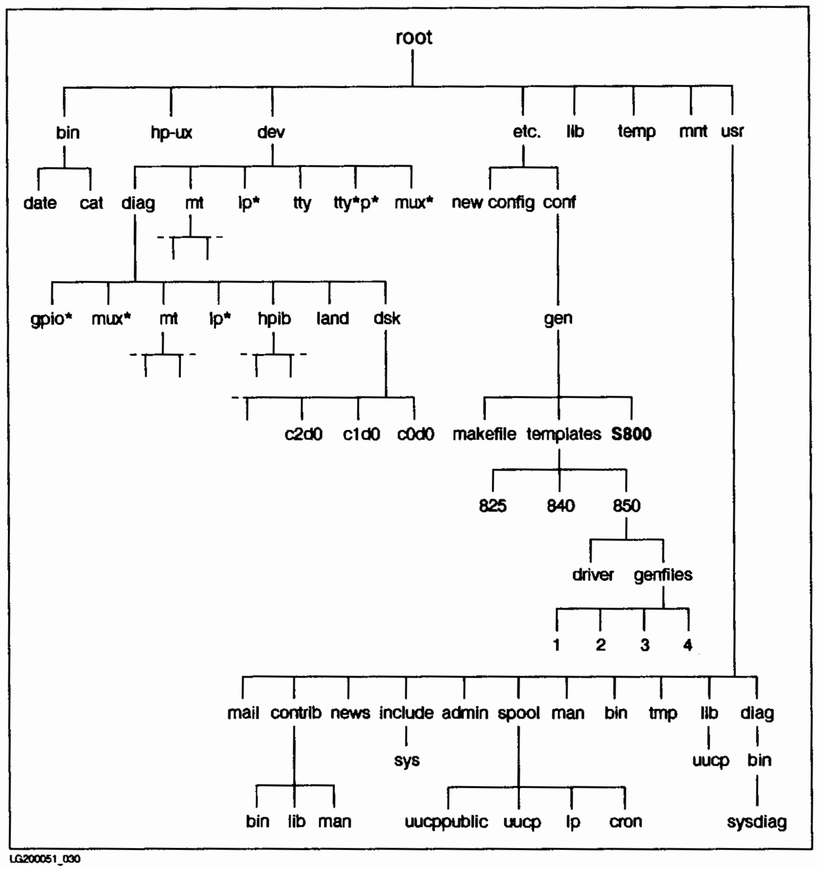

Figure A-1. Directory Structure

HP-UX Commands

Refer to the *HP 9000 Series 800 HP-UX System Administration Tasks Manual* or other HP-UX documentation for more information about HP-UX commands.

Table A-2. HP-UX File Commands

File Commands	
`cat` *file1*	Displays the contents of *file1* on screen.
`more` *file2*	Displays the contents of *file2* on screen.
`q`	Quits display and returns to command line when using **more**.
(Return)	Displays one more line when using **more**.
(Space)	Displays another screen when using **more**.
`cat >` *newtest*	Takes what you type at your terminal and puts it into the new file *newtest*, until you type (CTRL)D.
`cat >>` *oldtest*	Takes what you type at your terminal and adds it to the existing file *oldtest*, until you type (CTRL)D.
`cat` *file1 file2* > *file3*	Combines *file1 and file2* and puts them in *file3* with *file1* first.
`grep` *berlina alpha*	Displays the lines in which the string *berlina* occurs in the file *alpha*.
`cp` *rick rack*	Makes a copy of the file *rick* and calls it *rack*. (If *rack* is a directory, a copy of *rick* is put in that directory.)
`mv` *grey black*	Changes the name of *grey* to *black*. If *black* is a directory, the *grey* file is moved into it.
`sort` *acct*	Sorts *acct* and displays on screen. Default is alphabetical order.
`rm` *taxes*	Deletes the file *taxes*
`lp` *stuff*	Sends the file *stuff* to the system line printer.
`vi` *tutorial.5*	Creates or edits the file *tutorial.5* with the vi screen editor.
`diff` *myfile myfile1*	Displays the differences between *myfile* and *myfile1*.
`chown` *sam acct*	Changes the ownership of your file *acct* to *sam*.
`chgrp` *pubfiles sec1*	Changes your group ID of *sec1* to *pubfiles*.
`chmod go-rwx` *dates*	Removes read,write, and execute permission on the file *dates* for users in your group and for all other users (See "Using chmod" on next page).
`chmod ugo+rwx` *pubfiles*	Opens the existing subdirectory *pubfiles* so that anyone can read, write, or execute the files in it. See "Using chmod" on the next page.

```
who:              u = Login owner,
                  |  g = Group,
                  |  |  o = Other users
                  |  |  |
                  |  |  |
                  _  _  _
                 | || || |
                 rwxr-xr-x
                 ||   |
permissions:     ||   x = Execute
                 |w = Write,
                 r = Read,

op-codes: + = Add permission, - = Remove permission
```

Figure A-2. Using chmod

Table A-3. HP-UX Directory Commands

Directory Commands	
`ls`	Lists the files and subdirectories in the current directory
`ls -F`	Lists all contents, flags directories (/) and executable files (*)
`ls -l`	Gives a "long" listing of the current directory with complete information on each file
`ls` *acct?*	Directory list of files named *acct* plus one other character
`ls` *acct**	Directory list of files named *acct* plus 0 or more characters
`lssf` */dev/diag/**	Lists all the special files in directory */dev/diag*.
`file *`	Lists all files in current directory and tells file type
`ll`	Lists all the contents of the current directory,
`ll` *sue*	Lists the contents of the directory *sue* in the long format showing all the protection codes and iuformation
`ll` *sue* &| *lp*	Lists the contents of the directory *sue*, sends them to the line printer.
`pwd`	Displays the name of files in the current directory
`cd`	Returns you to your home directory
`cd` */user/sue*	Moves you to the directory */user/sue*
`cd ..`	Moves you to the parent directory. If you were in `sue`, this command would put you in `user` directory, as above
`mkdir` *Chap4*	Creates a new subdirectory in your current directory called *Chap4*
`rm -r *`	Removes all files in current directory - DANGEROUS. Make sure you know what directory you're in before typing this command.
`rmdir` *budget87*	Deletes the directory *budget87* (only if the directory contains no files)

Table A-3 (cont'd). HP-UX Directory Commands

`find . -name` *test.1* `-print`	Finds *test.1* and displays its path name
`find` */users/tmp* `-user` *pubfiles* `-print`	Searches from */users/tmp* and displays all files belonging to user *pubfiles*
`find / -user` *sue* `-print`	Finds all files belonging to *sue* and displays them

Table A-4. HP-UX System Commands

System Commands	
`who`	Displays the users currently logged onto the system and the ports used
`ps`	Displays the processes you are currently running
`ps -a`	Displays the processes being run by all users on the system
`man` *ls*	Displays information about the *ls* command and its options
`man -k` *mail*	Lists the HP-UX commands that relate to the keyword *mail*
`kill` *4507*	Terminates the background process number *4507*
`history`	Lists the last 20 commands entered from last to first
`!!`	Repeats the last command entered (c-shell only)
`login` *moondog*	Login as user *moondog*
`logout`	Logout
`df`	Shows disk space
`du`	Shows disk usage
`lpstat -t`	Shows status of print spooler
`write`	Writes to users already logged on
`wall`	System wide announcement to all users
`echo` *message*	Displays message on the screen
`hpux -is`	Boots HP-UX, system comes up in single user mode
`init s`	Changes run level from multiuser to single user
`init 2`	Changes run level from single user to multiuser
`mount`	Lists what file systems are mounted
`mount -a`	Mounts all the file systems listed in */etc/checklist*
`umount` */dev/dsk/c1d0s11*	Manually unmounts */dev/dsk/c1d0s11* file system

Table A-5. HP-UX Command Keys

Command Keys	
CTRL C or DEL	Interrupt. Stops a command currently being executed
CTRL D	Removes you from the current environment. At the $, #, or % prompts, these keys log you off the system (if you are in your Primary Shell)
CTRL H or Backspace	Deletes the previous character
CTRL S	Temporarily halts the output from the current command being executed (halts terminal scrolling, for instance)
CTRL Q	Resumes the output that was halted by CTRL S.

Table A-6. HP-UX Wildcard Characters

Wildcard Characters	
`*`	Designates all files in the current directory.
`s*`	Designates all files beginning with `s` in the current directory.
`*.c`	Designates all files ending with `.c` in the current directory.
`????`	Designates any 4 character filename in the current directory.
`s???`	Designates any 4 character filename beginning with `s` in the current directory.
`??.c`	Designates any 4 character filename ending with `.c` in the current directory.

Using vi

Use `vi` as a screen-oriented editor to edit a file. The following commands take effect as soon as the keys are pressed.

Table A-7. Vi Enter/Exit Commands

`vi` *file1*	Enter `vi` to edit *file1*
ESC	Enter command mode in `vi`
`:q`	Quit `vi` if no writes since last save
`:q!`	Quit `vi` without saving current changes to file
`:wq`	Save file and quit `vi`
`:w` *file1*	Save *file1*
`ZZ`	Save file and quit `vi`

Table A-8. Vi Move Cursor Commands

	First, press ESC to enter Command Mode
arrow keys	Move in key direction
`H`	Move to top of screen
`L`	Move to bottom of screen
`^^`	Move to beginning of line
`$`	Move to end of line
`nG`	Move to `nth` line of file

Table A-9. Vi Edit Commands

	First, press ESC to enter Command Mode
`a`	Add after cursor
`A`	Enters text at the end of current line
`i`	Insert before cursor
`I`	Enters text to the left of the first character that is not a blank on the current line
`o`	Add a line below cursor
`O`	Add a line above cursor
`cw`	Changes one word starting at cursor position

Table A-9. Vi Edit Commands (continued)

`dw`	Delete word
`ndw`	Delete n words
`dd`	Delete line
`ndd`	Delete n lines
`r`	Replaces character at cursor position
`R`	Replaces only those characters that are typed over with new text
`x`	Delete character
`nx`	Delete n characters
`J`	Join with next line
`np`	Retrieve `nth` last delete
`yy`	Yank, copies line to temporary storage. To insert blank line, move cursor to desired position and press Return.
3 `yy`	Yank. Copy the next n lines to temporary storage
`p`	Put the "yanked" lines here (at the cursor)

Table A-10. Vi Move Screen Commands

CTRL f	Moves to the next screen
CTRL b	Moves to the previous screen

Table A-11. Vi Search Commands

`/acct`	Search forward in file for the string *acct*
`?` *asparagus*	Search backward in file for string *asparagus*
`n`	Repeat search, same direction
`N`	Repeat search, other direction

Table A-12. Vi Miscellaneous Commands

`u`	Undo last change
`U`	Restore current line
`:set nu`	Temporarily display line nnmbers with file
`.`	Repeats action initiated by last command

System Backup

tar

Tar is used to save and restore files on magnetic tapes or flexible disks. For more information on `tar`, refer to the man pages on the system. (Type: `man tar`)

Syntax:

```
# tar -[key] [modifier] [file(s)]
```

Key	Description
r	Add files to end of archive
x	Extract (restore) named files from archive
u	Update only
c	Create a new archive
t	Terminal. Lists contents of archive
Modifiers	**Description**
v	Displays names of files archived
w	tar will print action and file name, then wait for you to reply y or n
f	Allows you specify another device other than /dev/rmt

Examples:

From `/users`, copy all of the files under `/users` to tape:

```
cd users
tar -cv users
```

Display file names on archive:

```
tar -vt
```

From `/users`, restore file `test` from archive to disk under `/users`:

```
cd users
tar -xvf /dev/mt/test users
```

From `/users`, copy file `/users/test` to the end of `/dev/mt/1m`:

```
cd users
tar -crf /dev/mt/1m users/test
```

cpio

The cpio command copies files in and out of an archive. An archive may be a file or a raw device. For more information on `cpio`, refer to the man pages on the system. (Type: `man cpio`)

Options	Description
`-o`	Reads *stdin* to obtain a list of path names and copies those files onto *stdout*
`-i`	Extracts from *stdin* those files that match patterns
`-p`	Used to copy files between directories instead of between devices
`-d`	Create directories if needed
`-t`	Print table of contents only
`-v`	List names as they are copied

Examples:

Copies all files from `/olddir` to `/newdir`:

```
mkdir newdir
cd olddir
find /user/local -print | cpio -pd newdir
```

Copies current directory to tape:

```
find . -print | cpio -o >  /dev/rmt/0m
```

Displays files on tape:

```
cpio -it <  /dev/rmt/0m
```

fbackup

The fbackup utility does full and incremental backups, as specified by a level number between 0 and 9. The user need not be superuser, but if the user does not have access to a given file, that file will not be backed up. For more information, refer to the *HP 9000 Series 800 HP-UX System Administration Tasks Manual* and the **man** pages on the system.

Syntax:

`/etc/fbackup -f` *device* `[-0-9] [options]`

Options	Description
-f *device*	Specifies name of backup device (usually a magnetic tape drive).
-0-9	Specifies backup level, where 0 = full backup; 3 = weekly backup; 8 = daily backup.
-u	Updates **/usr/adm/fbackupfiles/dates** to contaiu the backup level, start and finish times of the backup session, aud the graph file used for the session. If you use **fbackup** for incremental backups, you must keep a database of past backups.
-g *graphf*	Specifies path name of a text file (**/user/adm/fbackupfiles/graphfile**) that names the trees to include or exclude from the backup graph. If the basic directory structure of the system remains constant, this graph file can be used for all backups.
-i	Includes the specified file tree in backup.
-e	Excludes the specified file tree from backup.
-I *filename*	Specifies path name of an index file that will list names of the backup files.
-c *config*	Specifies path name of a file (**/usr/adm/fbackupfiles/fb_config**) that contains parameter values. Common parameters are: name of file to be executed when a fatal error occurs, number of times to try to back up an active file, and number of file reader processes to use.
-v	Runs in verbose mode.

Examples:

Full backup to a 9-track magnetic tape using the -e and -i options:

```
/etc/fbackup -0i /usr -e /usr/lib -f /dev/rmt/0h
```

Daily backup to a 9-track magnetic tape using -u, -g, and -c options:

```
/etc/fbackup -u8f /dev/rmt/0h -g /usr/adm/fbackupfiles/graphfile
-c /usr/adm/fbackupfiles/fb_config
```

frecover

The frecover utility restores files that were backed up using the `fbackup` command. The user need not be superuser, but if the user does not have access to a given file, frecover will not restore that file. For further information about `frecover`, refer to the man pages on the system.

Syntax:

```
frecover -r [options] [-f device]
```

or

```
frecover -x [-g graphf] [-i path] [-f device]
```

Options	Description
-r	Recovers all files on backup tape.
-R *path*	Continues an interrupted recovery.
-f *device*	Identifies the backup device.
-x	Either extracts or does not extract files identified by -i, -e, or -g.
-g *graphf*	Uses specified graph file.
-i	Includes a file tree in recovery.
-e	Excludes a file tree from recovery.
-I *filename*	Specifies path name of an index file that will list names of the backup files.
-o	Recovers files regardless of age.
-v	Runs in verbose mode.

Examples:

Recover all files specified by -g option and execute a shell script specified by -c option if the recovery process encounters an error:

```
/etc/frecover -x -g /usr/adm/fbackupfiles/graphfile
-c /usr/adm/fbackupfiles/fr_config -f/dev/rmt/0h
```

Recover all files on the backup media and organize them into the directories from which they were backed up:

```
/etc/frecover -r -f/dev/rmt/0h
```

Cookbook Procedure for Modifying HP-UX

This section briefly describes the steps to modify HP-UX for a new I/O configuration. Refer to Appendix B of the *HP 9000/825/835 Installation and Configuration Guide* or *HP 9000 Series 800 HP-UX System Administration Tasks Manual* for a complete explanation.

1. At the HP-UX prompt, issue the command:

   ```
   cd /etc/conf/gen
   ```

2. Copy the existing `S800 file` to a different name, so that you will have a backup copy in case of problems. For example:

   ```
   cp S800 S800BACKUP
   ```

3. Edit the `S800 file` so that it contains the device drivers and hardware addresses for the new I/O configuration. (See the previous section, "How to Read an S800 File.") You can use the `vi` screen editor to edit the file. For example:

   ```
   vi S800
   ```

4. Recompile the kernel with `uxgen`, using the edited `S800 file` as input:

   ```
   /etc/uxgen S800
   ```

5. Copy the old kernel `/hp-ux` in the root (/) directory and the old devices file `/etc/devices`. Write down the names of these files in case the new kernel does not boot. For example:

   ```
   cp /hp-ux /SYSBCKUP
   cp /etc/devices /etc/DEVBACKUP
   ```

6. Change the working directory:

   ```
   cd /etc/conf/S800
   ```

7. Move `hp-ux` to `/hp-ux` and `devices` to `/etc/devices`, by entering the commands:

   ```
   mv hp-ux /hp-ux
   mv devices /etc/devices
   ```

8. Create the special files (device files) for the new configuration. To do this the easy way, enter:

   ```
   cd /dev
   /etc/insf
   ```

9. Shut down the system and turn off system power:

   ```
   cd /
   shutdown -h 0
   ```

10. Install cards in the desired slots.
11. Turn on the system and reboot.

Setting Up A Print Spooler

To set up a particular printer to be used with the LP Spooler, you can either edit and use the `/etc/mklp` script, or type in the commands directly from the keyboard. Refer to the *HP 9000 Series 800 HP-UX System Administration Tasks Manual* section "Configuring the LP Spooler" for more information.

1. Log in as superuser (root) and shut down the LP scheduler:

   ```
   /usr/lib/lpshut
   ```

2. Execute the `lpadmin` command with the `-p` option. Repeat the command for each printer you want to configure.

   ```
   /usr/lib/lpadmin -plp -v/dev/lp0 -mhp2934a -h
   ```

Parameter	Description
`-plp`	names the printer `lp` (logical destination)
`-v/dev/lp0`	specifies the full path name of the printer's (lp0) special file, the physical destination.
`-mhp2934a`	specifies the printer model hp2934a from the `/usr/spool/lp/model` directory.
`-h`	means the printer is "hard-wired."

3. For each of the printers defined with `lpadmin`, execute `accept` and `enable` to allow requests to reach the printer:

   ```
   /usr/lib/accept lp
   /usr/bin/enable lp
   ```

4. Select a printer as the system default:

   ```
   /usr/lib/lpadmin -dlp
   ```

5. Restart the LP scheduler and see if it's running properly:

   ```
   /usr/lib/lpsched
   lpstat -t
   ```

6. If the scheduler is not running properly, remove the file `schedlock`. You may also need to remove the file `fifo`. Then repeat Step 5.

System Shut Down

It is wise to shut down HP-UX before turning off power. If you turn off power while HP-UX is running, you can damage the file system. Follow these steps to properly shut down the system:

1. Login as the superuser `root`.
2. Move to the root directory of the file system by entering the command `cd /` at the prompt.
3. Enter the `shutdown -h 0` command to shut down and halt the system immediately. (If you are already in single-user mode, you can enter `reboot -h` instead.)
4. You can turn off power when the console displays a message like:

   ```
   Halting (in tight loop) -- OK To Hit Reset Button
   ```

   For more information, see the section "Shutting Down the System" in the *HP 9000 Series 800 HP-UX System Administration Tasks Manual*.

You can also turn off the system at the ISL prompt without damaging the system.

Creating a New File System

Refer to the *HP 9000 Series 800 HP-UX System Administration Tasks Manual* section "Creating a New File System" for more information.

1. Make sure a device file exists on the disk where the file system is to reside.

   ```
   lssf /dev/dsk/*
   ```

2. Make sure the model of the disk drive you want to use exists in **/etc/disktab** along with correct default assignments for your system.

   ```
   more /etc/disktab
   ```

3. Run **newfs** to create a new file system. For example, on a HP 7935 using c1d0s11 (section 11):

   ```
   newfs /dev/rdsk/c1d0s11 hp7935
   ```

   Record superblock numbers as they are displayed on the screen.

4. Create a directory where the new file system will be mounted.

   ```
   mkdir /disc1
   ```

5. If you want the new file system mounted automatically, update **/etc/checklist** to include information about your new file system. When you type the following command all of the file systems listed in **/etc/checklist** will be mounted.

   ```
   mount -a
   ```

   You can also mount the file system manually by using the following command:

   ```
   mount /dev/dsk/c1d0s11 /disc1
   ```

   You can unmount the file system by using the following command:

   ```
   umount /dev/dsk/c1d0s11 /disc1
   ```

Checklist File

Refer to the *HP 9000 Series 800 HP-UX System Administration Tasks Manual*, Chapter 7, under "The Checklist File" for more information.

The `etc/checklist` file lists all file systems and swap devices:

```
special_file directory options pass_number backup_freq comment
```

Parameter	Description
`special_file`	A required field that specifies a block special file name.
`directory`	Name of the root mounted file system.
`options`	One or more options:
`defaults`	use all default options
`rw`	read-write (default)
`ro`	read-only
`suid`	set user ID execution allowed (default)
`nosuid`	set user ID execution not allowed
`pass_number`	Used by `fsck` to determine the order to check file systems (when -p is used)
`backup_freq`	Reserved for future use.
`comment`	Optional comment field beginning with # and ending with Return.

Example:

```
/dev/dsk/c1d0s11 /disc  rw  4  0  #  /user
```

fsck

For more information, refer to Appendix C "Using the fsck Command" in the *HP 9000 Series 800 HP-UX System Administration Tasks Manual*.

Requirements

- Single-user mode
- Quiescent or can cause loss of data
- Uses directory /lost+found
- `fsck` should be executed using a character special device file, not a block special device file except when run on the root file system, **must** use the block device (for example, `/dev/dsk/c0d0s0`).
- If `fsck` makes changes to the root file system, the system must be rebooted.

Modes

The following modes are supported with `fsck`.

Mode	Description
default	allows you to choose to perform each action or not.
-b	specify alternate superblock
-p	fixes the following automatically and never removes data: unreferenced inodes unreferenced pipes and fifos link counts in inodes too large missing blocks in the free list wrong counts in the superblock clean byte marked wrong
-P	operates same as `-p`, except ignores file systems marked clean by commands like `umount` and `reboot`.
-n	causes `fsck` to answer NO to all questions that might remove data. Can be used in multiuser (though not recommended), single-user, or in background.
-q	prints only the messages that require a response.
-y	causes `fsck` to answer YES to all questions. Might remove data.

Caution The `fsck -y` command can remove data automatically. Use with caution.

Setting Up a New User

For more information, see "Adding a New User" in the *HP 9000 Series 800 HP-UX System Administration Tasks Manual*.

1. Log in to root.
2. Edit `/etc/passwd` to add a new user to the last line of the file:

```
vi /etc/passwd
carol ::101:1 comment :/mnt/carol:/bin/csh
```

3. Edit `/etc/group` to add the user `carol` to an existing group:

```
vi /etc/group
nfl::11:todd,jerry,carol
```

4. Create directory for new user:

```
mkdir /mnt/carol
```

5. Change ownership for new user:

```
chown carol /mnt/carol
```

6. Have the System Administrator customize the user environment for the new user.