Service Handbook

HP Apollo 9000 Series 400
Models 400dl, 400t, 425t, 400s, 425s, 433s

Order No. A1630-90009
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New editions of this manual incorporate all material updated since the previous edition. Update packages may be issued between editions and contain replacement and additional pages to be merged into the manual by the user. Note that pages which are rearranged due to changes on a previous page are not considered revised.

The manual printing date and part number indicate its current edition. The printing date changes when a new edition is printed. (Minor corrections and updates which are incorporated at reprint do not cause the date to change.) The manual part number changes when extensive technical changes are incorporated.

July 1990...Edition 1
October 1991...Edition 2

Emissions Regulations

Federal Communications Commission (FCC)

The Federal Communications Commission of the U.S. government regulates the radio frequency energy emanated by computing devices through published regulations. These regulations specify the limits of radio frequency emission to protect radio and television reception. All HP Apollo nodes and peripherals have been tested and comply with these limits. The FCC regulations also require that computing devices used in the U.S. display the agency's label and that the related documentation include the following statement.

WARNING: This equipment generates, uses, and may emit radio frequency energy and, if not installed and used in accordance with these instructions, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. 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.

Compliance to these regulations requires the use of shielded cables.

Canadian Department of Communications (DOC)

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus as set out in the Radio Interference Requirements of the Canadian Department of Communications.

Compliance to these regulations requires the use of shielded cables.

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Emissions Regulations Compliance

Any third-party I/O device installed in HP Apollo system(s) must be in accordance with the requirements set forth in the preceding Emissions Regulations statements. In the event that a third-party noncompliant I/O device is installed, the customer assumes all responsibility and liability arising therefrom.

Compliance to these regulations requires the use of shielded cables.

Acoustics

Regulation On Noise Declaration for Machines -3. GSGV

Lpa < 70dB	Lpa < 70dB
operator position	am Arbeitsplatz
normal operation	normaler Betrieb
per ISO 7779	nach DIN 45635 T.19

Electrostatic Discharge (ESD) Precautions

Electrostatic charges can damage the integrated circuits on printed circuit boards. To prevent such damage from occurring, observe the following precautions when unpacking and installing the board.

- Stand on a static-free mat.
- Wear a static strap to ensure that any accumulated electrostatic charge will be discharged from your body to ground.
- Connect all equipment together, including the static-free mat, static straps routing nodes, and peripheral units.
- Keep uninstalled printed circuit boards in their protective antistatic bags.
- Handle printed circuit boards by their edges, once you have removed them from their protective antistatic bags.

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Product Information 1

Part 1 Model 400t, 425t, and 400dl

The following sections describe the Model 400t, 425t, and 400dl systems.

Model 400t and 425t Overview

The Model 400t and 425t systems are identical except for their core processors and their memory configurations. The Model 400t uses the MC68030 microprocessor and the MC68882 floating-point coprocessor on an emulator board attached to the CPU board. The Model 425t uses the MC68040 microprocessor.

Model 400t systems use a 2- or 4-MB memory board in sets of two, which allows for system configurations of 8 MB to 32 MB of main memory, in 4- or 8-MB increments. Model 425t systems use a 2-, 4-, or 8-MB memory board in sets of two, which allows for system configurations of 8 MB to 64 MB of main memory, in 4-, 8-, or 16-MB increments.

These systems include the following:

- One interface slot for DIO II or SGC graphics interface boards
- One interface slot for a network controller board (either an 802.5 or an Apollo Token Ring network controller) or an HP-IB interface board

Systems that run Domain/OS use the network controllers and the Domain low-profile keyboard. Systems that run HP/UX use the HP-IB interface board with the HP 46021A keyboard and other HP-HIL (Human Interface Loop) devices. The system can also include one or two 200-MB Winchester disk drives. The display options are the following:

- Monochrome 19-inch, 1280 x 1024, bit-mapped monitor and graphics controller
- Color 16-inch, 1280 x 1024, bit-mapped monitor and graphics controller
- Color 19-inch, 1280 x 1024, bit-mapped monitor and graphics controller

The Model 400t and 425t CPU boards contain the following built-in I/O interfaces:

- Domain keyboard
- HP-HIL keyboard and input device
- RS232 (expandable with the optional 3-port adapter for Domain/OS systems)
- 802.3 network (AUI or ThinLAN, jumper selectable on the CPU board)
- Audio output for optional external speaker
- Centronics parallel input/output
- SCSI (Small Computer Systems Interface)

Options include a 3-port Serial Input/Output (SIO) adapter for Domain/OS systems and an HP-IB interface board for HP-UX systems. For systems that run HP/UX, you can configure parameters for the RS232, 802.3 network, Centronics parallel, and SCSI interfaces by using the Boot ROM I/O configuration program. (For information about using the configuration program, refer to the section, "Configuring the EEPROM on HP-UX Compatible Mode Systems" in Chapter 3.)

Model 400dl Overview

The Model 400dl is identical to the Model 400t with the exception of the CPU board. The Model 400dl CPU board doesn't have the connectors necessary for internal or external disk drives and some I/O interfaces and memory. As a result the Model 400dl consists of the following configuration:

- A monochrome 19-inch, 1280 x 1024, bit-mapped monitor and graphics controller
- Eight- or 16-MB of memory, by using two or four 4-MB memory boards
- 802.3 network (AUI or ThinLAN, jumper selectable on the CPU board)
- RS232 (expandable with the optional 3-port adapter for Domain/OS systems)
- Domain keyboard
- HP-HIL keyboard and input device
- Audio output for optional external speaker

Note that the Model 400dl does not have SCSI or Centronics parallel external interfaces, and has only two memory configurations. In addition, the system does not use the single interface slot for a network controller board or an HP-IB interface board.

Figure 1-1 shows a typical Model 400t, 425t, or 400dl system.

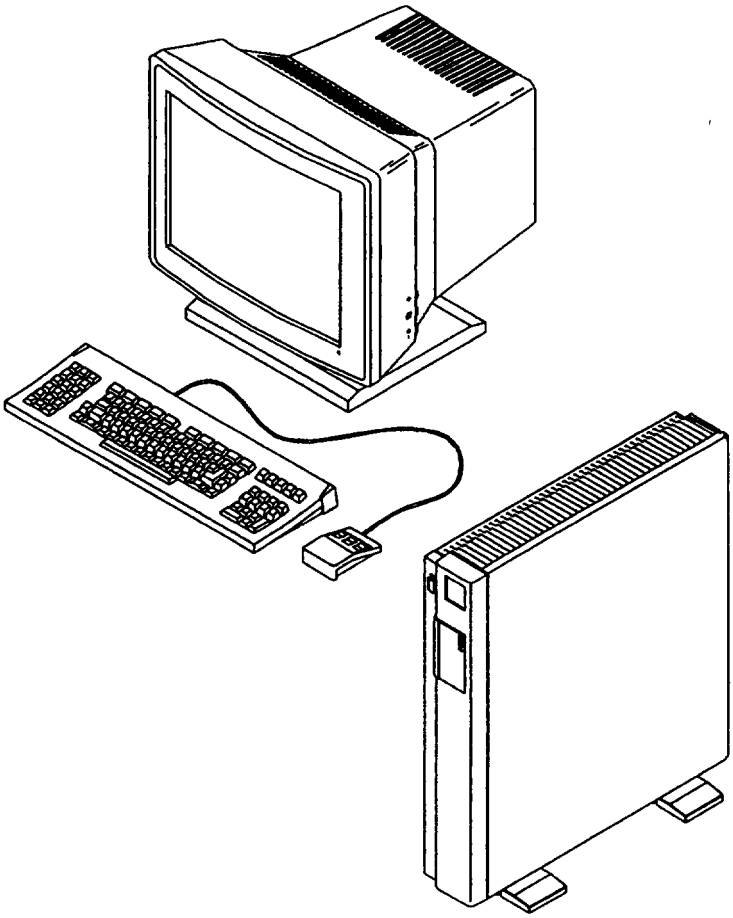


Figure 1–1. HP Apollo Model 400t, 425t, or 400dl Workstation

Physical Configurations

Model 400t, 425t, and 400dl systems consist of three physical units:

- System unit
- Monitor
- Keyboard

This section describes each of the major units and lists the components present in the system unit.

System Unit

The Model 400t and 425t system units contains the following components:

- CPU board
- Memory boards
- Winchester disk drive(s)
- Graphics controller board
- Optional network or HP-IB interface board
- Power supply

The Model 400dl system unit contains the following components:

- CPU board
- Memory boards
- Graphics controller board
- Power supply

The power cable used by the system unit differs depending on the country of installation.

Monitors

The Model 400t and 425t systems can be configured with the following monitor

- 19-inch, 1280 x 1024 monochrome monitor
- 16-inch, 1280 x 1024 color monitor
- 19-inch, 1280 x 1024 color monitor

The Model 400dl system can only use the 19-inch, 1280 x 1024 monochrome monitor.

Keyboards

Model 400t, 425t, or 400dl systems that run the Domain/OS operating system use the Domain low-profile keyboard.

Model 400t, 425t, or 400dl systems that run the HP/UX operating system use tl HP ITF keyboard.

The Domain keyboard connects to the rear of the system unit via a coiled cord that is permanently attached to the keyboard.

The ITR HP 46021A keyboard connects to the system unit via a detachable cord which is labeled at both ends. One end of the cord is labeled with a single dot, which connects to the HP-HIL port at the rear of the system unit (also labeled with a single dot). The other end of the cord is labeled with two dots, which connects to the port at the rear of the keyboard (also labeled with two dots). The keyboard also has a connector for HP-HIL devices, such as a mouse.

Winchester Disk Drive Specifications

Table 1-1 lists the specifications for the Model 400t and 425t internal 200-MB and 400-MB Winchester disk drive(s).

Table 1-1. Winchester Disk Drive Specifications

Characteristic	Specifications		
	Rodime 200-MB	**Quantum 200-MB**	**400 MB**
Capacity (formatted)	200 MB min.	210 MB min.	420 MB min.
Single cylinder seek	5 msec max.	5 msec max.	5 msec max.
Average seek time	18 msec	15.5 msec	14 msec
Maximum stroke	40 msec	30 msec	30 msec
Rotational speed	3600 rpm	3600 rpm	3600 rpm

Part 2 Model 400s, 425s, and 433s

The following sections describe the Model 400s, 425s, and 433s systems.

Overview

The Model 400s system uses the MC68030 microprocessor and the MC68882 floating-point coprocessor on an emulator board attached to the CPU board. The Model 425s and 433s systems use the MC68040 microprocessor. These system units are available in the following main configurations:

- Standard configuration, which includes two DIO-II interface slots (one for the graphics controller board or graphics processor interface board).
- DIO-II configuration, which includes the following:
  - Two DIO-II interface slots, one of which has the graphics controller board or graphics processor interface board
  - Three-slot DIO-II backplane is included for DIO-II accessory boards
- ISA configuration (Model 400s only), which includes the following:
  - Two DIO-II interface slots, one of which has the graphics controller board or graphics processor interface board
  - Four-slot personal computer backplane for ISA interface boards (which may be the Token Ring Network controller)
- EISA configuration (Model 425s and 433s only), which includes the following:
  - Two DIO-II interface slots, one of which has the graphics controller board or graphics processor interface board
  - Four-slot backplane for EISA interface boards
- Standard, EISA, or DIO-II configuration that includes a CPU board with integrated CRX and GRX graphics (Model 425s and 433s only)

Systems that run Domain/OS use the network controllers and the Domain low-profile keyboard. Systems that run HP/UX use the HP-IB interface board with

the HP 46021A keyboard and other HP-HIL devices. The systems also can include one to four disk drives. The display options are the following:

- Monochrome 19-inch, 1280 x 1024, bit-mapped monitor and graphics controller
- Color 16-inch, 1280 x 1024, bit-mapped monitor and graphics controller
- Color 19-inch, 1280 x 1024, bit-mapped monitor and graphics controller

Model 400s, 425s, and 433s systems use 4- and 16-MB memory modules. These modules are used in sets of two, allowing for system configurations of 8 MB to 128 MB of main memory in 8- and 32-MB increments.

Built-in interfaces on the CPU board include the following:

- HP-HIL keyboard and input device interface
- Audio output jack for optional external speaker
- Domain keyboard connector
- RS-232 (expandable with the optional 3-port adapter for Domain/OS systems)
- 802.3 network (AUI or ThinLAN, jumper selectable on the CPU board)
- Centronics Parallel Input/Output
- SCSI
- Monochrome GRX and Color CRX graphics interface (available on the optional CPU board with integrated graphics for Model 425s and 433s systems)

For systems that run HP/UX, you can configure parameters for the RS232, 802.3 network, Centronics parallel, and SCSI interfaces by using the Boot ROM I/O configuration program. (Refer to Appendix C for information about using the configuration program.)

Figure 1-2 shows a typical Model 400s, 425s, or 433s system.

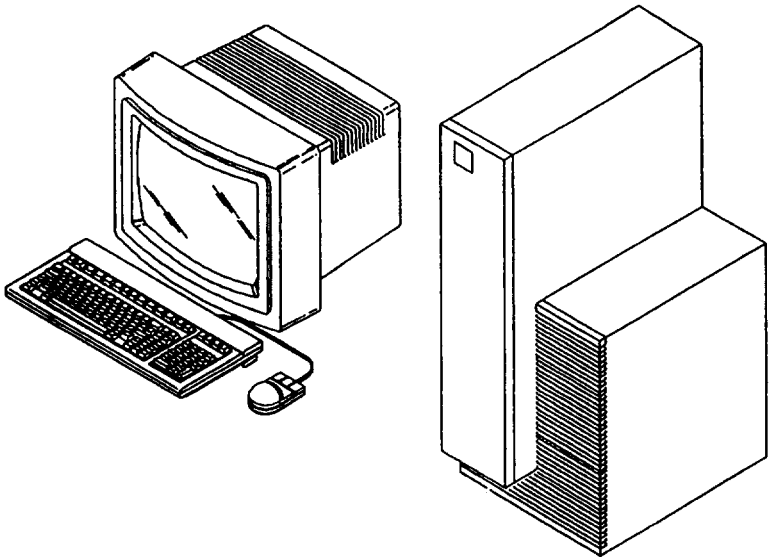


Figure 1–2. HP Apollo Model 400s, 425s, or 433s System

Accessory Cards/Boards

The following sections list the available DIO and AT-compatible accessory boards that are available for Model 400s, 425s, and 433s systems.

Supported DIO Accessory Boards

The following list shows the DIO-II accessory boards supported in Model 400s, 425s, and 433s system units. HP-UX supports all of these boards; Domain/OS supports only the HP 98643A LAN interface board.

- HP 36941A X.25/300 Link
- HP 91225A HP-HIL/Audio Interface
- HP 98286A HP-UX Dos Coprocessor
- HP 98622A 16-Bit Parallel
- HP 98624A HP-IB Interface
- HP 98628A Datacomm Interface
- HP 98638A 8-Port Multiplexer
- HP 98642A 4-Port Multiplexer
- HP 98643A LAN Interface
- HP 98644A RS-232 Interface
- HP 98646A VMEbus 16-Bit Interface
- HP 98649A SDLC Interface
- HP 98658A SCSI Interface
- HP 50692A SRM Interface

Supported AT-Compatible Accessory Boards

Model 400s, 425s, and 433s system units that run Domain/OS support the following AT-compatible accessory boards:

- A-ADD-PCC Domain DOS Co-processor
- A-ADD-SPE Serial/Parallel Interface
- A-NET-ATR Apollo Token Ring
- A-NET-ITR IBM Token Ring
- KIT-ATBUS-CENT Centronics Interface
- A-ADD-SCAT X.25 Serial Interface

Physical Configurations

Model 400s, 425s, and 433s systems consist of three physical units: the system unit, the monitor, and the keyboard. This section describes each of the major units and lists the components present in the system unit.

System Units

The system unit is available in three versions:

- Standard Model 400s, 425s, and 433s systems have the following components:
  - Power supply
  - Motherboard with two DIO-II slots
  - CPU board with attached emulator board and memory modules
  - Graphics controller or interface board
  - Mass storage devices
  - Fans

  An optional HP-IB interface board may also be included.
- DIO-II systems have an additional 3-slot DIO-II backplane.
- ISA Model 400s systems have an additional 4-slot ISA backplane that includes support for the Apollo Token Ring network board.

- EISA Model 425s or 433s systems have an additional 4-slot EISA backplane that includes support for the Apollo Token Ring network board.
- Model 425s and 433s systems with a newer chassis design can use the HP A1467A VMEbus Expander, which is an external chassis that holds up to eight VMEbus application cards. The VMEbus Expander connects to the system's VMEbus through a connector on the left side (facing) of the system unit.

Monitors and Graphics Controllers

Model 400s, 425s, and 433s systems can be configured with one of several monitors. They can also be configured with a graphics controller board or a graphics processor connected to a graphics interface board in the system unit.

Monitors

Supported monitors on Model 400s, 425s, and 433s workstations include the following:

- HP A1097A/A1097B high-resolution 19-in. color monitor
- HP 98754A high-resolution 19-in. color monitor
- HP 98789A high-resolution 16-in. color monitor
- HP 98774A high-resolution 19-in. monochrome monitor

Graphics Display Controllers

Supported graphics processors on Model 400s, 425s, and 433s workstations include the following:

- HP A1096A Monochrome VRX controller board
- HP A1416A Color VRX controller board
- HP 98705A Personal VRX P2 graphics processor
- HP 98705B Personal VRX P3 graphics processor
- HP 98735A Turbo VRX T1 graphics processor
- HP 98736A Turbo VRX T2 graphics processor
- HP 98736B Turbo VRX T3 graphics processor

Keyboards

Model 400s, 425s, and 433s systems that run the Domain/OS operating system use the Domain low-profile keyboard.

Systems that run the HP-UX operating system use the HP 46021B keyboard.

The Domain keyboard connects to the rear of the system unit via a coiled cord that is permanently attached to the keyboard.

The HP 46021A keyboard connects to the system unit via a detachable cord which is labeled at both ends. One end of the cord is labeled with a single dot, which connects to the HP-HIL port at the rear of the system unit (also labeled with a single dot). The other end of the cord is labeled with two dots, which connects to the port at the rear of the keyboard (also labeled with two dots). The keyboard also has a connector for HP-HIL devices, such as a mouse.

Internal Mass Storage

Refer to Table 1-2 for specifications of the storage device components for the Model 400s, 425s, and 433s system units. Mass storage devices include the following:

- HP A1442A 330 MB hard disk drive
- HP A1443A 660 MB hard disk drive for HP-UX
- HP A1444A 660 MB hard disk drive for Domain
- Micropolis 660 MB hard disk
- Micropolis and Hewlett-Packard 1.3 GB hard disk
- HP A1448A CD ROM disk drive
- HP A1449A QIC tape drive
- HP A1447A DAT tape drive

Table 1-2. Model 400s, 425s, and 433s Workstation Internal Mass Storage Devices

Specification	330 MB	660 MB	1.3 GB	CD ROM	QIC Tape	DAT Tape
Media Rate	1.6 MB/sec	1.6 MB/sec	1.6 MB/sec	175 KB/sec	90 KB/sec	183 KB/sec
SCSI Burst	5.0 MB/sec	5.0 MB/sec	5.0 MB/sec	1.5 MB/sec	1.5 MB/sec	1.5 MB/s
Capacity	330 MB	660 MB	1.36 GB	650 MB	60 MB	1.3 GB

Environmental/ Installation/PM

Model 400t, 425t, and 400dl System Units

The following sections list the environmental specifications, installation do mentation, and preventive maintenance that apply to Model 400t, 425t, and 400dl systems.

Environmental Specifications

Table 2-1 lists the environmental specifications for the Model 400t, 425t, a 400dl systems.

Table 2-1. Environmental Specifications for Model 400dl and for Model 400t and 425t with and without Mass Storage

Type	Specification
Temperature	5–40 degrees C operating
Humidity	95% maximum operating @ 40 degrees C
Vibration	Random operating 0.21G RMS
Shock	Shipping (package) 30G trapezoidal bench handling

Regulatory Requirements

This section lists the regulatory requirements for Model 400t, 425t, and 400 systems.

Electromagnetic Interference

- FCC Class A
- FTZ 1046 Level B
- VCCI Class 2

Safety

- UL 1950 with D3 deviations at 55 degrees C
- CSA 22.2 Number 220-M 1986 (self certify)
- IEC950/EN60950 with Nordic deviations at 55 degrees C
- EMKO TUE (74) DK 203
- Spanish Homologation to EN 60905

Ergonomics

- ZH1/618-1080

Installation

Refer to the documentation listed in Table 2-2 for information about installing the Model 400t, 425t, and 400dl systems.

Table 2-2. Model 400t, 425t, and 400dl Installation Manuals

Part Number	Manual Title
A1630-90001	*HP Apollo 9000 Series 400 Model 400t/dl Installation Card*
A1630-90006	*HP Apollo 9000 Series 400 Domain/OS Owners Guide*
A1630-90005	*HP Apollo 9000 Series 400 HP-UX Owners Guide*

Preventive Maintenance

Model 400t, 425t, and 400dl systems do not require preventive maintenance.

Model 400s, 425s, and 433s System Units

The following sections list the environmental specifications, installation documentation, and preventive maintenance that apply to Model 400s, 425s, and 400s systems.

Environmental Specifications

Table 2-3 lists the environmental specifications for the Model 400s, 425s, and 433s systems with internal mass storage devices.

Table 2-3. Environmental Specifications for Model 400s, 425s, and 433s System Units With Mass Storage

Type	Specification
Temperature	5-40 degrees C operating
Humidity	80% maximum operating @ 40 degrees C
Vibration	Random operating 0.21G RMS
Shock	Shipping (package) 30G trapezoidal bench handling

Table 2-4 lists the environmental specifications for the Model 400s, 425s, and 433s systems with no internal mass storage devices.

Table 2-4. Environmental Specifications for Model 400s, 425s, and 433s System Units Without Mass Storage

Type	Specification
Temperature	0-55 degrees C operating
Humidity	95% maximum operating @ 40 degrees C
Vibration	Random operating 0.21G RMS
Shock	Shipping (package) 30G trapezoidal bench handling

Regulatory Requirements

This section lists the regulatory requirements for Model 400s, 425s, and 433s systems.

Electromagnetic Interference

- FCC Class A
- FTZ 1046 Level B
- VCCI Class 1

Safety

- UL 1950 with D3 deviations at 55 degrees C
- CSA 22.2 Number 220-M 1986 (self certify)
- IEC950/EN60950 with Nordic deviations at 55 degrees C

Laser Safety

- European Harmonized Document 194
- IEC 825
- VBG 93
- BS4803 Part II
- 21 CFR Chapter 1 Sub-Chapter J

Ergonomics

- ZH1/618-1080

Installation

Refer to the documentation listed in Table 2-5 for information about installing the Model 400s, 425s, and 433s systems.

Table 2-5. Model 400s Installation Manuals

Part Number	Manual Title
A1421-90001	*HP Apollo 9000 Series 400 Installation Guide*
A1630-90006	*HP Apollo 9000 Series 400 Domain/OS Owners Guide*
A1630-90005	*HP Apollo 9000 Series 400 HP-UX Owners Guide*

Preventive Maintenance

Model 400s, 425s, and 433s systems do not require preventive maintenance.

Configuration 3

This chapter provides configuration information for Series 400 workstations and workstation FRUs.

Workstation and System Unit Configurations

Refer to the *HP Apollo 9000 Series 400 Support Matrix* for a complete list of supported accessories, peripherals, and operating systems.

FRU Configurations

The following subsections define the jumper and switch configurations for system boards and internal storage devices. Refer to the appropriate figure for configuration information for the FRU that you're replacing.

NOTICE: Series 400 system units do not use SCSI bus terminators on internal storage drives. No third-party internal storage devices can use terminators because other storage drives may not function properly. Refer to the third-party mass storage device's documentation for instructions.

CPU Board Configurations

Figure 3-1 shows the jumper locations for Series 400 CPU boards without integrated graphics. Figure 3-2 shows the jumper locations for the CPU board with integrated graphics. Refer to Table 3-1 to find the clock speeds of these CPU boards for the various Series 400 systems.

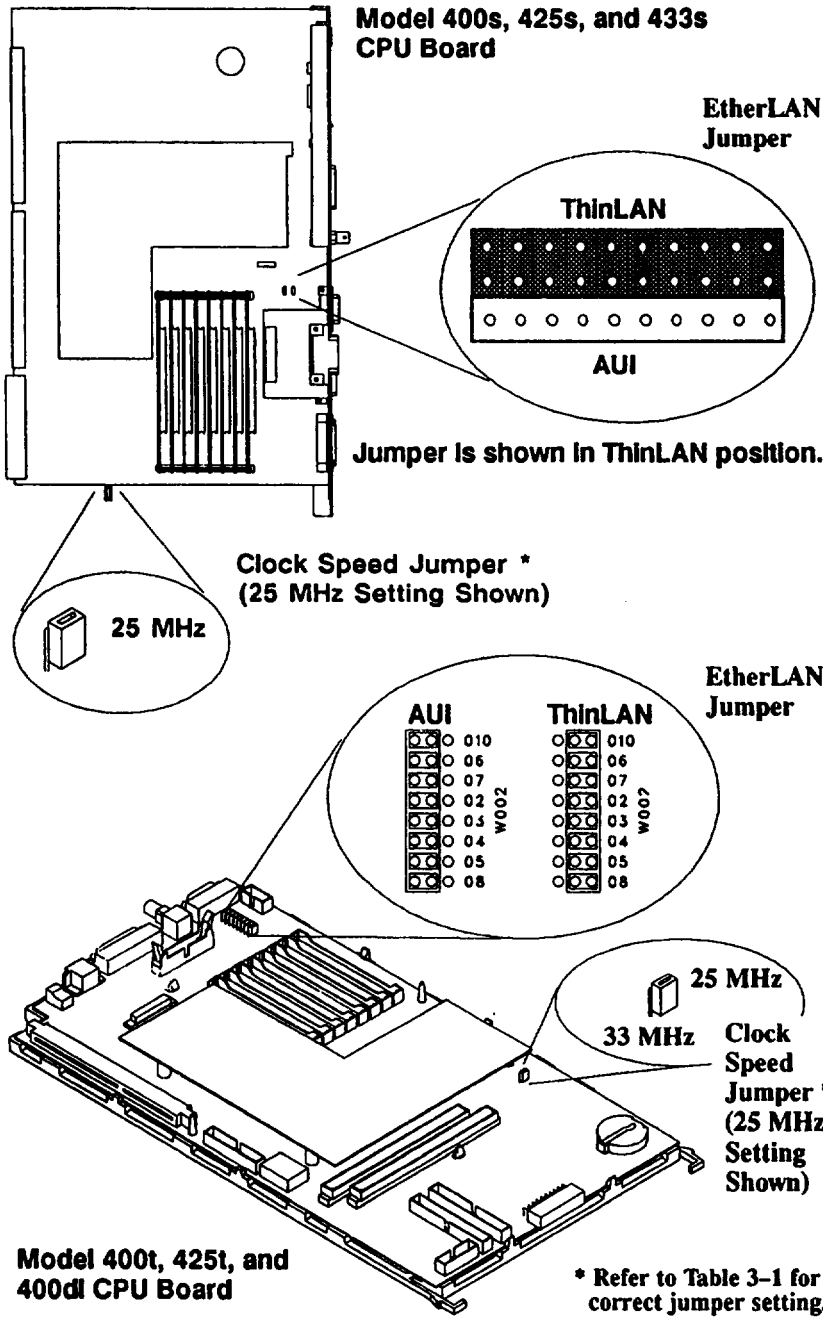


Figure 3–1. Jumper Configurations for CPU Boards Without Integrated Graphics

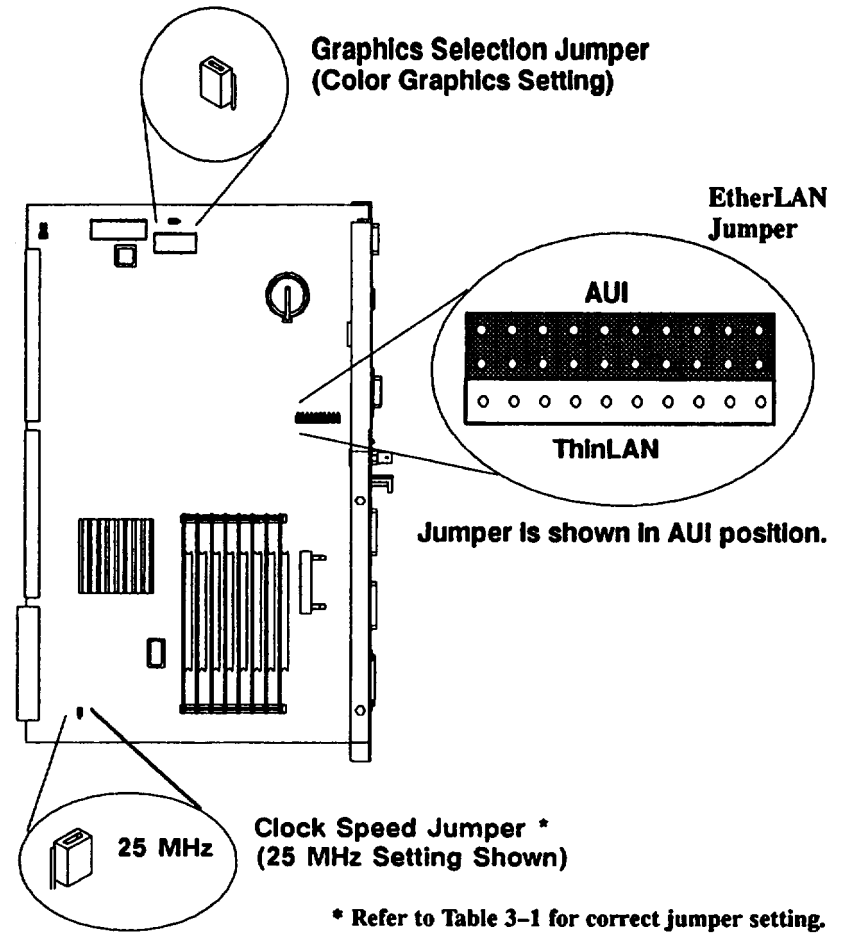


Figure 3-2. Jumper Configurations for the CPU Board with Integrated Graphics

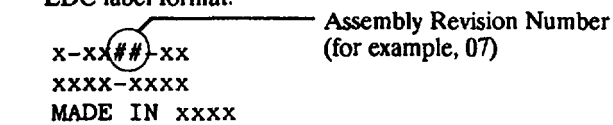
Table 3-1 shows the jumper settings for the clock speed of the different Series 400 system models.

Table 3–1. Jumper Configurations for CPU Board Clock Speed

Model	Integrated Graphics?	EDC Label Assy Rev	Jumper Setting
400dl/400t	No	N/A	25 MHz
425t/425s	No	≤ 06	33 MHz
425t/425s	No	≥ 07	25 MHz
425s	Yes	N/A	25 MHz
433s	No	N/A	33 MHz
433s	Yes	N/A	33 MHz

For Model 425t and 425s systems, the clock speed depends on the assembly revision listed on the CPU board's EDC label. Identify the assembly revision number at the following location on the EDC label:

EDC label format:



HP A1416A VRX Color Graphics Controller

Figure 3-3 shows the default switch configuration for the VRX Color Graphics Controller board. For alternative switch configurations, refer to the *HP A1416A Graphics Interface Familiarization Guide.*

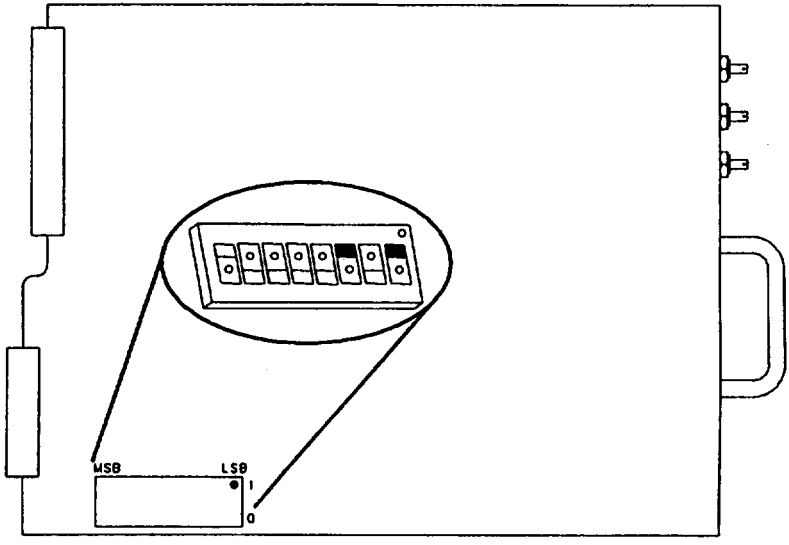


Figure 3-3. HP A1416A Color Graphics Controller Switch Configuration

HP A1096A VRX Monochrome Graphics Controller

Figure 3–4 shows the jumper locations for the VRX Monochrome Graphics Controller board. Table 3–2 lists the jumper configurations.

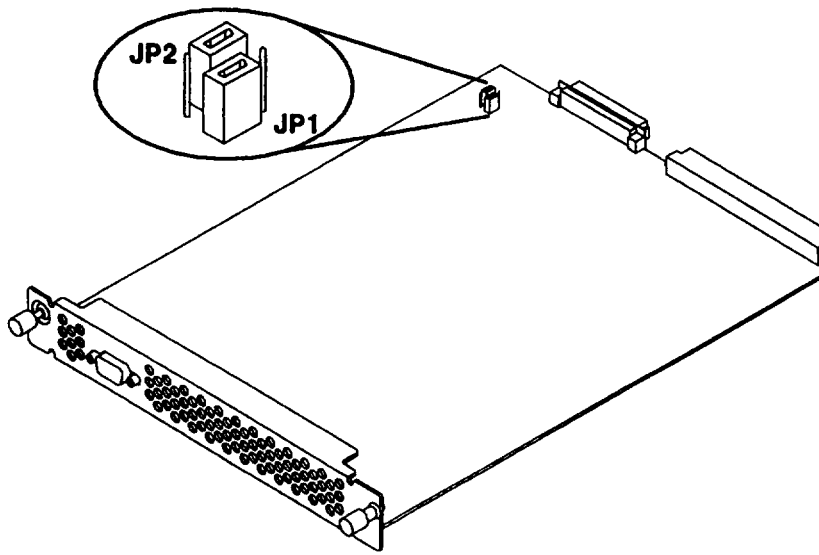


Figure 3–4. VRX Monochrome Graphics Controller Jumpers

Table 3–2. Jumper Configurations for VRX Monochrome Controller

JP2 JP1	Address (Hex)
	1000000
	1400000
	1800000
	1C00000

802.5 Network Controller-AT

Figure 3-5 shows the standard jumper configuration for the 802.5 Network Controller-AT. Figure 3-6 shows the alternate jumper configuration. Use the standard jumper configuration for the first or only 802.5 controller in the system. Use the alternate jumper configuration for a second 802.5 controller, or for the only 802.5 controller if another option board in the system uses the standard configuration parameters.

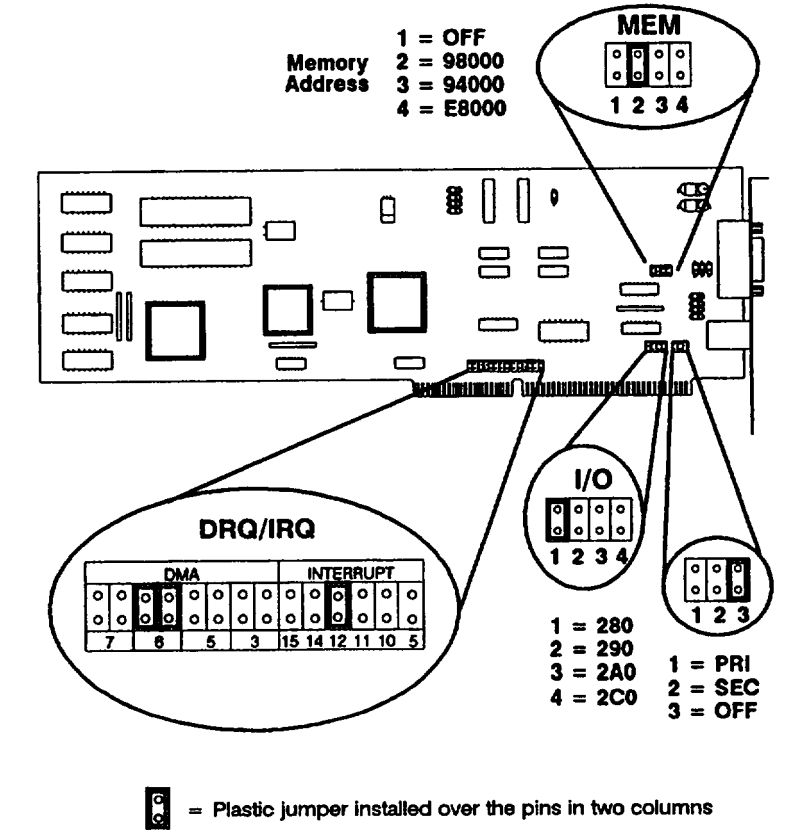


Figure 3-5. Standard 802.5 Network Controller-AT Jumper Configuration

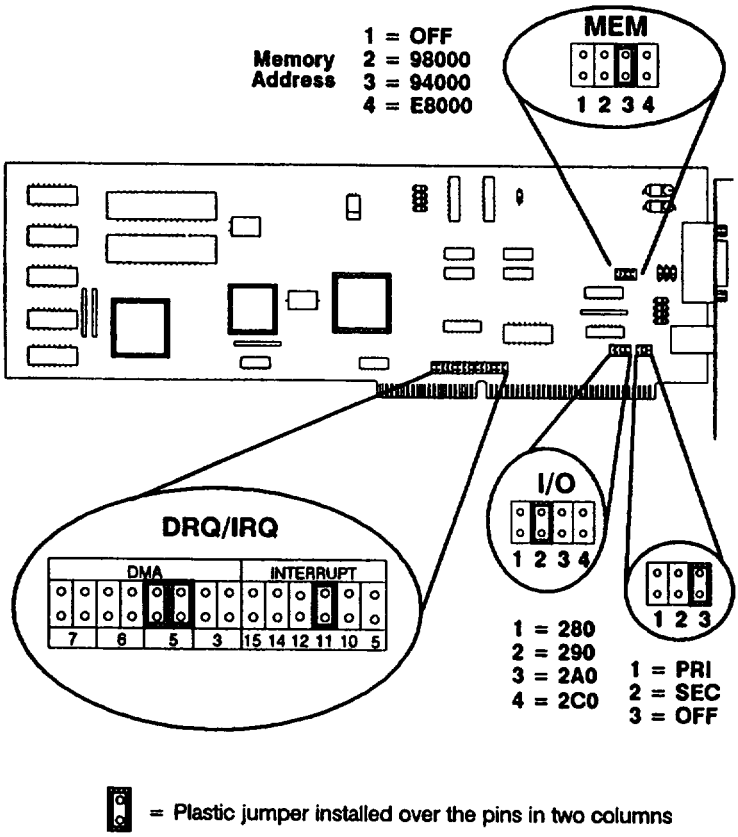


Figure 3–6. Alternate 802.5 Network Controller–AT Jumper Configuration

Apollo Token Ring Network Controller–AT

Figure 3–7 shows the standard jumper settings for the first or only Apollo Token Ring Network Controller–AT. Figure 3–8 shows the alternate jumper settings for the second Apollo Token Ring Network Controller–AT.

NOTICE: Jumper W11 is factory selected; *do not remove.*

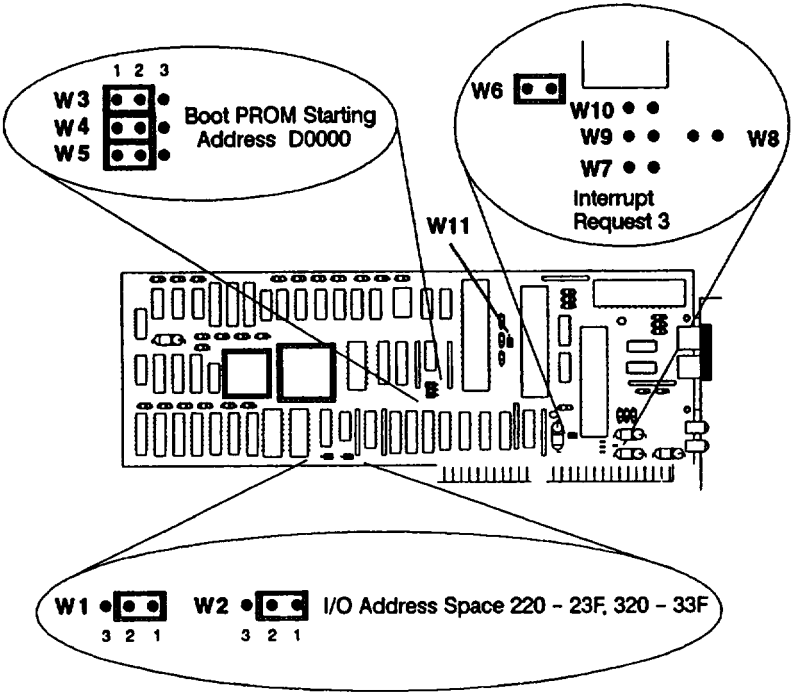


Figure 3–7. Apollo Token Ring Network Controller–AT Jumper Settings

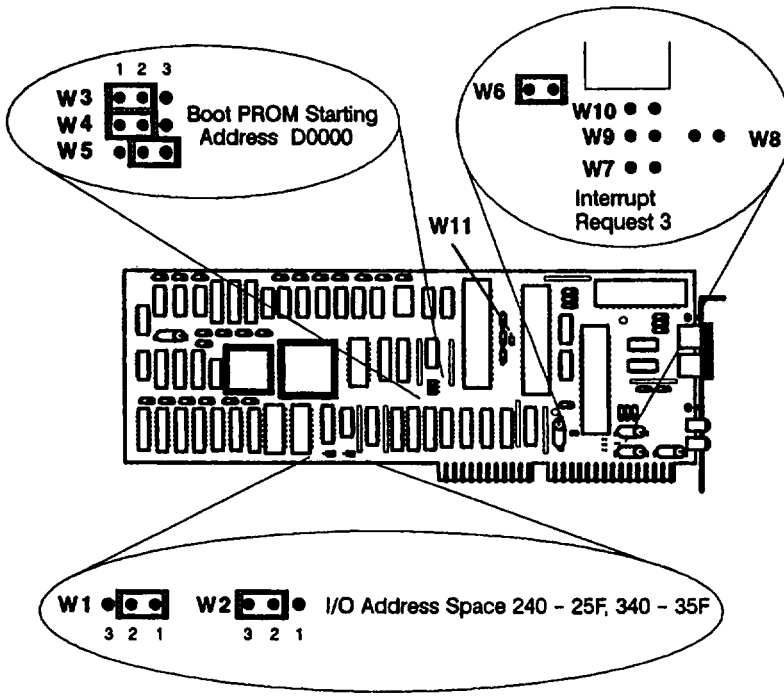


Figure 3–8. Alternate Apollo Token Ring Network Controller–AT Jumper Settings

PC Coprocessor Board

Figure 3-9 shows the standard jumper configurations for the PC Coproces board. Figure 3-10 shows the alternate jumper configurations for the PC Coprocessor board.

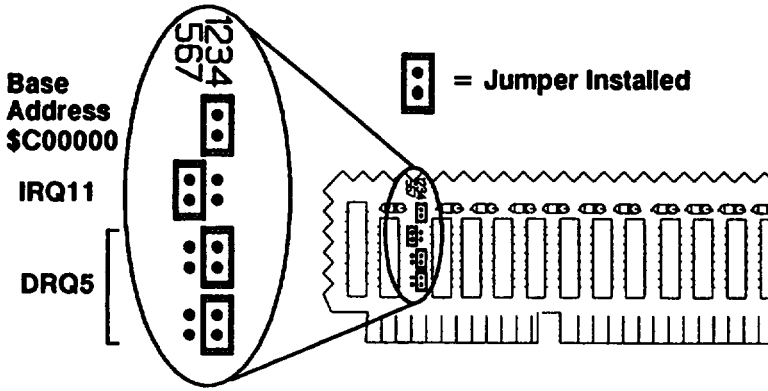


Figure 3-9. PC Coprocessor Standard Jumper Configurations

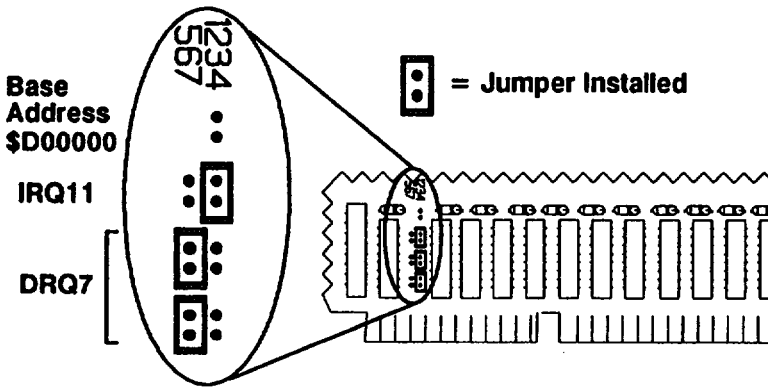


Figure 3-10. PC Coprocessor Alternate Jumper Configurations

Rodime 200 MB Disk Drive

Figure 3–11 shows the jumper configurations for the Rodime 200 MB Winchester Disk Drive.

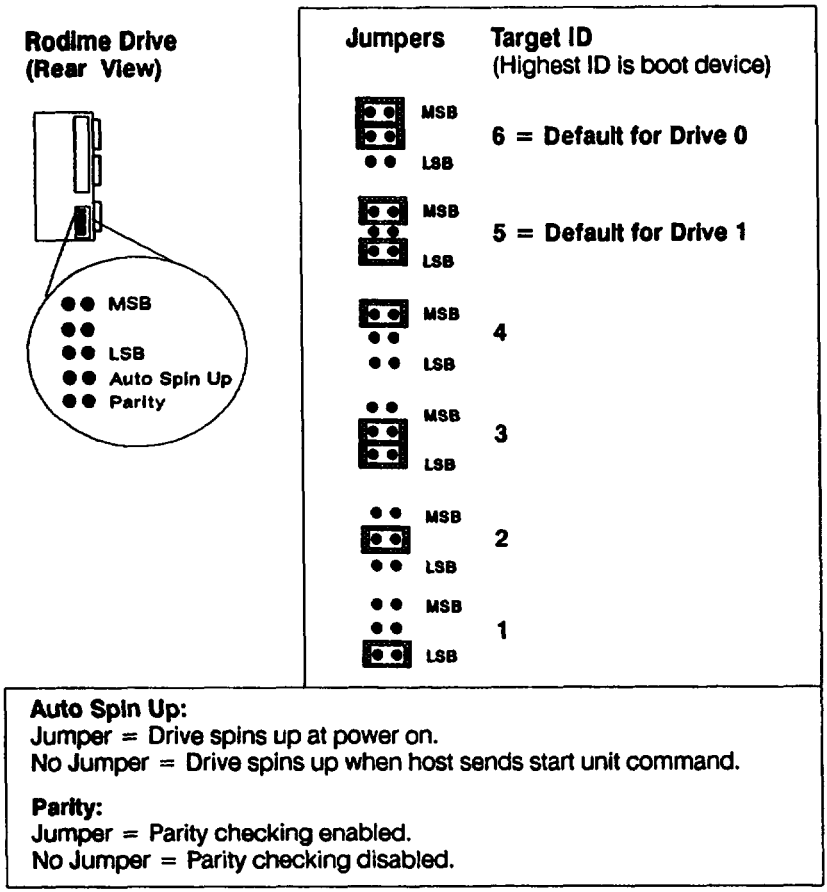
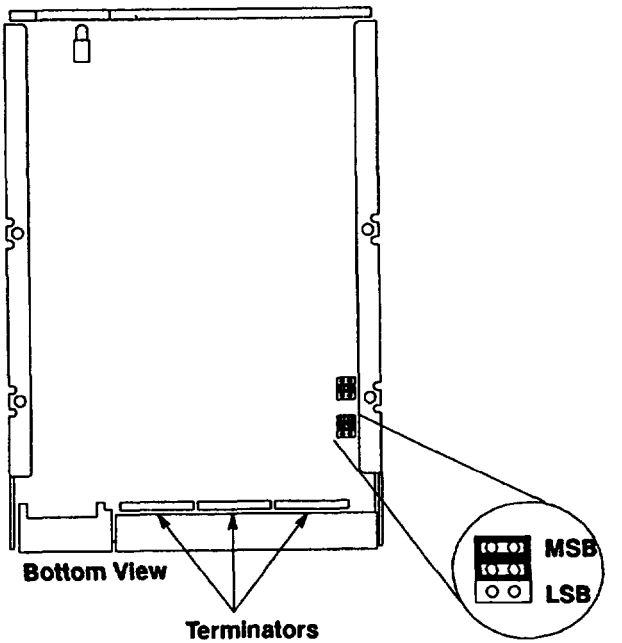


Figure 3–11. 200 MB Rodime Winchester Disk Drive

Quantum 200 MB and 400 MB Disk Drive

Figure 3–12 shows the jumper configurations for the 200 MB and 400 MB Quantum disk drives. If present, remove the terminators from the drive.



Jumpers	Target ID (Highest ID is boot device)
MSB LSB	6 = Default for Drive 0
MSB LSB	5 = Default for Drive 1
MSB LSB	4
MSB LSB	3
MSB LSB	2
MSB LSB	1

Figure 3–12. 200 MB and 400 MB Quantum Disk Drive

Hewlett-Packard 400 MB Disk Drive

Figure 3–13 shows the jumper configurations for the 400 MB Hewlett-Packard disk drive. If present, remove the terminators from the drive.

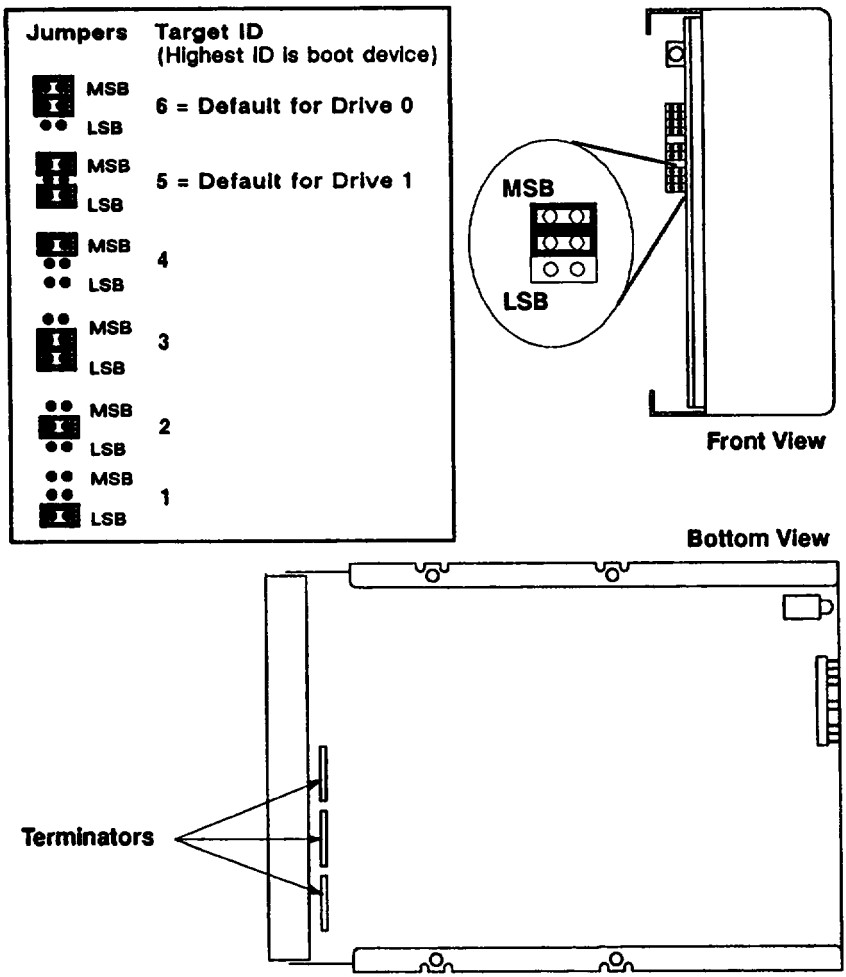
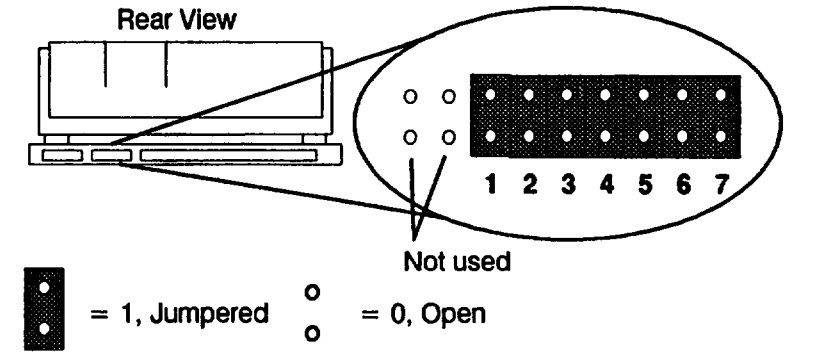


Figure 3–13. 200 MB and 400 MB Quantum Disk Drive

HP 1442A 330 and HP A1443A 660 MB Disk Drive

Figure 3-14 shows the jumper configurations for the HP 330 MB and 660 MB disk drives.



Pin Set	Function: 0 = Open, 1 = Jumpered
1	Reserved for future use, normally 1.
2	Drive initiation of SDTR message: 0 = Inhibit initiation of SDTR message. 1 = Enable initiation at power on and RESET.
3	Parity: 0 = Parity checking is disabled. 1 = Parity checking is enabled.
4	Auto spin up: 0 = Drive does not spin up until host sends start unit command. 1 = Drive automatically spins up at power on.
5–7	SCSI address; 7 is LSB.

5 6 7	Address	5 6 7	Address
0 0 0	0	1 0 0	4
0 0 1	1	1 0 1	5
0 1 0	2	1 1 0	6
0 1 1	3	1 1 1	7

Figure 3-14. HP 1442A 330 and HP A1443A 660 MB Disk Drive

Micropolis 660 MB and 1.3 GB Disk Drives

Figure 3-15 shows the jumper configurations for the Micropolis 660 MB and 1.3 GB disk drives. If present, remove the SCSI terminator from the drive. See Figure 3-16 for the location of SCSI terminator.

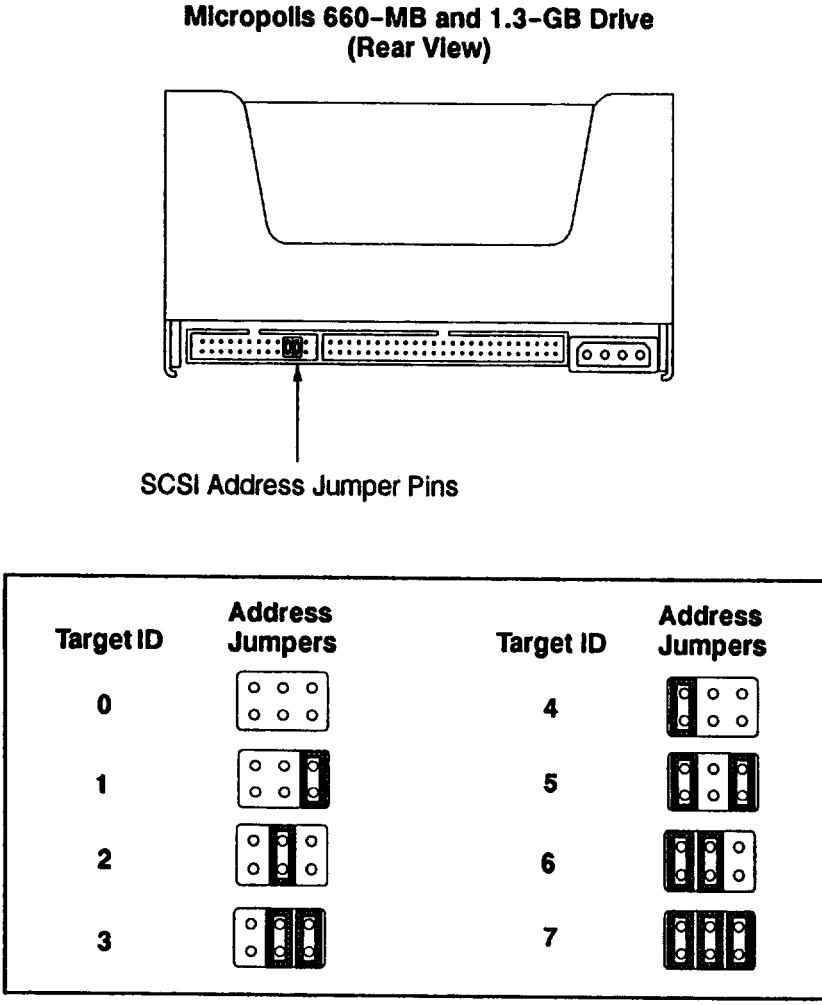


Figure 3-15. Micropolis 660 MB and 1.3 GB Disk Drives

Micropolis 660-MB and 1.3-GB Drive (Bottom View)

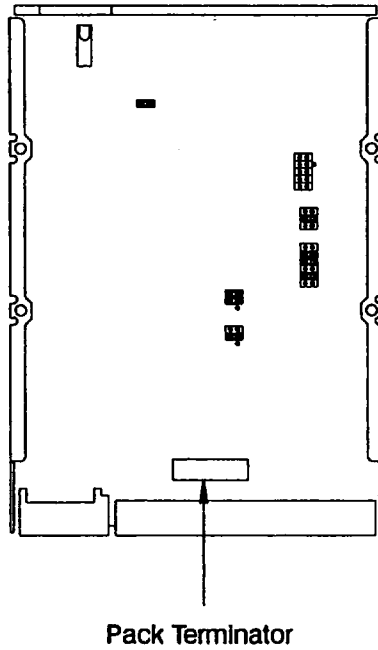
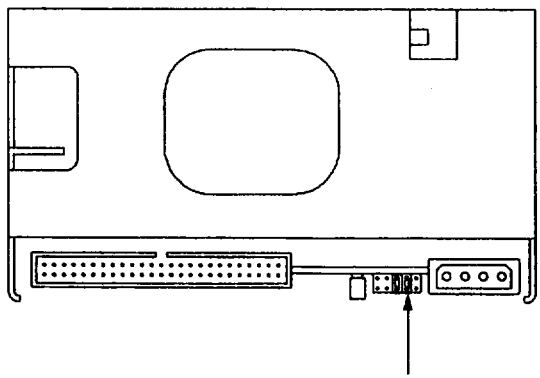


Figure 3-16. Micropolis 660 MB and 1.3 SCSI Terminator Locations

Hewlett-Packard 1.3 GB Disk Drive

Figure 3-17 shows the jumper configurations for the Hewlett-Packard 1.3 GB Hard Disk Drive. If present, remove the SCSI terminators from the drive. See Figure 3-18 for the location of SCSI terminators.

Hewlett-Packard 1.3-GB Drive
(Rear View)



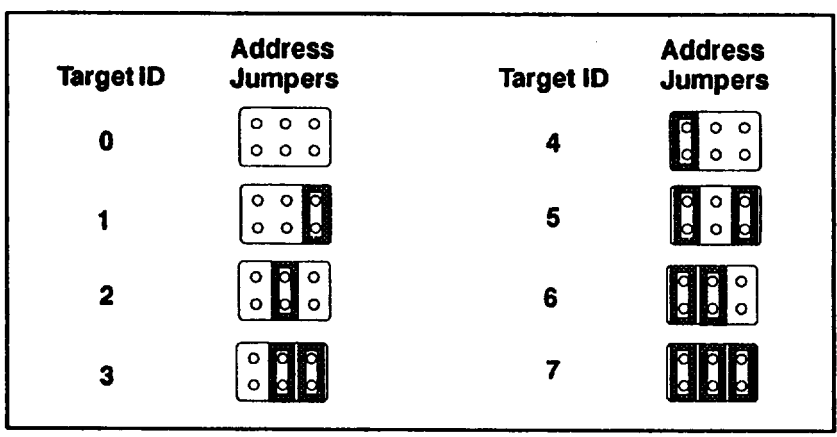


Figure 3-17. Micropolis 660 MB and 1.3 GB Disk Drive

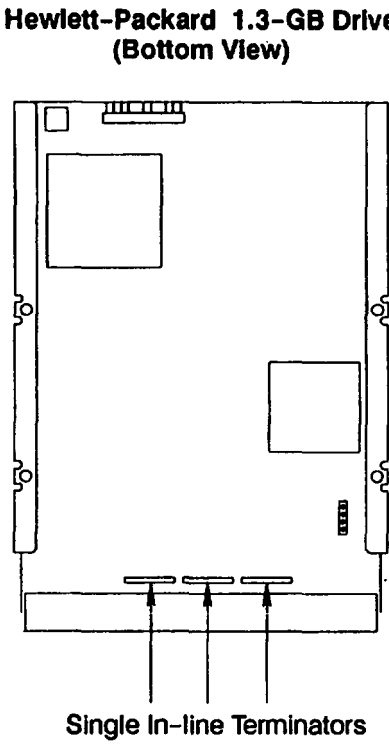
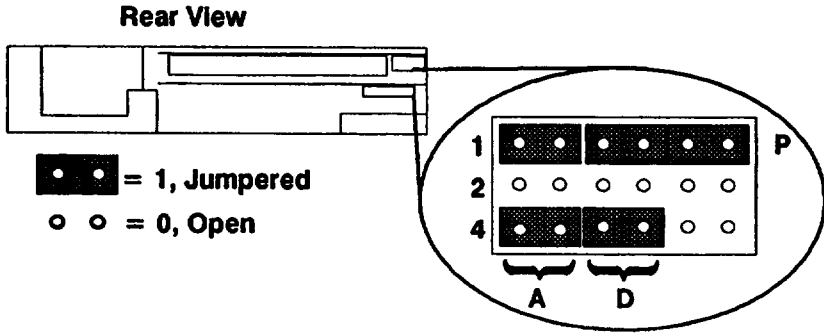


Figure 3–18. Hewlett-Packard 1.3 GB SCSI Terminator Locations

HP A1449A 0.25-in. QIC 60-MB Tape Drive

Figure 3-19 shows the jumper configurations for the QIC 60-MB Tape Drive.



Pin Set	Function: 1 = Jumpered, 0 = Open
A	SCSI ID address; 0 is LSB

1 2 4	Address	1 2 4	Address
0 0 0	0	0 0 1	4
1 0 0	1	1 0 1	5
0 1 0	2	0 1 1	6
1 1 0	3	1 1 1	7

P — Parity:
0 = Parity checking is disabled.
1 = Parity checking is enabled.

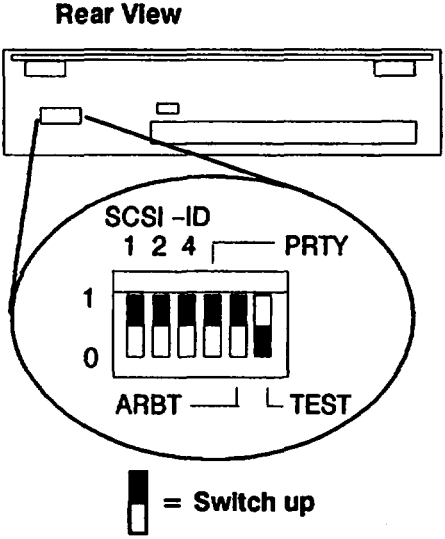
D — Disconnect Size: 0 is LSB

1 2 4	Byte Size	1 2 4	Byte Size
0 0 0	2K	0 0 1	12K
1 0 0	4K	1 0 1	16K
0 1 0	6K	0 1 1	24K
1 1 0	8K	1 1 1	32K

Figure 3-19. HP A1449A 0.25-in. QIC 60 MB Tape Drive

HP A1448A CD-ROM Drive

Figure 3-20 shows the jumper configurations for the CD-ROM drive.



Switch	Function and Settings
1,2,4	SCSI ID address; 1 is LSB

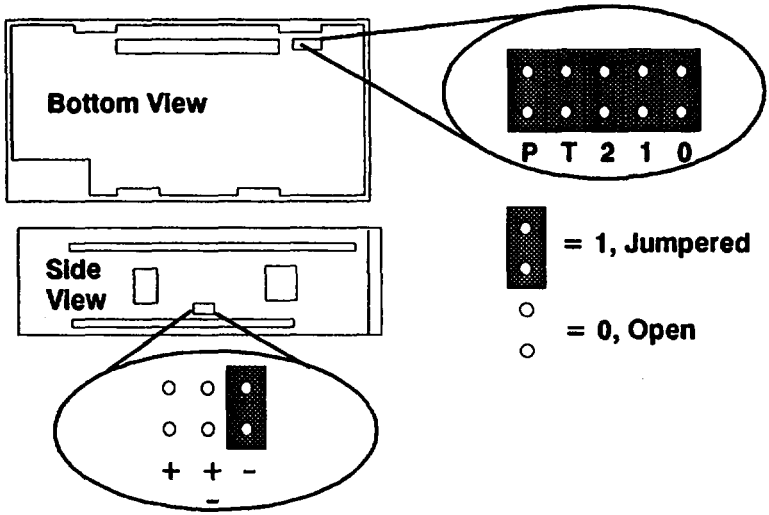
1 2 4	Address	1 2 4	Address
0 0 0	0	0 0 1	4
1 0 0	1	1 0 1	5
0 1 0	2	0 1 1	6
1 1 0	3	1 1 1	7

PRTY	Parity: 0 = Parity checking is disabled. 1 = Parity checking is enabled.
ARBT	Arbitration: 0 = Arbitration is disabled. 1 = Arbitration is enabled.
TEST	Test: For repair facility use only.

Figure 3-20. HP A1448A CD ROM Drive

HP A1447A DAT Tape Drive

Figure 3-21 shows the jumper configurations for the DAT tape drive.



Pin Set	Function: 0 = Open, 1 = Jumpered
P	Parity: 0 = Parity checking is disabled. 1 = Parity checking is enabled.
T	Power supply voltage to the on-board terminating resistors: 0 = Terminator power is enabled. 1 = Terminator power is disabled.
2–0	SCSI address; 0 is LSB

2 1 0	Address	2 1 0	Address
0 0 0	0	1 0 0	4
0 0 1	1	1 0 1	5
0 1 0	2	1 1 0	6
0 1 1	3	1 1 1	7

+	Vertical mounting, eject button down
+/-	Horizontal mounting, tape slot up
-	Vertical mounting, eject button up

Figure 3-21. HP A1447A DAT Tape Drive

Series 400 Systems EEPROM

The EEPROM stores the node ID, the network priority, and (at SR10.3 PSK8) the bus clock speed used by Domain compatible systems. The EEPROM also stores the I/O configuration information used by HP-UX compatible systems. To retain this information when you replace a CPU board, transfer the original EEPROM to the new CPU board. If you replace a defective EEPROM, use the EEPROM part numbers listed in Chapter 7 to order a replacement EEPROM with the same node ID as the original EEPROM.

CAUTION: Use an anti-static strap to prevent electrostatic damage to the EEPROM. Electrostatic damage can destroy the EEPROM or erase configuration information from the EEPROM.

This section explains how to remove the EEPROM from a CPU board because the EEPROM has failed or because you are replacing the CPU board. Refer to the appropriate subsection for the type of procedure that you are performing.

Transferring an EEPROM to a Replacement CPU Board

When replacing a CPU board, remove the EEPROM from the failed CPU board and install it in the new/exchange CPU board. Refer to Figure 3-22 for the location of the EEPROM on a Model 400t, 425t, and 400dl CPU board. Refer to Figure 3-23 for the location of the EEPROM on the two types of Model 400s, 425s, and 433s CPU boards. Use an EEPROM puller to remove the EEPROM.

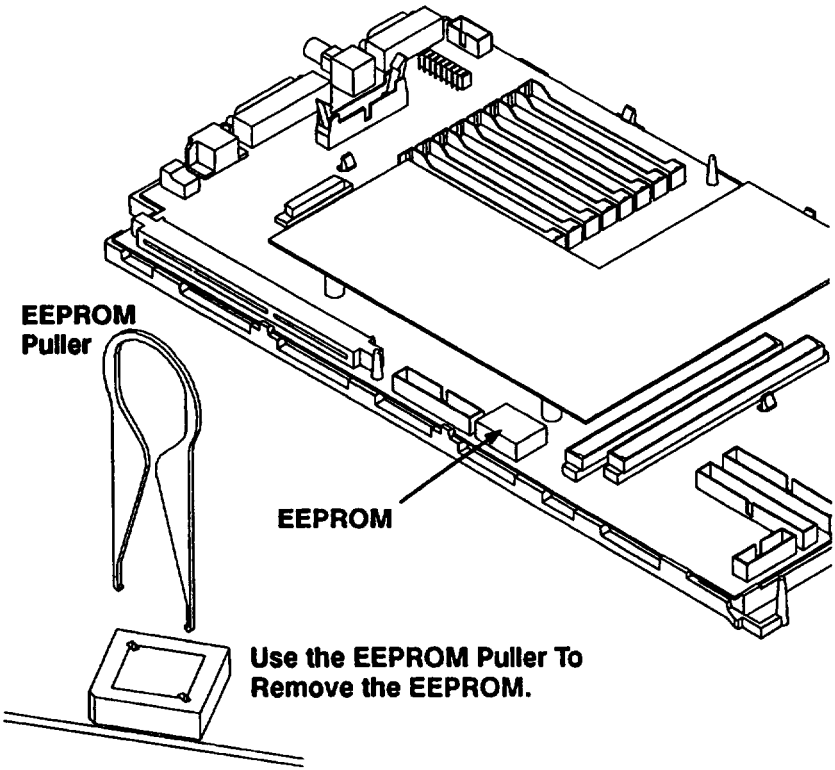


Figure 3–22. Removing the EEPROM (Model 400t, 425t, and 400dl)

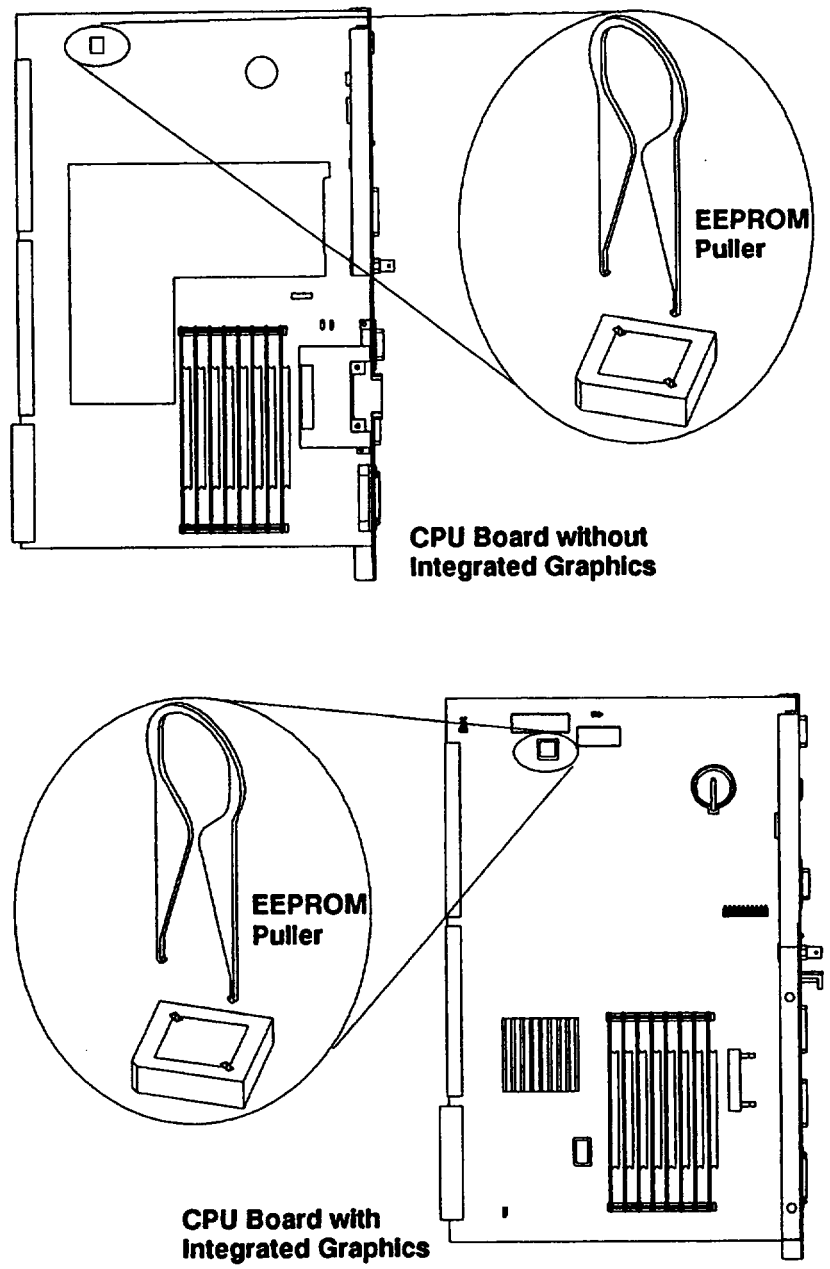


Figure 3–23. Removing the EEPROM (Model 400s, 425s, and 433s)

Replacing a Defective EEPROM

Figure 3-24 shows how to remove the EEPROM from the Model 400t, 425t, or 400dl system unit without removing the CPU board. To replace an EEPROM in a Model 400s, 425s, or 433s system unit, you must remove the CPU board. Refer to the appropriate CPU board in Figure 3-23 for the location of the EEPROM.

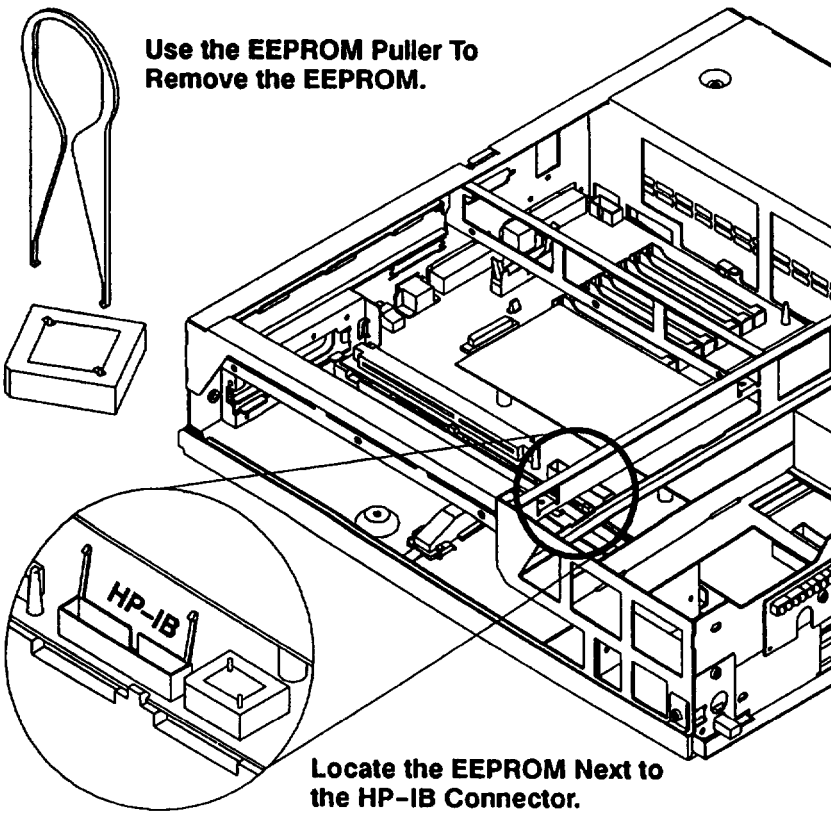


Figure 3-24. Replacing the EEPROM in a Model 400t, 425t, or 400dl

When you replace a failed EEPROM, or if the EEPROM has been corrupted, perform the appropriate bulleted step:

- For systems that use Domain Compatible mode, perform the following steps:

  1. Use the Boot ROM configuration program to select Domain Compatible mode, the primary network for the system, and at SR10.3 PSK8, the bus clock speed.

  2. Run the Chuvol utility.

- For systems that use HP-UX Compatible mode, use the Boot ROM configuration program to perform the following steps:

  1. Select HP-UX Compatible mode.

  2. Set the Auto System Select and I/O Configuration modes to their previous configurations.

  3. Change the LAN ID in the cluster configuration file to that of the new EEPROM.

NOTICE: Because the EEPROM stores the node ID, application software for Domain/OS systems that rely on the node ID for licensing requirements may not function after you replace the EEPROM.

Configuring the EEPROM on HP-UX Compatible Mode Systems

This section explains how to configure the EEPROM for the boot mode, auto system select, and integrated interfaces for HP-UX systems.

Boot Mode Selection

Perform the following steps to select the boot mode for an HP-UX system:

1. If you have already booted an operating system, log out and stop any user processes. If not, go on to step 2.

2. If the system unit is operating in HP-UX mode, reset the system unit and get the power-up display. Then, when the keyboard is identified, type the following command:

   C <Return>

3. If the system unit is operating in Domain mode, reset the system unit and type the following comand:

   CF <Return>

4. From the Configuration Control Menu, type the number key command to get the Boot Mode Selection Menu:

   key **<Return>**

5. From the Boot Mode Selection Menu, type the number key for the Boot Mode you want to use.

   key **<Return>**

6. From the Boot Mode Selection sub-menu, type the command to make the selection temporary (T) or permanent (P):

   key **<Return>**

7. To execute the menu, type the following command:

   E <Return>

8. The system unit resets and goes into the boot mode you have selected.

Auto System Select Mode for HP-UX Compatible Mode Systems

Perform the following steps to use the Auto System Select mode:

1. If you have already booted an operating system, log out and stop any user processes. If not, go to step 2.

2. Reset the system unit and get the power-up display. Then, when the keyboard is identified, type the following command:

   C <Return>

3. From the Configuration Control Menu, type the following command to get the Auto System Select Menu:

   2 <Return>

4. From the Auto System Select Menu, type the number key for the option status you want to change:

   key **<Return>**

5. To execute the menu, type the following command:

   E <Return>

6. If you set the menu to select a system, the system unit resets and displays the available operating systems in the upper right-hand corner of the display. Select the operating system you want to boot by typing the number and letter key for the system:

   key key **<Return>**

7. If you set the menu to store the selected system, the path to that operating system is stored. The next time the system unit is turned on, that operating system boots.

Internal I/O Configuration Mode for HP-UX Compatible Mode Systems

This section explains how to configure the built-in interfaces under Boot ROM control by using keyboard inputs.

Default and Optional Configurations

Table 3-3 lists the available options for configuring the built-in interfaces.

Table 3-3. Built-In Interface Default Configurations

Interface	Configuration Function	Default	Options
Optional HP-IB	Select Code (cannot be changed)	7	None
	System Controller	Yes	No
RS-232	Select Code	9	0 to 31
	Remote/Local		
	sys. unit shipped with kbd.	Local	Remote
	sys. unit shipped without kbd.	Remote	Local
	Interrupt Level	3	3 to 6
	Modem Enable	Yes	No
SCSI	Select Code	14	0 to 31
	Interrupt Level	3	3 to 6
	Bus Address	7	0 to 7
	Parity	Yes	No
Thin/AUI LAN	Select Code	21	0 to 31
	Interrupt Level	5	3 to 6
HP Parallel	Select Code	12	0 to 31
	Interrupt Level	3	3 to 6

Changing I/O Configuration

Perform the following steps to change an interface configuration:

1. If you have already booted an operating system, log out and stop any user processes. If not, go on to step 2.

2. Reset the system unit. When the power-up display, identifies the keyboard, type the following command:

   C <Return>

3. From the Configuration Control Menu, type the following command display the I/O Configuration Menu:

   1 <Return>

4. From the I/O Configuration Menu, type the number for the interface that you want to configure:

   key **<Return>**

5. Type the number for the feature that you want to change:

   key **<Return>**

6. Type the number or letter key(s) to change the feature:

   key(s) **<Return>**

7. Exit the selected interface menu by typing the following command:

   X <Return>

8. Type the appropriate letter key to store the new values, store the default values, or abort and not make any changes:

   key **<Return>**

9. When you turn on the system unit for the first time and the Configuration Control Menu appears, type the following command to enter the Auto System Select Mode:

   2 <Return>

10. If you have already selected an operating system, abort the menu without making changes by typing the following command:

    A <Return>

Configuring the EEPROM on Domain Compatible Mode Systems

This section describes how to select Domain Compatible mode, network priority, and clock speed for systems that run Domain/OS. The system EEPROM stores this information.

You must configure the EEPROM if any of the following events occurs:

- You have replaced the system EEPROM with a new EEPROM that is not configured correctly.
- The EEPROM mode configuration is corrupted, possibly because of electrostatic discharge when handled without using a grounding strap.
- A Domain/OS system ships from the factory with an incorrectly configured EEPROM.

Refer to the appropriate susbsection for your selected task.

Selecting Domain Compatible Mode

Perform the following steps to configure the system to run in Domain Compatible mode.

1. Turn on the system unit.
2. Perform the appropriate substep according to the type of display on the screen:

A. If you see the following display (the undefined mode display), go directly to Step 5.

```
Copyright 1990,                    Configuration Control
Hewlett-Packard Company,          Keys Mode Name          Class
All Rights Reserved.              ---------------------------
                                    1  I/O Configuration
BOOTROM Rev. n.n dd/mm/yy           2  Boot Mode Selection
MD nn REV n.nn, yyyy/mm/dd hh:mm:ss          .
MC680n0 Processor                            .
        .                                    .
        .                           A  Abort without changes
        .                         ---------------------------
                                   Type [key] Return ?




Configuration Mode
RESET to Power-up
```

B. If you see the following display (the HP-UX Compatible mode display), go to Step 3.

```
Copyright 1990,
Hewlett-Packard Company,
All Rights Reserved.

BOOTROM Rev. n.n dd/mm/yy
MD nn REV n.nn, yyyy/mm/dd hh:mm:ss
MC680n0 Processor
        .
        .
        .




System Search Mode
RESET to Power-up
```

3. Perform Substep A for systems with a Boot ROM revision of 2.0 or greater. Perform Substep B for systems with a Boot ROM revision less than 2.0.

   A. *For Boot ROMs with a revision of 2.0 or greater,* type the following command:

      dom <Return>

      After the double beep, type **<Return>** to set permanent Domain compatible mode and reset the system. Then go to Step 8.

   B. *For Boot ROMs with a pre-2.0 revision,* when the system displays `system search mode` on the bottom of the screen, display the Configuration Control menu by typing the following command:

      c <Return>

4. Select the Boot Mode Selection menu by typing the following at the prompt:

   `Type [key] Return ?` **3 <Return>**

   Go to Step 6.

5. Select the Boot Mode Selection menu by typing the following at the prompt:

   `Type [key] Return ?` **2 <Return>**

6. Select Permanent Domain Compatible mode by typing the following the prompts:

   `Type [key] Return ?` **1 <Return>**

   `Type T or P Return ?` **p <Return>**

7. Store the Domain Compatible mode selection in the EEPROM by typing the following command:

   <e> <Return>

   After the double beep, type **<Return>**.

8. If in SERVICE mode, the system displays the MD header and MD prompt. If in NORMAL mode, the system executes Self Test diagnostics and boots Domain/OS. Refer to the *Series 400 Workstation Domain/OS Owner's Guide* for more detailed information about selecting operating modes.

Selecting the Primary Network

Perform the following steps to select the primary network for the system. If you are selecting a primary network for a diskless system, select the same primary network used by the partner node.

1. Stop any user processes and log out.

2. Shut down to the MD prompt by typing the following at the `login:` prompt:

   `login:` **shut <RETURN>**

3. Type the following at the MD prompt (>):

   > pnet *x* **<RETURN>**

   where *x* corresponds to one of the following values:

   e for 802.3 network
   r0 for Apollo Token Ring network with network controller 0
   r1 for Apollo Token Ring network with network controller 1
   t0 for 802.5 network with network controller 0
   t1 for 802.5 network with network controller 1

   If the system uses two Apollo Token Ring or 802.5 network controller boards, you must specify controller 0 (r0 or t0) or controller 1 (r1 or t1 as the primary controller. The default is 0.

4. Type the **pnet** command to confirm the primary network:

   > pnet <RETURN>

   You receive the following system message:

   ```
   APOLLO TOKEN RING: CONTROLLER = 0
   ```

   The example display shows that the primary network is set to controll 0 for the Apollo Token Ring network.

Selecting the System Clock Speed

Domain/OS and SAX rely on the system clock speed that is stored in the EEPROM to run correctly. You must load the correct clock speed (as listed in Table 3–4) for the system if you replace the EEPROM or if the EEPROM becomes corrupted.

Table 3–4. Clock Speed Settings

Model	Clock Setting
400dl	25 MHz
400t	25 MHz
425t	25 MHz
425s	25 MHz
433s	33 MHz

Run the **config** program, as described in the following steps, to display or change the system clock speed.

1. Stop any user processes and log out.

2. Shut down to the MD prompt by typing the following at the `login:` prompt:

   `login:` **shut <Return>**

3. Type the following at the MD prompt:

   > RE <Return>

   After the beep, type **<Return>**.

4. Type the following text to execute the config program:

   > EX CONFIG <Return>

   The screen displays the following header information and the config menu:

```
Found disk device: SCSI Disk ctlr 6, unit 0
low: FFC80000 high: FFC81554 start: FFC80EA8

Config Utility (Offline), Rev x.x : Built Month dd, year
time

Current Configuration:

     CPU Speed: 25 MHz.

          Configuration Options
         ---------------------

    1  -  Set CPU Speed to 25 Mhz
    2  -  Set CPU Speed to 33 Mhz
    3  -  Show Current Configuration
    Q  -  Quit <Return>

    Enter Option :
```

5. Type a menu option to display the current clock speed configuration, change the clock speed configuration, or exit the config program. For example, type the following option number at the prompt to configure the system's clock speed in the EEPROM to 25 MHz:

```
Enter Option: 1 <Return>
```

The screen displays the clock speed configuration and displays the config menu:

```
Current Configuration:

     CPU Speed: 25 MHz.


          Configuration Options
         ---------------------

    1  -  Set CPU Speed to 25 Mhz
    2  -  Set CPU Speed to 33 Mhz
    3  -  Show Current Configuration
    Q  -  Quit <Return>

    Enter Option :
```

6. Enter **q** at the prompt to exit the config program and return to the MD environment:

```
Enter Option: q <Return>

>
```

Connecting Terminals to Domain Compatible Mode Systems

You can troubleshoot a Domain Compatible mode system that has display problems by connecting a terminal to the system SIO line. This section explains how to connect the standard field terminal or another node to the system's SIO line.

Using a Field Terminal

The data terminal currently available for field use is a specially modified IXO model TC301. This device is battery powered with a 1-line, 16-character LCD display. The terminal communicates at 300 baud only, and is configured as a DCE device. It plugs into the system, and its attached cable needs no adapters. Perform the following steps to activate the field terminal:

1. Press the ON/OFF key. The terminal displays the following message:

   ```
   HI, IXO ACCESS CENTER?
   ```

2. Press the NO key. The terminal displays the following message:

   ```
   MANUAL, FULL
   ```

3. Press the PHONE key. The terminal displays the following message:

   ```
   LOGGING ON
   ```

   The terminal then displays the online mode indicator.

4. You are now ready to connect the field terminal to the system and access the MD.

Using a Workstation as a Terminal

If you need to use another workstation to emulate a terminal, type the following next to the "$" shell prompt:

$ emt <RETURN>

When you receive the "emt >" prompt, enter the following three command lines:

emt > **line 1 <RETURN>**

emt > **raw**

emt > **<F1>**

The workstation replies with the following message:

```
emt > EMT remote node .... F1 to exit
```

You are now ready to connect a cable from SIO line 1 on the EMT system to an SIO port on the system that you need to access. You need to use an RS-232 extension cable because the system's SIO output is configured as a DTE. Use a null modem between the two systems. When you are finished using the node in the Remote mode, press the **F1** function key to exit emt.

NOTICE: The maximum SIO cable length must not exceed 15.24 m (50 ft).

Troubleshooting 4

This chapter provides information about isolating a failing Field Replaceable Unit (FRU). The flowcharts are logically structured help you run diagnostics, replace FRUs, and so on. The remainder of the information in this chapter supports the directions in the flowcharts. If the flowcharts call for FRU replacements, follow the removal and replacement procedures in Chapter 5 of the *Servicing the HP Apollo 9000 Series 400* manual.

Troubleshooting in Domain Compatible Mode

You must be familiar with the Domain/OS shells and commands to troubleshoot Series 400 system units that are running in Domain compatible mode. You must be able to start and stop processes. You should also become familiar with a number of standalone utilities, and with both the online and offline diagnostics. The *Domain Hardware Utilities Reference* manual describes all standalone utilities for Domain nodes, and *Using Domain Diagnostics, Volume 1* describes the MD environment and the diagnostics.

For Series 400 systems that run Domain compatible mode, note any error or status messages, and then run the power-up diagnostics, known as Self Test. If the Self Test diagnostics fail, replace the FRU that is indicated. If the tests pass but you still suspect a problem, you should run the next level of diagnostics. If you can boot Domain/OS, run the System Acceptance Exerciser (SAX). If you are restricted to the MD, run the Extended Self Test (ET). If the ET or SAX diagnostics fail, replace the indicated FRU. If the system does not report errors, the suspected problem is probably not hardware related. Refer to the following sections for more information about Self Test and SAX.

Troubleshooting in HP-UX Compatible Mode

You must be familiar with the HP-UX operating system to troubleshoot Series 400 system units that are running in HP-UX compatible mode with HP-UX. You must be able to start and stop processes. You should also be familiar with the Boot ROM Test Mode, Series 300 Test Tools and the HP-UX ce.utilities. The *Series 200/300 Test Tools Manual* has instructions for running the Series 300 Test Tools. Instructions for using ce.utilities are found in the *System Support Tape User's Guide.*

For Series 400 systems that run HP-UX compatible mode, note any error or status messages, and then run the power-up boot ROM diagnostics, known as Self Test. If the Self Test diagnostics fail, replace the FRU that is indicated. Refer to the following sections for more information about Self Test.

Troubleshooting Flowcharts for Domain Mode

This section provides flowcharts (Figure 4–1 through Figure 4–9) that route you through a series of standard troubleshooting procedures for Series 400 systems that use Domain Compatible mode.

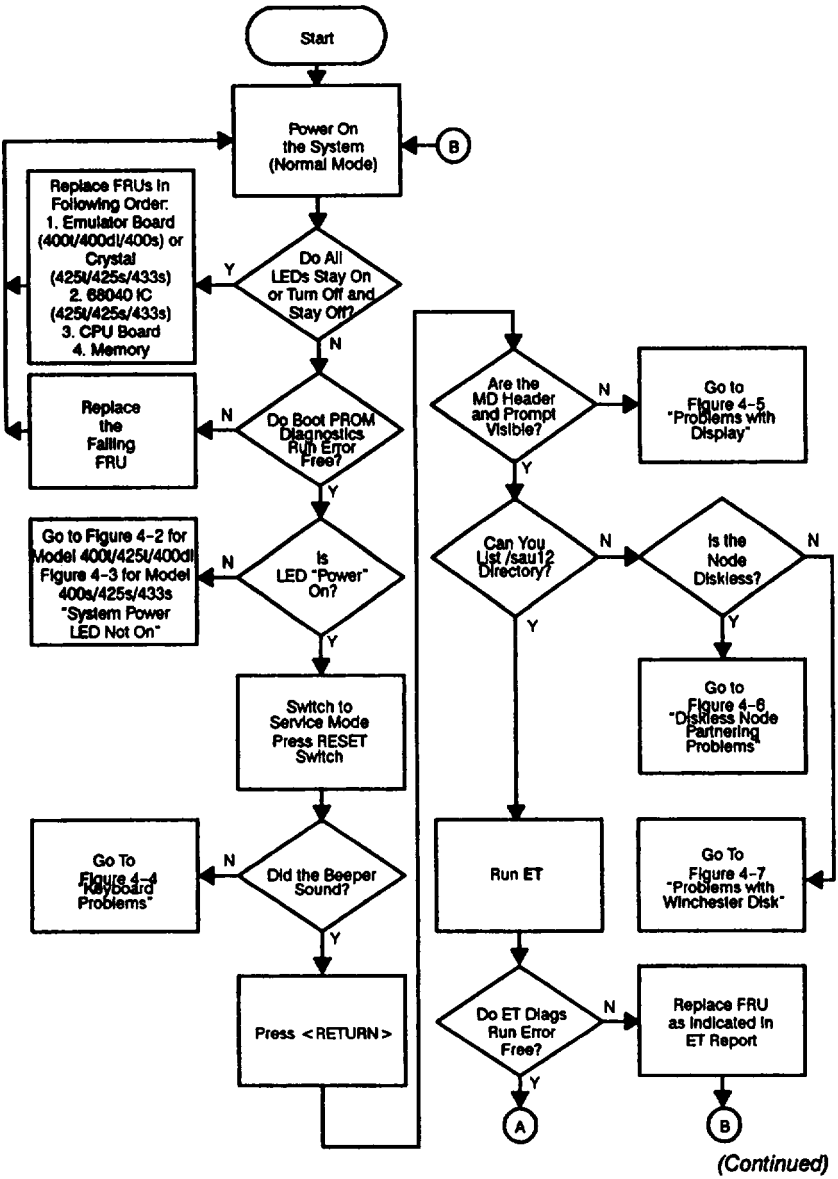


Figure 4–1. Main Flowchart

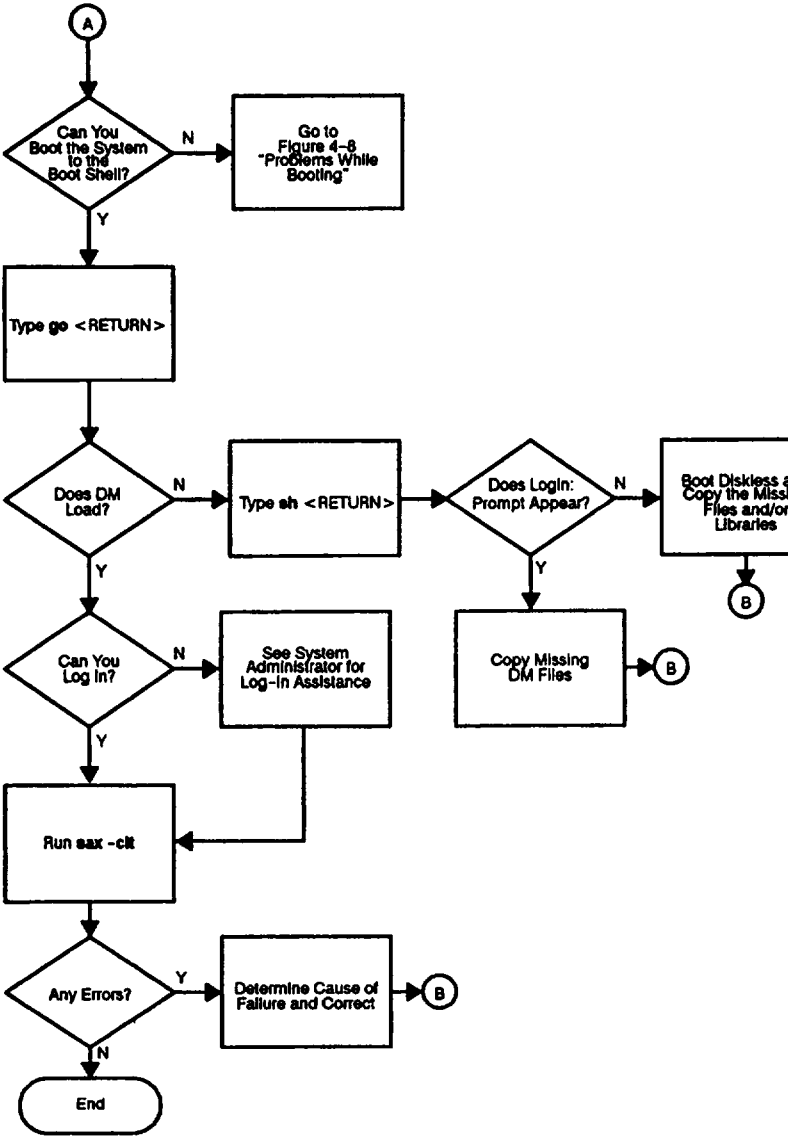


Figure 4–1. Main Flowchart (Cont.)

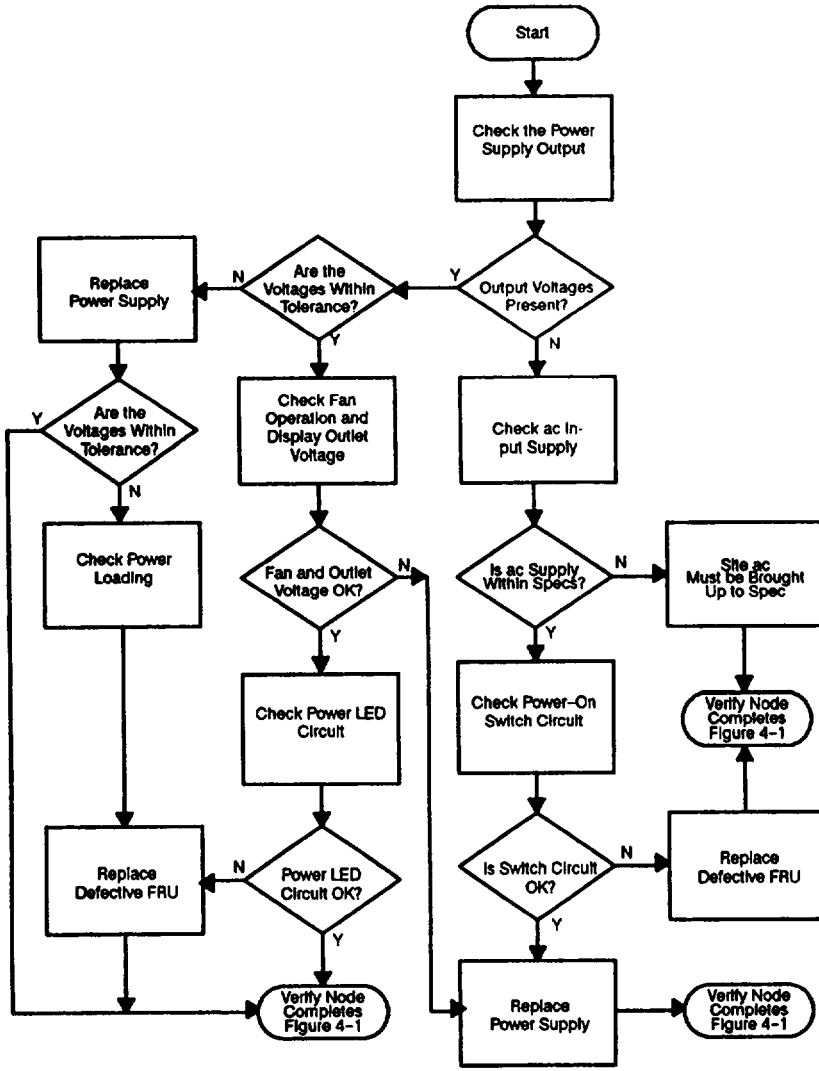


Figure 4–2. Model 400t and 400dl System Power LED Not On

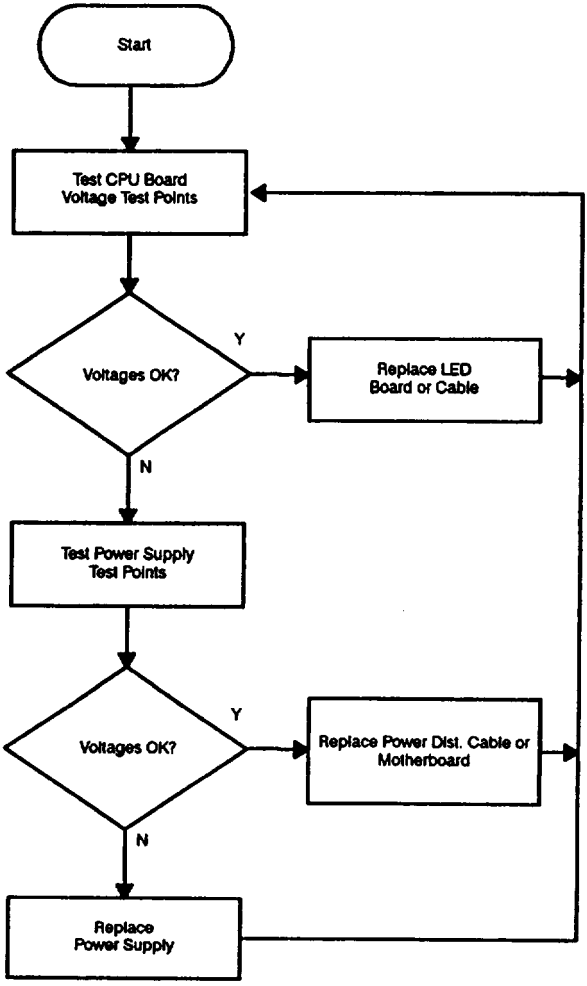


Figure 4–3. Model 400s System Power LED Not On

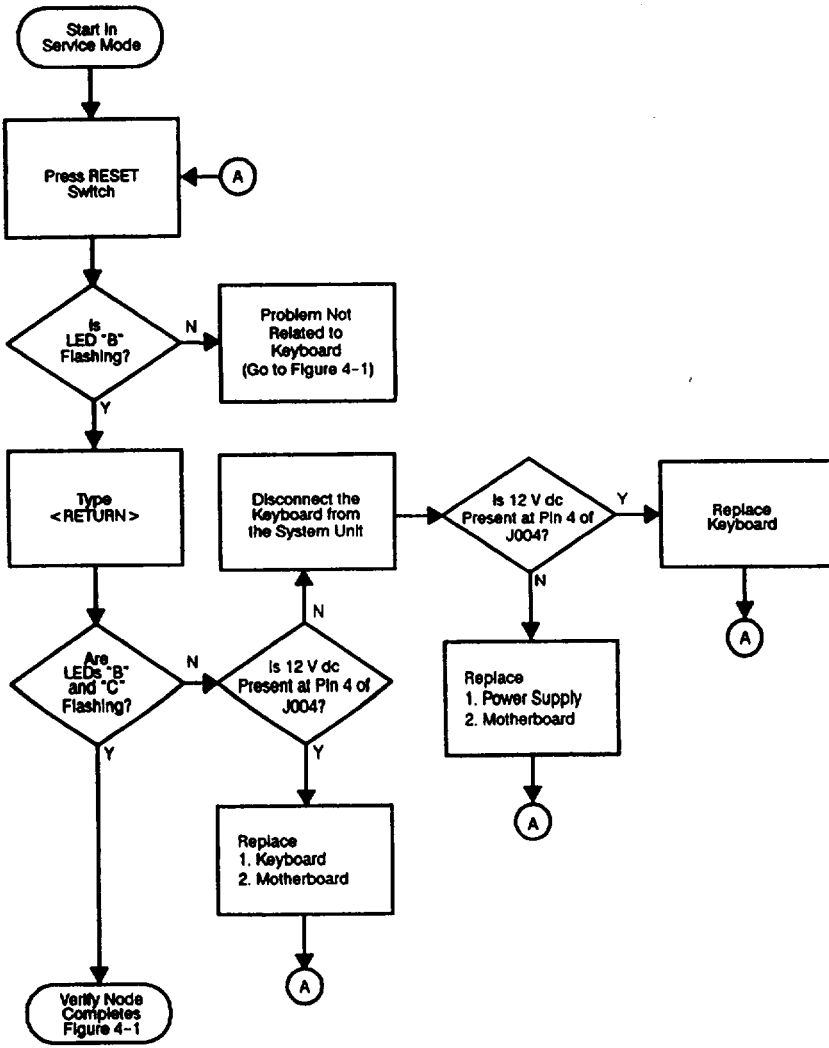


Figure 4–4. Domain Keyboard Problems

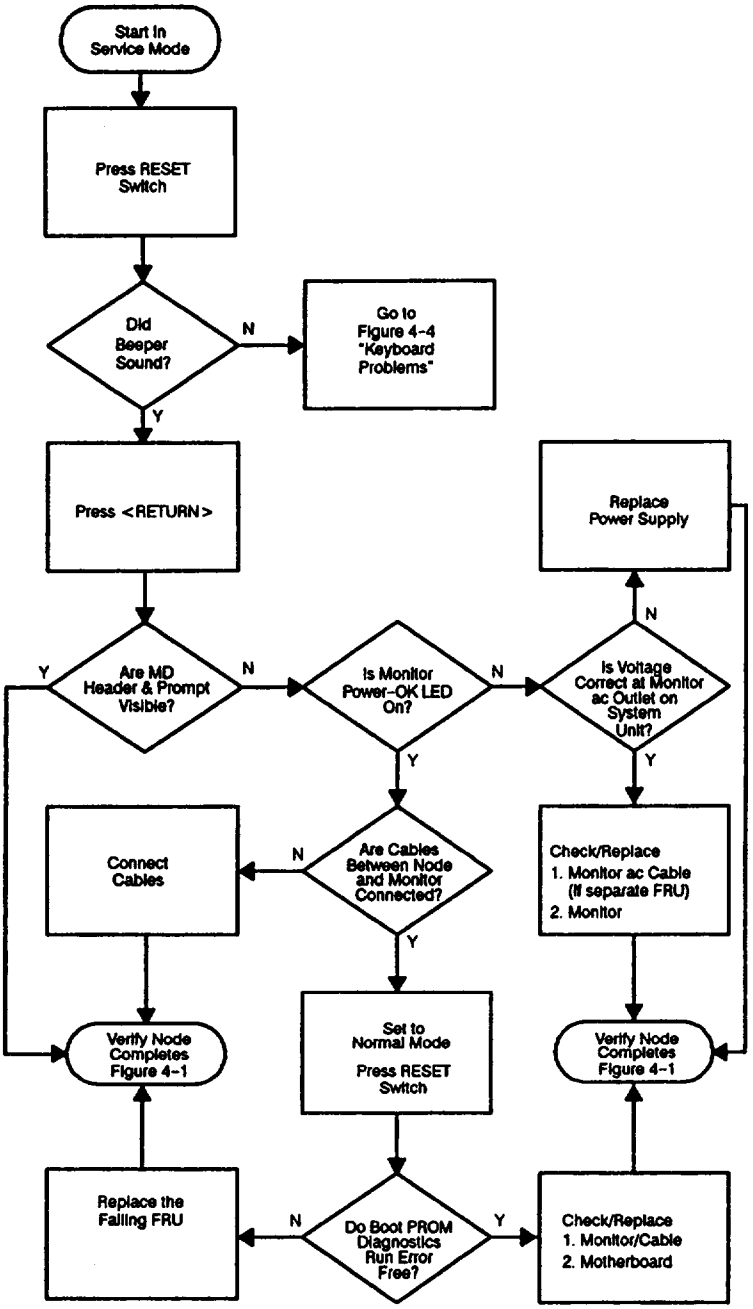


Figure 4–5. Problems with Display

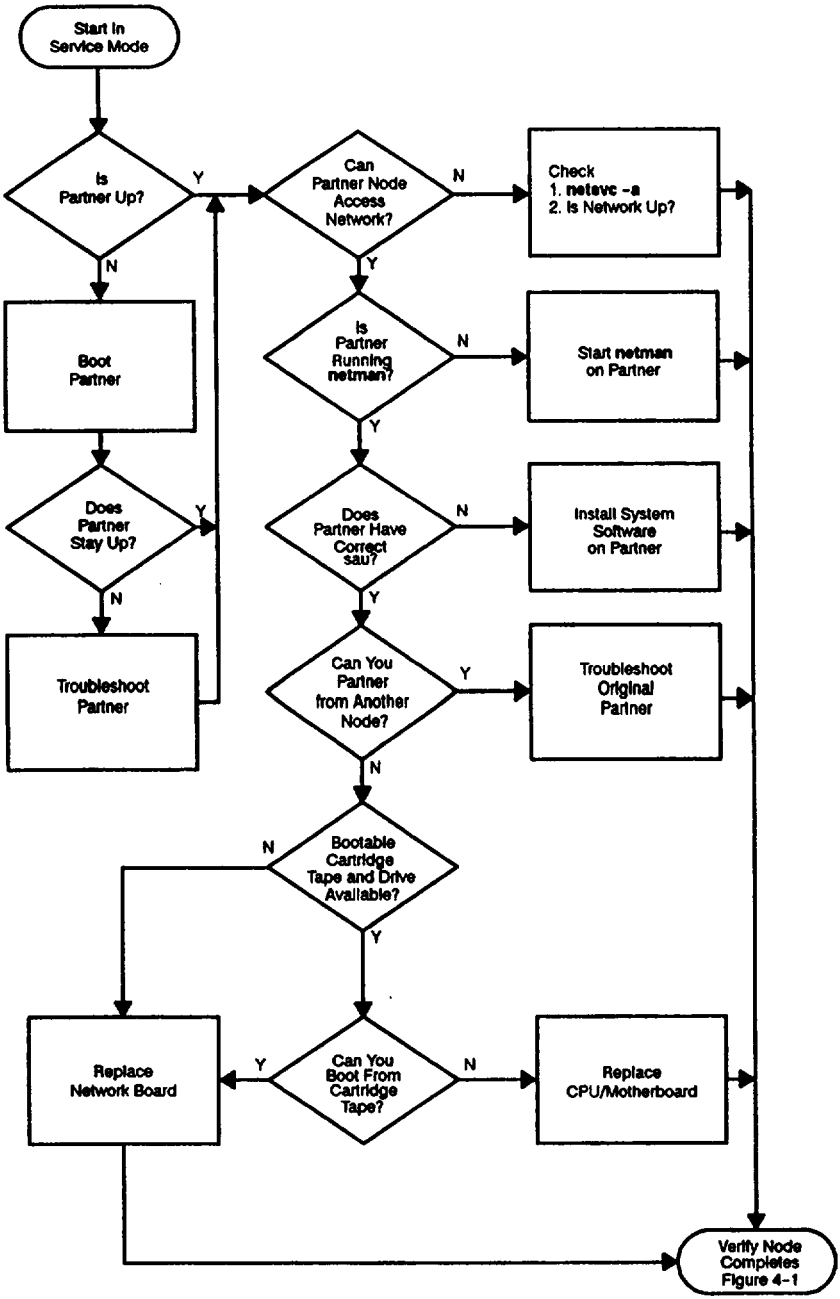


Figure 4–6. Diskless Node Partnering Problems

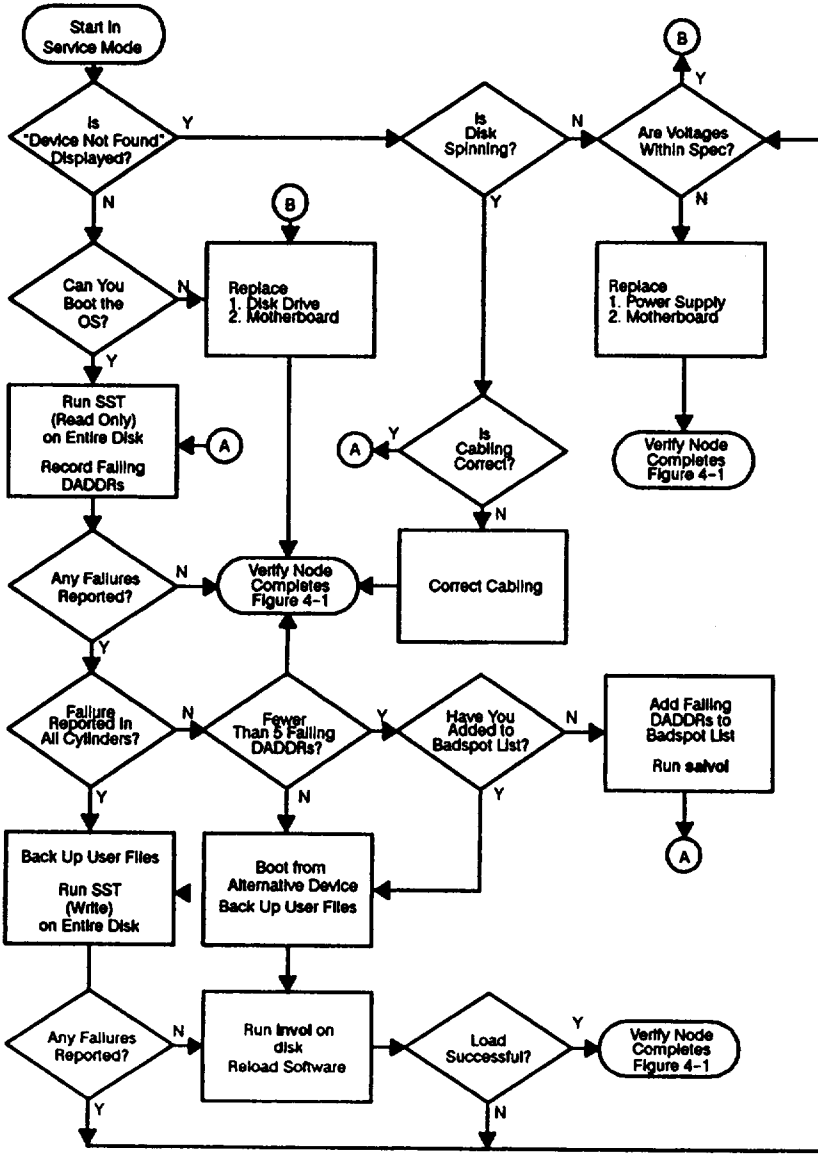


Figure 4–7. Problems with Winchester Disk

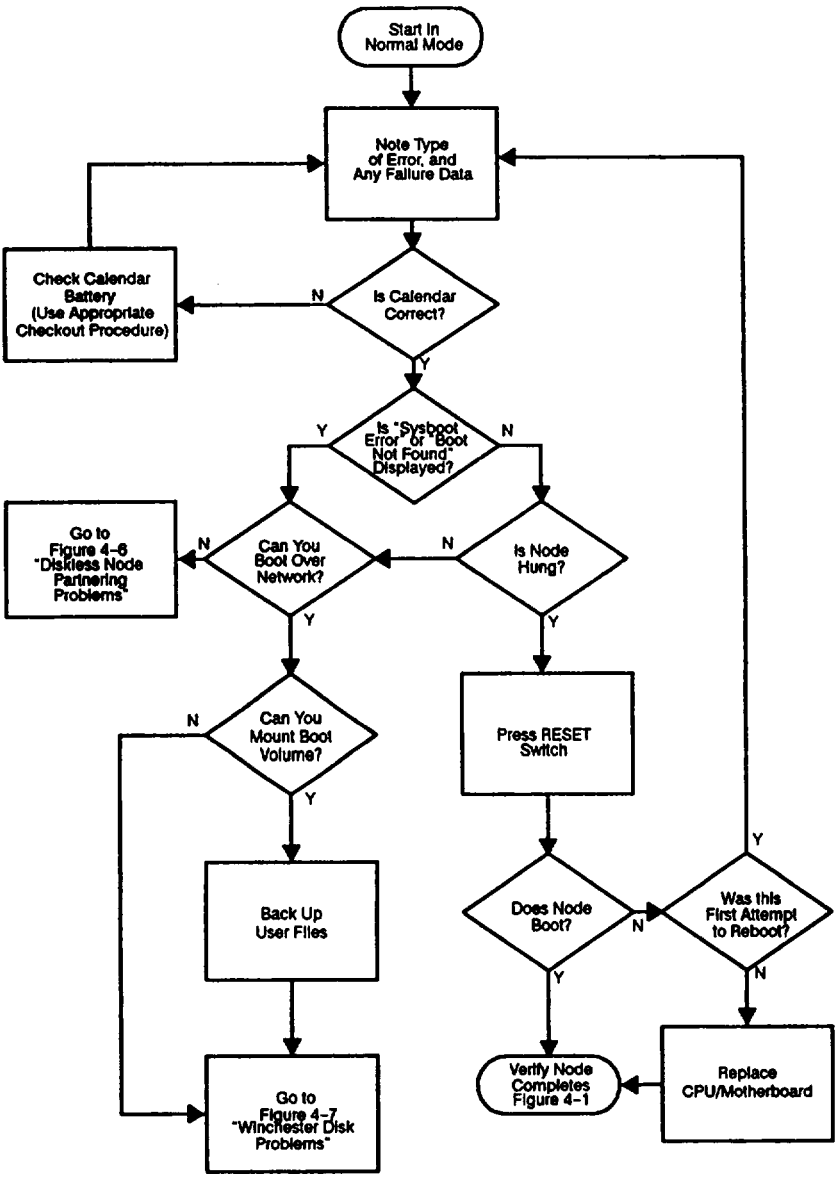


Figure 4–8. Problems While Booting

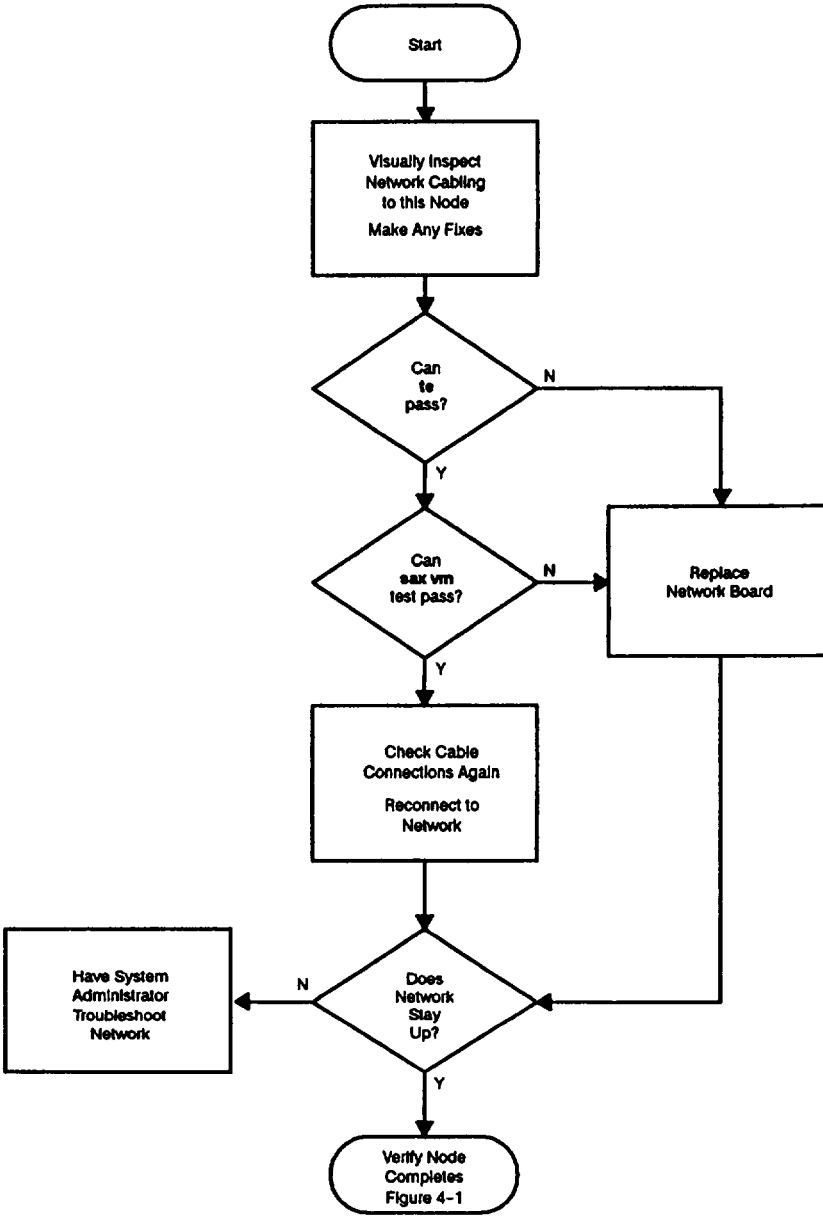


Figure 4–9. Node Causes Network Problems

HP-UX Troubleshooting Flow Charts

This section provides flowcharts that route you through a series of standard troubleshooting procedures for Series 400 systems that use HP-UX Compatible mode (see Figure 4-10 and Figure 4-11).

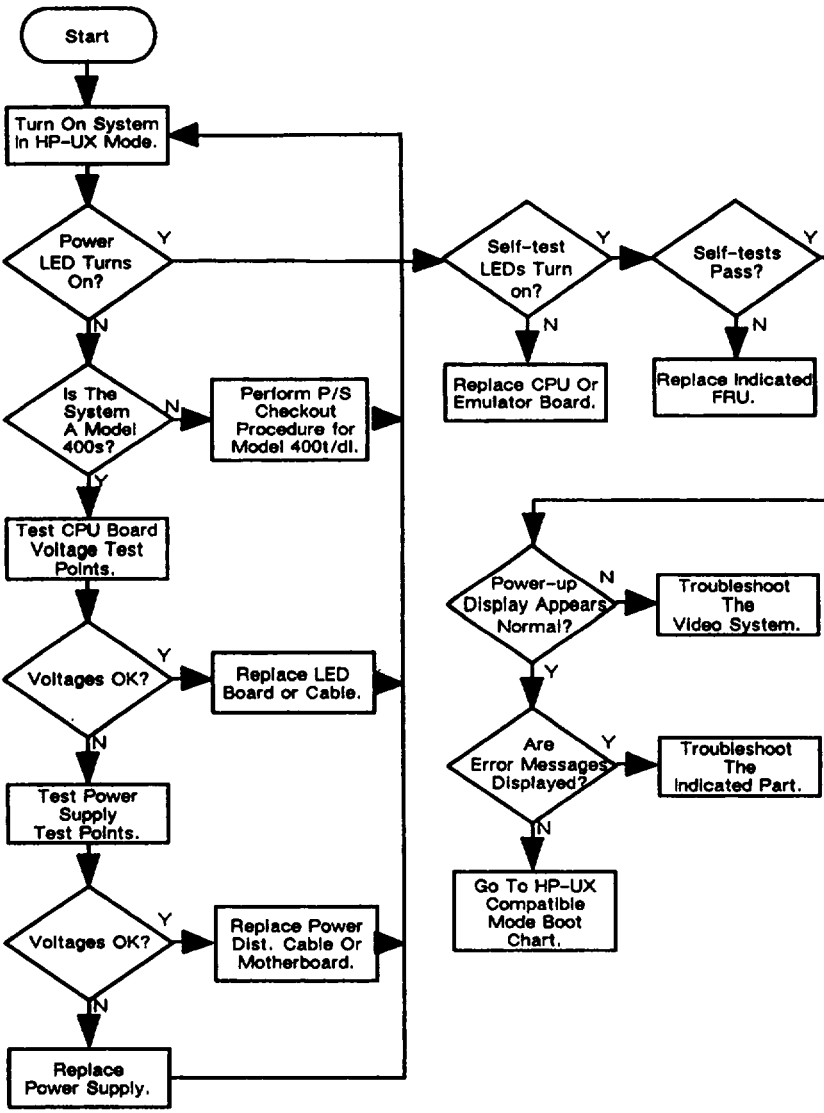


Figure 4-10. HP-UX Compatible Mode Main Troubleshooting Flowchart

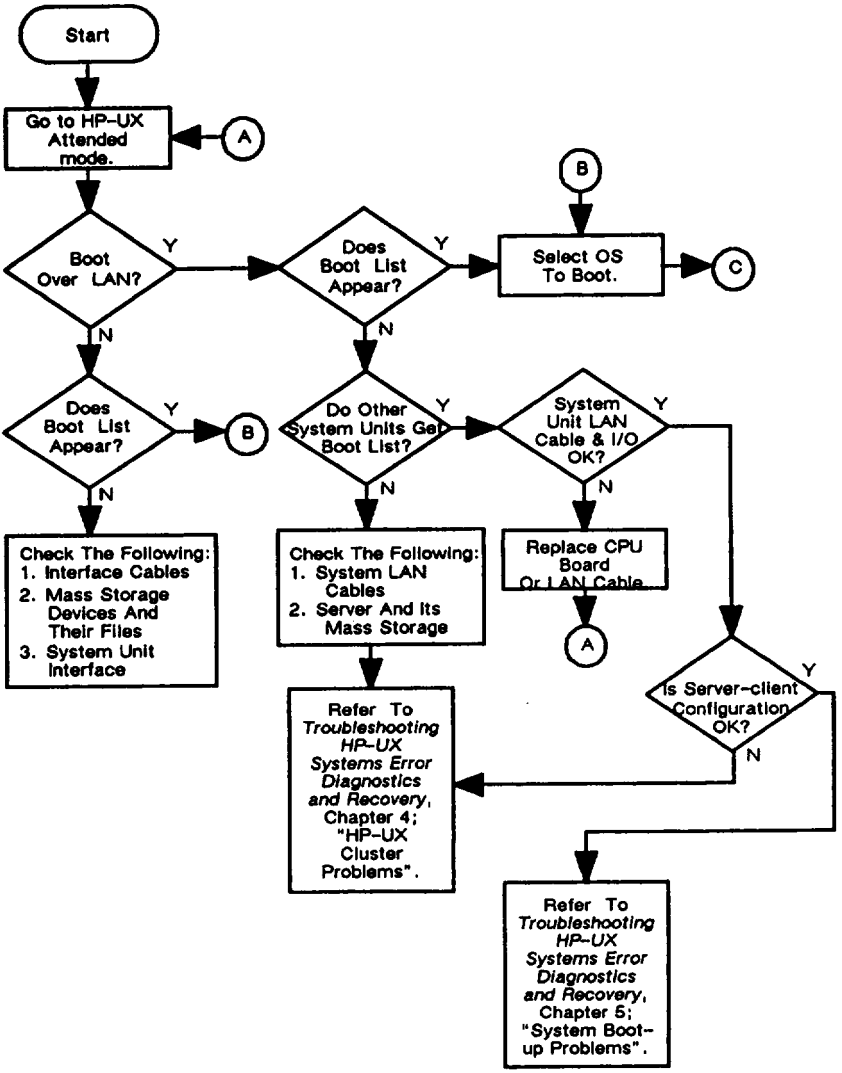


Figure 4–11. HP–UX Compatible Mode Boot Flowchart

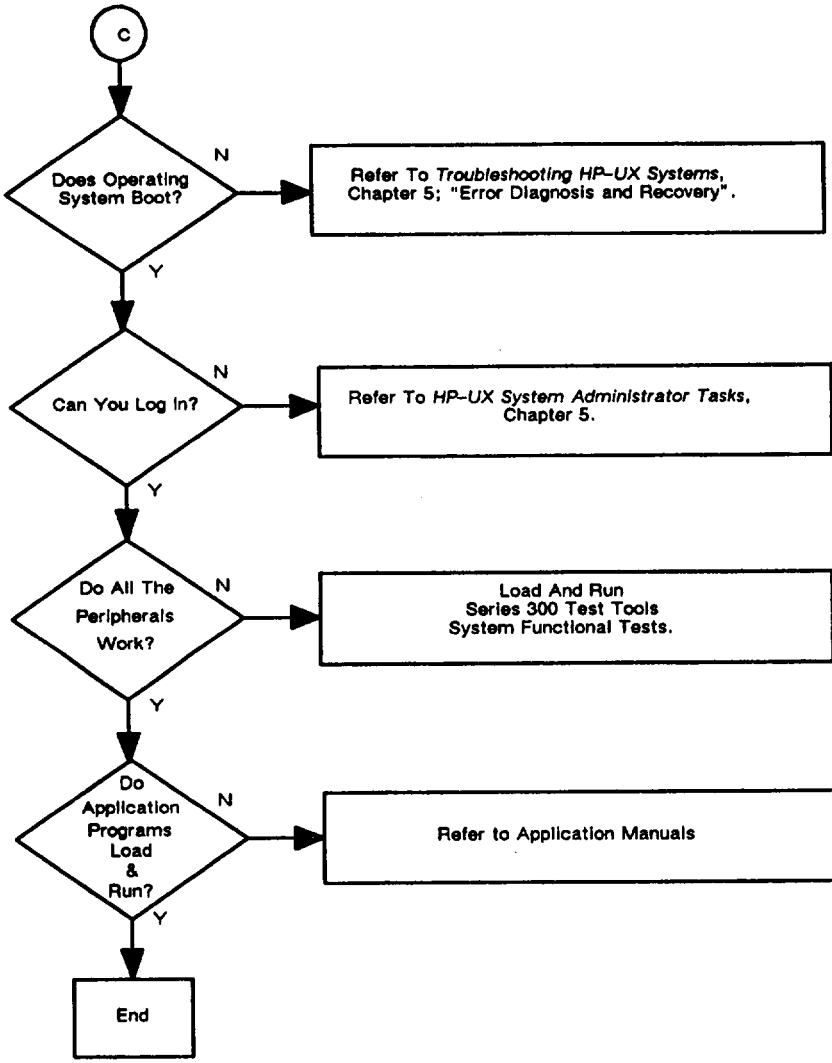


Figure 4-11. HP-UX Compatible Mode Boot Flowchart (Cont.)

Checkout Procedures for Model 400t, 425t, and 400dl Systems

This section describes how to check the power supply output to the system unit and how to check the calendar battery.

WARNING: These procedures involve the verification of high-voltage components. They should be performed by qualified service personnel only.

CAUTION: Make sure that you are properly grounded before you attempt any of the following procedures. Use an antistatic mat with static straps and other static prevention devices whenever possible.

Figure 4–12 shows the power connections, which are referenced in the procedures that follow.

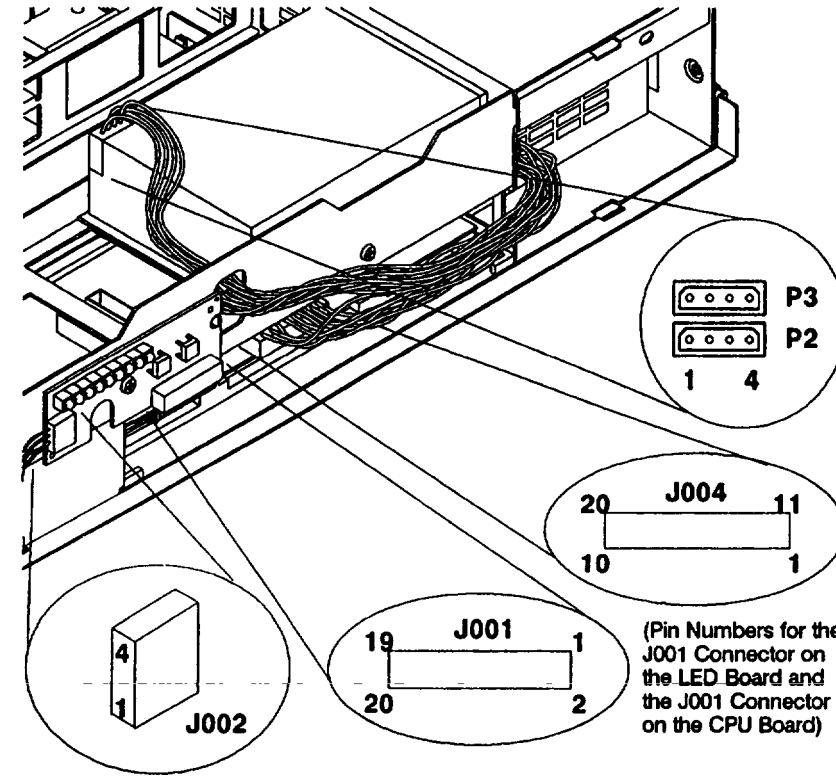


Figure 4–12. Power Connections (Model 400t, 425t, and 400dl)

Power Supply Verification for the Model 400t, 425t, and 400dl Systems

Note the following information about the power supply operation before you perform the troubleshooting steps:

- The power supply delivers dc voltages to the CPU board and disk drives when you press the power-on switch on the front panel. The power-on switch activates the power supply by pulling low a signal line at Connector J004, Pin 8. (The signal line is normally high when the supply is off.)
- When you power on the system, a relay within the power supply closes to route ac voltage to the display monitor outlet at the rear of the system unit.
- The system fan, which is housed in the rear of the power supply, is not a separate FRU. If the fan doesn't operate, you must replace the power supply.

Perfrom the following steps to troubleshoot the power supply. You need a voltmeter and an ohmmeter to perform these steps.

NOTICE: Before you replace the power supply or a related FRU, always check the power supply harness and other FRU cables for loose, broken, or pinched wires.

1. Make sure that the system power is off and that the power cord is unplugged.

2. Remove the system cover.

3. If connected, disconnect the system from the network. If the system uses a network connector, unplug it from the network wall outlet. If the system uses BNC connectors to connect to the network, unplug them from the rear of the system unit. This opens the loop in the network. To complete the loop while you are servicing the system, use a barrel type BNC connector between the IN and OUT connectors.

4. Plug in the power cord and power on the system. Do not unplug the J004 connector from the CPU board. Measure the voltages through the top of the connector. Use the voltmeter to test for the voltages on the J004 connector as listed in Table 4–1.

Table 4–1. Power Supply Voltages and Tolerances (Model 400t, 425t, and 400dl)

Voltage (V dc)	Tolerance at J004 Connector	J004 Connector Pin No.	Wire Color
+5	4.85 to 5.25 V dc	1, 3, and 9	Red
Ground	—	14, 16, 18, and 20	Black
+12	11.4 to 12.6 V dc	7	Violet
-12	-11.28 to -12.72 V dc	6	Green
+12	11.4 to 12.6 V dc	4	Brown
+9	8.7 to 9.3	Differential between Pins 17 and 19	Orange Yellow
Voltage (V dc)	**Tolerance at P2 and P3 Connector**	**P2 and P3 Connector Pin No.**	**Wire Color**
+5	4.85 to 5.25 V dc	4	Red
+12	11.4 to 12.6 V dc	1	Violet
Ground	—	2 and 3	Black

Continue on with Step 5, Step 6, or Step 7, depending on the configuration of the dc output voltages.

5. If the dc output voltages are not present at J004, perform the following two steps:

   A. Check the ac outlet for power with a voltmeter. If the ac outlet power is incorrect, an electrician must correct it.

   B. With the power–on switch open, use a voltmeter to check Pin 8 on the J004 connector for +16 to +20 V dc. If the voltage is not correct, replace the power supply.

      If the voltage is correct at Pin 8, close the power–on switch. If you read Pin 8 at ground, replace the power supply. If you still detect +16 to +20 V dc, replace the power–on switch panel. If the new switch doesn't fix the problem, replace these FRUs in the following order:

      Ribbon Cable (connects LED board to CPU board)
      LED Board
      CPU Board

      You can check these FRUs before you replace them by checking the power–on switch circuits for continuity, as shown in Table 4–2. Check for continuity with Connectors J004 and J002 unplugged. Refer to Figure 4–12 for the locations of the connectors and pins listed in Table 4–2.

Table 4–2. Switch Circuit FRU Pin Numbers

To Check This FRU	Check for Continuity Between These Two Connectors
FRU	**Connector Pin to Connector Pin**
CPU Board	J004 8 — J001 15
Cable from LED Board to CPU Board	J001 15 — J001 15
LED Board	J001 15 — J002 4
CPU Board	J004 20 — J001 1
Cable from LED Board to CPU Board	J001 1 — J001 1
LED Board	J001 1 — J002 3

6. If the dc output voltages are present at J004, but not within tolerance, perform the following six steps:

   A. Power off the system and unplug the ac power cord from the wall outlet. Replace the power supply.

   B. If the problem persists, you must check for power loading. Power off the system and unplug the power cord from the wall outlet. Remove one option board (graphics, network, or HP-IB) from its board slot (refer to Chapter 5 for information about removing the board). Plug the power cord into the ac wall outlet and power on the system. Recheck the voltages. If necessary, repeat this procedure for a second option board. If you replace a defective board, configure any switches or jumpers the same as on the original board (refer to Appendix B).

   C. If the cause of the problem isn't an option board, power off the system and unplug the power cord from the ac outlet. Reinstall the board(s) in its slot.

   D. Unplug connector P2 from the disk drive. Power on the system unit and recheck the voltages. If necessary, repeat this step on a second disk drive. Replace the disk drive if the voltages are now within specifications (see Chapter 5).

   E. If the problem persists, replace the CPU/Motherboard (see Chapter 5) and repeat this procedure.

   F. After you verify that the power supply voltages are within the specified ranges, power off the system and unplug the ac cord from the wall outlet. Replace the system unit cover. Make sure that all of the internal connections are secure.

7. If the dc output voltages are within tolerance, perform the following three steps:

   A. If the fan does not operate, replace the power supply.

   B. If the display outlet ac voltage is incorrect, replace the power supply.

   C. If the power LED is not on, replace the Power-On Switch Panel. If the LED still doesn't light, replace these FRUs in the following order:

      Ribbon Cable (connects LED board to CPU board)
      LED Board
      CPU Board

      You can check the LED board and CPU board before you replace them by checking the power LED circuits for continuity, as shown in Table 4-3. Check for contiunity with Connectors J004 and J002 unplugged. Refer to Figure 4-12 for the locations of the connectors and pins listed in Table 4-3.

Table 4–3. Power–On LED Circuit FRU Pin Numbers

To Check This FRU	Check for Continuity Between These Two Connectors
FRU	**Connector Pin to Connector Pin**
CPU Board	J004 9 — J001 4
Cable from LED Board to CPU Board	J001 4 — J001 4
LED Board	J001 4 — J002 1
CPU Board	To LED Register On CPU Board — J001 14
Cable from LED Board to CPU Board	J001 14 — J001 14
LED Board	J001 14 — J002 2

Winchester Disk Power Checkout for the Model 400t and 425t System Units

Perform the following steps to check the voltages supplied to the disk drives. Yo need a voltmeter to perform these steps.

1. Make sure that the system power is off and the power cord unplugged.

2. Remove the system cover.

3. Ensure that the power connector (P2 or P3) is securely attached to the Winchester disk drive.

4. Plug in the system unit's power cord and power on the system. If the fan does not start to spin, check out the power supply as described in the previous section, *Power Supply Verification for the Model 400t, 425t, and 400dl Systems.*

5. Use the voltmeter to test the voltages at the power supply input connector to the Winchester drive. Unplug P2 or P3 to check the voltages. Figure 4–13 shows the connector voltages.

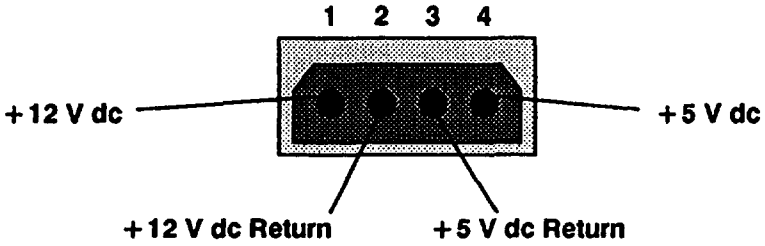


Figure 4–13. Disk Drive Power Supply Input Connector (P2 or P3)

6. If the voltages are not within specifications, see Table 4–1 and perform the power supply checkout as described in the previous section, *Power Supply Verification for the Model 400t, 425t, and 400dl Systems.*

7. If the power supply checks out within specifications and the problem persists, check the jumper configurations for the disk drive (refer to Chapter 3 for the disk jumper configurations).

Calendar Battery Checkout for Model 400t, 425t, and 400dl Systems That Use Domain Compatible Mode

Perform the following steps with the system power off.

1. Turn on the system unit and the monitor. If the calendar backup battery is not working (incorrectly seated, or dead), you see an incorrect date printed in one of the messages shown in Figure 4–14.

   NOTICE: You may see the third message the first time you boot the system or if the clock has never been set.

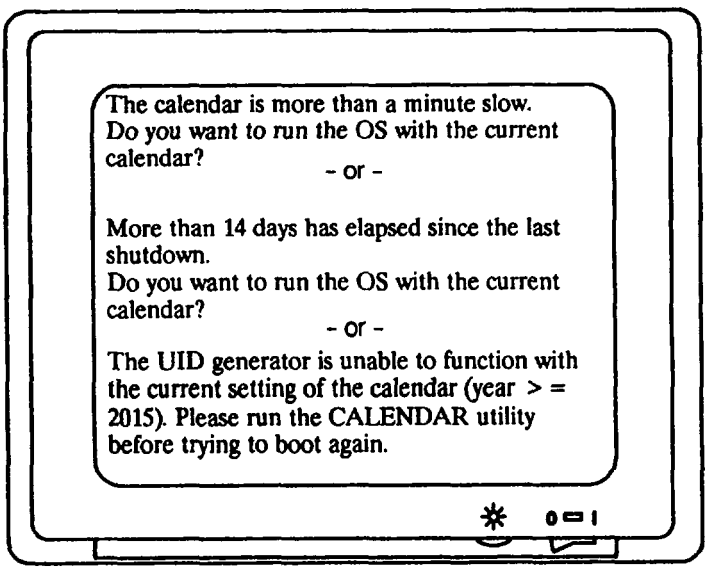


Figure 4–14. Calendar Battery Message

2. Turn off the system unit and unplug its ac power cord from the wall outlet. Remove the system unit cover.

3. Check to see if the calendar backup battery is properly seated on the CPU board. If the battery is seated properly, replace it. If it is not seated properly, seat it correctly and replace the system unit cover. Plug in the ac power cord and turn on the system again. If the error message does not appear, the problem is fixed. If the error message appears again, replace the battery.

Checkout Procedures for the Model 400s, 425s, and 433s System Units

This section explains how to troubleshoot the power supply and calendar battery on Model 400s, 425s, and 433s system units.

Power Supply Verification for 400s, 425s, and 433s System Units

Note the following information about power supply operation before you perform the troubleshootoing steps:

- The power supply delivers dc voltages to all boards, internal mass storage devices, and fans when you press the power-on switch.
- If the power is not completely connected to the motherboard with a normal load and is turned off, then turned on, it may be a minute or two before the voltages come up to their normal values.

NOTICE: Before you replace the power supply or a related FRU, always check the power supply harness and other FRU cables for loose, broken, or pinched wires.

1. Start this procedure with the system unit power off and the power cord unplugged. Remove the top cover.

2. If connected, disconnect the system unit from the network. If the system uses a network connector, unplug it from the network. If the system uses BNC connectors to connect to the network, unplug the BNC "T" from the system unit connector leaving the network intact through the arms of the "T" connector.

3. Plug in the power cord and power on the system. Measure the +5, -12 and +12 voltages on the CPU board test points through the holes in the top of the chassis, as shown in Figure 4-15. To measure the -5 and +9 V dc, open the power supply drawer and measure it at the connector.

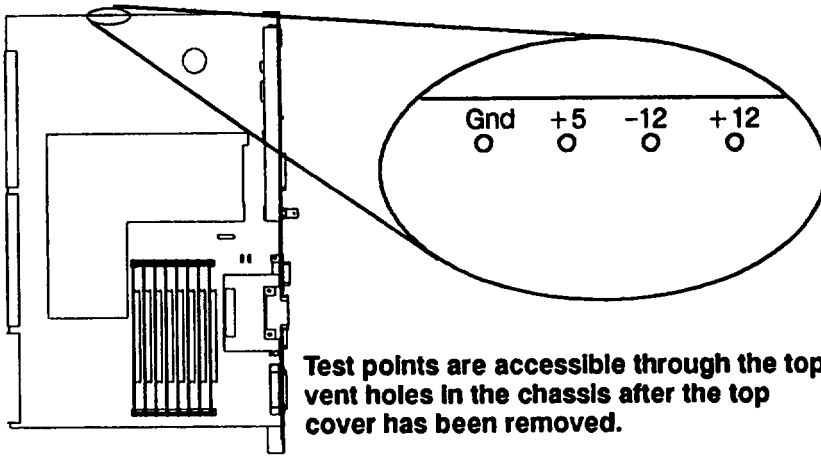


Figure 4–15. System Unit CPU Board Voltage Test Points (Model 400s, 425s, and 433s)

Table 4–4 lists the voltages that the power supply provides to the system unit.

Table 4–4. System Unit Power Supply Voltages and Tolerances (Model 400s, 425s, and 433s)

Voltage (dc)	Tolerance
+5	4.85 to 5.20 V dc
-5	-4.60 to -5.50 V dc
+9	8.70 to 9.30 V dc
+12	11.40 to 12.60 V dc
-12	-11.40 to -12.60 V dc

Continue with Step 4 or Step 5, depending on the result of your voltage checks.

4. If the DC output voltages are not present at the CPU board test points, perform the following steps:

   A. If the system unit has an ISA/EISA backplane, remove the right side and RFI covers. Check the voltages on the ISA/EISA power distribution cable on the ISA/EISA backplane as listed in Figure 4–18. If the voltages are present, replace the CPU board. If the voltages are not present, go on to step B.

   B. Check the ac outlet for power with a voltmeter. If the ac outlet power is incorrect, an electrician must correct it.

C. Switch the system unit power off, remove the power supply screws, and slide the power supply out about 3 inches. Switch the power on and measure the voltages on the two power supply connectors, as shown in Figure 4–16 and Figure 4–17 (leave the connectors connected to the power supply and measure the voltages through the rear of the connectors). If the voltages are not present, go to Step D. If the voltages are present, go to Step E.

D. Check Pin 24 on the large connector shown in Figure 4–16 for + 5 V dc. If the voltage is not correct, replace the power supply.

   If the voltage is correct at Pin 24, close the power–on switch. If you read Pin 24 at ground, replace the power supply. If you still detect + 5 volts, replace the power–on switch. If the new switch doesn't fix the problem, go to Step E.

E. Either the power distribution cable, motherboard, or CPU board is defective. Check the power distribution cable for continuity. If the power distribution cable is defective, replace it. Otherwise, replace the CPU board and recheck the voltage test points. If the voltages are not present, replace the motherboard.

5. If the voltages are present at the CPU board or power supply test points but not within tolerance, perform the following steps

   A. Power off the system unit and unplug the ac power cord from the power supply. Replace the power supply.

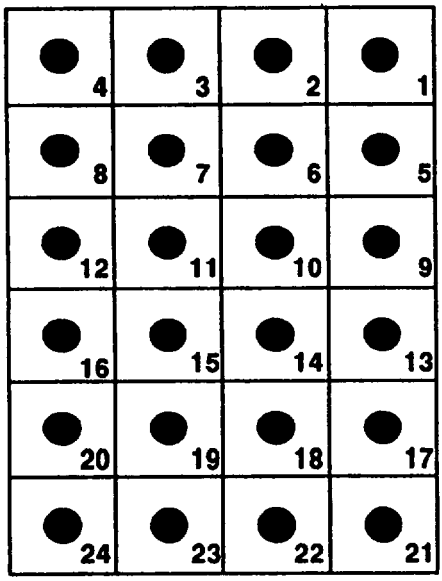
   B. If the problem persists, reinstall the original power supply and follow the information in this step to check for power loading by a board. Power off the system unit and remove one board other than the CPU board. Power on the system unit and retest. If necessary, repeat this procedure for a second board. If you replace a defective board, configure any switches or jumpers the same as the original board.

   C. If a board does not appear to have caused the problem, power off the system unit and unplug the power cord from the power supply. Reinstall the boards in their slots.

   D. Unplug the internal mass storage power distribution cable from one of the mass storage devices. Power on the system unit and recheck the voltages. If necessary, repeat this step for each internal mass storage device. Replace the mass storage device if the voltages are within specifications.

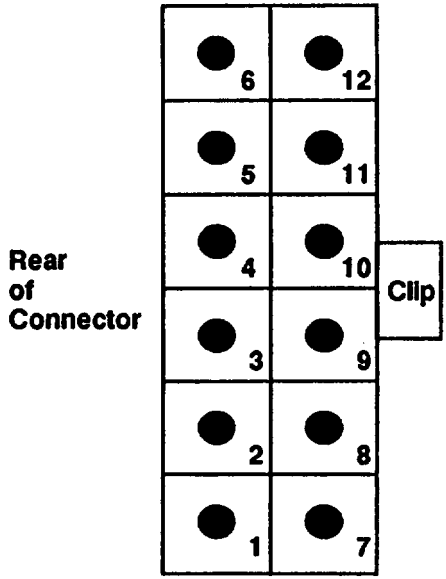
Main Power Distribution Cable Connectors

The pin numbers on the large connector of the main power distribution cable are the same as the pins on the power supply board (see Figure 4–16). Its small connector's pin numbers are different than the pins on the power supply board (see Figure 4–17). Note that you must check these voltages with the connectors attached to the power supply. Check the voltages through the rear of the connectors.



Pin	Voltage	Pin	Voltage
1	Ground	13	+5 V
2	Ground	14	+5 V
3	Ground	15	+5 V
4	Ground	16	+5 V
5	Ground	17	+5 V
6	Ground	18	+5 V
7	Ground	19	+5 V
8	Sense +	20	+5 V
9	+5 V	21	+5 V
10	Ground	22	Iso 9V -
11	Ground	23	Iso 9V +
12	Sense -	24	IntrLock

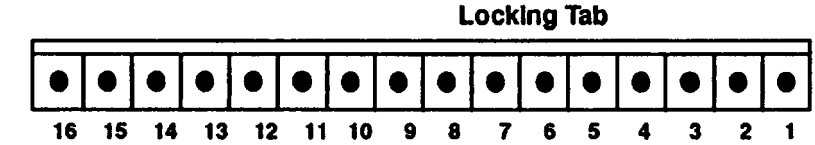
Figure 4–16. System Unit Power Supply Large Cable Connector (Model 400s, 425s, and 433s)



Pin	Voltage
1	+12 V
2	+12 V
3	Ground
4	Ground
5	Ground
6	NPU Reset
7	+12 V
8	+12 V
9	Ground
10	Ground
11	-12 V
12	-5 V

Figure 4–17. System Unit Power Supply Small Cable Connector (Model 400s, 425s, and 433s)

Figure 4–18 shows the voltages of the ISA/EISA backplane power cable connector.



Pin	Voltage	Pin	Voltage	Pin	Voltage	Pin	Voltage
1	Ground	5	+12 V	9	+5 V	13	+5 V
2	+5 V	6	+12 V	10	Ground	14	Ground
3	Ground	7	Ground	11	-12 V	15	+5 V
4	+12 V	8	+5 V	12	-5 V	16	Ground

Figure 4–18. System Unit ISA/EISA Backplane Power Cable Connector (Model 400s, 425s, and 433s)

Figure 4–19 shows the voltages for a storage device connector on the motherboard.

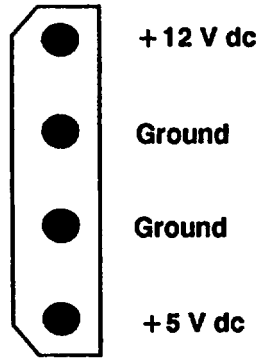


Figure 4–19. System Unit Motherboard Mass Storage Power Distribution Connector (Model 400s, 425s, and 433s)

Calendar Battery Checkout for Model 400s, 425s, and 433 Systems That Use Domain Compatible Mode

Perform the following steps with the system power off:

1. Turn on the system unit and the monitor. If the calendar backup batter is not working (incorrectly seated, or dead), you see an incorrect date printed in one of the messages shown in Figure 4–20.

   NOTICE: You may see the third message the first time you boot the system or if the clock has never been set.

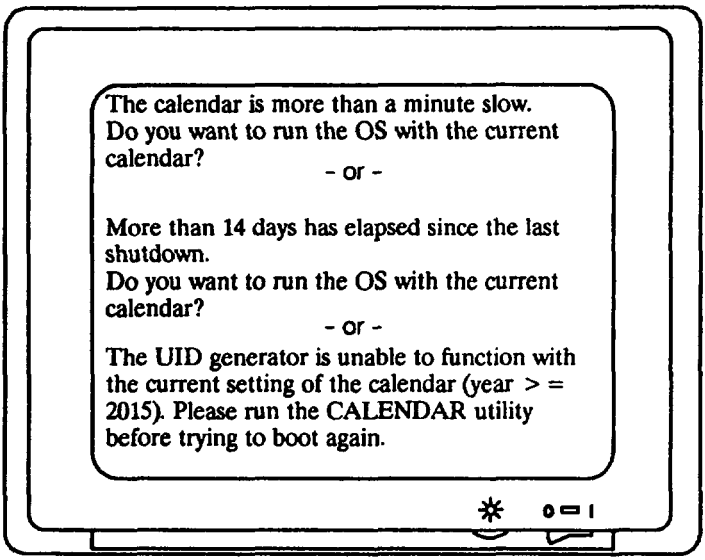


Figure 4–20. Calendar Battery Message

2. Turn off the system unit and unplug its ac power cord from the wall out let. Remove the system unit cover.

3. Check to see if the calendar backup battery is properly seated on the CPU board. If the battery is seated properly, replace it. If it is not seate properly, seat it correctly and replace the system unit cover. Plug in the ac power cord and turn on the system again. If the error message does not appear, the problem is fixed. If the error message appears again, replace the battery.

Memory Module Failures

Figure 4–21 shows how the memory modules are numbered.

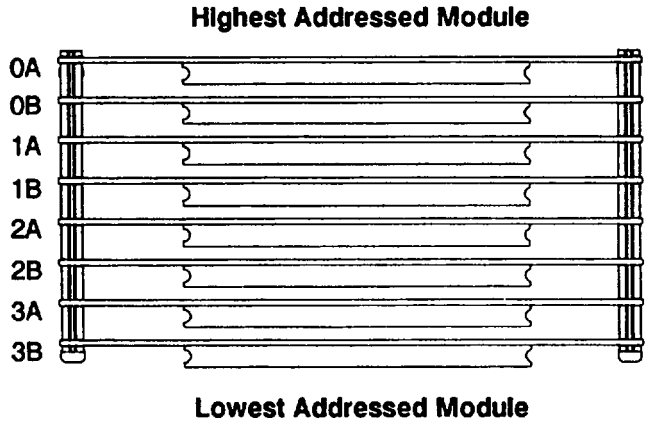


Figure 4–21. Memory Modules

Refer to Table 4–5 and Table 4–6 to determine the memory module with the failing address. Memory modules are grouped in pairs called Module Pairs, representing two memory modules.

Table 4–5. Model 400t, 425t, and 400dl Memory Addresses vs. Memory Block

Memory Addresses Upper Address	Memory Addresses Lower Address	98229–66520 Two Modules 4 MB Blocks	98229–66521 Two Modules 8 MB Blocks	98229–66523 Two Modules 16 MB Blocks
FFFFFFFF	FFC00000	Module Pair	Module Pair	Module Pair
FFBFFFFF	FF800000			
FF7FFFFF	FF400000			
FF3FFFFF	FF000000			
FEFFFFFF	FEC00000			
FEBFFFFF	FE800000			
FE7FFFFF	FE400000			
FE3FFFFF	FE000000			
FDFFFFFF	FDC00000			
FDBFFFFF	FD800000			
FD7FFFFF	FD400000			
FD3FFFFF	FD000000			
FCFFFFFF	FCC00000			
FCBFFFFF	FC800000			
FC7FFFFF	FC400000			
FC3FFFFF	FC000000			

Address LSD of F, E, D, C, 7, 6, 5, and 4 are on the "A" board.
Address LSD of B, A, 9, 8, 3, 2, 1, and 0 are on the "B" board.

Table 4–6. Model 400s, 425s, and 433s Memory Addresses vs. Memory Block

Block Memory Addresses Upper Address	Lower Address	98229–66521 Two Modules 8 MB Blocks	98229–66524 Two Modules 32 MB Blocks
FFFFFFFF	FF800000	Module Pair	Module Pair
FF7FFFFF	FF000000		
FEFFFFFF	FE800000		
FE7FFFFF	FE000000		
FDFFFFFF	FD800000		
FD7FFFFF	FD000000		
FCFFFFFF	FC800000		
FC7FFFFF	FC000000		
FBFFFFFF	FB800000		
FB7FFFFF	FB000000		
FAFFFFFF	FA800000		
FA7FFFFF	FA000000		
F9FFFFFF	F9800000		
F97FFFFF	F9000000		
F8FFFFFF	F8800000		
F87FFFFF	F8000000		

Address LSD of F, E, D, C, 7, 6, 5, and 4 are on the "A" board.
Address LSD of B, A, 9, 8, 3, 2, 1, and 0 are on the "B" board.

HP-UX Compatible Mode Error Messages

"UNEXPECTED" Error Messages

Several "UNEXPECTED" failure messages may be displayed at any time. When the CPU executes an instruction set, certain events are expected to occur. Should an interrupt (either internally from the CPU or externally from some other device) occur and cause a RAM or CPU address to be used out of sequence, the following error message is displayed:

```
UNEXPECTED USE OF (address)
```

Table 4-7 lists these messages. The address' 5 most significant hexadecimal digits are FFFFF so only the 3 Least Significant Digits (LSD) are used in the table. When a range of addresses is shown, each address in the range is six addresses apart.

When an "UNEXPECTED" failure message equates to an interrupt level, vectored interrupt, or trap, the following situations normally exist::

- **Interrupt levels 1 through 7:** Can happen at any time and are usually caused by an interface set to the indicated interrupt level. If the error repeats, replace the CPU board.
- **CPU traps:** Usually occurs when the operating system is being used. A CPU trap indicates something in the processor circuits didn't go right. If the error repeats, replace the emulator or CPU board.
- **Other errors:** Several things on the CPU/emulator board in an interface or processor circuit can cause these errors. If the error repeats, replace the CPU or emulator board.

Table 4–7. UNEXPECTED USE OF *(address) Failure Messages*

3 Hex LSDs	Unexpected Event
FFA	Bus error
FF4	Address error
FFE	Illegal Instruction
FE8	Zero by zero trap
FE2	Check trap
FDC	TRAPV trap
FD6	Privilege violation
FCA	1010 Op. Code
FC4	1111 Op. Code
FBE	Interrupt level 1 (keyboard)
FB8	Interrupt level 2 (not used)
FB2	Interrupt level 3
FAC	Interrupt level 4
FA6	Interrupt level 5
FA0	Interrupt level 6
F9A	Interrupt level 7 (reset from keyboard)
F3A - F94	CPU traps
F34	Reset from keyboard
F2E	Keyboard timeout (fast handshake)
F28	Battery backup interrupt
F22	Non-maskable interrupt from the backplane
F1C	Spurious interrupt
EEC - F16	Vectored interrupt
EE6	Format error, co-processor violation, or unknown
EE0	Co-processor exception vectors

Diagnostics

This chapter describes how to run offline diagnostics for Domain/OS and HP-UX systems.

Mnemonic Debugger Self Test Diagnostics

Perform the steps in the appropriate subsection to force execution of Self Test diagnostics on a Domain/OS system.

Running the Standard Self Test Diagnostics

Perform the following steps to run the Standard Self Test diagnostics:

1. Log out and stop any user processes.

2. Shut down to the MD prompt by typing the following at the "login:" prom

   login: **shut**

3. From the MD prompt " > ", type the following:

   > re <RETURN>

4. After the beeper sounds, press **<RETURN>** and type the following:

   > te <RETURN>

Running the Extended Self Test Diagnostics

Perform the following steps run the Extended Self Test diagnostics:

1. Log out and stop any user processes.

2. Shut down to the MD prompt by typing the following at the "login:" prom

   login: **shut**

3. From the MD prompt " > ", type the following:

   > re <RETURN>

4. After the beeper sounds, press **<RETURN>** and type the following:

   > et <RETURN>

5. Answer the prompts as they appear.

Running the Continuous Self Test Diagnostics

Perform the following steps to run the Continuous Self Test diagnostics:

1. Log out and stop any user processes.

2. Shut down to the MD prompt by typing the following at the "login:" prompt:

   login: **shut**

3. From the MD prompt " > ", type the following:

   > re <RETURN>

4. After the beeper sounds, press **<RETURN>** and type the following:

   > ct <RETURN>

LED Status and Error Messages

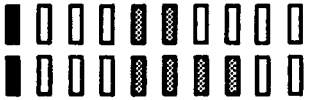
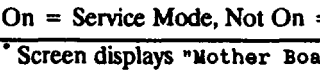
Table 5-1 shows the codes displayed by the LEDs during normal Domain/OS operation.

Table 5-1. MD Status LED Codes

LED Display (A through D Flashing)	System Status
P A B C D E F G H S	
■ □ □ □ ▒ □ □ □ □ ▒	Operating system running
■ □ □ ▒ □ □ □ □ □ ▒	Disk access in progress
■ □ ▒ □ □ □ □ □ □ ▒	Network receive in progress
■ ▒ □ □ □ □ □ □ □ ▒	Network transmit in progress
P = Power-OK Indicator ▒■ = LED On	S = Service Mode Indicator On = Service Mode Off = Normal Mode

Table 5-2 shows the FRU codes displayed by the Self Tests as they appear on the front panel display. Use these LED codes to determine the failing FRU.

Table 5-2. Self Test LED FRU Codes

LED Display (P A B C D E F G H S)	FRU Name	Hex Code
	Boot ROM	0D
	EEPROM	21
	HP-IB	24
	DMA	28
	EEPROM	2E
	SCSI device 0	30
	SCSI device 1	31
	SCSI device 2	32
	SCSI device 3	33
	SCSI device 4	34
	SCSI device 5	35
	SCSI device 6	36
	SCSI device 7	37
	Network interface board	38
	Graphics interface board	39
	CPU board (SIO)	3A
	Memory	3B
	Emulator board, crystal, 68040 IC, CPU board, or EEPROM*	3C
	System bus	3D
	Domain keyboard	3E
	CPU board (Utility)	3F

S = Service Mode Indicator P = Power-OK Indicator
On = Service Mode, Not On = Normal Mode ▒ = LED On

* Screen displays "Mother Board" for this failure.

HP-UX Boot ROM Test Diagnostics

This section provides the following information about HP-UX systems:

- LED displays and messages for Self Test errors
- Boot ROM messages
- Boot ROM test mode
- ce.utilities

Boot ROM Self-Test LED Displays

Figure 5-1 shows how to identify the state of the LEDs that are displayed in the following tables.

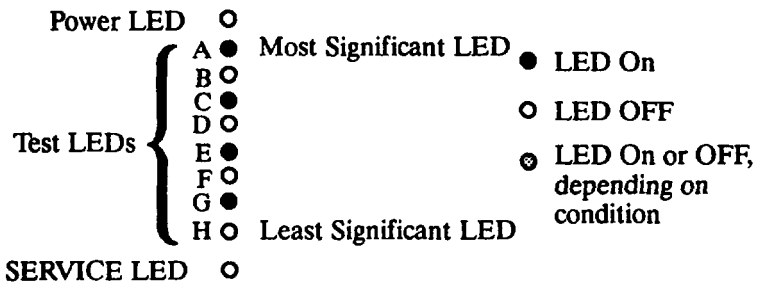


Figure 5-1. Sample Boot ROM Self-Test LEDs

General Failure Code Descriptions

Table 5-3 and Table 5-4 show the LED displays for general failures on HP-UX systems.

Table 5–3. General Failure Code Description (Upper Two Bits Fail Indicator)

Upper 2 Bits Fail Indicator	LED Code and Failure Description		
State indications only	○ ○ ⊗ ⊗ ⊗ ⊗ ⊗ ⊗	⊗ LEDs indicate power-up state	
Required device missing or data acknowledge failure	○ ● ⊗ ⊗ ⊗ ⊗ ⊗ ⊗	⊗ LEDs indicate device.	
Failing device	● ○ ⊗ ⊗ ⊗ ⊗ ⊗ ⊗	⊗ LEDs indicate device.	
Special codes (Special case highest priority codes)	● ● ● ● ● ● ● ●	● LEDs never accessed.	○ LEDs ● failed ● to ● acknowledge ● data. ● ● ●
			● CPU ● board ● timer ● failed or ● missing. ● ● ○

Table 5-4. General Failure Code Descriptions (Lower Two Bits Fail Indicator)

Lower 2 Bits Fail Indicator	LED Code and Failure Description
State indications only	○ ○ ⊗ ⊗ ⊗ LEDs indicate power-up state. ⊗ ⊗ ⊗ ⊗
Miscellaneous (highest priority)	○ Ignore. ○ Ignore. ○ ○ ⊗ Failure indicator. ⊗ Failure indicator. ⊗ Failure indicator. ⊗ Failure indicator.
Internal peripheral failure (medium priority)	○ Ignore. ○ Ignore. ○ ● ⊗ Peripheral number. ⊗ Peripheral number. ⊗ Peripheral number. ⊗ Peripheral number.
Internal interface failure (lowest priority)	○ Ignore. ○ Ignore. ● ⊗ Select code. ⊗ Select code. ⊗ Select code. ⊗ Select code. ⊗ Select code.

State and Failure Codes

Table 5-5 lists the LED state and failure codes used by the Boot ROM.

Table 5-5. Boot ROM LED State and Failure Codes

LEDs State/Failure	LEDs State/Failure	LEDs State/Failure
○ No failure. ○ ○ ○ ○ ○ ○ ○	○ Failed CPU ○ register test. ○ ○ Replace emulator ○ board. ○ ○ ●	○ Testing the ○ top 16 KB ○ of memory. ○ ○ ○ ● ○
○ Top 16 KB of ○ meemory ○ missing or not ○ found. ○ ● ○ Check memory in ○ slot 0A.	○ Searching for ○ user supplied ○ extension ROM. ○ ○ ● ○ ●	○ Started executing ○ extension ROM ○ instructions. ○ ○ ● ● ○
○ Starting test ○ vector list. ○ ○ ○ ● ● ●	○ Resetting all ○ interfaces. ○ ○ ● ○ ○ ○	○ I/O on-board ○ test code ○ running. ○ ● ○ ● ●
○ Internal ○ checksum. ○ ○ ● ● ○ ○	○ DIO-II ○ console testing. ○ ○ ● ● ○ ●	○ Failed Boot ROM ○ checksum. ○ ○ Replace ● CPU ● board. ● ○
○ Preloading memory ○ for main test. ○ ○ ● ● ● ●	○ Testing memory. ○ ○ ● ○ ○ ○ ○	○ Failure: ○ not enough ○ memory. ● ○ Replace slot 0A ○ memory module ○ ●
○ Failure: ○ ROM system. ○ ● Replace ROM ○ system. ○ ● ○	○ Faillure: ○ Boot error. ○ ● Replace CPU ○ board. ○ ● ●	○ Failure: ○ Operating system ○ tried to load at too ● high of a memory ○ address. ● Try again or replace ○ CPU or emulator ○ board.

(Continued)

Table 5–5. Boot ROM LED Failure Codes (Cont.)

LEDs State/Failure	LEDs State/Failure	LEDs State/Failure
○ Not enough memory to load operating system. ○ ○ ● ○ ● ○ ● Add more memory.	○ Failure: ○ 4 MS timer. ● ○ Replace CPU ○ board. ○ ○ ○	○ Failure: ○ HP-HIL circuit. ● ○ Replace CPU ○ board ○ ● ○
○ Failure: ○ HP-IB board. ● ○ Replace HP-IB ○ board. ● ○ ○	○ Failure: ○ DMA circuit. ● ○ Replace CPU ● board. ○ ○ ○	○ Failure: ○ High-resolution ● video board font ○ ROM. ● ● Replace video ○ board. ○
○ Failure: ○ Video board ● bit-map circuit. ○ ● Replace video ● board. ○ ●	○ Failure: DIO-I ○ Interface at select ● code identified by ⊗ five lowest LEDs. ⊗ ⊗ Replace board ⊗ that has the failed ⊗ interface.	● Failure: DIO-II ⊗ Interface at select ⊗ code identified by ⊗ all LEDs. ⊗ ⊗ Replace board ⊗ that has the failed ⊗ interface.

Boot ROM Messages

Table 5-6 and Table 5-7 list the messages displayed for Boot ROM funct
Each message is explained and, if required, a procedure to resolve an inc
problem.

Table 5-6. Boot ROM Displayed Status Messages

Displayed Message	Meaning and What to Do
`CONFIGURE MODE`	System unit is in configure mode. Press B, F, I or X and RETURN.
`Bit Mapped Display`	Bit-mapped video board identified.
`BOOTING A SYSTEM`	An operating system is booting
`(n) Bytes`	Memory amount in decimal. Messag appears after memory test completes.
`Console Keyboard at SC`	Remote keyboard circuit found at sel code indicated.
`DMA`	DMA circuit identified.
`HP-HIL.Keyboard`	CPU board HP-HIL circuit identified Keyboard may now be used.
`HP-IB`	HP-IB interface circuit identified.
`HPnnnnn (type) at (SC)`	HP interface circuit identified: nnnn = product number type = interface type SC = select code Found either the DIO-II accessory ca or an equivalent circuit on the CPU b
`HP98265 (SCSI [E] SC)`	HP SCSI interface circuit identified: [E] = S for single-ended D for differential SC = select code Found either the DIO accessory card equivalent circuit on the CPU board.
`LOADING MEMORY`	Memory is loading with Boot ROM c

(Cont

Table 5–6. Boot ROM Displayed Status Messages (Cont.)

Displayed Message	Meaning and What to Do
`MC68030 Processor`	MC68030 CPU identified.
`MC68882 CoProcessor`	MC68882 CoCPU identified.
`Remote Interface at SC`	Remote interface identified at the indicated select code.
`RESET To Power Up`	Press RESET to re-start power-up
`RESET To Re-try`	Press RESET to try what failed before.
`SYSTEM SEARCH MODE (ENTER To Pause)`	Looking for an operating system. Press ENTER to pause.
`SYSTEM SEARCH MODE (RETURN To Pause)`	Looking for an operating system. Press RETURN to pause.
`SELF-TEST MODE`	System unit is in Self-Test Mode. Press T for extended testing. Press L for continuous self-tests.
`TESTING MEMORY`	Testing memory. Wait until it finishes.
`WAITING 1 MINUTE (Enter To Abort Wait)`	System unit has paused while you decide what to do next. Press Enter to abort the one minute wait and then continue.
`WAITING 1 MINUTE (Enter To Abort Wait)`	System unit has paused while you decide what to do next. Press Enter to abort the one minute wait and then continue.

Table 5–7 lists and explains the messages displayed for Boot ROM failures. It also indicates procedures to resolve the problems.

Table 5–7. Boot ROM Displayed Failure Messages

Displayed Message	Meaning and What to Do
`CONTINUE AT OWN RISK (ENTER To Continue)`	A self-test was not completed. You may continue but errors may occur. Press ENTER to restart power-up sequence.
`CONTINUE AT OWN RISK (RETURN To Continue)`	A self-test was not completed. You may continue but errors may occur. Press RETURN to restart power-up sequence.
`DATA PARITY ERROR AT` (address)	Parity error at (address). Replace memory module that has the indicated address.
`F Disc Error`	Error in disk drive. Troubleshoot disk drive.
`MEMORY FAILED AT` (address)	Memory failed at (address). Refer to Table 4–5 and Table 4–6. Replace memory module.
`MEMORY GONE AT` (address)	Memory not found at indicated address. Replace memory module that has the indicated address
`NOT ENOUGH MEMORY`	Not enough memory to load operating operating system. Add more memory.
`PARITY BIT ERROR AT` (address)	Parity error at (address). Replace memory module that has the indicated address.
`RAM FAILED ABOVE FFFFC000`	Failure in top 16 KB of memory. Replace memory in slot 0A.
`RAM GONE ABOVE FFFFC000`	CPU could not find top 16 KB of memory. Replace memory in slot 0A.
`SYSTEM WOULD LOAD TOO HIGH`	An addressing error would make the operating system try to load at too high an address. Probable cause: • Bad media. • Data transfer error. • Bad processor, interface, or mass storage device. Try again. If error repeats, troubleshoot above items.

(Continued)

Table 5–7. Boot ROM Displayed Failure Messages (Cont.)

Displayed Message	Meaning and What to Do
SYSTEM NOT FOUND	Selected operating system not found on mass storage devices. Verify operating system is available on a mass storage device, then try again. If error repeats, troubleshoot processor, interface, and mass storage.
UNEXPECTED USE OF (address)	Possible CPU related error. See Table 4–7.
Configuration EEPROM Failed	Configuration EEPROM or associated circuits may not work correctly. One of these situations may exist: • Some default and some new configuration values are set. • Some error occurred that should not affect operation. Try again. If error repeats, replace CPU board.
EEPROM Has Bad Information	Configuration Mode started, main menu may appear, but something failed. Try again. If problem continues, replace CPU board. If Configuration Mode does not start and no error message appears, a hardware failure probably occurred. Replace CPU board.
EEPROM Load Section Missing	Could not load new configuration data. Hardware failure. Replace CPU board.
EEPROM Defaults Section Missing	Default configurations could not be found. Hardware failure. Replace CPU board.
Too much data to save	Too many interfaces for EEPROM to manage. Reconfigure system unit with fewer interfaces.

Using the Boot ROM Test Mode for HP-UX Systems

Perform the following steps to select and run Self Tests on HP-UX systems.

1. When your display's last lines show the following message, you can start the Test Mode:

   ```
   RESET to Power-UP, SPACE to clear input     Waiting for
   System Selection ?
   ```

   Type the command:

   T <Return>

2. The following Self Test Controls Menu appears.

   ```
          Self Test Controls
   Keys   Test Option    Selected
   ----------------------------
    1     Continuous          N
    2     Extended            N
    3     Test Memory         Y

    D     set Defaults
    R     Run Tests
   ----------------------------
   Type [key] RETURN ?
   ```

   Type the command key to set the status for the test you want to run:

   key **<Return>**

   Continuous testing causes the boot ROM to repeat the self-test.

   Extended testing invokes a longer memory test and enables the LAN and SCSI tests. SCSI tests are for external SCSI devices only. If an external MAU is not connected for AUI interfaces, the test reports a failure.

   Test Memory may be disabled by setting it to N.

3. To run the self-tests, type the following command:

   R <Return>

4. The self-tests running in Extended or Test Memory mode automatically stop when they finish and the system unit then goes into boot mode. If Continuous Self-Tests are running, they may be stopped by resetting the system unit or cycling power.

Using the HP-UX ce.utilities

Perform the following steps to select and run ce.utilities on HP-UX systems.

1. If not already connected, connect a tape drive to the system for the System Support Tape.

2. Verify the system unit is in the HP-UX compatible mode.

   Refer to Appendix C of *Servicing the HP Apollo 9000 Series 400 Models 400dl, 400t, 425t, 400s, 425s, 433s* for detailed instructions.

3. From the Auto System Select Mode, note the tape drive with the System Support Tape with these operating systems:

   ```
   SYSTEM_SF

   SYSTEM_S3
   ```

4. If you want to run the Series 300 System Functional Tests, select SYSTEM_SF as the temporary operating system to boot.

   If you want to run the Series 300 Computer Tests, select SYSTEM_S3 as the temporary operating system to boot .

   Refer to the *System Support Tape User's Guide* and the *Series 300 Test Tools Manual* for detailed instructions.

5. To continue and run specific ce.utilities tests, boot the HP-UX operating system. The remaining steps of this procedure can only be performed with the HP-UX operating system running.

6. To list all tests on the tape, type the following command, where *drive* is the device file name of the tape drive:

   lifls /dev/*drive* **<Return>**

7. To find out what files are available for a certain test, type the following command:

   lifcp -r /dev/*drive: filename1* **- | cpio -ictv <Return>**

   where *filename1* is one of these six ce.utility tests:

   ```
   CRTADJ          FLOAT           ECC
   CS80            SFT             VME
   ```

   drive is the device file name of the tape drive.

   Note that the HP 98720A and HP98730A tests are not supported on Series 400 system units.

8. If you want to list the file names for a specific ce.utility test in a new file, type the following command:

   lifcp -r /dev/*drive: filename1* - | cpio -ictv [> *filename2*] <Return>

   where *drive* is the device file name of the tape drive
   filename1 is one of these six ce.utilities tests:

CRTADJ	FLOAT	ECC
CS80	SFT	VME

   filename2 is the name of the file in which you want to list the files.

9. To list the files, type the following command:

   more *filename2* <Return>

10. To find out what ce.utilities tests are already on the HP-UX operating system, type the following commands:

    cd /usr/diag/CE.utilities <Return>

    ls <Return>

11. If you want to run a test that is not already on HP-UX, you must first copy the test from the tape to the HP-UX file system. A new directory, **/usr/CE.utilities**, is automatically created and the files from the tape are copied into it. Type the following command

    lifcp -r /dev/*drive:test* - | cpio -icdvxm <Return>

    where *drive* is the device file name of the tape drive
    test is one of the eight test files you want to copy from the tape to the file system.

Information on each ce.utility test may be found as follows:

- CRTADJ: Refer to *System Support Tape User's Guide.*
- CS/80: Refer to the *Series 300 Test Tools Manual.*

  NOTICE: If the CS/80 test is run in single user mode, the system halts when the exerciser is stopped. You must reboot HP-UX to continue.

- FLOAT: Type the following commands and a help file appears on the screen.

  cd /usr/CE.utilities/Floatcard <Return>

  ./help <Return>

- SFT: Refer to the *Series 300 Test Tools Manual.*

- VME: Type the following command and a readme file appears on the screen.

  more vme_README <Return>

- ECC: Type the following commands for information on setting up and execution the ECC tests.

  cd /etc

  man ecclogger <Return>

- Refer to the *System Support Tape User's Guide* and the *Series 300 Test Tools Manual* for detailed information on running the CE.utilities.

Peripherals 6

Refer to the HP Apollo 9000 Series 400 Support Matrix and the HP Apollo 9000 Workstation Configuration Guide for a complete listing of peripherals.

Field Replaceable Units 7

This chapter lists Field Replaceable Units (FRUs) for the Series 400 systems. Refer to the appropriate section for illustrated parts breakdowns and part number lists.

Model 400t, 425t, and 400dl System Units

This section lists Field Replaceable Units for the Model 400t, 425t, and 400dl workstations. Figure 7–1 shows an IPB of the Model 400t, 425t, and 400dl system unit. Match the numbers in the IPB to the FRUs listed in Table 7–1. Refer to Table 7–2 for a list of FRUs that are external to the system unit.

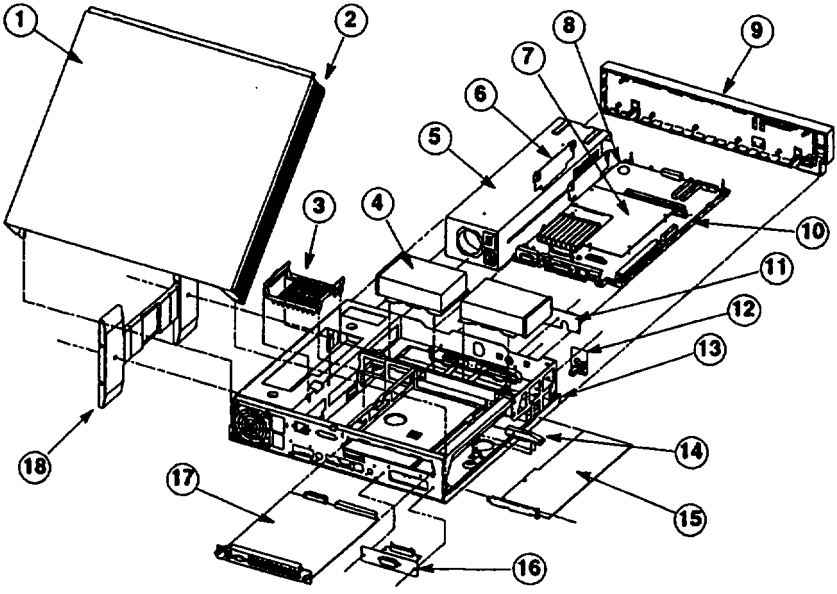


Figure 7–1. Illustrated Parts Breakdown of the System Unit (Model 400t, 425t, and 400dl)

Table 7–1. Model 400t, 425t, and 400dl System Unit FRUs

Item	Description	New Part No.	Exchange Part No.
1	Top Cover	A1630–62007	
2	Side Bezel	A1630–40009	
3	Memory Clamp	A1630–40024	
4	200 MB Disk, Rodime (400t/425t)	A1630–60006	A1630–69006
	200 MB Disk, Quantum (400t/425t)	A1630–60011	A1630–69011
	400 MB Disk, Quantum (400t/425t)	A1094–60008	A1094–69008
	Disk Mount. Plate (Not Shown)	A1630–00006	
5	Power Supply	0950–2055	
6	Memory Boards		
	2 MB (400t/425t)	98229–66520	98229–69520
	4 MB	98229–66521	98229–69521
	16 MB (425t)	98229–66523	98229–69523
7	CPU Board Componenets		
	Emulator Board (400t/400dl)	98574–66513	98574–69513
	68040 Chip, 25 MHz (425t)	5180–1351	
	EEPROM	A1630–80041	
	Boot ROM, 2.0/2.1 (400t/400dl)	1818–5108	
	Boot ROM, 2.0/1.19 (425t) [1]	1818–4990	
	Crystal, 50 MHz (425t)	1818–0788	
8	Calendar Battery	1420–0314	
9	Front Bezel	A1630–62008	
10	CPU Board (400t/425t)	A1630–66001	A1630–69001
	CPU Board (400dl)	A1630–66011	A1630–69011
11	LED Board	A1630–66005	
12	Power Switch	A1630–62044	
13	Bottom Panel	A1630–60008	
14	PC AT Board Skid	A1630–40005	
15	PC AT Network Board (400t/425t)		
	Apollo Token Ring	A1658–66004	A1658–69004
	802.5 Token Ring	A1658–66005	A1658–69005
	HP-IB Cont Bd Assy (400t/425t)		
	HP-IB Board	A1421–66545	
	HP-IB Board Mounting Plate	A1630–00005	
17	Video Board		
	VRX Monochrome	A1630–66003	A1630–69003
	VRX Color (400t/425t)	A1630–62028	A1630–69028

[1] Boot ROM revision levels. The first number indicates the HP-UX revision, the second number the Domain/OS revision.

(Continued)

Table 7–1. Model 400t, 425t, and 400dl System Unit FRUs (Cont.)

Item	Description	New Part No.	Exchange Part No.
18	Floor Stand	5041–2467	
	Screws, Floor Stand	4295–525	
	Blank Plate, HP–IB/PC–AT slot (Not Shown)	77171	
	Internal Cables (Not Shown)		
	DIO–II Graphics Cable	A1630–61006	
	SGC Graphics Cable	A1630–61007	
	Apollo Keybd Conn. Cable	12769	
	Disk Data Cable (400t/425t)	A1630–62013	
	Parallel Port Cable (400t/425t)	A1630–62014	
	SCSI Conn. Cable (400t/425t)	A1630–62037	
	LED Board Cable	A1630–62021	
	HP–IB Board Cable	A1630–62018	

Table 7–2. Model 400t, 425t, and 400dl Non–System Unit FRUs

FRU Description	New Part No.	Exchange Part No.
19" Monchrome Monitor	2090–0235	98774–69001
19" Color Monitor (98754A)	2090–0229	98754–69001
19" Color Monitor		
A1097A [1]	N/A	A1097–69001
A1097B [2]	N/A	A1097–69002
A1097C [3]	N/A	A1097–69003
A1097D [4]	N/A	A1097–69004
16" Color Monitor	2090–0213	
Signal Cable for Mono. Monitor	015325	
Signal Cable for Color Monitors	98700–61603	
Domain Keyboard	1630–82001	
Domain Mouse	1630–82009	
HP Keyboard	46021A	
HP Keyboard cable	46020–60001	
HP Mouse	46060B	

[1] For North America, Northern Hemishere
[2] For North America, Southern Hemisphere
[3] For Europe, Northern Hemisphere
[4] For Europe, Southern Hemisphere

Model 400s, 425s, and 433s System Units

This section lists Field Replaceable Units (FRUs) for the Model 400s, 425s, and 433s workstations. Figure 7-2 shows the parts of the Model 400s, 425s, and 433s system unit. Match the numbers in this figure to Table 7-3 for descriptions and part numbers.

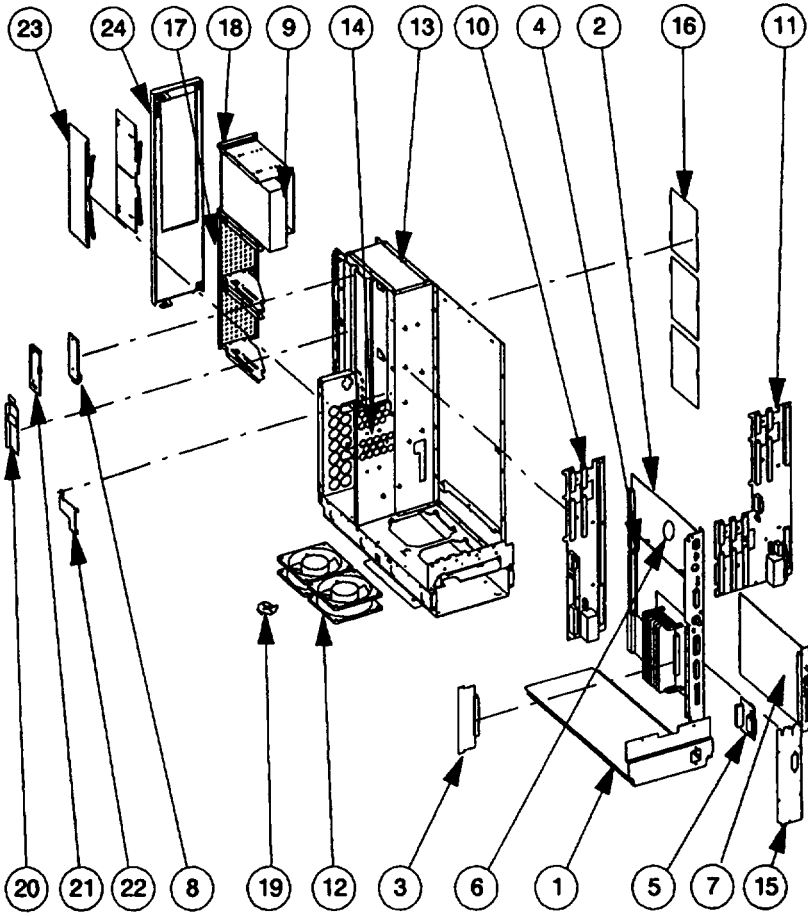


Figure 7-2. Model 400s, 425s and 433s System Unit Illustrated Parts Breakdown

Table 7–3. Model 400s, 425s, and 433s Main System Unit Part Numbers (Refer to Figure 7–2)

Item	Description	New Part No.	Exchange Part No.
1	Power Supply		0950-2107
2	CPU Board (old chassis)	A1421-66001	A1421-69514
	CPU Board (new chassis) [1]	A1421-63514	A1421-69514
	CPU Board w/Integrated Graphics	A1421-66518	A1421-69518
3	Memory Boards		
	4 MB Memory Board	98229-66521	98229-69521
	16 MB Memory Board	98229-66524	98229-69524
4	CPU Board Components:		
	Emulator Board (400s)	98574-66513	98574-69513
	68040 Chip (425s/433s)	5180-1350	
	128K Cache (425s/433s)	A1421-66516	
	Boot ROM, 2.0/2.1 [2] (400s)	1818-5108	
	Boot ROM, 2.0/1.19 [2] (425s/433s)	1818-4990	
	Boot ROM, rev. 3.0 (425s/433s)	1818-5158	
	EEPROM	A1421-80015	
	Crystal, 100 MHz (425s/433s)	1813-0787	
	LAN Jumper	1258-0218	
	Ejector Assy (inclds HP-IB Plate)	5001-7493	
5	HP-IB Interface Board	A1421-66545	
6	Real-Time Clock Battery	1420-0314	
7	Video/Graphics Boards		
	Color Video Board	A1416-66571	A1416-69572
	Mono. Video Board	A1630-66003	A1630-69003
	GAD Bus Interface	98702-66501	98702-69501
	PDMA Interface	98735-66580	98735-69580
	VDMA Interface	98735-66581	98735-69581
8	LED Board	A1421-66540	
9	Mass Storage Devices		
	CD ROM Disk Drive	C2293-60002	
	QIC Tape Drive	011778-001	011778-001R
	HP 330 MB Hard Drive	C2212-60061	C2212-69061
	HP 660 MB Hard Drive	C2213-60061	C2213-69061
	Micropolis 660 MB Hard Drive	A1095-60001	A1095-69001
	Micropolis 1.3 GB Hard Drive	A1095-60002	A1095-69002
	HP 330/660 MB Drive Cntrlr Bd	97548-63037	98548-69037
10	Standard/ISA Motherboard	A1421-66501	
11	DIO-II Motherboard	A1421-66504	
12	Main Fan	5180-5246	

[1] Backward compatible with older chassis.
[2] Boot ROM Revision levels. The first number indicates the HP-UX revision, the second number the Domain/OS revision.

(Continued

Table 7-3. Model 400s, 425s, and 433s Main System Unit Part Numbers (Cont.)
(Refer to Figure 7-2)

Item	Description	New Part No.
13	Chassis (old)	5001-9066
	Chassis (new)	5001-7497
14	DIO-II Front Wall (DIO-II Version Only)	5001-9076
15a	HP-IB Plate (for old CPU bd)	5001-9072
15b	Blank Plate (for old CPU bd)	5001-9071
16	Disk Cover	5001-7423
17	Full Ht Disk Bracket Assy (old chassis)	5001-9087
	Full Ht Disk Bracket Assy (new chassis)	5001-7499
18	Half Ht Bkt Assy (old chassis)	5001-9095
	Half Ht Bkt Assy (new chassis)	5001-7500
19	Fan Bracket	5001-9091
20	LED Cable Protector	5001-7431
21	LED RFI Sheild	5001-7428
22	LED Cable Cover	5001-7432
23	Front Trim (Right/Left)	5041-2471
24	Front Door (old chassis)	A1421-87908
	Front Door (new chassis, must order ID label)	A1421-87909
	(Parts Not Shown)	
	Door ID Label (for Model 425s new chassis door)	A1421-84001
	Top Cover (old chassis)	5001-9068
	Top Cover (new chassis)	5001-7498
	Top Cover Thumb Screw (new chassis)	5001-7435
	Spring for Top Cover Thumb Screw (new chassis)	5001-7446
	Left Side Cover (old chassis)	5001-9069
	Left Side Cover (new chassis)	TBD
	Right Side Cover (old chassis)	5001-9070
	Right Side Cover (new chassis)[1]	TBD
	Bezel	5041-2435
	Rear Trim (old chassis)	5041-2470
	Disk Bracket Filler Plate (old chassis)	5001-9096
	Half Ht Bkt Filler Plate (new chassis)	5041-2485
	Mass Storage Trim/Door Latch (new chassis)	5041-2483
	Full Height Disk Mass Storage Trim (new chassis)	5041-2484
	DIO-II Bd Card Guide	0403-0397
	Memory Bd Card Guide	5041-2434
	Mass Storage Cable Clamp	1400-1549
	VME Motherboard	A1421-66506
	Main Power Distribution Cable	A1421-61601
	LED Ribbon Cable	A1421-61602
	Power Switch/Cable Assy	A1421-61608
	HP-IB Ribbon Cable	98574-61600
	Mass Storage Power Distribution Cable	A1421-61604
	SCSI Interface Cable	A1421-61603
	Main Fan Extension Cable	A1421-61612
	Main Fans Tray (new chassis)	5001-7497

[1] Backward compatible with older chassis.

Figure 7-3 shows the parts of the DIO-II card cage. Match the numbers in this figure to Table 7-4 for descriptions and part numbers.

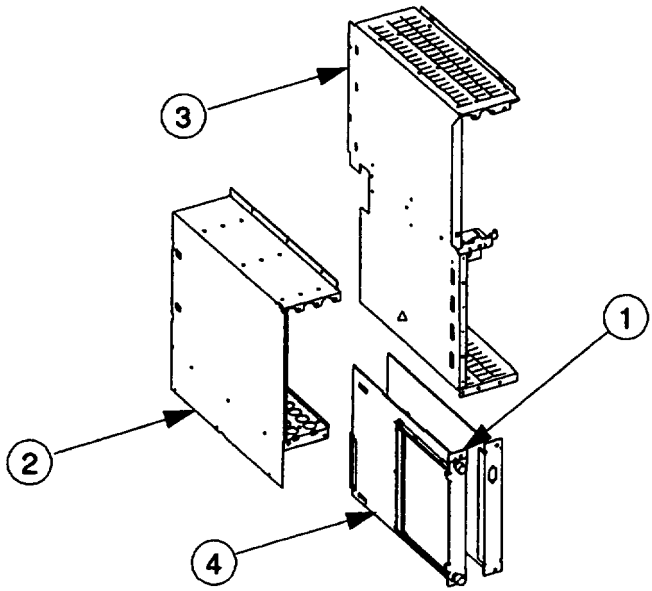


Figure 7-3. Model 400s, 425s, and 433s DIO-II Card Cage

Table 7-4. Model 400s, 425s, and 433s DIO-II Card Cage Part Numbers

Item	Description	New Part Number	Exchange Part Number
1	DIO Board		
	16-Bit Parallel	98622-66504	
	HP-IB Interface	98624-66501	
	High-Speed HP-IB	98625-66502	98625-69502
	Datacomm	98628-66504	98628-69504
	4-Port MUX	98642-66501	98642-69501
	EtherNET 802.3 LAN	98643-66501	98643-69501
	Serial RS-232	98644-66502	98644-69502
	VMEbus	98646-66502	98646-69502
	SDLC Interface	98649-66502	98649-69502
	SCSI Interface	98658-66501	98658-69501
	8-Port MUX	98638-60001	98638-69001
2	DIO-II Cardcage (old chassis)	5001-9075	
	DIO-II Cardcage (new chassis)	5001-9089	
3	DIO-II Center Wall	5001-9089	
4	DIO-II to DIO-I Converter	A1421-67910	
	Cover Plate (not shown)	98561-04104	

Figure 7–4 shows the parts of the ISA/EISA card cage. Match the numbers in this figure to Table 7–5 for descriptions and part numbers.

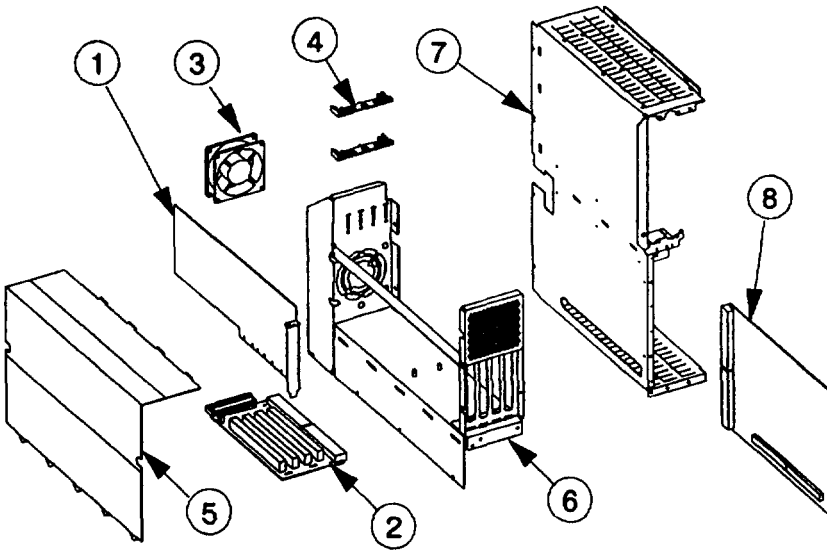


Figure 7–4. Model 400s, 425s, and 433s ISA/EISA Card Cage

Table 7–5. Model 400s, 425s, and 433s ISA/EISA Card Cage Part Numbers

Item	Description	Part Number	Exchange Part Number
1	ISA/EISA Boards		
	Apollo Token Ring	A1658–66004	A1658–69004
	IBM Token Ring	A1658–70002	A1658–79002
	IKON92	015179–001	015179–001R
	X.25 Serial Interface	011783–001	011783–001R
	Domain DOS Co-proc.	009436A	009436R
	Serial/Parallel	011023	011023R
2	ISA Backplane	A1421–66507	
3	Cardcage Fan	5180–5247	
4	ISA Card Guide/Fan Clip	5041–2469	
5	RFI Cover	5001–9092	
6	ISA/EISA Cardcage (old chassis)	5001–9074	
	EISA Cardcage (new chassis)	TBD	
7	ISA Center Wall	5001–9067	
8	DIO–II to ISA Converter Bd.	A1630–66004	
	DIO–II to EISA Converter Bd.	A1630–66506	
	Parts not Shown:		
	ISA Pwr. Dist. Cable	A1421–61607	
	Cover Plate	5001–7430	

Diagrams 8

This chapter provides functional block diagrams of the Series 400 system units.

Model 400t, 425t, and 400dl System Units

This section provides functional block diagrams of the Model 400t, 425t, and 400dl system units.

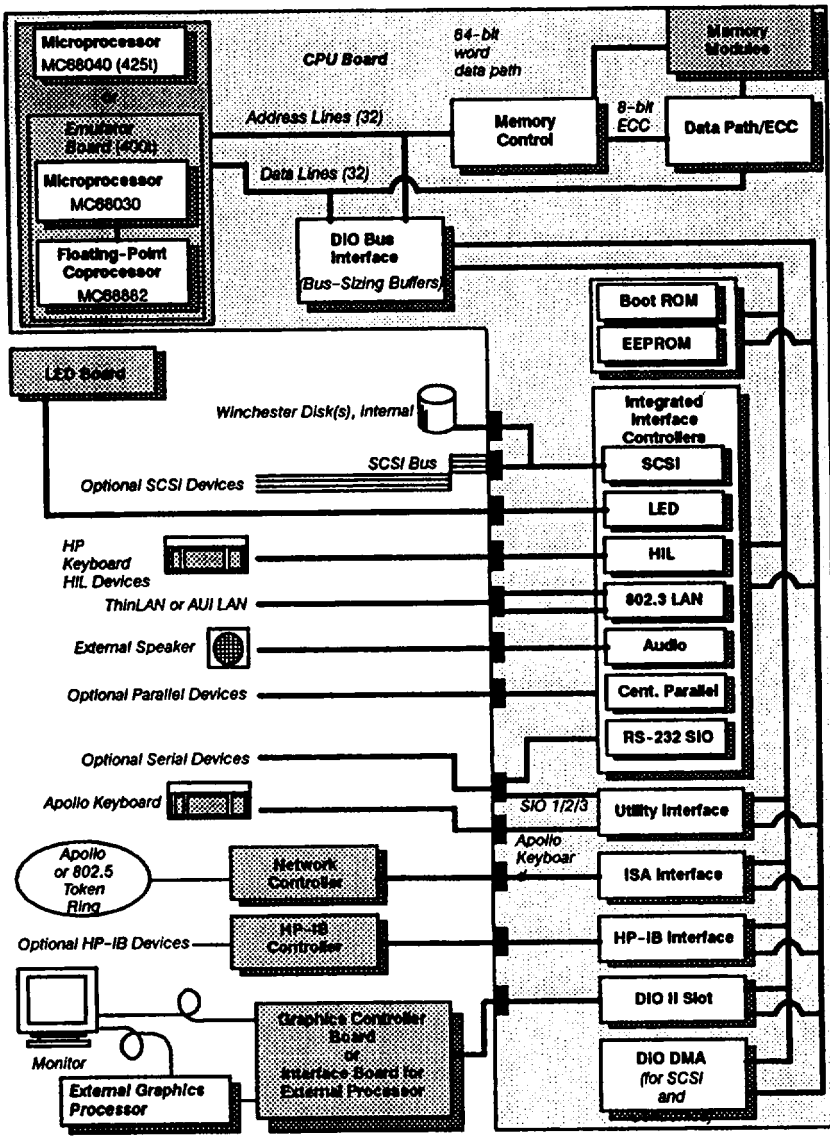


Figure 8–1. Model 400t and 425t System Unit Functional Block Diagram

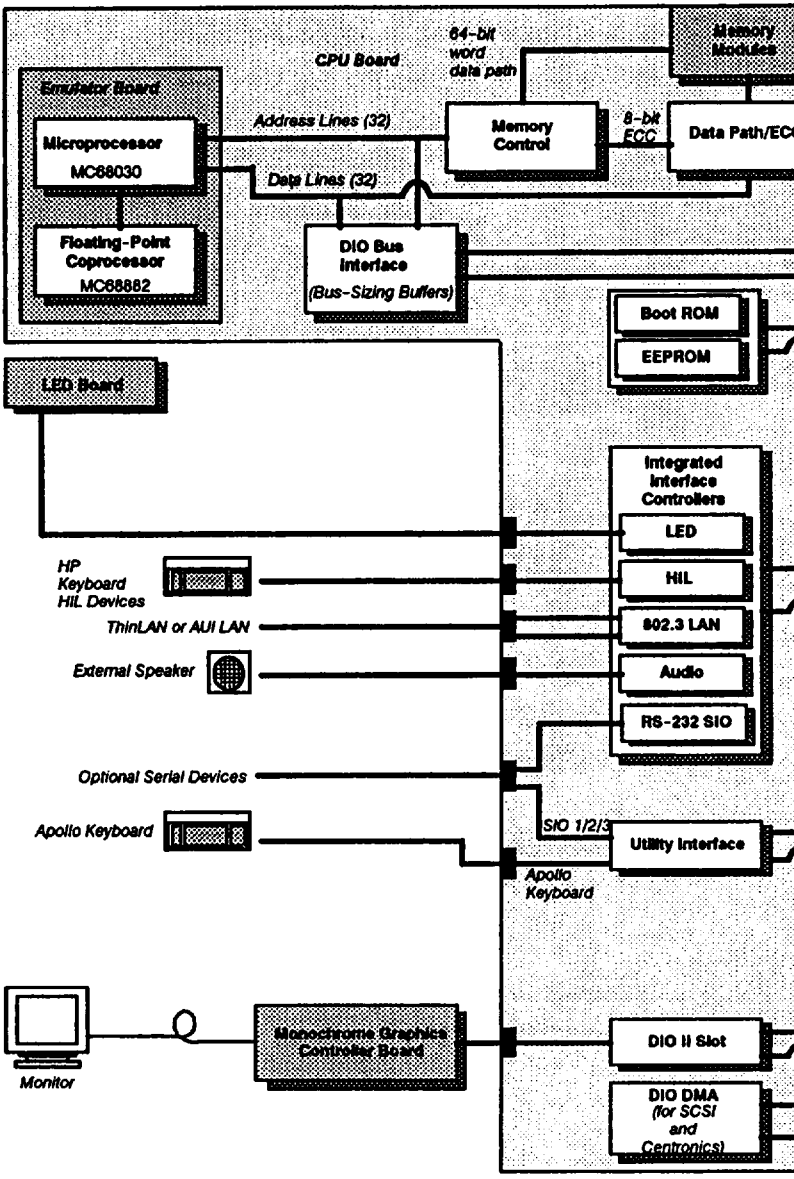


Figure 8-2. Model 400dl System Unit Functional Block Diagram

Model 400s, 425s, and 433s System Units

This section provides functional block diagrams of the Model 400s, 425s, and 433s system units.

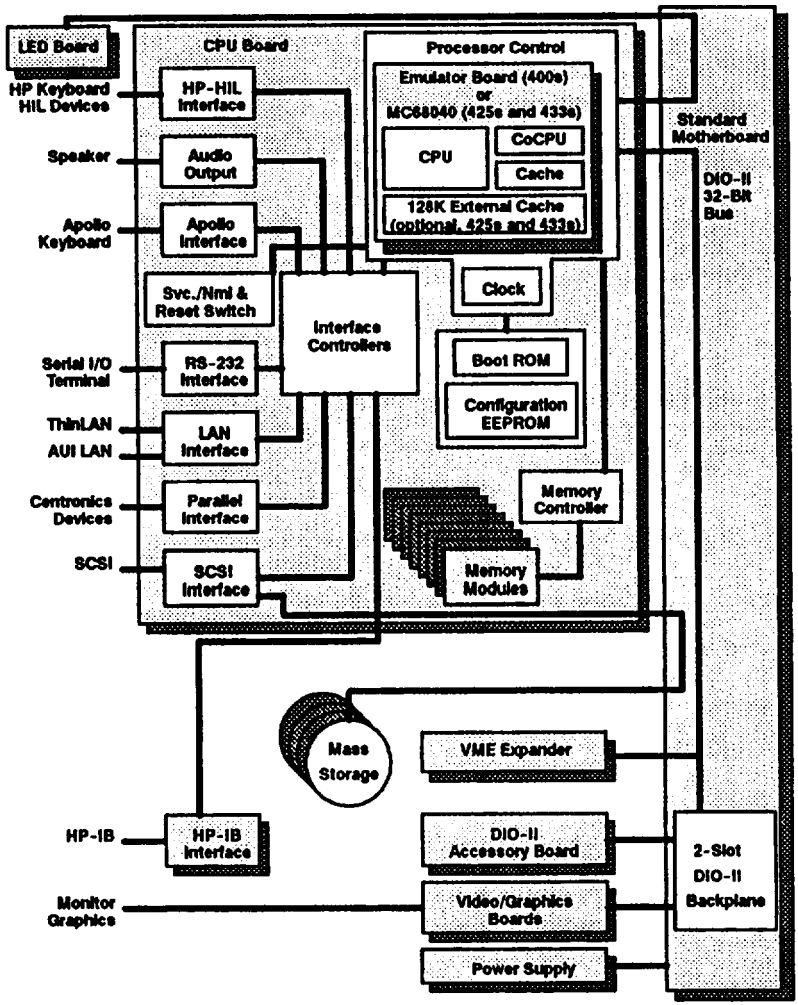


Figure 8–3. Model 400s, 425s, and 433s Standard I/O System Unit Functional Block Diagram

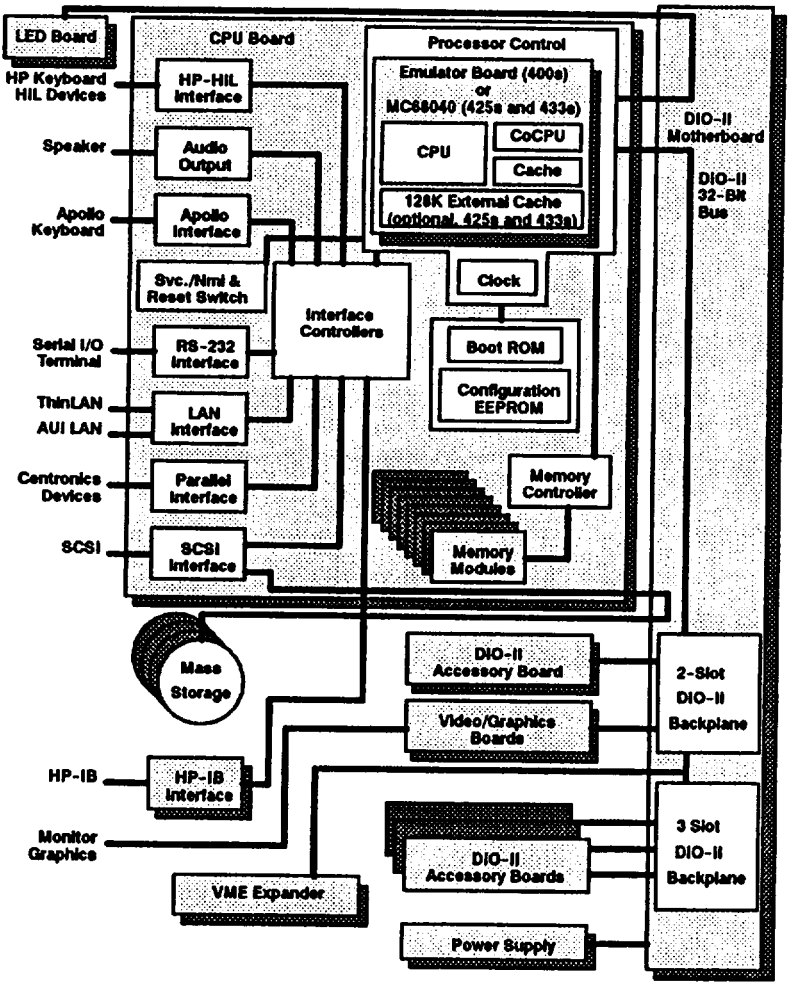


Figure 8–4. Model 400s, 425s, and 433s DIO–II System Unit Functional Block Diagram

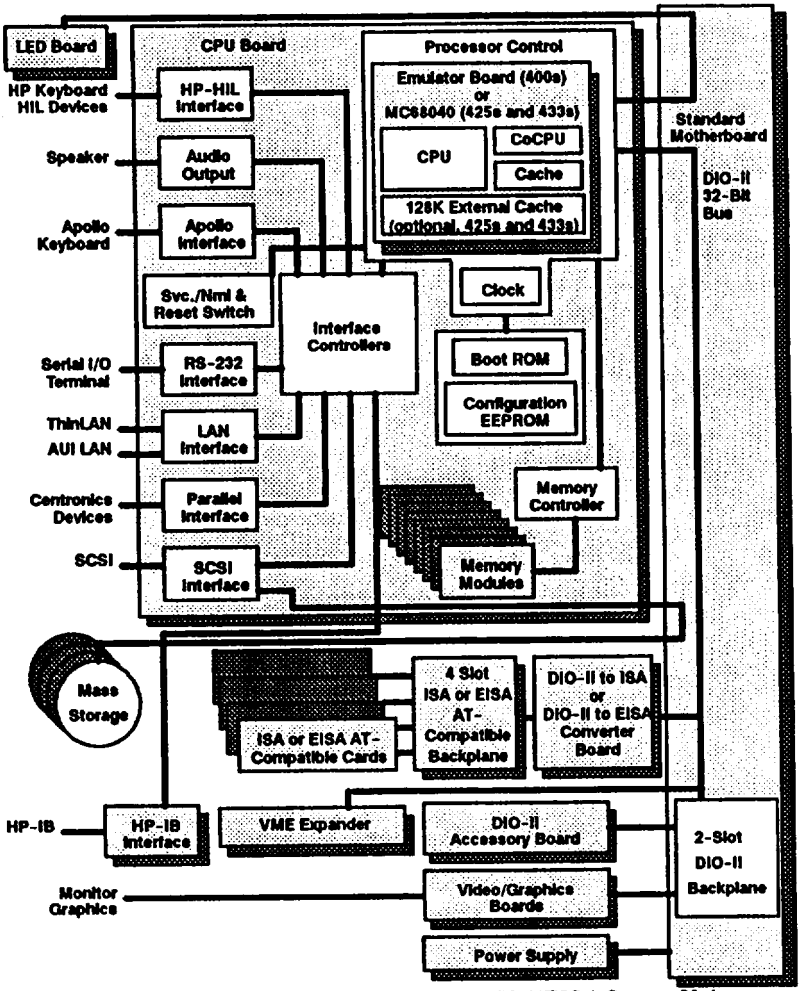


Figure 8–5. Model 400s, 425s, and 433s ISA/EISA System Unit Functional Block Diagram

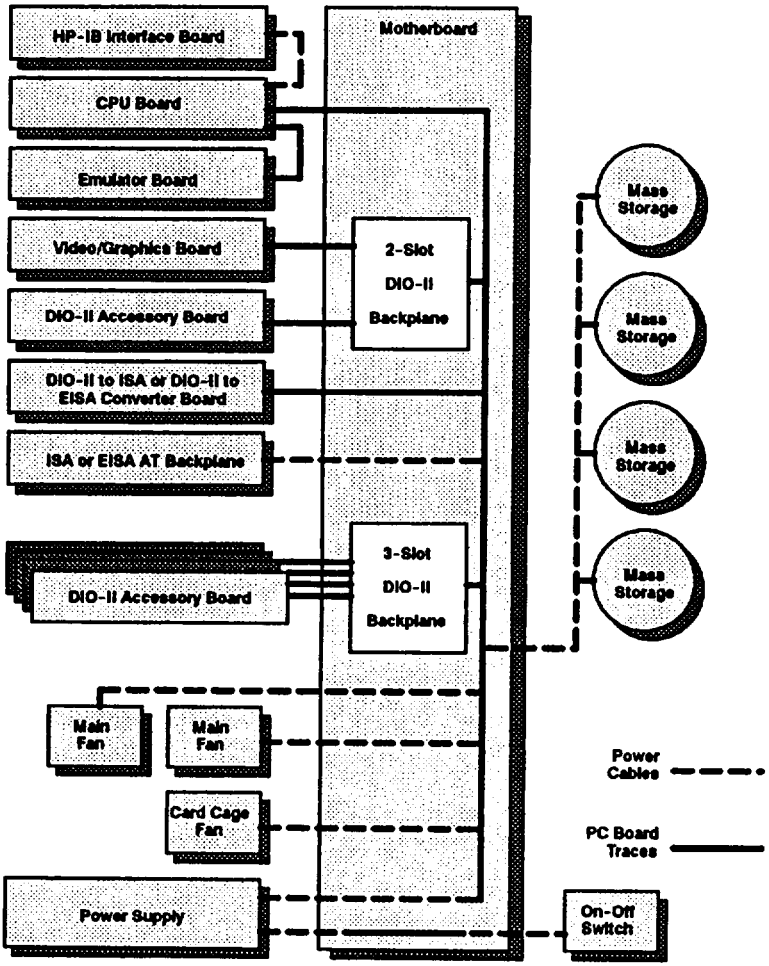


Figure 8–6. Model 400s, 425s, and 433s System Unit Power Distribution Diagram

Reference

This chapter lists Series 400–related documentation.

Installation Manuals

Refer to Table 9–1 for Series 400–related installation documenation.

Table 9–1. Series 400 Installation Manuals

Part Number	Title
A1630–90001	*HP Apollo 9000 Series 400 Model 400dl, 400t, 425t Installation Guide*
A1421–90001	*HP Apollo 9000 Series 400 Model 400s, 433s Installation Guide*
A1630–90005	*HP Apollo 9000 Series 400 Workstation Domain/OS Owner's Guide*
A1630–90006	*HP Apollo 9000 Series 400 Workstation HP–UX Owner's Guide*
A1421–90004	*HP Apollo 9000 Model 400s and 433s Configuration Worksheet*
A1630–90003	*Installing a 200–MB Winchester Disk into the HP Apollo Series 9000 Model 400t and 425t Workstation*
A1096–90000	*Installing the VRX Monochrome Controller Board (A1096A) into the HP Apollo Series 400 Workstations*

Service Manuals

Refer to Table 9–2 for Series 400–related service documenation.

Table 9–2. Series 400 Service Manuals

Part Number	Manual Title
A1630–90007	*Servicing the HP Apollo 9000 Series 400 Workstations*
A1630–90009	*HP Apollo 9000 Series 400 Service Handbook*
09800–90011	*Series 200/300 Test Tools Manual*
98561–90035	*Series 300 Computers System Support Tape User's Manua*
D–9329–0	*Using Domain Diagnostics, Volume 1*
D–11775–C	*Using Domain Diagnostics, Volume 2*
92453–90026	*Troubleshooting HP–UX Systems Error Diagnostics and Recovery*

Reference Manuals

Refer to Table 9-3 for Series 400-related reference documenation.

Table 9-3. Series 400 Reference Manuals

Part Number	Manual Title
	HP Apollo 9000 Series 400 Support Matrix
	HP Apollo 9000 Workstation Configuration Guide
D-2685-B	*Apollo Documentation Quick Reference*
98594-90080	*HP-UX Documentation Reference*
D-9414-A	*Domain System Utilities Reference*
D-2348-A	*Getting Started with Your Domain/OS System*
D-8860-C	*Installing Domain Software with Apollo's Release and Installation Tools*
98594-90061	*HP-UX System Administrator Tasks*

Service Notes

Place service notes here.

Order Number A1630–90009