COMPAQ

ProLiant ML530 Servers

Maintenance and Service Guide

Fourth Edition (September 2000)
Part Number 122829-004
Spare Part Number 159306-001
Compaq Computer Corporation

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About This Guide

This maintenance and service guide is a troubleshooting guide for reference when servicing Compaq ProLiant ML530 servers.

IMPORTANT: The installation of options and the servicing of this product must be performed by individuals who are knowledgeable of the procedures, precautions, and hazards associated with equipment containing hazardous energy circuits.

Symbols in Text

These symbols may be found in the text of this guide. They have the following meanings.

WARNING: Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or loss of life.

CAUTION: Text set off in this manner indicates that failure to follow directions could result in damage to equipment or loss of information.

IMPORTANT: Text set off in this manner presents clarifying information or specific instructions.

NOTE: Text set off in this manner presents commentary, sidelights, or interesting points of information.

Compaq Technician Notes

WARNING: Only authorized technicians trained by Compaq should attempt to repair this equipment. All troubleshooting and repair procedures are detailed to allow only subassembly/module-level repair. Because of the complexity of the individual boards and subassemblies, no one should attempt to make repairs at the component level or to make modifications to any printed wiring board. Improper repairs can create a safety hazard.

WARNING: To reduce the risk of electric shock or damage to the equipment:

- If the system has multiple power supplies, disconnect power from the system by unplugging all power cords from the power supplies.
- Do not disable the power cord grounding plug. The grounding plug is an important safety feature.
- Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.

CAUTION: To properly ventilate your system, you must provide at least 12 inches (30.5 cm) of clearance at the front and back of the computer.

CAUTION: The computer is designed to be electrically grounded. To ensure proper operation, plug the AC power cord into a properly grounded AC outlet only.

NOTE: Any indications of component replacement or printed wiring board modifications may void any warranty.

Where to Go for Additional Help

In addition to this guide, the following information sources are available:

- User documentation
- *Compaq Service Quick Reference Guide*
- Service training guides
- Compaq service advisories and bulletins
- Compaq QuickFind
- Compaq Insight Manager
- Compaq download facility data line: 281-518-1418
- Compaq website:

  http://www.compaq.com

Telephone Numbers

For the name of your nearest Compaq authorized reseller:

- In the United States, call 1-800-345-1518.
- In Canada, call 1-800-263-5868.

For Compaq technical support:

- In the United States and Canada, call 1-800-386-2172.
- For Compaq technical support phone numbers outside the United States and Canada, visit the Compaq website:

  http://www.compaq.com

Chapter **1**

Illustrated Parts List

This chapter provides the illustrated parts breakdown and a spare parts list for Compaq *ProLiant*™ ML530 servers. To obtain information on names and part numbers of referenced spare parts, refer to Figure 1-1 and Table 1-1 for external components, and Figure 1-2 and Table 1-2 for system components.

IMPORTANT: Use only 133-MHz front-side bus Pentium III Xeon processors with gold-colored heat sinks. Processors with other-colored heat sinks will not function properly in Compaq ProLiant ML530 servers.

External Components—Exploded View

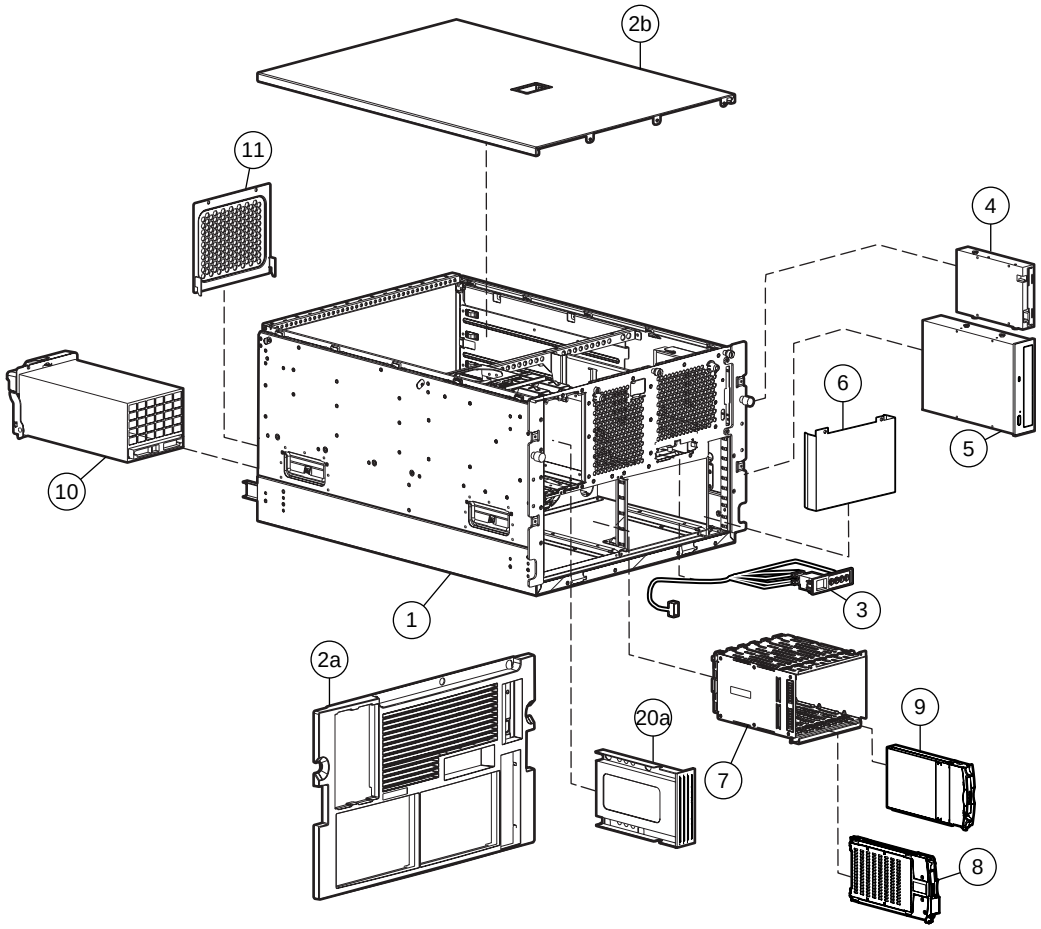

Figure 1-1. External components—exploded view

External Components—Spare Parts List

Table 1-1
External Components Spare Parts List

Item	Description	Spare Part Number
	Chassis	
1	Chassis, rack-mount	159316-001
2	Cover kit, rack-mount	167122-001
	a) Rack-mount bezel	
	b) Access panel	
3	Power On/Standby switch with LEDs and cable	161659-001
	Mass Storage Devices	
4	Diskette drive, 1.44 MB	123958-001
5	CD-ROM drive	327659-001
6	Hard drive cage blanking panel	159311-001
7	Hard drive cage with backplane board (maximum: 2 per unit)	159313-001
8	Hot-plug hard drive (maximum: 12 per unit)	
	9.1 GB hot-plug Wide Ultra2 SCSI hard drive, 7200 rpm	104665-001
	9.1 GB hot-plug Wide Ultra2 SCSI hard drive, 10,000 rpm	386536-001
	9.1 GB hot-plug Wide Ultra3 SCSI hard drive, 10,000 rpm	152188-001
	9.1 GB hot-plug Wide Ultra3 SCSI hard drive, 15,000 rpm	189393-001
	18.2 GB hot-plug Wide Ultra2 SCSI hard drive, 7200 rpm	104663-001
	18.2 GB hot-plug Wide Ultra2 SCSI hard drive, 10,000 rpm	143920-001
	18.2 GB hot-plug Wide Ultra3 SCSI hard drive, 10,000 rpm	152190-001
	18.2 GB hot-plug Wide Ultra3 SCSI hard drive, 15,000 rpm	189351-001
	36.4 GB hot-plug Wide Ultra3 SCSI hard drive, 10,000 rpm	177986-001
9	Hard drive blank (maximum: 12 per unit)	122759-001
	Power Supplies	
10	Hot-plug power supply, 450 W (maximum: 3 per unit)	157793-001
11	Power supply blanking panel (maximum: 2 per unit)	159310-001

Note: The tower chassis model is listed under “Hardware” in Table 1-2.

System Components—Exploded View

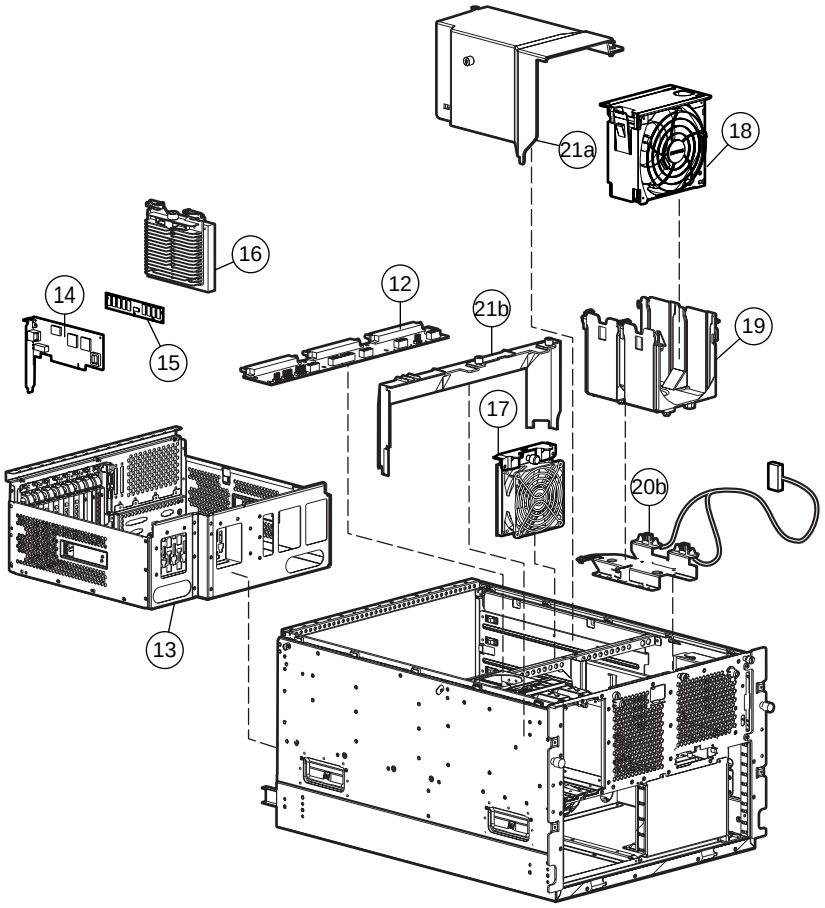

Figure 1-2. System components—exploded view

System Components—Spare Parts List

Table 1-2
System Components Spare Parts List

Item	Description	Spare Part Number
	Boards	
12	Power backplane board	159314-001
13	System board tray	159301-001
14	10/100 PCI network interface controller (NIC)	174831-001
	Memory	
15	Memory modules, 133-MHz, ECC SDRAM DIMM (maximum: 8 per unit)	
	64-MB SDRAM, 64 megabit memory module	159225-001
	128-MB SDRAM, 64 megabit memory module	159226-001
	128-MB SDRAM, 128 megabit memory module	164278-001
	256-MB SDRAM, 64 megabit memory module	159304-001
	256-MB SDRAM, 128 megabit memory module	159377-001
	512-MB SDRAM, 128 megabit memory module	159227-001
	512-MB SDRAM, 256 megabit memory module	177628-001
	Processor	
16	Processor with gold-colored heat sink (maximum: 2 per unit)	
	800-MHz processor with gold-colored heat sink	167121-001
	866-MHz processor with gold-colored heat sink	187528-001
	933-MHz processor with gold-colored heat sink	187529-001
	1-GHz processor with gold-colored heat sink	217045-001
	Fans	
17	Hot-plug drive fan (maximum: 3 per unit)	161657-001
18	Hot-plug system fan (maximum: 4 per unit)	171531-001
19	System fan basket (maximum: 2 per unit)	161658-001
20	Miscellaneous hardware kit	159321-001
	a) Removable media bay blanking panel, shown in Figure 1-1 (maximum: 2 per unit)	
	b) System fan basket-and-cable bracket with cable (maximum: 2 per unit)	
21	Miscellaneous plastics kit	159322-001
	a) CPU fan air baffle	
	b) Hard drive fan air baffle	

Note: The hot-plug drive fan looks similar to the fan used in the Compaq ProLiant 6400R, but operates differently. The Compaq ProLiant 6400R fan is not compatible with Compaq ProLiant ML530 servers.

continued

Table 1-2
System Components Spare Parts List *continued*

Item	Description	Spare Part Number
	Controllers	
22	Smart Array 5300 Controller*	171383-001
23	32-MB memory module with battery backup*	171385-001
	Cable Kits	
24	SCSI cable kit*	159318-001
	a) Internal SCSI cable	
	b) External SCSI cable	
25	Miscellaneous power cable kit*	159319-001
26	Miscellaneous signal cable kit*	159320-001
27	Real-time clock battery (4.5-V, 600-mA alkaline battery)*	160274-001
	Miscellaneous	
28	Maintenance and service guide*	159306-001
29	Country kit, tower*	159307-001
30	Country kit, rack*	159308-001
	Hardware	
31	Chassis, tower*	159315-001
32	Cover kit, tower*	161660-001
	a) Access panel	
	b) Tower cover	
	c) Front bezel door	
33	Locking casters*	296227-001
34	Tower-to-rack conversion kit*	159317-001
35	Enhanced keyboard*	386209-001

*Not shown

Chapter 2

Removal and Replacement Procedures

This chapter provides subassembly/module-level removal and replacement procedures for Compaq ProLiant ML530 servers. After completing all the necessary removal and replacement procedures, run the Diagnostics program to verify that all components operate properly.

WARNING: To reduce the risk of personal injury or damage to the equipment, heed all warnings and cautions throughout the "Removal and Replacement Procedures" chapter.

WARNING: To reduce the risk of personal injury or damage to the equipment, the installation of options other than hot-plug power devices should be performed only by individuals who are qualified in servicing computer equipment and trained to deal with products capable of producing hazardous energy levels.

The following tools are recommended to service Compaq ProLiant ML530 servers:

- Torx T-15 screwdriver or right-angle Allen wrench included on the rear of Compaq ProLiant ML530 servers
- Torx T-10 screwdriver or right-angle Allen wrench for replacement of the drive fan cable connector bracket only
- 4-mm flat-blade screwdriver
- From the Compaq SmartStart and Support Software CD:
  - System Configuration Utility software
  - Array Diagnostic Utility software
  - Diagnostics software

Electrostatic Discharge Information

A discharge of static electricity can damage static-sensitive devices or microcircuitry. Proper packaging and grounding techniques are necessary precautions to prevent damage. To prevent electrostatic damage, observe the following precautions:

- Transport products in static-safe containers such as conductive tubes, bags, or boxes.
- Keep electrostatic-sensitive parts in proper containers until arrival at static-free stations.
- Cover workstations with approved static-dissipating material. Provide a wrist strap connected to the work surface and properly grounded tools and equipment.
- Keep the work area free of nonconductive materials such as ordinary plastic assembly aids and foam packing.
- Always be properly grounded when touching a static-sensitive component or assembly.
- Avoid touching pins, leads, or circuitry.
- Always place drives PCB assembly-side down.
- Use conductive field service tools.

Symbols on Equipment

Any surface or area of the equipment marked with these symbols indicates the presence of electric shock hazards. The enclosed area contains no operator-serviceable parts.

WARNING: To reduce the risk of injury from electric shock hazards, do not open this enclosure.

Any RJ-45 receptacle marked with these symbols indicates a Network Interface Connection.

WARNING: To reduce the risk of electric shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.

Any surface or area of the equipment marked with these symbols indicates the presence of a hot surface or hot component. If this surface is contacted, the potential for injury exists.

WARNING: To reduce the risk of injury from a hot component, allow the surface to cool before touching it.

This label or equivalent is located on the surface of your CD-ROM drive. This label indicates that the product is classified as a CLASS 1 LASER PRODUCT.

Power supplies or systems marked with these symbols indicate the equipment is supplied by multiple sources of power.

WARNING: To reduce the risk of injury from electric shock, remove all power cords to completely disconnect power from the system.

weight in 93–137 lb
weight in 42–62 kg

Any product or assembly marked with these symbols indicates that the component exceeds the recommended weight for one individual to handle safely.

WARNING: To reduce the risk of personal injury or damage to the equipment, observe local occupational health and safety requirements and guidelines for manual material handling.

Preparation Procedures

System power in Compaq ProLiant ML530 servers does not completely shut off with the front panel Power On/Standby switch. The switch toggles between on and standby, rather than on and off. The standby position removes power from most electronics and the drives, but portions of the power supply and some internal circuitry remain active. To completely remove all power from the system, you must disconnect all power cords from the server. For more information about removing power from the system, see "Powering Down the Server" later in this section. See "Server Warnings and Precautions" later in this section for further safety information.

WARNING: To reduce the risk of personal injury or damage to the equipment when moving the server, be sure that:

- The access panel is securely fastened to the chassis.
- You do not use the system board tray handle to move the unit.
- You do not use the rack-mount bezel handles to move the unit.
- You do not use the tower front bezel door as a handle to move the unit.

IMPORTANT: Before beginning to remove any serviceable parts, determine whether the part is hot-pluggable or non-hot-pluggable. Hot-pluggable devices in Compaq ProLiant ML530 servers include SCSI hard drives, fans, and power supplies.

IMPORTANT: Before powering down the unit, verify devices to be replaced by checking the LED indicator status. LED indicators will no longer be lit after power is removed from the system.

Hot-Pluggable Device

The server can remain on to remove and replace hot-plug devices. The access panel can be removed without causing a system shutdown. Hot-pluggable devices will have port-colored latches. Hot-pluggable devices in Compaq ProLiant ML530 servers include SCSI hard drives, fans, and power supplies.

CAUTION: Electrostatic discharge can damage electronic components. Be sure you are properly grounded before beginning any installation procedure. See "Electrostatic Discharge Information" earlier in this chapter.

IMPORTANT: If the server is a tower model, either lock the casters for stability when removing the access panel, or place the server on its side with the access panel up. To reduce the risk of personal injury or damage to the equipment, see "Server Warnings and Precautions" later in this chapter.

IMPORTANT: If the server is mounted in a rack, accessibility to hot-pluggable devices can be increased by sliding the server partially out of the rack. To reduce the risk of personal injury or damage to the equipment, see "Rack Warnings" and "Server Warnings and Precautions" later in this chapter.

Non-Hot-Pluggable Device

Power must be removed from the server to remove or replace non-hot-pluggable devices. Non-hot-pluggable parts include the processors, all boards, DIMMs, and drive cages. See "Powering Down the Server" for complete power-down instructions.

WARNING: To reduce the risk of personal injury or damage to the equipment, the installation of options other than hot-plug power devices should be performed only by individuals who are qualified in servicing computer equipment and trained to deal with products capable of producing hazardous energy levels.

Powering Down the Server

Before beginning any of the removal and replacement procedures for non-hot-plug devices:

1. Press the Power On/Standby switch. This places the server in standby mode, thereby disabling the main power supply output and providing auxiliary power (+5V) to the server.
2. Verify that the power status LED indicator on the front panel, located nearest to the Power On/Standby switch, is amber and that the fans have stopped spinning.

IMPORTANT: It is not necessary to power down the server to replace hot-plug devices such as power supplies, fans, or SCSI hard drives when they are not in active use.

3. Disconnect all AC power cords from the AC outlets, then from the server.

WARNING: To reduce the risk of injury from electric shock, remove all power cords to completely disconnect power from the system.

4. Disconnect all external peripheral devices from the server.

CAUTION: Electrostatic discharge can damage electronic components. Be sure you are properly grounded before beginning any installation procedure. See "Electrostatic Discharge Information" earlier in this chapter.

5. For stability and safety, properly positioning the server is critical.
   - If the server is mounted in a rack, remove the server from the rack and place it on a sturdy table or workbench. To reduce the risk of personal injury or damage to the equipment, see "Rack Warnings" later in this chapter. Refer to the *Compaq ProLiant ML530 Setup and Installation Guide* for further information on working with racks.
   - If the server is a tower model, either lock the casters for stability when removing the access panel, or place the server on its side with the access panel up.

Rack Warnings

WARNING: To reduce the risk of personal injury or damage to the equipment, be sure that:

- The leveling jacks are extended to the floor.
- The full weight of the rack rests on the leveling jacks.
- The stabilizing feet are attached to the rack if it is a single-rack installation.
- The racks are coupled in multiple-rack installations.
- Only one component is extended at a time. A rack may become unstable if more than one component is extended for any reason.
- You are careful when pressing the component rail release latches and sliding the component into the rack. The slide rails could pinch your fingertips.
- You load the rack from the bottom up and load the heaviest item into the rack first.
- You do not attempt to move equipment racks without adequate assistance, due to their height and weight.
- You do not attempt to move an equipment rack on an incline that is greater than 10 degrees from the horizontal.
- You do not attempt to move a fully loaded equipment rack. Remove equipment from the rack before moving the rack.

Server Warnings and Precautions

WARNING: To reduce the risk of personal injury or damage to the equipment:

- Observe local health and safety requirements and guidelines for manual material handling.
- Obtain adequate assistance to lift and stabilize the product during installation or removal. The Compaq ProLiant ML530 server weighs at least 100 pounds (45 kilograms) when fully assembled.
- Remove all pluggable power supplies and modules to reduce the weight of the product.
- Make sure that the product is properly mated with the rails. Products that are improperly mated with the rails may be unstable.

WARNING: To reduce the risk of personal injury, electric shock, or damage to the equipment:

- The installation of internal options and routine maintenance and service of this product should be performed by individuals who are knowledgeable about the procedures, precautions, and hazards associated with equipment containing hazardous energy levels.
- Allow the product to cool before removing covers and touching internal components.
- Do not use conductive tools that could bridge live parts.
- Remove all watches, rings, or loose jewelry when working in hot-plug areas of an energized server.
- The access panel provides access to hazardous energy circuits.

  The panel should remain locked during normal operation.

  -or-

  The server should be installed in a controlled access location where only qualified personnel have access to the server.
- Power down the equipment and disconnect power from all AC power cords before removing devices from non-hot-plug areas.
- Do not replace non-hot-plug components while power is applied to the product. First, shut down the product and disconnect all AC power cords.
- Do not exceed the level of repair specified in the procedures in the product documentation. All troubleshooting and repair procedures are detailed to allow only subassembly or module-level repair. Because of the complexity of the individual boards and subassemblies, do not attempt to make repairs at the component level or to make modifications to any printed wiring board. Improper repairs can create a safety hazard.
- Verify that the AC power supply branch circuit that provides power to the rack is not overloaded. This will reduce the risk of personal injury, fire, or damage to the equipment. The total rack load should not exceed 80 percent of the branch circuit rating. Consult the electrical authority having jurisdiction over your facility wiring and installation requirements.

WARNING: To reduce the risk of electric shock or damage to the equipment:

- Do not pull on a cord or cable. When unplugging from the electrical outlet, grasp the cord by the plug.
- Do not disable the power cord grounding plug. The grounding plug is an important safety feature.
- Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.

CAUTION: Compaq ProLiant ML530 servers must always be operated with system unit covers and air baffles in place. Proper cooling will not be achieved if the system unit covers or air baffles are removed for extended periods of time.

IMPORTANT: The installation of options and servicing of this product shall be performed by individuals who are knowledgeable of the procedures, precautions, and hazards associated with equipment containing hazardous energy circuits.

Tower Model Front Bezel Door

To remove the tower model front bezel door:

1. Unlock and swing open the front bezel door completely.
2. Lift up the front bezel door ❶ and pull it away from the chassis ❷.

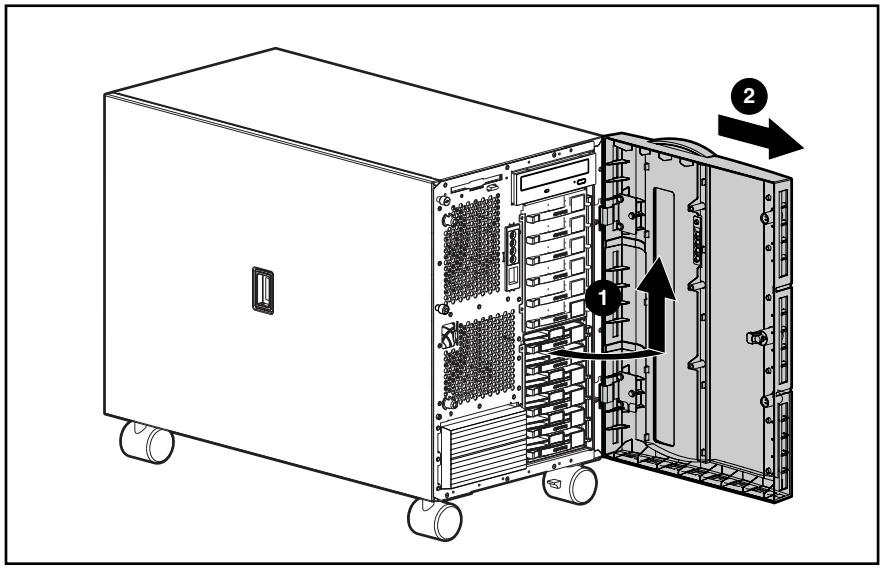

Figure 2-1. Removing the tower model front bezel door

Reverse steps 1 and 2 to replace the front bezel door.

Rack-Mount Bezel

WARNING: To reduce the risk of personal injury or damage to the equipment, do not use the rack-mount bezel handles or system board tray handle to move Compaq ProLiant ML530 servers.

To remove the rack-mount bezel:

1. Perform the preparation procedures. See "Hot-Pluggable Device" earlier in this chapter.
2. Loosen the access panel screws or remove the access panel. See "Access Panel" later in this chapter.
3. Remove the four T-15 ❶ screws securing the rack-mount bezel to the chassis.
4. Pull the rack-mount bezel ❷ away from the chassis.

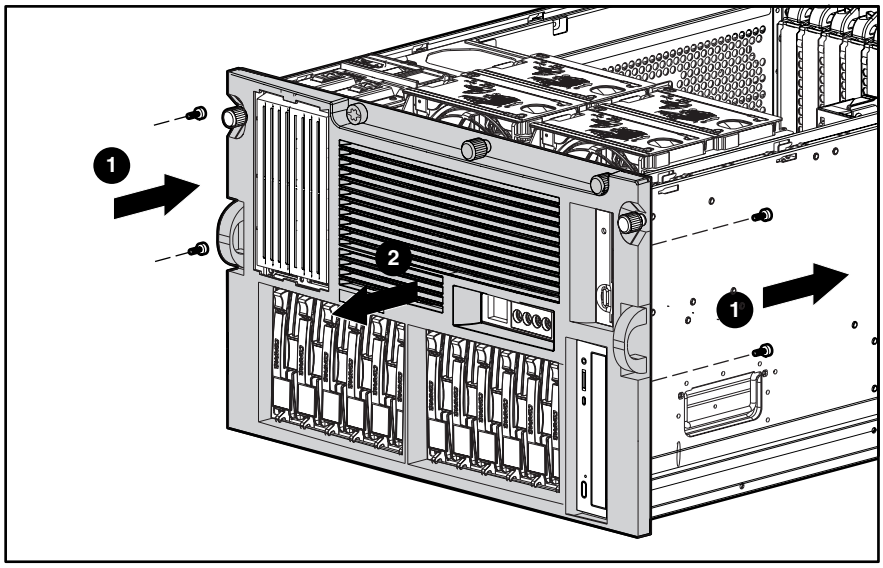

Figure 2-2. Removing the rack-mount bezel

Reverse steps 1 through 4 to replace the rack-mount bezel.

Access Panel

WARNING: To reduce the risk of personal injury from hot surfaces, allow the internal system components to cool before touching them.

CAUTION: Electrostatic discharge can damage electronic components. Be sure you are properly grounded before beginning any installation procedure. See "Electrostatic Discharge Information" earlier in this chapter.

CAUTION: Leaving the access panel off the chassis will diminish the cooling capability and may adversely impact operation of the server.

To remove the access panel:

1. Open the front bezel door (tower model only).
2. Loosen the two thumbscrews ❶ on the front of the chassis.
3. Loosen the T-15 security screw ❷ located on the front of the chassis.
4. Slide the access panel ❸ toward the back of the server, then lift it away from the chassis.

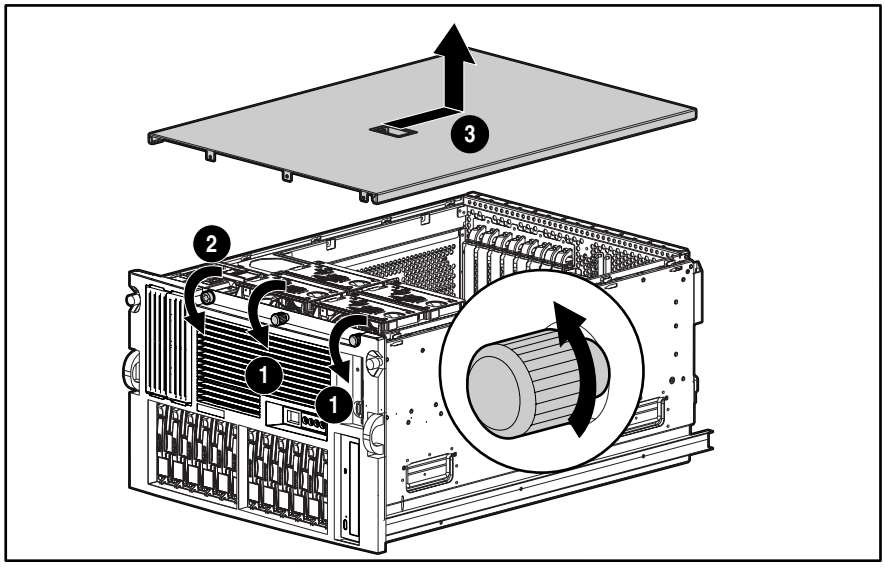

Figure 2-3. Removing the access panel

Reverse steps 1 through 4 to replace the access panel.

Fans

Compaq ProLiant ML530 servers ship standard with two hot-pluggable system fans (one CPU and one I/O) and three hot-pluggable drive fans. The two system fan baskets are designed to allow for a redundant hot-pluggable fan in each basket. Figure 2-4 and Table 2-1 illustrate the location of all fans in Compaq ProLiant ML530 servers, with the fan name and the description of what is cooled by each fan.

NOTE: Fan speed will vary with the internal temperature of the server. Automatic adjustment of fan speed differs in accordance with installed drivers.

NOTE: Fans may continue to spin after a temporary failure occurs. Replace failed fans (amber LED) even if spinning continues.

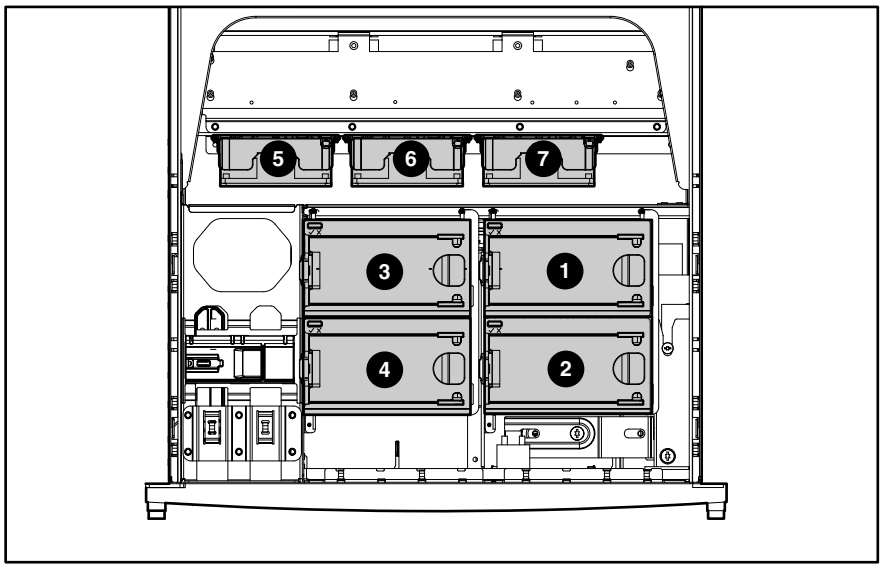

Figure 2-4. Hot-plug fan locations

Table 2-1
Hot-Plug Fan Locations

Fan	Description	Component Cooled
❶	Primary CPU fan (standard)	Processors
❷	Redundant CPU fan (optional)	Processors
❸	Primary I/O fan (standard)	System board
❹	Redundant I/O fan (optional)	System board
❺, ❻, ❼	Drive fans (standard)	Hard drives

Note: If the fan diagnostic LED indicator is amber, this indicates fan failure. If the fan diagnostic LED indicator is green, the fan is working properly. See "LED Indicators, Hot-Plug Fan" in Chapter 4 for more information.

Hot-Plug System Fans

Compaq ProLiant ML530 servers have two system fan baskets, one for the I/O fan and one for the CPU fan. Each basket can hold a primary and a redundant hot-plug system fan. The hot-plug system fans cool the system board components (I/O fan) and the processors (CPU fan).

CAUTION: Never remove both fans from one system fan basket while the server is powered up. Overheating and damage to hardware could result. If the appropriate Compaq software drivers are installed, the operating system software will initiate a power shutdown in the event of overheating.

To remove a hot-plug system fan:

1. Perform the preparation procedures. See "Hot-Pluggable Device" earlier in this chapter.
2. Remove the access panel. See "Access Panel" earlier in this chapter.
3. Press the locking latch in ❶ and lift the failed hot-plug system fan out of the system fan basket ❷.

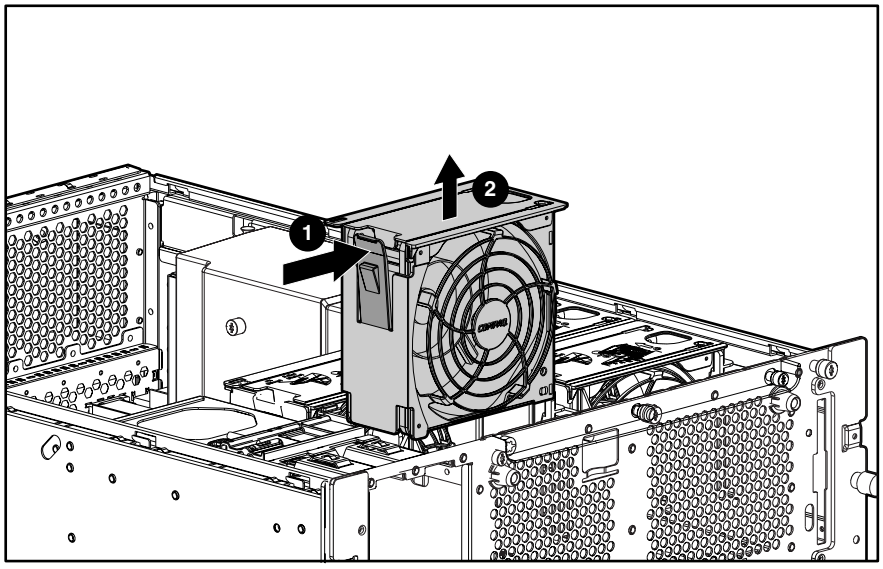

Figure 2-5. Removing a hot-plug system fan

Reverse steps 1 through 3 to replace a hot-plug system fan with a new fan.

System Fan Basket Assembly

The system fan basket assembly is comprised of two components:

- Plastic system fan basket
- Metal system fan basket-and-cable bracket

The plastic basket holds the system fans in place. The metal bracket secures the basket and holds the fan cables in place. Before removing a system fan basket assembly, power must be removed from the server. Inadequate cooling will occur when both fans in a fan basket are removed.

WARNING: To reduce the risk of personal injury or damage to the equipment, the installation of options other than hot-plug power devices should be performed only by individuals who are qualified in servicing computer equipment and trained to deal with products capable of producing hazardous energy levels.

CAUTION: Never remove both hot-plug fans from one system fan basket while the server is powered up. Overheating and damage to hardware could result. If the appropriate Compaq software drivers are installed, the operating system software will initiate a power shutdown in the event of overheating.

To remove the system fan basket:

1. Perform the preparation procedures. See "Powering Down the Server" earlier in this chapter.
2. Remove the hot-plug system fans. See "Hot-Plug System Fans" earlier in this section.
3. Loosen the thumbscrew ❶ that holds the system fan basket to the chassis.
4. Remove the system fan basket ❷ from the chassis.

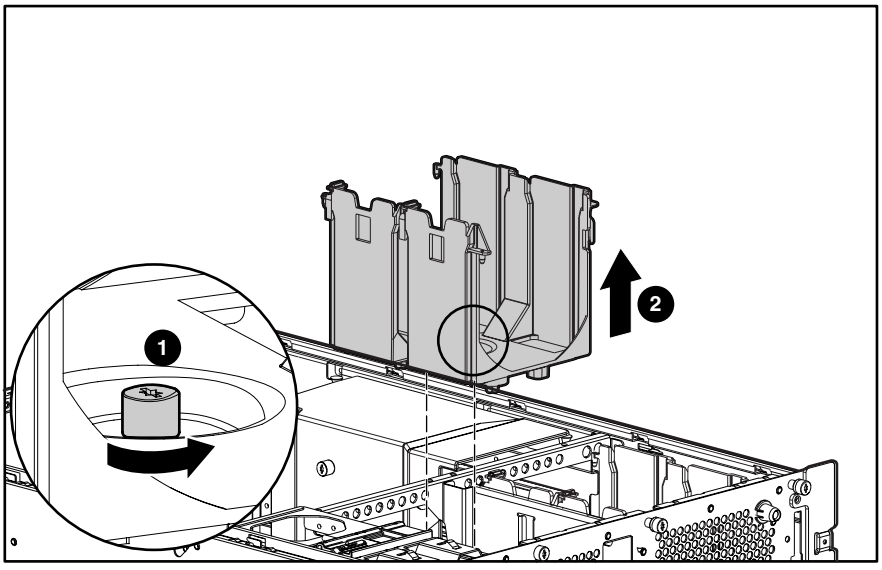

Figure 2-6. Removing the system fan basket

Reverse steps 1 through 4 to replace the system fan basket.

To remove the system fan basket-and-cable bracket:

1. Remove the system fan basket. See "To remove the system fan basket" earlier in this section.
2. Remove the four T-15 screws ❶ that secure the system fan basket-and-cable bracket to the chassis.
3. Slide the bracket toward the center of the chassis, then lift it away from the chassis ❷.

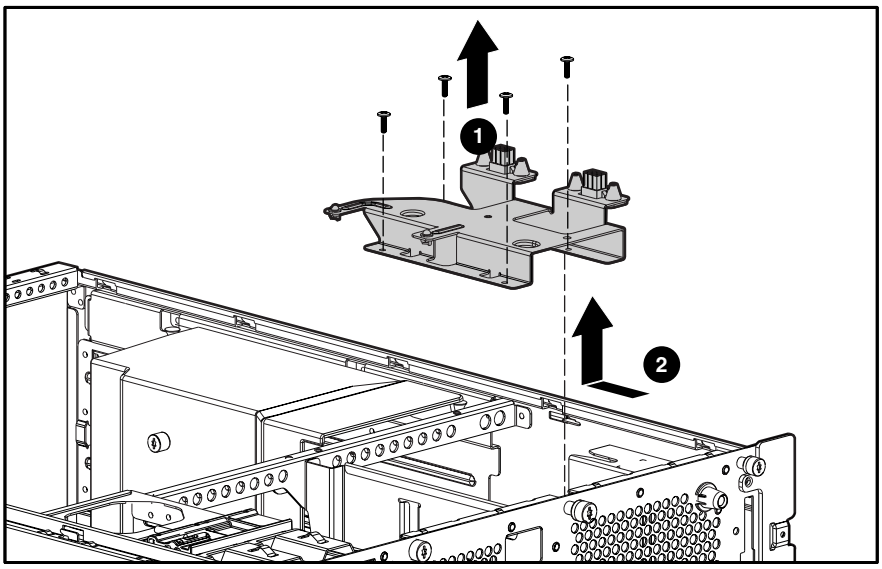

Figure 2-7. Removing the system fan basket-and-cable bracket

Reverse steps 1 through 3 to replace the system fan basket-and-cable bracket.

To remove a system fan cable:

1. Disconnect the system fan cable from the system board.
2. Release the cable from the cable clip.
3. Remove the cable from the chassis.

Reverse steps 1 through 3 to replace a system fan cable.

CPU Fan Air Baffle

To remove the CPU fan air baffle:

1. Perform the preparation procedures. See “Hot-Pluggable Device” earlier in this chapter.
2. Remove the access panel. See “Access Panel” earlier in this chapter.
3. Unclip the external SCSI cable (if present) from the cable clips ❶ on the CPU fan air baffle.
4. Unsnap the two pins ❷ and loosen the thumbscrew ❸ on the CPU fan air baffle.
5. Lift the CPU fan air baffle away from the chassis ❹.

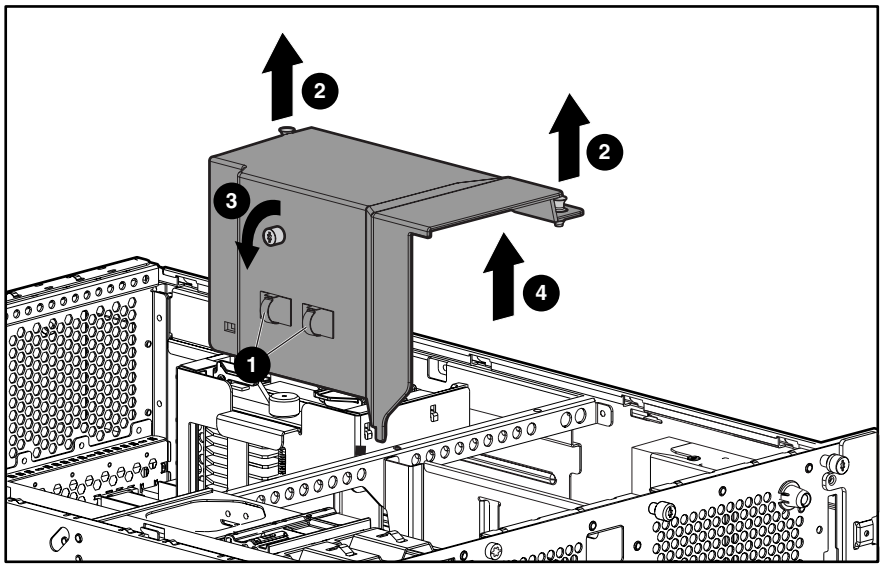

Figure 2-8. Removing the CPU fan air baffle

Reverse steps 1 through 5 to replace the CPU fan air baffle.

Hard Drive Fan Air Baffle

To remove the hard drive fan air baffle:

1. Perform the preparation procedures. See "Powering Down the Server" earlier in this chapter.
2. Remove the system fan basket assembly. See "System Fan Basket Assembly" earlier in this chapter.
3. Loosen the two thumbscrews ❶ on the hard drive fan air baffle.
4. Slide the baffle over the drive fans, then lift the hard drive fan air baffle out of the chassis ❷.

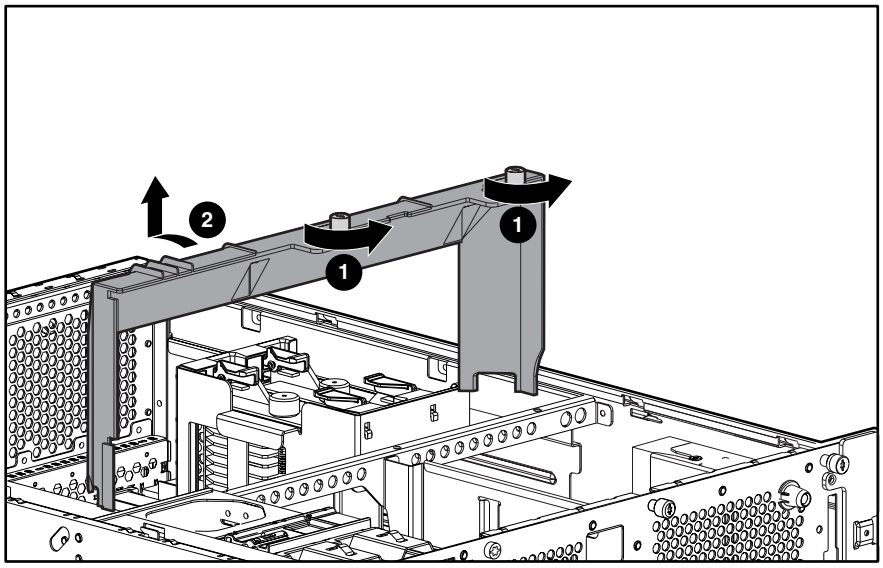

Figure 2-9. Removing the hard drive fan air baffle

Reverse steps 1 through 4 to replace the hard drive fan air baffle.

Hot-Plug Drive Fans

Three hot-plug drive fans come standard with Compaq ProLiant ML530 servers.

IMPORTANT: It is not necessary to power down the server to replace hot-plug devices such as power supplies, fans, or hard drives when they are not in active use.

NOTE: The hot-plug drive fan looks similar to the fan used in the Compaq ProLiant 6400R server, but operates differently. The Compaq ProLiant 6400R fan is not compatible in Compaq ProLiant ML530 servers.

To remove a hot-plug drive fan:

1. Perform the preparation procedures. See "Hot-Pluggable Device" earlier in this chapter.
2. Remove the access panel. See "Access Panel" earlier in this chapter.
3. Press the thumb latch adjacent to the system board tray handle to release the system board tray. Using the system board tray handle, pull the tray partially out of the chassis to access the hot-plug drive fans.

CAUTION: Hot-plug hard drive fans are located below the server cabling. Be careful not to inadvertently unplug or loosen cables when accessing hot-plug drive fans.

4. Loosen the thumbscrew ❶ located at the top of the fan.
5. Lift the hot-plug drive fan out of the chassis ❷.

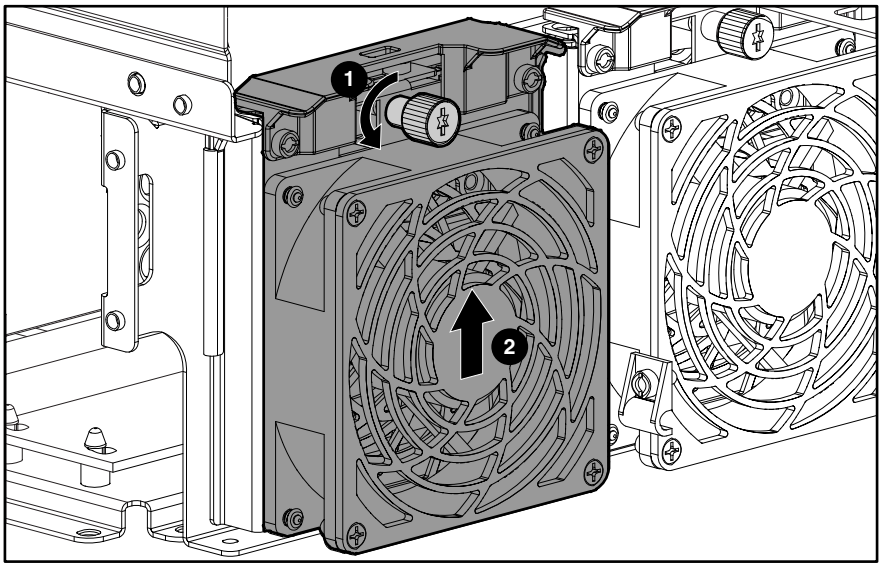

Figure 2-10. Removing a hot-plug hard drive fan

Reverse steps 1 through 5 to replace a hot-plug drive fan.

Drive Fan Cable and Cable Bracket

WARNING: To reduce the risk of personal injury or damage to the equipment, the installation of options other than hot-plug power devices should be performed only by individuals who are qualified in servicing computer equipment and trained to deal with products capable of producing hazardous energy levels.

To remove the drive fan cable and cable bracket:

1. Perform the preparation procedures. See "Powering Down the Server" earlier in this chapter.
2. Remove the hot-plug drive fans. See "Hot-Plug Drive Fans" earlier in this section.
3. Remove the hard drive fan air baffle. See "Hard Drive Fan Air Baffle" earlier in this section.
4. Remove the hot-plug SCSI hard drives and hard drive cage. See "Hard Drive Cage with Backplane Board" later in this chapter.
5. Remove the T-10 screw securing the drive fan cable bracket in place, then lift the drive fan cable bracket from the chassis.
6. Unplug the drive fan cable from the power backplane board and remove it from the unit.

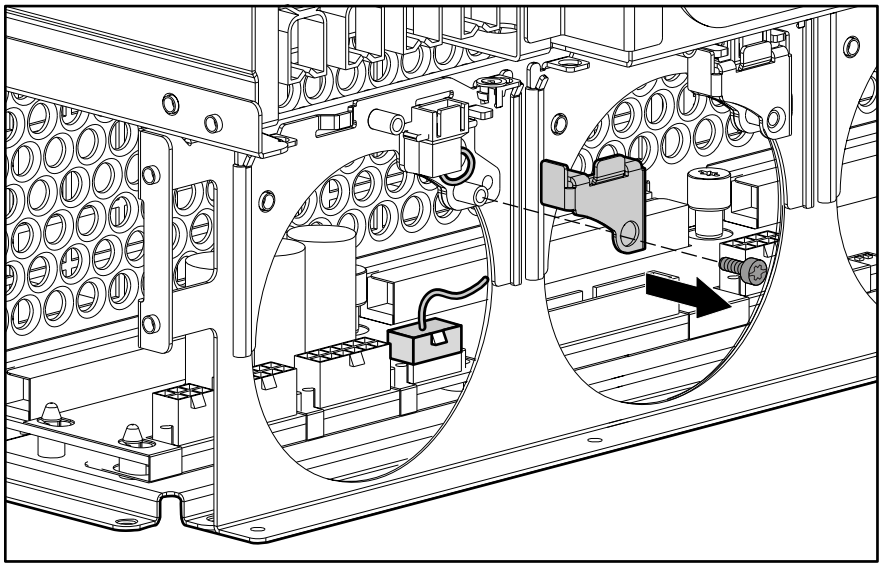

Figure 2-11. Removing the drive fan cable and cable bracket

Reverse steps 1 through 6 to replace the drive fan cable and cable bracket.

Removable Media and Mass Storage Devices

Compaq ProLiant ML530 servers can house up to 16 mass storage devices, shown in Figure 2-12, including:

- Preinstalled 3.5-inch 1.44-MB diskette drive
- Preinstalled IDE CD-ROM drive
- Two removable media devices
- Two hot-plug drive cages containing twelve 1-inch LVD hot-plug drives (six drives each on two SCSI buses)

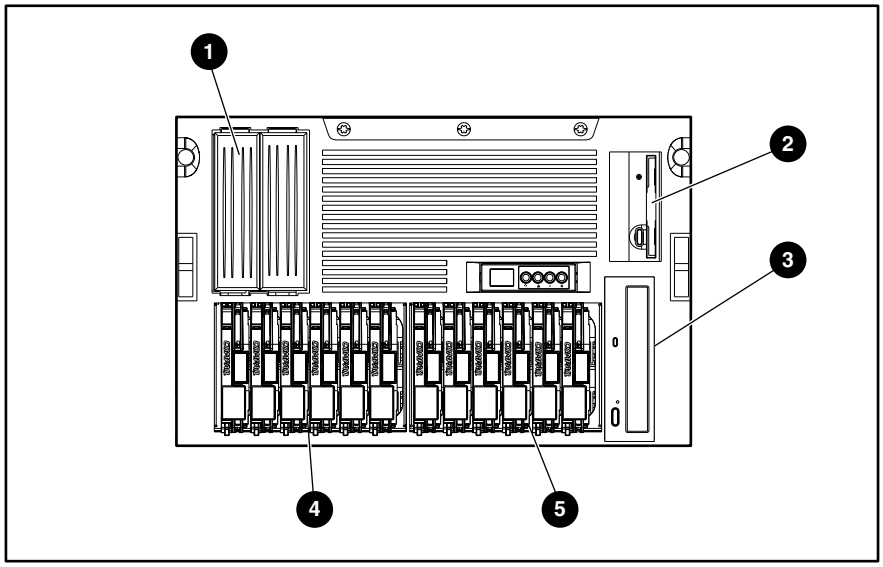

Figure 2-12. Removable media and mass storage device locations

Table 2-2
Removable Media and Mass Storage Device Descriptions

Location	Description
❶	Removable media devices
❷	Diskette drive
❸	CD-ROM drive
❹	Primary hard drive cage with hot-plug SCSI hard drives
❺	Optional hard drive cage with hot-plug SCSI hard drives

Hot-Plug SCSI Hard Drives

CAUTION: Before removing or replacing a hot-plug SCSI hard drive, the affected drive must not be in use. See "LED Indicators, Hot-Plug SCSI Hard Drive" in Chapter 4 for more information.

To remove a hot-plug SCSI hard drive:

1. Perform the preparation procedures. See "Hot-Pluggable Device" earlier in this chapter.
2. Open the front bezel door (tower model only).
3. Slide the release button ❶.
4. Pull the release lever ❷ that holds the hard drive in place.
5. Pull the hard drive ❸ from the cage.

IMPORTANT: Remove or replace only one hot-plug SCSI hard drive at a time. The controller relies on other hard drives to reconstruct data on the replaced hard drive. Drive reconstruction is active when the drive online LED is flashing green.

6. Insert another hot-plug SCSI hard drive or a hard drive blank into the empty hard drive bay, pushing the drive until it is firmly seated.

CAUTION: Hard drive blanks must fill unused hard drive bays to ensure proper airflow.

NOTE: When a hard drive configured for fault tolerance is replaced, the replacement hard drive will automatically begin reconstruction. Drive reconstruction is active when the drive online LED is flashing green.

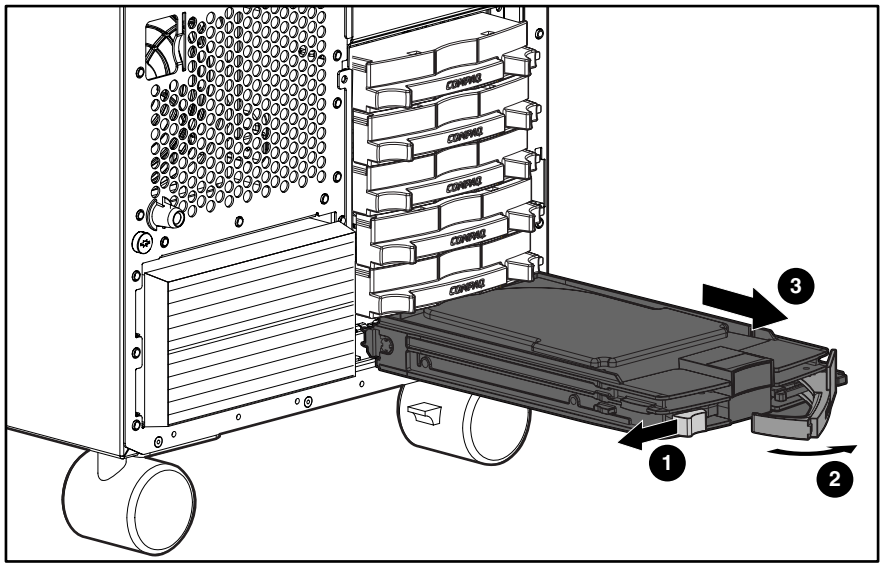

Figure 2-13. Removing a hot-plug SCSI hard drive

Hard Drive Cage with Backplane Board

CAUTION: If an active hard drive is replaced while the system is powered down, a POST error message (1786) will occur when the system is powered up. The following prompt will appear:

PRESS <F1> TO BOOT THE SYSTEM AND REBUILD THE REPLACED DRIVE, OR
PRESS <F2> TO BOOT THE SYSTEM WITHOUT REBUILDING THE DRIVE(S).

Pressing **F2** will cause permanent data loss to the logical hard drive. Press **F2** only if all of the hard drives were replaced or if complete data loss is desired.

To remove the hard drive cage with backplane board:

1. Perform the preparation procedures. See "Powering Down the Server" earlier in this chapter.
2. Remove the front bezel and access panel.
   - For the tower model, see "Tower Model Front Bezel Door" and "Rack-Mount Bezel" earlier in this chapter.
   - For the rack model, see "Rack-Mount Bezel" earlier in this chapter.
3. Remove all hard drives from the bays of the cage to be removed. See "Hot-Plug SCSI Hard Drives" earlier in this chapter.
4. Remove the hard drive fan air baffle. See "Hard Drive Fan Air Baffle" earlier in this chapter.
5. Disconnect all cabling. The SCSI A signal cable is color-coded blue, and the SCSI B signal cable is color-coded yellow.

6. Remove the four T-15 screws ❶ securing the hard drive cage to the chassis.
7. Slide the hard drive cage assembly ❷ out the front of the chassis.

   NOTE: To increase accessibility to the cables, remove the drive fans. See "Hot-Plug Drive Fans" earlier in this chapter.

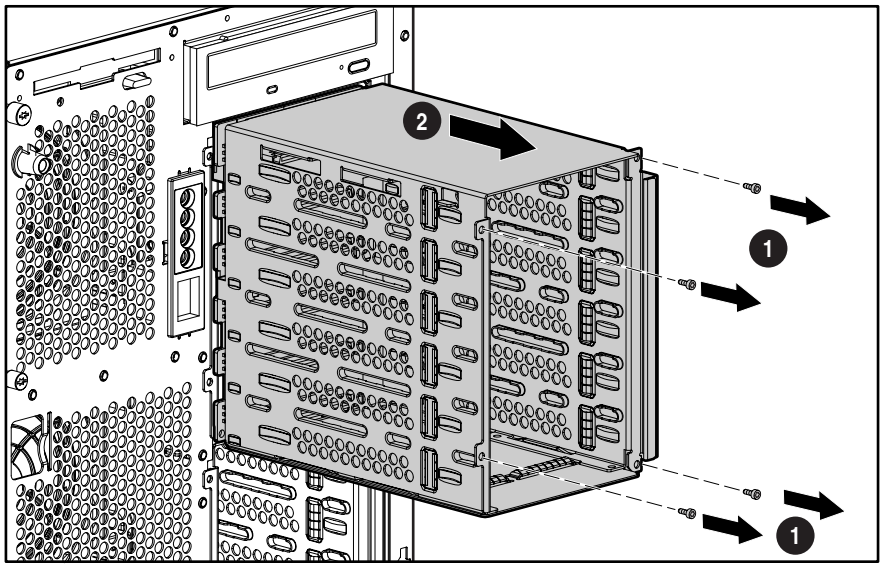

Figure 2-14. Removing the hard drive cage

Reverse steps 1 through 7 to replace the hard drive cage, or cover the opening with a blanking panel to maintain proper airflow.

Removable Media Devices

The removable media area contains two bays. To remove a device:

1. Perform the preparation procedures. See "Powering Down the Server" earlier in this chapter.
2. Remove the access panel. See "Access Panel" earlier in this chapter.
3. Disconnect all cabling from the removable media device.
4. Slide the green plastic locking lever ❶ on the outside of the removable media area to release the device.
5. Pull the device ❷ from the removable media area.

CAUTION: A blanking panel must cover an unused media bay to ensure proper airflow.

6. Remove and retain guide rails and screws from the blank or device for use on the replacement blank or device.

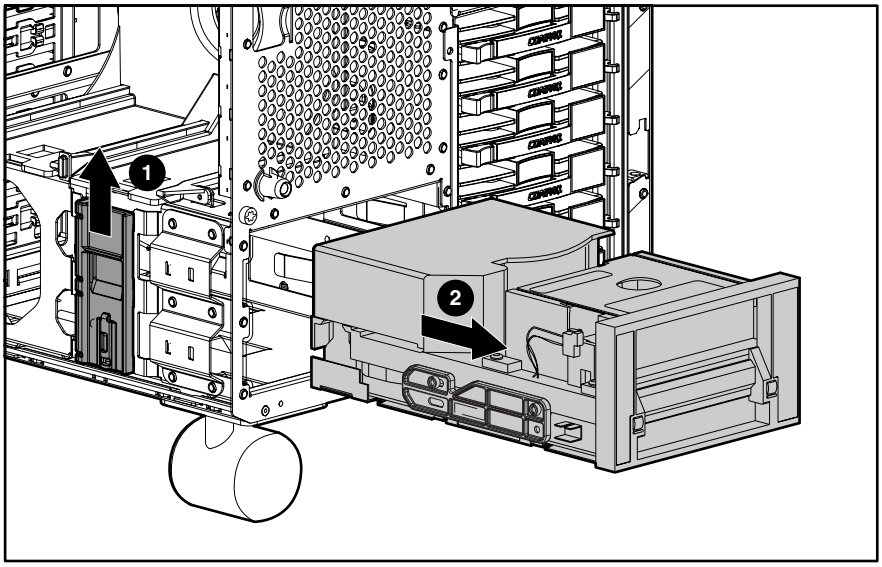

Figure 2-15. Removing a device from the removable media area

Reverse steps 1 through 6 to replace a removable media device, or cover the opening with a blanking panel.

CD-ROM Drive

To remove the CD-ROM drive:

1. Perform the preparation procedures. See “Powering Down the Server” earlier in this chapter.
2. Remove the access panel. See “Access Panel” earlier in this chapter.
3. Remove the hard drive fan air baffle. See “Hard Drive Fan Air Baffle” earlier in this chapter.
4. Disconnect all cabling from the CD-ROM drive. The CD-ROM drive signal cable is color-coded orange.
5. Remove the redundant CPU fan for easier accessibility. See “Hot-Plug System Fan” earlier in this chapter.
6. Loosen the thumbscrew ❶ located near the bottom of the CPU fan basket to release the metal locking bracket.
7. Slide the metal locking bracket ❷ toward the CD-ROM drive.
8. Pull the CD-ROM drive ❸ from the chassis.

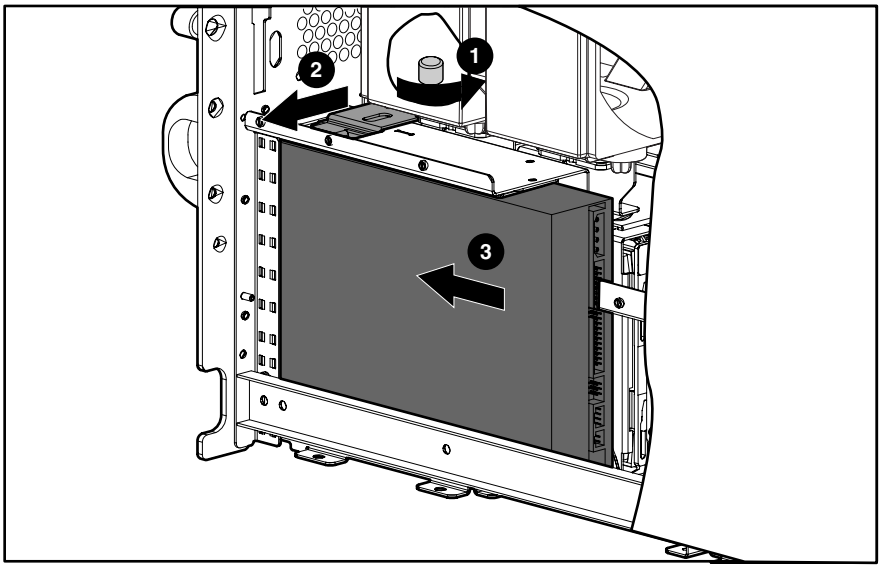

Figure 2-16. Removing the CD-ROM drive

Reverse steps 1 through 8 to replace the CD-ROM drive.

Diskette Drive

To remove the diskette drive:

1. Perform the preparation procedures. See "Powering Down the Server" earlier in this chapter.
2. Remove the access panel. See "Access Panel" earlier in this chapter.
3. Disconnect all cabling from the diskette drive. The diskette drive signal cable is color-coded purple.
4. Loosen the thumbscrew ❶ on the side of the diskette drive.
5. Slide the diskette drive back ❷, then lift it out of the chassis.

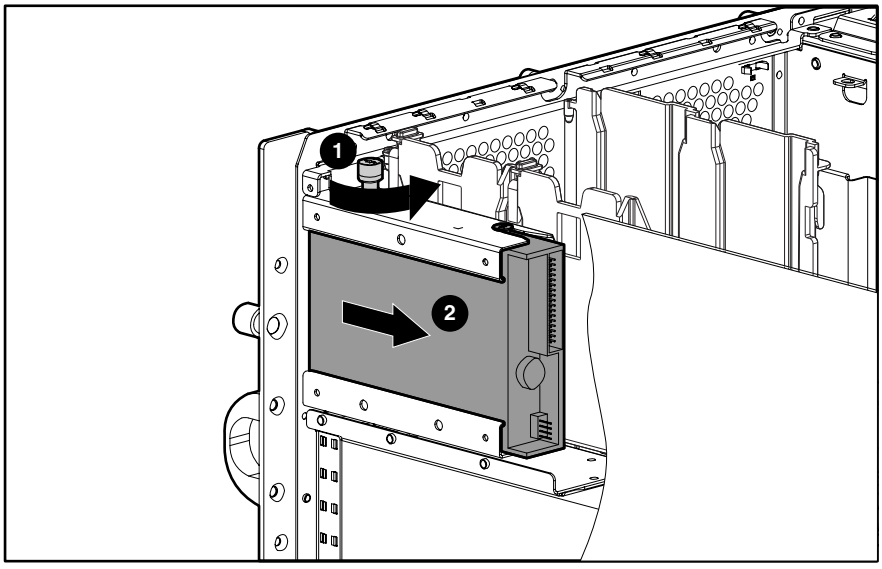

Figure 2-17. Removing the diskette drive

Reverse steps 1 through 5 to replace the diskette drive.

Cable Routing Diagrams

The location and routing of each cable in Compaq ProLiant ML530 servers is shown in the following diagrams. For further information, refer to the *Compaq ProLiant ML530 Setup and Installation Guide*. To improve serviceability, the signal cables and system board are color-coded as follows:

- Blue = SCSI A
- Yellow = SCSI B
- Orange = CD-ROM drive
- Purple = Diskette drive

When replacing the system board or power backplane board, remove the cables in the following sequence for easier accessibility.

CAUTION: Due to the sliding design of the system board tray, the cables must be routed properly. Cables can be damaged by pinching or chafing if not routed or contained properly.

IMPORTANT: Some cables are held to the side of the chassis with cable clips or are bound by straps with hook-and-loop fasteners to keep the cables properly stored. The clips can be opened by releasing the clip tab. Replace the cable in the clips or strap when completing cable routing procedures.

NOTE: Remove the PCI bracket for easier access. See "PCI Bracket" later in the chapter.

1. Power cables for system fans. See Figure 2-18.
2. Signal cables for SCSI hard drives and removable media devices (blue and yellow cables). See Figure 2-19 and Figure 2-20.
3. Power and signal cables for the CD-ROM and diskette drives (orange and purple cables, respectively). See Figure 2-21.
4. System data cable. See Figure 2-22.
5. System power cables. See Figure 2-23.
6. Power cables for SCSI hard drives and removable media devices. See Figure 2-24.
7. Power cables for drive fans. See Figure 2-25.

Reverse steps 1 through 7 to connect power and signal cables.

System Fans-Power Cables

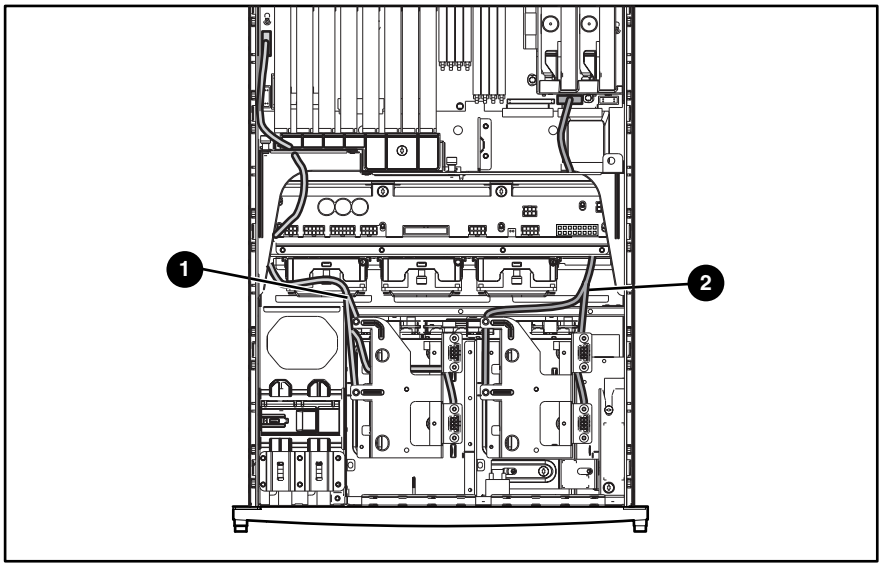

Figure 2-18. Power cables for system fans

Table 2-3
System Fans—Power Cables

Item	Description
❶	Power cable for I/O fans
❷	Power cable for CPU fans

SCSI Hard Drives and Removable Media Devices—Signal Cables

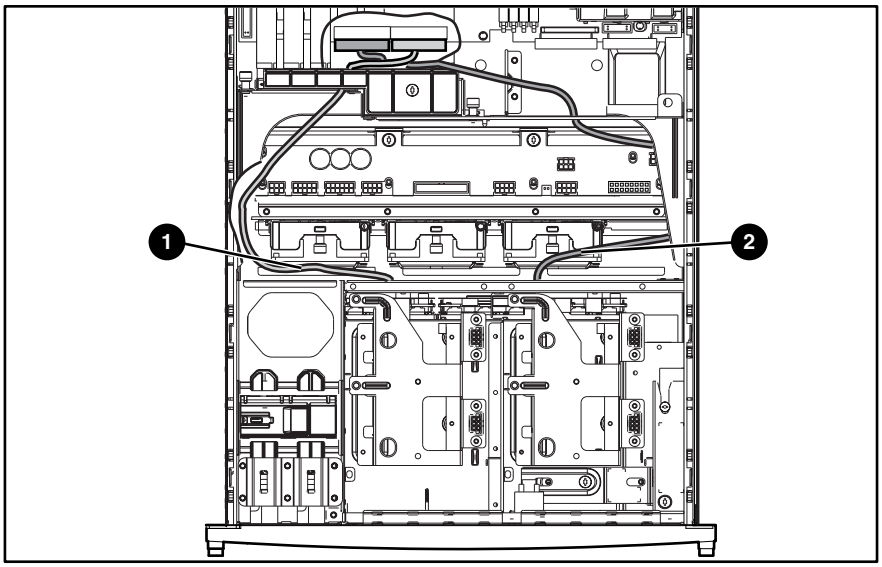

Figure 2-19. Signal cables for SCSI hard drives and removable media devices

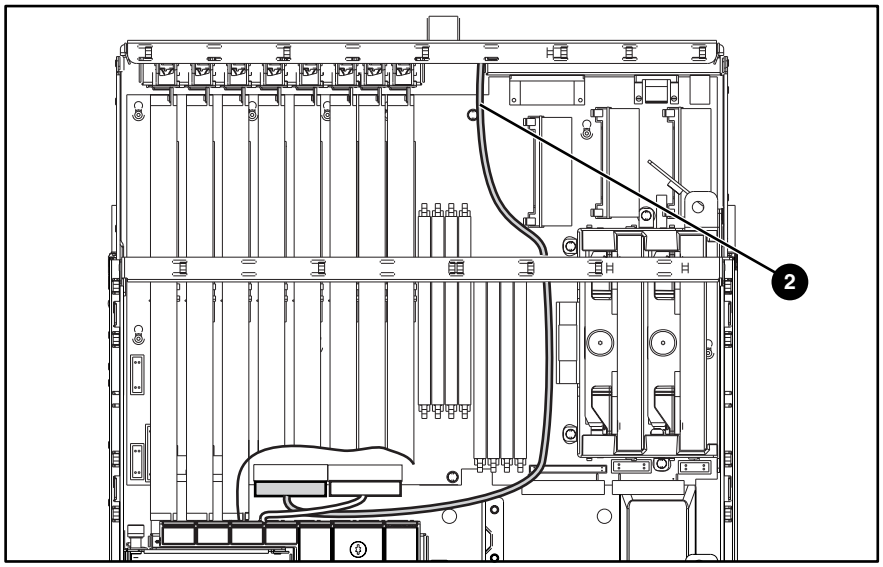

Figure 2-20. Optional signal cable routing for external devices with SCSI channel B

Table 2-4
SCSI Hard Drives and Removable Media Devices—Signal Cables

Item	Description
❶	Signal cable for SCSI channel A (blue cable)
❷	Signal cable for SCSI channel B (yellow cable)

CD-ROM and Diskette Drives—Power and Signal Cables

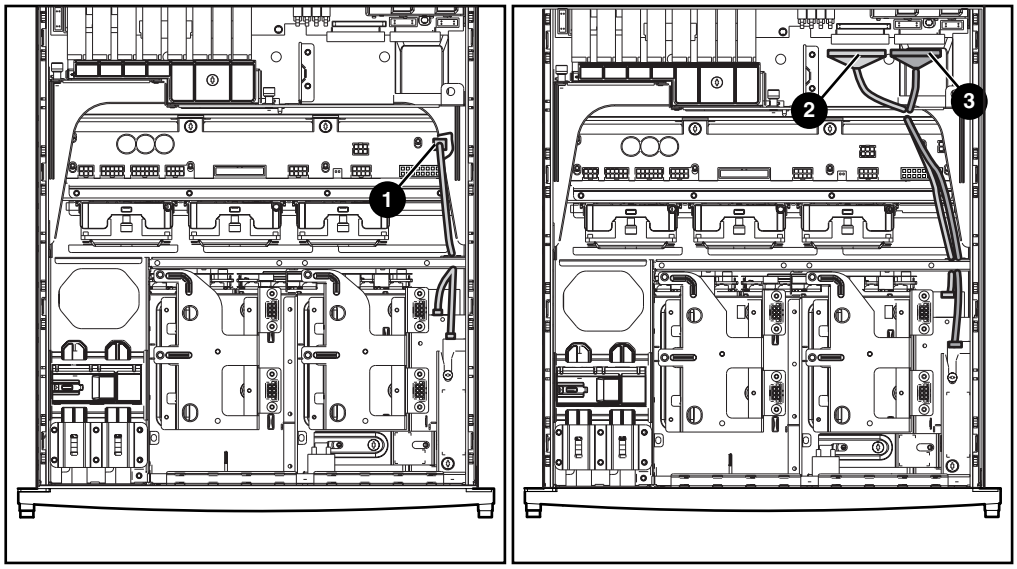

Figure 2-21. Power and signal cables for the CD-ROM and diskette drives

Table 2-5
CD-ROM and Diskette Drives—Power and Signal Cables

Item	Description
❶	Power cable for the CD-ROM and diskette drives
❷	Signal cable for the CD-ROM drive (orange cable)
❸	Signal cable for the diskette drive (purple cable)

System Board—Data Cable

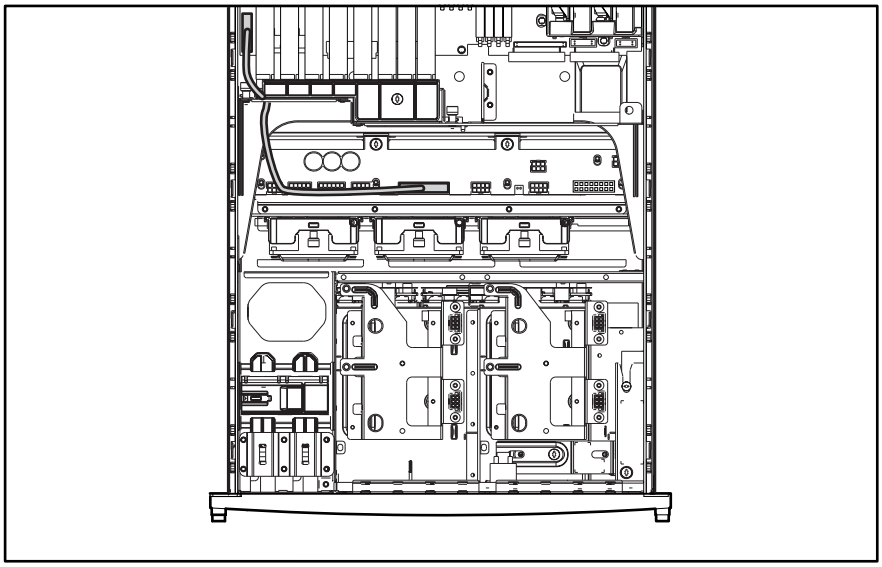

Figure 2-22. System data cable

System Board—Power Cables

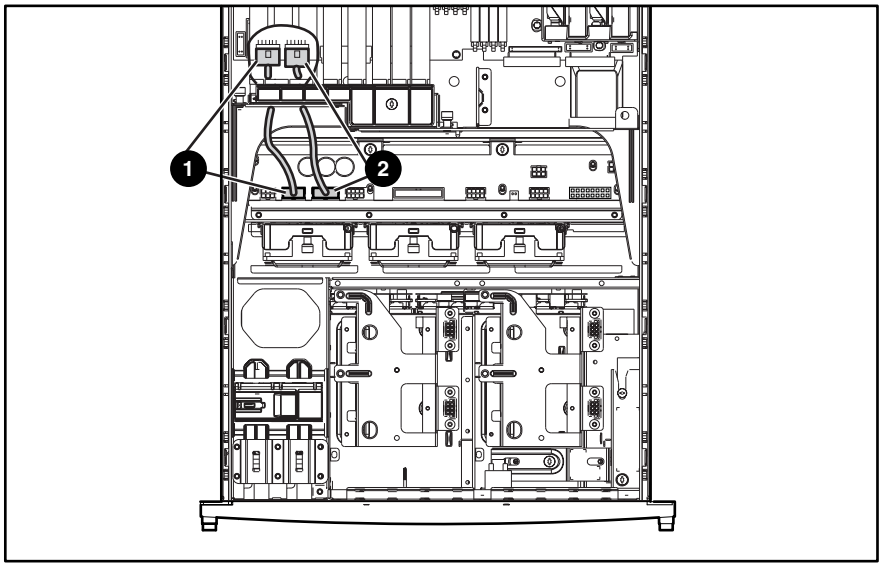

Figure 2-23. System power cables

Table 2-6
System Board—Power Cables

Item	Description
❶	System power cable 1
❷	System power cable 2

SCSI Hard Drives and Removable Media Devices—Power Cables

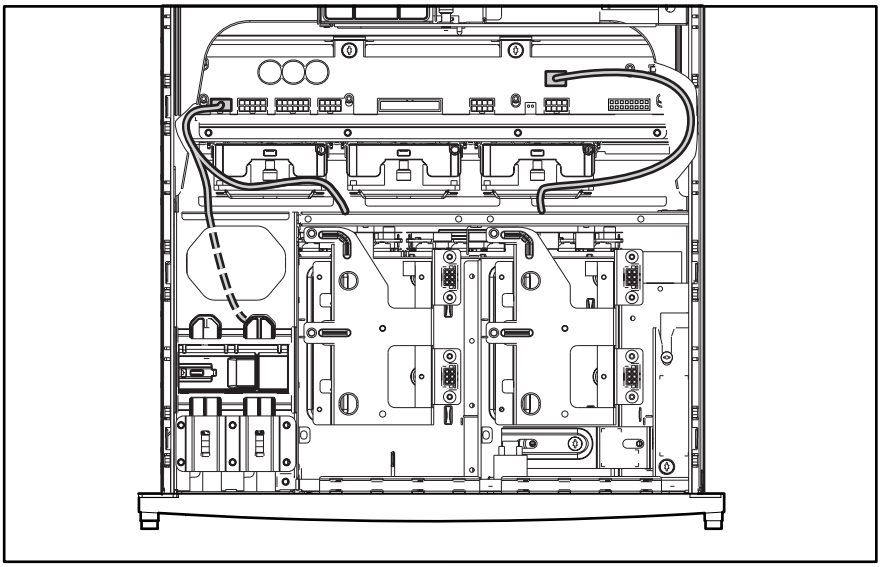

Figure 2-24. Power cables for SCSI hard drives and removable media devices

Drive Fans—Power Cables

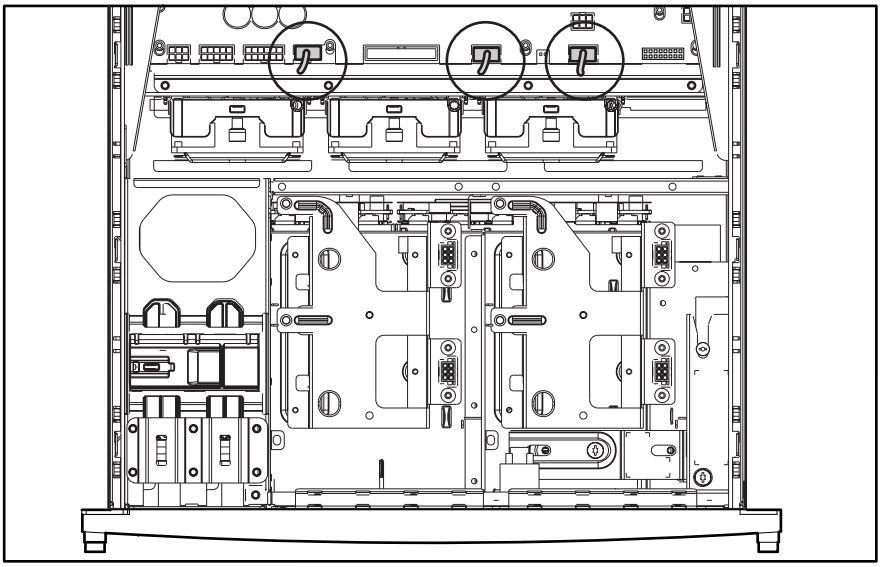

Figure 2-25. Power cables for drive fans

System Board Tray

WARNING: To reduce the risk of personal injury or damage to the equipment, do not use the system board tray handle to lift or move Compaq ProLiant ML530 servers.

IMPORTANT: The system board tray is replaced as one unit. The system board does not have to be removed from the tray.

To remove the system board tray:

1. Perform the preparation procedures. See "Powering Down the Server" earlier in this chapter.
2. Remove the access panel. See "Access Panel" earlier in this chapter.
3. Remove the CPU fan air baffle. See "CPU Fan Air Baffle" earlier in this chapter.

4. Press the thumb latch ❶ adjacent to the system board tray handle to release the system board tray. Using the system board tray handle, pull the tray partially out of the chassis ❷.
5. Disconnect and remove all cables from the system board and PCI expansion board. See "Cable Routing Diagrams" earlier in this chapter. To improve serviceability, the signal cables and system board are color-coded as follows:
   - Blue = SCSI A
   - Yellow = SCSI B
   - Orange = CD-ROM drive
   - Purple = Diskette drive
6. Push the latches ❸ on the system board tray slides to allow the tray to slide further out of the chassis.
7. Pull the system board tray out of the chassis ❹.

CAUTION: Electrostatic discharge can damage electronic components. Be sure you are properly grounded before beginning any installation or removal procedure. See "Electrostatic Discharge Information" earlier in this chapter.

8. Disconnect and remove all memory modules, processors, PCI expansion boards, and cables from the system board. Place these components on a nonconductive work surface.

IMPORTANT: Options must be reinstalled in the same position from where they were removed. See replacement procedures in this chapter for each of the options requiring installation on the new system board tray.

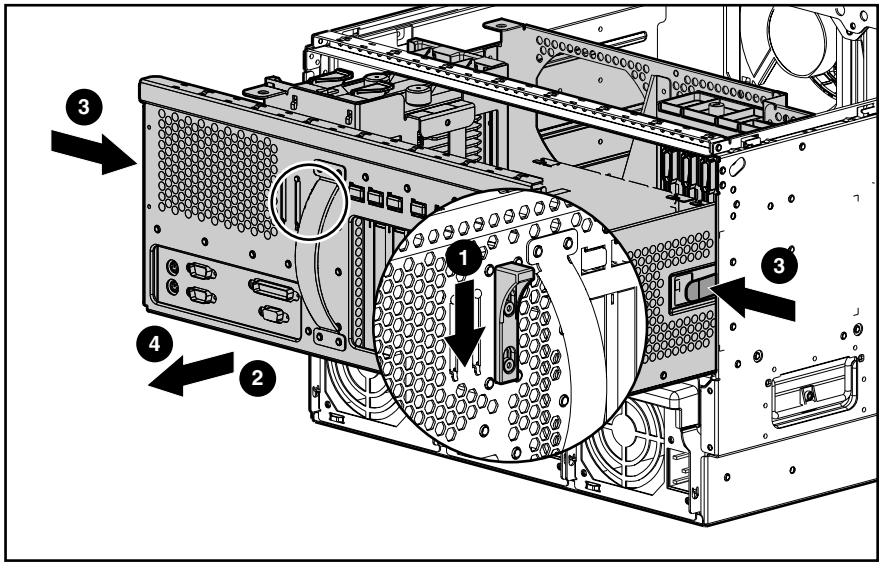

Figure 2-26. Removing the system board tray

Reverse steps 1 through 8 to replace the system board tray, reinstalling all removed memory modules, processors, and PCI expansion boards onto the new system board tray. Change the switch settings to match the switch settings on the system board being replaced.

System Board Components

The system board is mounted to the inside of the tray. When the access panel and the CPU fan air baffle are removed, all the system board components are visible.

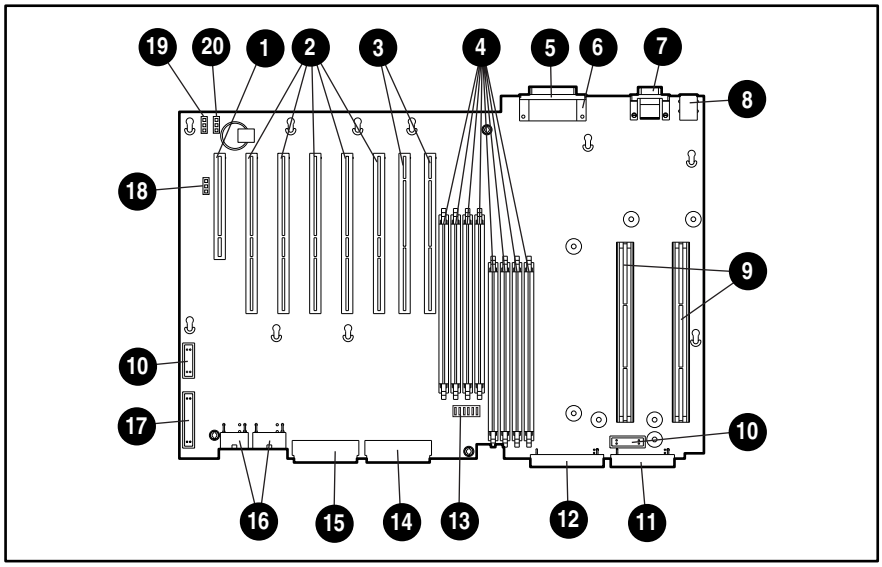

Figure 2-27. System board components

Table 2-7
System Board Components

Item	Description	Item	Description
❶	32-bit, 33-MHz primary PCI bus	⓫	Diskette drive signal cable connector (purple)
❷	64-bit, 33-MHz, tertiary PCI bus	⓬	IDE CD-ROM signal cable connector (orange)
❸	64-bit, 66-MHz, 3-volt only secondary PCI bus	⓭	Configuration switch
❹	2 sets of 4 DIMM memory sockets	⓮	SCSI channel A connector (blue)
❺	Parallel port	⓯	SCSI channel B connector (yellow)
❻	Video port	⓰	Power connectors
❼	Serial ports	⓱	System data connector
❽	Keyboard/mouse interface	⓲	Remote power switch header
❾	Processor slots	⓳	Battery power header
❿	Fan cable connectors (2 locations)	⓴	External battery header

PCI Retainer

To remove the PCI retainer:

1. Perform the preparation procedures. See "Powering Down the Server" earlier in this chapter.

   NOTE: The PCI retainer is a shipping bracket and is not necessary for normal server operation. The PCI retainer may be removed using hot-pluggable device procedures, as long as the PCI expansion boards are not removed.

2. Remove the access panel. See "Access Panel" earlier in this chapter.
3. Loosen the thumbscrew ❶.
4. Pivot the PCI retainer ❷ and lift it from the chassis ❸.

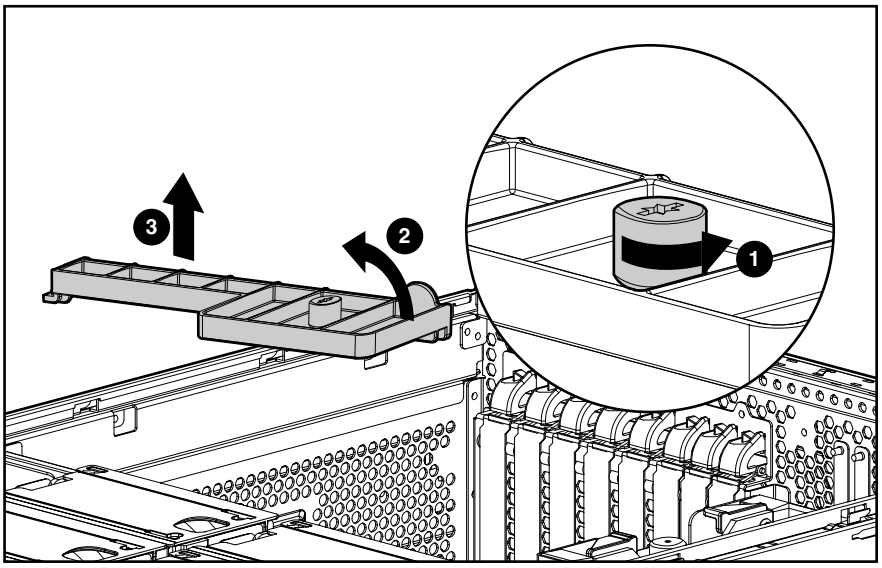

Figure 2-28. Removing the PCI retainer

Reverse steps 1 through 4 to replace the PCI retainer.

PCI Expansion Boards

Compaq ProLiant ML530 servers include eight PCI expansion slots, as shown in Figure 2-27.

To remove an expansion board:

1. Perform the preparation procedures. See "Powering Down the Server" earlier in this chapter.
2. Remove the access panel. See "Access Panel" earlier in this chapter.
3. Remove the PCI retainer. See "PCI Retainer" earlier in this section.

   NOTE: The system board tray must be completely in or completely out of the chassis to remove a full size expansion board.

4. Press the top of the expansion slot latch ❶ on the rear of the system board drawer and pull the latch ❷, releasing the PCI expansion board or slot cover.
5. Remove the PCI expansion board or slot cover ❸.

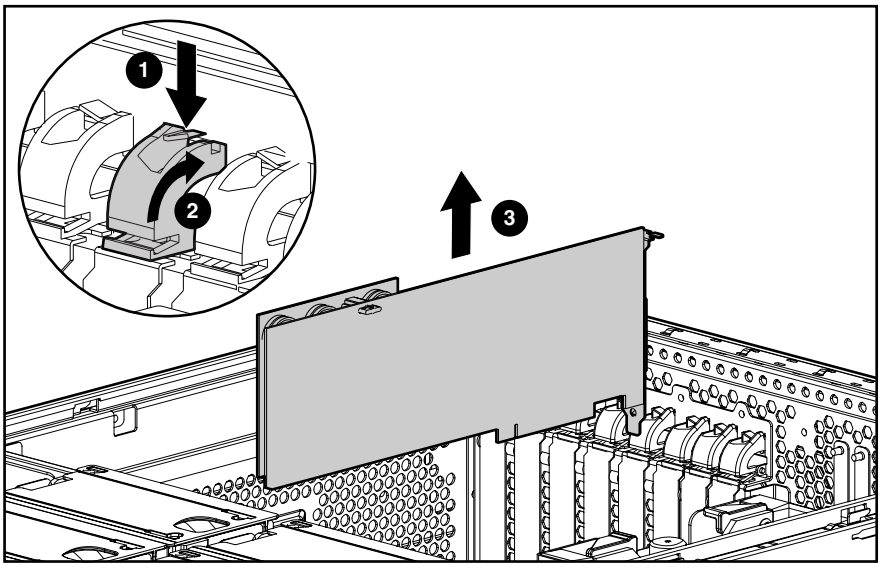

Figure 2-29. Removing a PCI expansion board

Reverse steps 1 through 5 to replace a PCI expansion board.

PCI Bracket

To remove the PCI bracket:

1. Remove all of the PCI expansion boards. See "PCI Expansion Boards" earlier in this section.
2. Loosen the two thumbscrews ❶.
3. Slide the PCI bracket toward the system board, then out of the chassis ❷.

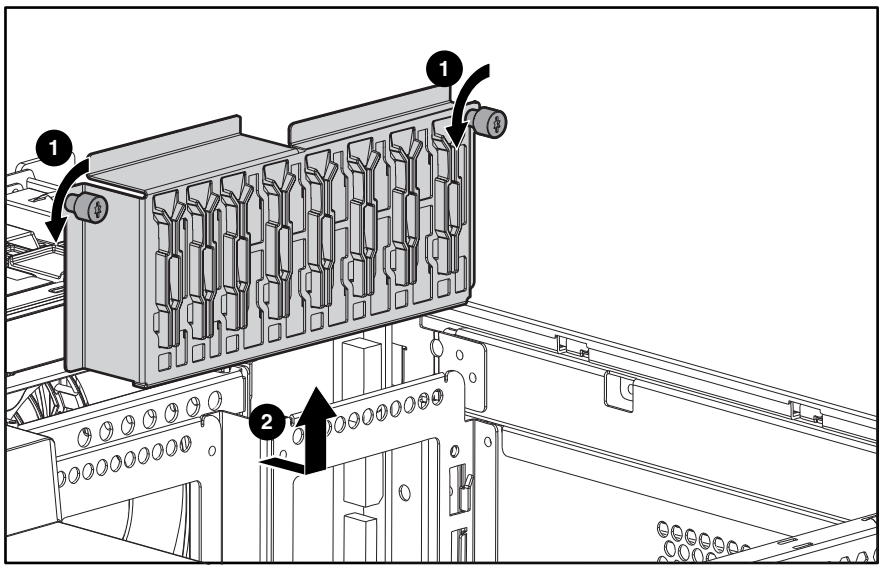

Figure 2-30. Removing the PCI bracket

Reverse steps 1 through 3 to replace the PCI bracket.

Memory Modules

Compaq ProLiant ML530 servers support from 64 MB to a maximum of 4 GB of synchronous DRAM (133-MHz, ECC SDRAM) DIMM memory. See Figure 2-31 for the SDRAM DIMM socket locations.

Follow these guidelines, and the instructions in this section, when installing or replacing memory modules:

- Install SDRAM DIMMs in the proper sockets.
- Use only 64-, 128-, 256-, or 512-MB SDRAM DIMMs.
- SDRAM DIMMs must be 133-MHz registered (buffered).
- Install SDRAM DIMMs in the following socket sequence for maximum performance:
  - DIMM 1 ❶
  - DIMM 5 ❺
  - DIMM 2 ❷
  - DIMM 6 ❻
  - DIMM 3 ❸
  - DIMM 7 ❼
  - DIMM 4 ❹
  - DIMM 8 ❽

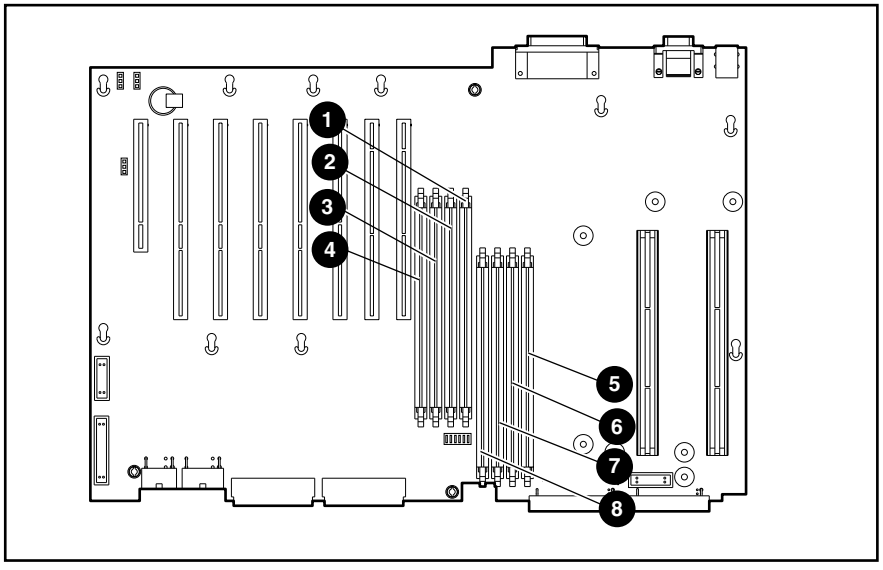

Figure 2-31. SDRAM DIMM socket locations

To remove an SDRAM DIMM:

1. Perform the preparation procedures. See "Powering Down the Server" earlier in this chapter.
2. Remove the access panel. See "Access Panel" earlier in this chapter.
3. Press both SDRAM DIMM socket latches ❶ outward.
4. Pull out the SDRAM DIMM ❷.

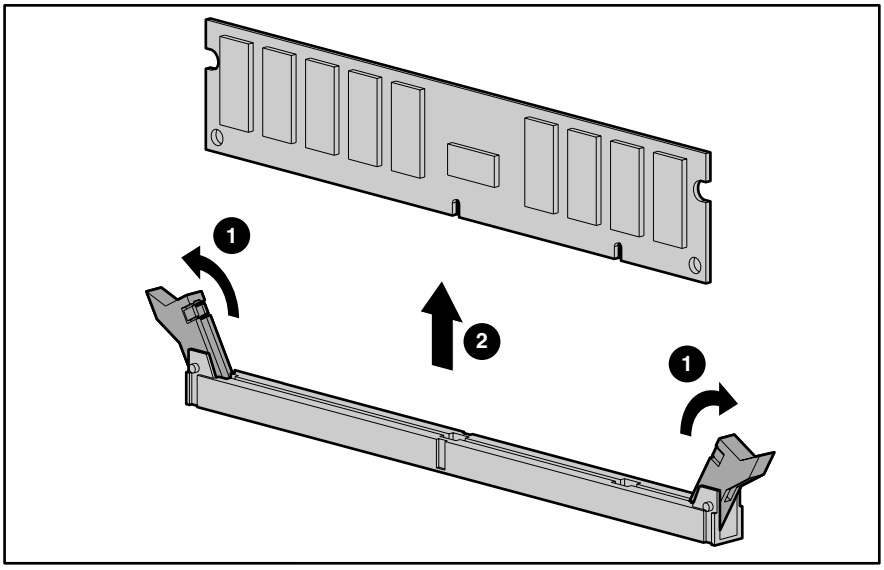

Figure 2-32. Removing an SDRAM DIMM

Reverse steps 1 through 4 to replace an SDRAM DIMM.

IMPORTANT: A memory module can be installed one way only. Be sure to match the key sockets on the module with the tab on the memory socket. Push the module down into the socket, ensuring that the module is fully inserted and properly seated.

Processors

Compaq ProLiant ML530 servers support up to two processors. The primary processor is located closest to the edge of the system board.

IMPORTANT: Use only 133-MHz front-side bus Pentium III Xeon processors with gold-colored heat sinks. Processors with other colored heat sinks will not function properly in Compaq ProLiant ML530 servers.

To remove a processor:

1. Perform the preparation procedures. See "Powering Down the Server" earlier in this chapter.
2. Remove the access panel. See "Access Panel" earlier in this chapter.
3. Remove the CPU fan air baffle. See "CPU Fan Air Baffle" earlier in this chapter.
4. Loosen the thumbscrew ❶ located on the top of the processor.
5. Lift and swing the levers ❷ outward.
6. Remove the processor from the slot ❸.

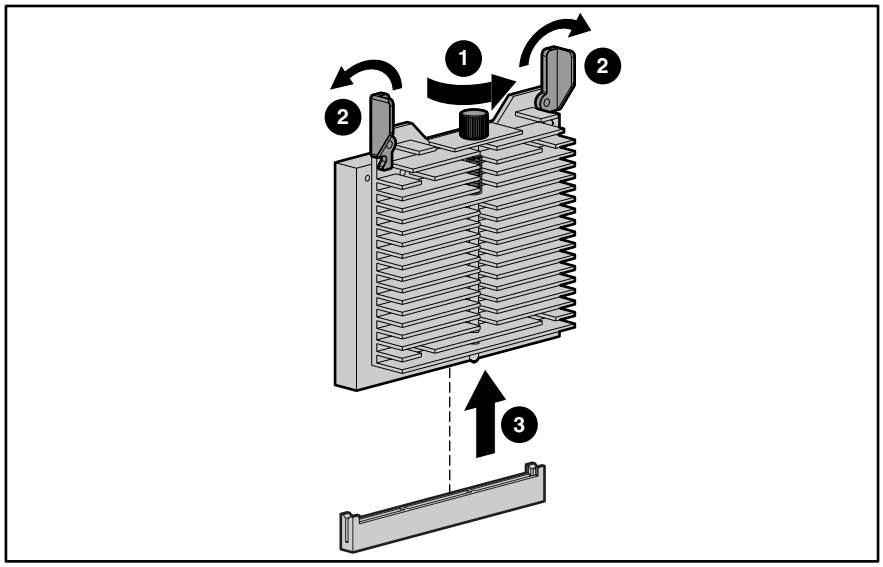

Figure 2-33. Removing a processor

Reverse steps 1 through 6 to replace the processor.

Hot-Plug Power Supplies

Compaq ProLiant ML530 servers use a hot-plug 450-watt power supply. Only one power supply is required on a system having a single six-bay SCSI hard drive cage. The power supply must be located in the primary bay. A second power supply is considered redundant for a single hard drive cage configuration, but necessary for a two hard drive cage configuration. When two hard drive cages are used, a third power supply is supported as an option for redundancy. The location of the power supplies is shown in Figure 2-34 and described in Table 2-8.

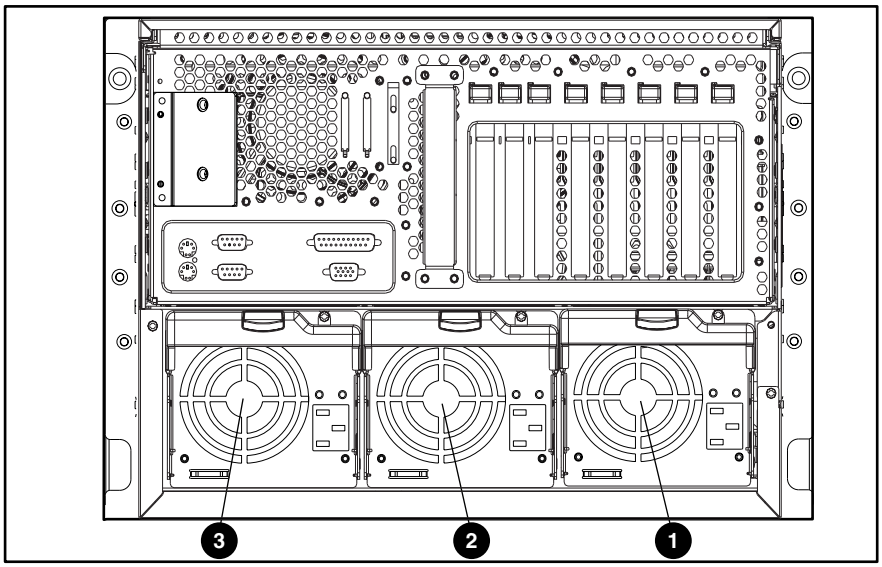

Figure 2-34. Power supply bay configuration

Table 2-8
Power Supply Bay Configuration

Bay	Description
❶	Primary hot-plug power supply
❷	Optional hot-plug power supply ■ Redundant with one six-bay SCSI hard drive cage ■ Necessary with two six-bay SCSI hard drive cages
❸	Optional hot-plug power supply (redundant for all configurations)

To remove a hot-plug power supply:

CAUTION: A power supply can only be replaced as a hot-pluggable device when the unit has redundancy. If there is only one power supply, or two power supplies with two hard drive cages, the unit must be powered down to replace the power supply.

1. Perform the preparation procedures. See "Hot-Pluggable Device" earlier in this chapter.
2. Unplug the power cord from the hot-plug power supply.

IMPORTANT: If a security screw is present on the power supply, remove the security screw before removing the power supply.

3. Press the thumb latch ❶ in the middle of the power supply handle to release the handle.
4. Pull the handle ❷ down.
5. Slide the power supply ❸ out of the chassis.

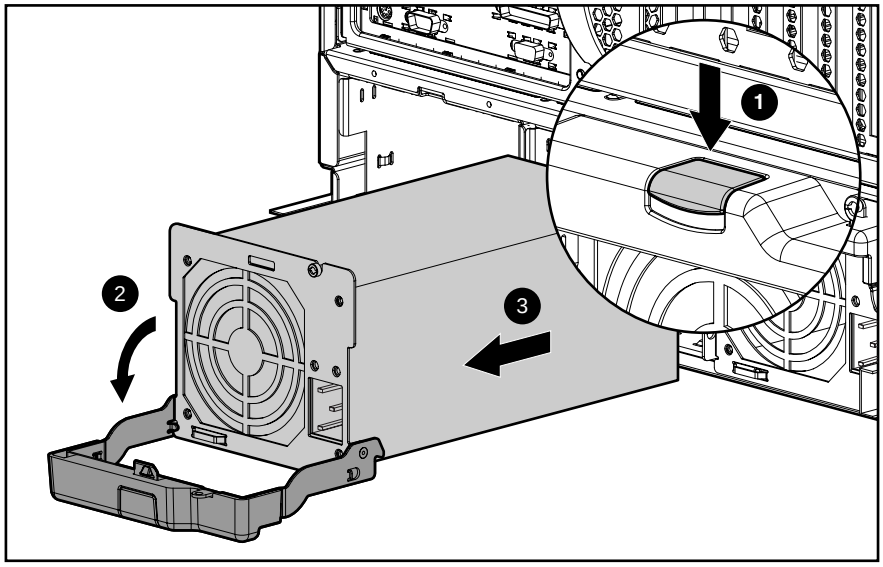

Figure 2-35. Removing a hot-plug power supply

Reverse steps 1 through 5 to replace a hot-plug power supply.

CAUTION: When the power supply is not being replaced, cover the opening with a power supply blanking panel to maintain proper airflow.

Power Supply Blanking Panel

CAUTION: When the power supply is not being replaced, cover the opening with a power supply blanking panel to maintain proper airflow.

To remove a power supply blanking panel:

1. Perform the preparation procedures. See "Hot-Pluggable Device" earlier in this chapter.
2. Remove the two T-15 screws ❶ securing the power supply blanking panel to the chassis.
3. Pull the power supply blanking panel ❷ away from the chassis.

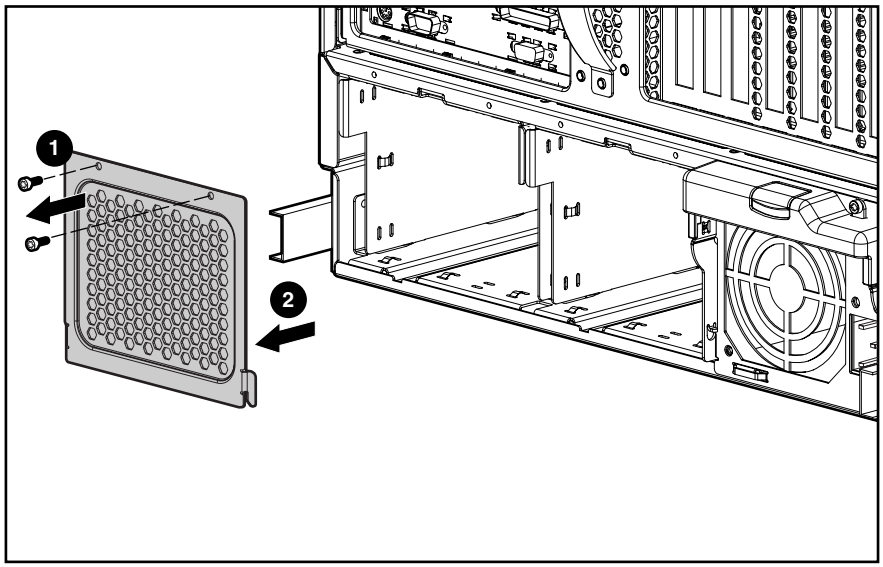

Figure 2-36. Removing the power supply blanking panel

Reverse steps 1 through 3 to replace a power supply blanking panel.

Power Backplane Board

To remove the power backplane board:

1. Perform the preparation procedures. See “Powering Down the Server” earlier in this chapter.
2. Remove the power supplies. See “Hot-Plug Power Supplies” earlier in this chapter.
3. Remove the access panel. See “Access Panel” earlier in this chapter.
4. Press the thumb latch adjacent to the system board tray handle to release the system board tray. Slide the system board tray partially out of the chassis.
5. Disconnect and remove all cables from the power backplane board. See “Cable Routing Diagrams” earlier in this chapter.
6. Loosen the two thumbscrews ❶.
7. Slide the power backplane board ❷ toward the power supplies, then lift the power backplane board from the chassis.

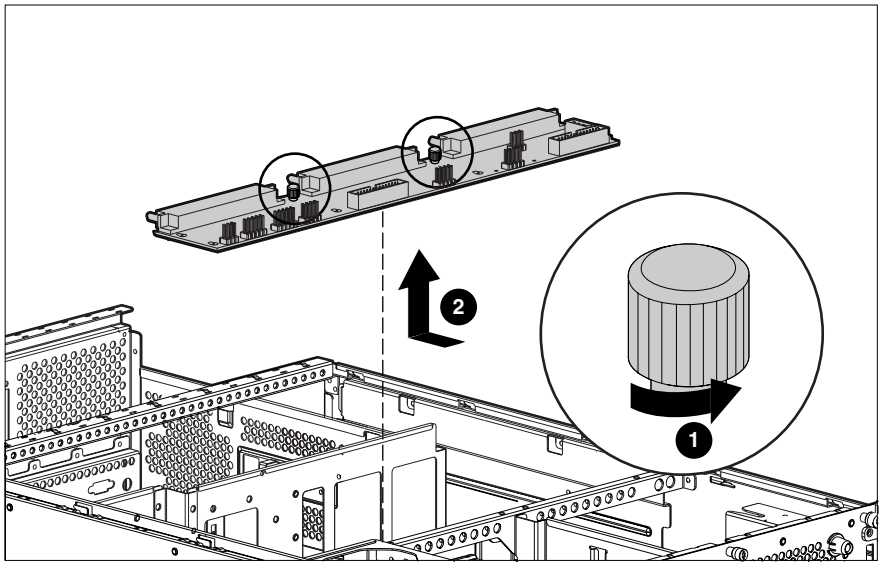

Figure 2-37. Removing the power backplane board

Reverse steps 1 through 7 to replace the power backplane board.

Power On/Standby Switch

To remove the Power On/Standby switch and cable assembly:

1. Perform the preparation procedures. See “Powering Down the Server” earlier in this chapter.
2. Remove the access panel. See “Access Panel” earlier in this chapter.
3. Remove the hard drive fan air baffle. See “Hard Drive Fan Air Baffle” earlier in this chapter.
4. Disconnect the power switch cable from the power backplane board ❶, and feed it through the cable grommet.
5. Press the tabs ❷ on both sides of the switch to release it.

   NOTE: A 4-mm flat-blade screwdriver can be used to assist with pressing the tabs.

6. With the tabs released, pull the switch and cable out the front of the bezel ❸.

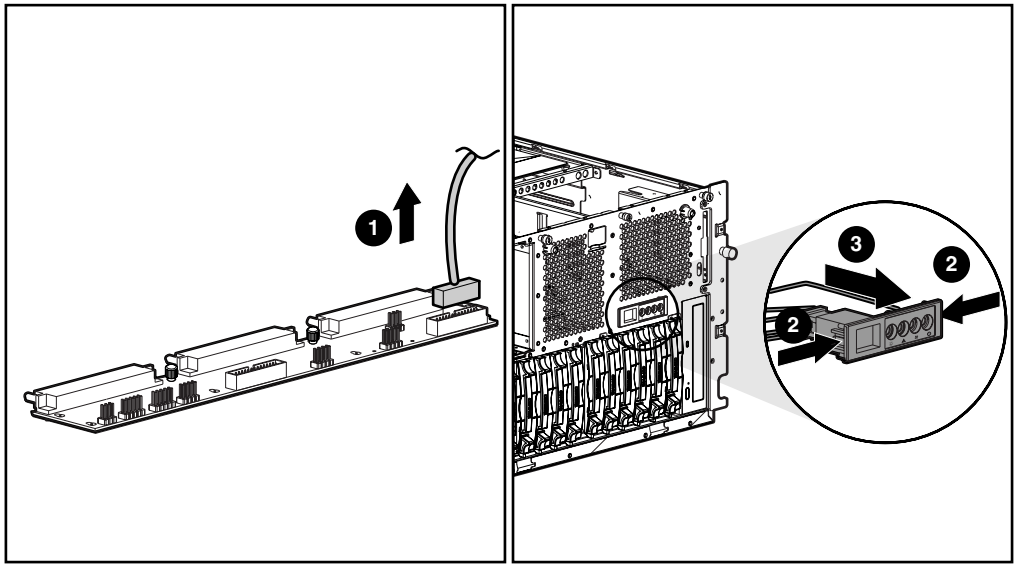

Figure 2-38. Removing the Power On/Standby switch

Reverse steps 1 through 6 to replace the Power On/Standby switch.

Chapter **3**

Diagnostics and Troubleshooting

This chapter describes software and firmware diagnostic tools available for Compaq ProLiant ML530 servers. The sections in this chapter are:

- Diagnostic Tools Utility Overview
- Default Configuration
- Utilities Access
- Power-On Self-Test (POST)
- Diagnostics Software
- Array Diagnostic Utility (ADU)
- Integrated Management Log
- Rapid Error Recovery
- Remote Service Features
- ROMPaq Error Recovery Options
- Compaq Insight Manager

Diagnostic Tools Utility Overview

The Compaq Diagnostic utilities were developed to assist in diagnosing problems, testing the hardware, and monitoring and managing Compaq server hardware.

Table 3-1
Diagnostic Tools

Tool	Function	Procedure
Compaq Diagnostics	A utility to assist testing and/or verifying operation of Compaq hardware. If problems are found, Compaq Diagnostics isolates failures down to a replaceable part, whenever possible.	Diagnostics and utilities are located on the system partition on the hard drive and must be accessed when a system configuration error is detected during the Power-On Self-Test (POST). Compaq Diagnostics software is also available on the Compaq SmartStart and Support Software CD. A Diagnostics diskette can be created from the SmartStart and Support Software CD. The Diagnostics utility can be run from the diskette.
Compaq Inspect Utility	A utility that provides a report detailing system information.	The Inspect utility can be run from either the main menu of the System Configuration Utility or the Compaq Diagnostics program.
Compaq Insight Manager™	A client/server application used to remotely manage Compaq hardware in a network environment. Reports hardware fault conditions (both failure and pre-failure) and collects data for reporting and graphing.	For more information, refer to the Compaq Management CD and the *Compaq Insight Manager User Guide*. More information on viewing and printing the event list can be found in the "Compaq Insight Manager" section of this chapter.
Compaq Survey Utility	An online information gathering agent that runs on servers, gathering critical hardware and software information from various sources. A utility for servers running Windows NT or NetWare. If a significant change occurs between data gathering intervals, previous information is marked, and the survey text file is overwritten to reflect the latest configuration and changes since last configuration. This allows a historical record of change events for server hardware and software.	Install the Survey Utility from SmartStart, the Compaq Integration Maintenance Utility, or the Compaq Management CD.

continued

Table 3-1
Diagnostic Tools *continued*

Tool	Function	Procedure
Array Diagnostics Utility (ADU)	A Windows-based tool designed to run on all Compaq systems that support Compaq array controllers. Two main functions of ADU are to collect all possible information about the array controllers in the system and to generate a list of detected problems. This tool is available for all Compaq servers covered by this guide.	Use the information provided in the "Array Diagnostics Utility" section later in this chapter.
Drive Array Advanced Diagnostics (DAAD)	The predecessor to ADU, DAAD is a DOS-based tool for Compaq servers with Smart Array Controllers. DAAD collects information about the array controllers in the system and offers a list of detected problems.	For a list of Compaq servers still supported by this tool, visit the Compaq website: http://www.compaq.com
Integrated Management Log	A log of system events, such as system failures or nonfatal error conditions. View events in the Integrated Management Log from within: ■ Compaq Insight Manager ■ OS-specific IML Utilities	The Integrated Management Log requires Compaq operating system–dependent drivers. Refer to the Compaq Support Software CD for instructions on installing the appropriate drivers.
System Configuration Utility	Utility to easily configure the hardware installed in or connected to the server. Specifically, the utility can: ■ Resolve resource conflicts in areas such as memory, port addresses, and interrupts (IRQs) ■ Configure PCI boards automatically ■ Provide switch and jumper settings ■ Manage installation of memory, processor upgrades, and mass storage devices such as hard drives, tape drives, and diskette drives ■ Store configuration information in nonvolatile memory ■ Assist in installing an operating system ■ Assist in running diagnostic tools such as TEST and INSPECT	Run the Compaq System Configuration Utility directly from the Support Software CD supplied the with SMART Controller Option Kit, or the SmartStart and Support Software CD supplied with your server. Use the CD supplied for the latest version supporting the SMART Controller. If the server does not have a bootable CD-ROM drive, create diskettes with the latest version of the System Configuration Utility from the Support Software CD, or the SmartStart and Support Software CD.

Default Configuration

When the system is first turned on, the system ROM detects the unconfigured state of the hardware and provides default configuration settings for most devices. By providing this initialization, the system can run Diagnostics and other software applications before running the normal SmartStart and System Configuration programs.

Default Configuration Messages

IMPORTANT: If formatting and partitioning the boot drive before running SmartStart and the System Configuration programs, this prohibits creating a System Partition and the offline remote management features that it provides.

If a System Configuration, Diagnostics, or SmartStart and Support Software CD is in the CD-ROM drive prior to powering on the server, the system ROM will power up to that utility. If the system ROM does not detect one of those CDs, you will be prompted to identify the intended operating system. The system powers up if any operating system–dependent configurations have changed with the new operating system selection. If the selected operating system–dependent configurations are the same as the current configurations, the system powers up normally. If you enter a wrong choice, you may change the operating system on subsequent restarts.

Inspect Utility

The Inspect Utility provides configuration information such as the contents of the operating system startup files, the current memory configuration, the ROM version, and Integrated Management Log information. The utility operates with MS-DOS and in the MS-DOS emulation mode of MS OS/2.

Running the Inspect Utility

1. Turn the server off, then back on, then press **F10** when the cursor displays in the upper right corner of the screen.
2. Select Diagnostics and Utilities at the main menu.
3. Press **Enter**.
4. Select Inspect Computer and press **Enter**.

   NOTE: If Diagnostics is not installed on the hard drive, System Configuration prompts you to insert the Diagnostics diskette into drive A.

5. Follow the instructions. The first time the Inspect utility displays, select Entire System and press **Enter**.

Printing the Inspect Listing

Select Print on the Inspect screen to print a copy of the Inspect listing. Keep a copy of the listing with each server for later reference.

Utilities Access

The Compaq SmartStart and Support Software CD contains the SmartStart program and many of the Compaq utilities needed to maintain the system, including:

- System Configuration Utility
- Array Configuration Utility
- Array Diagnostic Utility
- ROMPaq Firmware Upgrade Utilities
- Compaq Diagnostics

CAUTION: Do not select the Erase Utility when running the SmartStart and Support Software CD. This will result in data loss to the entire system.

Running Compaq Utilities

Compaq Utilities can be run from the system partition on the hard drive, from diskette, or from the SmartStart and Support Software CD.

Running the Utilities from the System Partition

If the system was installed using SmartStart, the Compaq utilities will automatically be available on the system partition. The system partition could also have been created during a manual system installation.

To run the utilities on the system partition, start the system and press **F10** when you see:

Press F10 for system partition utilities.

Then select the desired utility from the menu:

- The System Configuration Utility is available under the System Configuration menu.
- The Array Configuration Utility is available under the System Configuration menu.
- Compaq Diagnostics (Test and Inspect) are available under the Diagnostics and Utilities menu.
- The ROMPaq Firmware Upgrade Utility is available under the Diagnostics and Utilities menu.

Running the Utilities from Diskette

- Run the utilities from their individual diskettes. If you have a utility diskette newer than the version on the SmartStart and Support Software CD, use the diskette. Always use the newest version of the utilities.
- Create a diskette version of the utility from the SmartStart and Support Software CD.

To create diskette versions of the utilities from the CD:

1. Power up from the Compaq SmartStart and Support Software CD.
2. From the Compaq System Utilities screen, select Create Support Software Disks, then Next.
3. Select the diskette to create from the list, then follow the instructions on the screen.

Running the Utilities from the Compaq SmartStart and Support Software CD

IMPORTANT: Only the System Configuration Utility, the Array Configuration Utility, and the Array Diagnostic Utility can be executed from the Compaq SmartStart and Support Software CD. All other utilities must be executed from the system partition or from diskette.

To run these utilities directly from the Compaq SmartStart and Support Software CD:

1. Power up from the Compaq SmartStart and Support Software CD.
2. From the Compaq System Utilities screen, select the utility to run, then select Next.
   - To execute the System Configuration Utility, select Run System Configuration Utility.
   - To execute the Array Configuration Utility, select Run Array Configuration Utility.
   - To execute the Array Diagnostic Utility, select Run Array Diagnostic Utility.

Power-On Self-Test

Power-On Self-Test (POST) is a series of diagnostic tests that run automatically on Compaq computers when the system is turned on. POST checks the following assemblies to ensure that the computer system is functioning properly:

- System ROM
- Keyboard
- Power supplies
- System board
- Memory
- Controllers
- Diskette drives
- Hard drives
- Fans

POST Error Messages

If POST finds an error in the system, it issues an audible sound, visual message, or both. If an error code displays on the screen during POST or after resetting the system, follow the instructions in the POST Error Messages table.

> **NOTE:** Many of the actions listed require you to run Diagnostics or the Compaq System Configuration Utility. Steps for running these utilities are provided following the POST Error Messages table.

The Recommended Action column of the table lists the steps necessary to correct the problem. After completing each step, run the Diagnostics program to verify whether the error condition has been corrected. If the error code reappears, perform the next step, then run the Diagnostics program again. Follow this procedure until Diagnostics no longer detects an error condition.

Table 3-2
POST Error Messages

Error Code	Audible Beeps	Probable Source of Problem	Recommended Action
A Critical Error occurred prior to this power-up	None	A catastrophic system error, which caused the server to crash, has been logged.	Run Diagnostics. Replace the failed assembly as indicated.
Unsupported Processor Detected System Halted	1 long, 1 short	Processor not supported by current system ROM.	Check documentation for supported processors, and if supported, remove the processor and update the system to the latest ROM. Then reinstall the processor.
FATAL ROM ERROR: The System ROM is not properly programmed	1 long, 1 short	ROM programmed in the factory incorrectly.	Flash the ROM or replace the physical ROM part.
101-ROM Error	1 long, 1 short	System ROM checksum	Run Diagnostics. Replace the failed assembly as indicated.
101-I/O ROM Error	None	Options ROM checksum	Run Diagnostics. Replace the failed assembly as indicated.
102-System Board Failure	None	DMA, timers, and so on	Replace the system board. Run the Compaq System Configuration Utility.
104-ASR-2 Timer Failure	None	System board failure	Run Diagnostics. Replace the failed assembly as indicated.
105-Current System ROM is corrupt – now booting redundant System ROM	2 long	Nonbooted ROM image is corrupt.	Flash the ROM utilizing ROMPaq.
162-System Options Not Set	2 short	Configuration incorrect	Run the System Configuration Utility and correct the configuration.
163-Time & Date Not Set	2 short	Invalid time or date in configuration memory	Run the System Configuration Utility and correct the time or date.
164-Memory Size Error	2 short	Configuration memory incorrect	Run the System Configuration Utility and correct memory configuration.
172-Configuration Nonvolatile Memory Invalid	None	Nonvolatile configuration corrupt or jumper installed.	Run the System Configuration Utility and correct.
173-Slot ID Mismatch	None	Board replaced, configuration not updated.	Run the System Configuration Utility and correct.

continued

Table 3-2
POST Error Messages *continued*

Error Code	Audible Beeps	Probable Source of Problem	Recommended Action
174-Configuration/ Slot Mismatch Device Not Found	None	EISA or PCI board not found.	Run the System Configuration Utility and correct.
175-Configuration/ Slot Mismatch Device Found	None	EISA or PCI board added, configuration not updated.	Run the System Configuration Utility and correct.
177-Configuration Not Complete	None	Incomplete system configuration	Run the System Configuration Utility and correct.
178-Processor Configuration Invalid	None	Processor type or step does not match configuration memory.	Run the System Configuration Utility and correct.
180-Log Reinitialized	None	IML reinitializing due to log corruption.	Event message only, no action required.
201-Memory Error	None	RAM failure	Run Diagnostics. Replace failed assembly as indicated.
203-Memory Address Error	None	RAM failure	Run Diagnostics. Replace failed assembly as indicated.
207-Invalid Memory Configuration – Check DIMM [SIMM] Installation	None	Memory module installed incorrectly.	Verify placement of memory modules.
208-Invalid Memory Speed – Check DIMM [SIMM] Installation	1 long, 1 short	The speed of the memory is not compatible with the server.	Verify the speed of the memory modules installed, then check your server's user documentation, and replace the speed as indicated.
209-Memory Detection Failure. Check Memory Installation	1 long, 1 short	Unable to size memory.	Check DIMM installation and, if error persists, call your Compaq service provider.
211-Cache Switch Set Incorrectly	None	Switch not set properly during installation or upgrade.	Verify switch settings.
212-System Processor Failed/ Mapped Out	1 short	Processor in slot *X* failed.	Run Diagnostics and replace failed processor.
214-DC-DC Converter Failed	None	PowerSafe Module (DC-DC Converter) failed.	Run Diagnostics. Replace failed assembly as indicated.
218-Cache Accelerators Not Installed. System Halted.	None	Cache accelerators not installed or improperly installed.	Check cache accelerator installation.
219-Tag Update Rules SRAM Failure. System Halted	None	Catastrophic chipset failure.	Call Compaq service provider.

continued

Table 3-2
POST Error Messages *continued*

Error Code	Audible Beeps	Probable Source of Problem	Recommended Action
219-Snoop Rules SRAM Failure. System Halted.	None	Catastrophic chipset failure.	Call Compaq service provider.
220-Cache Accelerator Slot *X* Initialization Failed. System Halted.	None	Cache accelerator in slot *X* improperly installed or bad.	Check cache accelerator installation and, if properly installed, replace.
301-Keyboard Error	None	Keyboard failure	Turn off the computer, then reconnect the keyboard.
301-Keyboard Error or Test Fixture Installed	None	Keyboard failure	Replace the keyboard.
ZZ-301-Keyboard Error	None	Keyboard failure. (*ZZ* represents the Keyboard Scan Code.)	1. A key is stuck. Try to free it. 2. Replace the keyboard.
303-Keyboard Controller Error	None	System board, keyboard, or mouse controller failure	1. Run Diagnostics. 2. Replace failed assembly as indicated.
304-Keyboard or System Unit Error	None	Keyboard, keyboard cable, or system board failure	1. Make sure the keyboard is attached. 2. Run Diagnostics. 3. Replace the part indicated.
40*X*-Parallel Port *X* Address Assignment Conflict	2 short	Both external and internal ports are assigned to parallel port *X*.	Run the System Configuration Utility and correct.
601-Diskette Controller Error	None	Diskette controller circuitry failure	1. Make sure the diskette drive cables are attached. 2. Replace the diskette drive and/or cable. 3. Replace the system board.
605-Diskette Drive Type Error	2 short	Mismatch in drive type	Run the System Configuration Utility to set diskette type correctly.
1151-Com Port 1 Address Assignment Conflict	2 short	Both external and internal serial ports are assigned to COM1.	Run the System Configuration Utility and correct.
1152-Com Port 2, 3, or 4 Address Assignment Conflict	2 short	Both external and internal serial ports are assigned to COM2, COM3, or COM4.	Run the System Configuration Utility and correct.

continued

Table 3-2
POST Error Messages *continued*

Error Code	Audible Beeps	Probable Source of Problem	Recommended Action
1610-Temperature violation detected. Waiting for system to cool	2 short	Ambient system temperature is too hot.	Check fan and system environment.
1611-Fan failure detected	2 short	Required fan is not installed or spinning.	Check fans.
1611-I/O Fan (Fan *X*) failure detected	2 short	I/O fan has failed.	Replace the failed fan.
1611-CPU Fan (Fan *X*) failure detected	2 short	CPU fan has failed.	Replace the failed fan.
1612-Primary power supply failure	2 short	Primary power supply has failed.	Replace power supply as soon as possible.
1613-Low System Battery	None	Real time clock system battery is running low on power.	Run Diagnostics. Replace failed assembly as indicated.
1615-Power Supply Configuration Error	None	Configuration requires an additional power supply.	Install an additional power supply.
1615-Power Supply Failure, Power Supply Unplugged, or Power Supply Fan Failure in Bay *X*	None	A power supply has failed.	Check and replace specified power supply.
1617-Fan controller not responding	2 short	Fan controller failure	Check and replace failed controller assembly.
1617-I/O Fan controller not responding	2 short	I/O fan controller failure	Check and replace failed controller assembly.
1617-CPU Fan controller not responding	2 short	CPU fan controller failure	Check and replace failed controller assembly.
1618-PCI slots powered down. Check PCI hot plug enabler connectors.	None	PCI hot plug enabler is missing or failed.	Check and replace missing or failed assembly.
1620-Locked SCSI Bus Detected. Verify SCSI bus cabling. System halted.	None	SCSI bus failure	Run Diagnostics. Replace failed assembly as indicated.
1621-Current SCSI bus cable configuration is not recommended	None	Improper SCSI bus cabling	Check documentation for proper SCSI bus cabling.

continued

Table 3-2
POST Error Messages *continued*

Error Code	Audible Beeps	Probable Source of Problem	Recommended Action
1622-Internal SCSI Jumper Board Not Installed	None	The system has detected that the array enabler board is not installed.	Install the array enabler board.
1703-SCSI cable error detected. Terminated cable attached to output connector of SCSI backplane. System halted.	None	A terminated cable is attached to the output connector of the SCSI backplane.	Remove terminated connector.
1703-SCSI cable error detected. Must be configured for single backplane, simplex, or duplex. System halted.	None	Cables connected in unsupported configuration.	Reconnect cables in a supported configuration as described in documentation.
1703-SCSI cable error detected. Internal SCSI cable not attached to system board connector. System halted.	None	Incorrect cabling	Ensure that the integrated SCSI controller has SCSI termination attached.
1720-Slot *X* Drive Array – SMART Drive Detects Imminent Failure SCSI: Port *Y*: SCSI ID *X*	None	Indicated drive has reported a SMART predictive-failure condition and may fail at some time in the future.	If the drive is part of a nonfault-tolerant configuration, back up all data before replacing drive and restore all data afterward. If the drive is part of a fault-tolerant configuration **do not** replace the drive unless all other drives in the array are online. Press **F1** to resume.

continued

Table 3-2
POST Error Messages *continued*

Error Code	Audible Beeps	Probable Source of Problem	Recommended Action
1721-Slot *X* Drive Array – Drive parameter tracking predicts an imminent failure. The following devices should be replaced when conditions permit. Do not replace drive unless all other drives in the array are online. Back up data before replacing drive(s) if using RAID 0.	None	Monitor and performance threshold exceeded condition.	Replace the drive when it is available. The drive has not failed, but replacement is recommended.
1724-Slot *X* Drive Array – Physical Drive Position Change(s) Detected – Logical drive configuration has automatically been updated.	None	Logical drive configuration has been updated automatically following physical drive position changes.	Press **F1** to resume.
1726-Slot *X* Drive Array – Array Accelerator Memory Size Change Detected	None	Indicates array accelerator configuration has been updated automatically due to replacement of array accelerator (or controller) with one having different memory size.	Press **F1** to resume.
1727-Slot *X* Drive Array – New Logical Drive(s) Attachment Detected. If more than 32 logical drives, this message will be followed by: Auto-configuration failed: Too many logical drives.	None	Controller has detected an additional array of drives that was attached when the power was off. The logical drive configuration information has been updated to add the new logical drives. The maximum number of logical drives supported is 32. Additional logical drives will not be added to the configuration.	Press **F1** to resume.

continued

Table 3-2
POST Error Messages *continued*

Error Code	Audible Beeps	Probable Source of Problem	Recommended Action
1729-Slot 1 Drive Array – Disk Consistency Initialization in Progress – RAID 4/5 performance may be lower until auto-reliability monitoring has completed auto-background parity consistency initialization.	None	Initial RAID configuration in progress.	Normal message following initialization, no action required.
1730-Fixed Disk 0 does not support DMA Mode.	None	Hard drive error	Run the System Configuration Utility and correct.
1731-Fixed Disk 1 does not support DMA Mode.	None	Hard drive error	Run the System Configuration Utility and correct.
1740-Fixed Disk 0 failed Set Block Mode command.	None	Hard drive error	Run the System Configuration Utility and correct.
1741-Fixed Disk 1 failed Set Block Mode command.	None	Hard drive error	Run the System Configuration Utility and correct.
1750-Fixed Disk 0 failed Identify command.	None	Hard drive error	Run the System Configuration Utility and correct.
1751-Fixed Disk 1 failed Identify command.	None	Hard drive error	Run the System Configuration Utility and correct.
1760-Fixed Disk 0 does not support Block Mode.	None	Hard drive error	Run the System Configuration Utility and correct.
1761-Fixed Disk 1 does not support Block Mode.	None	Hard drive error	Run the System Configuration Utility and correct.

continued

Table 3-2
POST Error Messages *continued*

Error Code	Audible Beeps	Probable Source of Problem	Recommended Action
1764-Slot *X* Drive Array – Capacity Expansion Process is temporarily disabled (followed by one of the following): ■ Expansion will resume when Array Accelerator has been reattached. ■ Expansion will resume when Array Accelerator has been replaced. ■ Expansion will resume when Array Accelerator RAM allocation is successful. ■ Expansion will resume when Array Accelerator battery reaches full charge. ■ Expansion will resume when automatic data recovery has been completed.			Reattach or replace the array accelerator. Wait until the array accelerator batteries to fully charge or for Automatic Data Recovery to complete, as indicated.
1765-Slot *X* Drive Array Option ROM Appears to Conflict with an ISA Card. ISA cards with 16-bit memory cannot be configured in memory range C0000 to DFFFF along with the SMART-2/E 8-bit Option ROM due to EISA bus limitations. Please remove or reconfigure the ISA card.			■ Remove or reconfigure conflicting ISA cards. ■ Disable "shared memory" on any ISA network cards that may be installed.
1766-Slot *X* Drive Array requires System ROM Upgrade. Run Systems ROMPaq Utility.			Run the latest Systems ROMPaq Utility to upgrade the System ROMs.
1767-Slot *X* Drive Array Option ROM is Not Programmed Correctly or may Conflict with the Memory Address Range of an ISA Card. Check the Memory Address Configuration of installed ISA Card(s) or run Options ROMPaq Utility to attempt SMART-2/E Option ROM Reprogramming.			Remove or reconfigure conflicting ISA cards, especially any cards that are not recognized by the System Configuration Utility. Try reprogramming the ROM on the SMART-2/E Controller using the latest Options ROMPaq (version 2.29 or later).
1768-Slot *X* Drive Array-Resuming logical drive expansion process.	None	SMART-2 Controller error	No action required. Message displays whenever a controller reset or power cycle occurs while an array expansion is in progress.
1769-Slot *X* Drive Array – Drive(s) disabled due to failure during expand. Select F1 to continue with logical drives disabled. Select F2 to accept data loss and to re-enable logical drives.	None	SMART-2 Controller error. Data has been lost while expanding the array; therefore, the drives have been temporarily disabled.	Press **F2** to accept the data loss and re-enable the logical drives. Restore data from backup.
1771-Primary Disk Port Address Assignment Conflict	None	Address assignment conflict. Internal and external hard drive controllers are both assigned to the primary address.	Run the System Configuration Utility and correct.

continued

Table 3-2
POST Error Messages *continued*

Error Code	Audible Beeps	Probable Source of Problem	Recommended Action
1772-Secondary Disk Port Address Assignment Conflict	None	Address assignment conflict. Internal and external hard drive controllers are both assigned to the secondary address.	Run the System Configuration Utility and correct.
1773-Primary Fixed Disk Port Assignment Conflict	None	Hard disk drive error	Run the System Configuration Utility and correct.
1774-Slot *X* Drive Array – Obsolete data found in Array Accelerator. Select F1 to discard contents of Array Accelerator. Select F2 to write contents of Array Accelerator to drives.	None	SMART-2 Controller error	The data found in the array accelerator is older than data found on the drives. Press **F1** to discard the older data in the array accelerator and retain the newer data on the drives.
1775-Slot *X* Drive Array – ProLiant Storage System Not Responding SCSI Port (y): Check storage system power switch and cables. Turn the system power off while checking the ProLiant power and cable connections, then turn the system power back on to retry.	None	Storage system problem	Turn off power to the system. Check the external ProLiant power switch – external drives must all be powered up before or at the same time as the main system. Check cables. If the retry does not help, try replacing the cable, ProLiant firmware, ProLiant backplane, or the Smart Array Controller.
1776-Slot *X* Drive Array – SCSI Bus Termination Error – Internal and external drives cannot both be attached to the same SCSI port. SCSI port *Y*: Check cables RESUME = F1 Key	None	External and internal connectors of the specified SCSI ports are both attached to drives. The indicated SCSI bus is disabled until this problem is resolved.	The SCSI bus is not properly terminated when internal and external drives are attached concurrently to the same SCSI bus. 1. Turn off power to the server. 2. Verify cabling to the specified port. Reconfigure the drives as indicated.

continued

Table 3-2
POST Error Messages *continued*

Error Code	Audible Beeps	Probable Source of Problem	Recommended Action
1777-Slot *X* Drive Array – ProLiant Drive Storage Enclosure Problem Detected (followed by one or more of the following): SCSI Port *Y*: Cooling Fan Malfunction Detected SCSI Port *Y*: Overheated Condition Detected SCSI Port *Y*: Side-Panel must be Closed to Prevent Overheating SCSI Port *Y*: Redundant Power Supply Malfunction Detected SCSI Port *Y*: Wide SCSI Transfer Failed SCSI Port *Y*: Interrupt Signal Inoperative (RESUME = F1 KEY)	None	Temperature violation detected. Cooling fan failure, internal temperature alert or open side panel	Check cooling fan operation by placing your hand over the fan. Check the internal plenum cooling fan in tower servers or storage systems. If the fan is not operating, check for obstructions and check all internal connectors. If the unit's side panel was removed, replace it. When the ProLiant Storage System power LED is amber instead of green, this indicates a redundant power supply failure. Check SCSI cables. Verify your cabling against the diagrams in your Compaq Smart Array Controller user's guide. If the routing is correct, replace cables on the specified port until the POST message is eliminated.
1778-Drive Array resuming Automatic Data Recovery process	None	This message displays whenever a controller reset or power cycle occurs while Automatic Data Recovery is in progress.	No action necessary.
1779-Slot *X* Drive Array – Replacement drive(s) detected OR previously failed drive(s) now operational: Port *Y*: SCSI ID *Z*: Restore data from backup if replacement drive *X* has been installed.	None	Intermittent drive failure and/or possible loss of data	If this message appears and drive *X* has not been replaced, this indicates an intermittent drive failure. This message also appears once immediately following drive replacement whenever data must be restored from backup.
1780-Disk 0 Failure	None	Hard drive/format error	Run Diagnostics. Replace failed assembly as indicated.
1781-Disk 1 Failure	None	Hard drive/format error	Run Diagnostics. Replace failed assembly as indicated.

continued

Table 3-2
POST Error Messages *continued*

Error Code	Audible Beeps	Probable Source of Problem	Recommended Action
1782-Disk Controller Failure	None	Hard disk drive circuitry error	Run Diagnostics. Replace failed assembly as indicated.
1783-Slot *X* Drive Array Controller Failure	None	ROM installation problem or array accelerator board problem. If this message displays immediately following a ROM installation, the ROM is defective or not installed properly.	Check to see if: ■ The array accelerator board is attached properly. ■ The array controller is firmly inserted in its slot. If the error recurs, upgrade the System ROM. Otherwise, replace the Smart Array Controller.
1784-Drive Array Drive Failure, Physical Drive	None	Defective drive and/or cables	Check for loose cables. Replace defective drive *X* and/or cables.
1785-Drive Array not Configured (followed by one or more of the following):	None	Configuration error	See actions below.
Array Accelerator Memory Size Increased.			Run the Compaq System Configuration Utility.
Configuration information indicates drive positions beyond the capability of this controller. This may be due to drive movement from a controller that supports more drives than the current controller.			To avoid data loss, turn the system power off and reattach the drives to the original controller.
Configuration information indicates drives were configured on a controller with a newer firmware version.			To avoid data loss, reattach the drives to the original controller or use Options ROMPaq to upgrade the controller firmware to the version of the original controller. Press **F1** to resume.
Drive positions appear to have changed.			Run the Array Diagnostic Utility if previous positions are unknown. Then turn off system power and move the drives to their original positions.

continued

Table 3-2
POST Error Messages *continued*

Error Code	Audible Beeps	Probable Source of Problem	Recommended Action
continue 1785-Drive Array not Configured (followed by one or more of the following):	None	Configuration error	See actions below.
Drive positions cannot be changed during Capacity Expansion.			Run the Array Diagnostic Utility if previous positions are unknown. Then turn off system power and move the drives to their original positions.
External Cable(s) Attached to Wrong SCSI Port Connector(s).			Turn off system power and swap SCSI power connectors to prevent data loss.
No drives detected.			Turn off system power and check SCSI cable connections to make sure the drives are attached properly.
Run Compaq Array Configuration Utility			Run the Compaq Array Configuration Utility.

continued

Table 3-2
POST Error Messages *continued*

Error Code	Audible Beeps	Probable Source of Problem	Recommended Action
1786-Slot 1 Drive Array Recovery Needed. The following SCSI drive(s) need Automatic Data Recovery: SCSI Port 1: SCSI ID 0 Select F1 to continue with recovery of data to drive. Select F2 to continue without recovery of data to drive. -Or- Slot 1 Drive Array Recovery Needed. Automatic Data Recovery Previously Aborted! The following SCSI drive(s) need Automatic Data Recovery: SCSI Port 1: SCSI ID 0 Select F1 to retry Automatic Data Recovery to drive. Select F2 to continue without starting Automatic Data Recovery data to drive data to drive.	None	System in Interim Data Recovery mode. Data has not yet been recovered.	Press **F1** to allow Automatic Data Recovery to begin. Data will automatically be restored to drive *X* now that the drive has been replaced or now seems to be working. -Or- 1. Press **F2** and the system will continue to operate in the Interim Data Recovery mode. The "previously aborted" version of the 1786 POST message will appear if the previous rebuild attempt was aborted for any reason. 2. Run the Array Diagnostic Utility (ADU) for more information. If the replacement drive has failed, try using another replacement drive. -Or- If the rebuild was aborted due to a read error from another physical drive in the array, back up all readable data on the array, run Diagnostics Surface Analysis, and then restore data.
1787-Drive Array Operating in Interim Recovery Mode. Physical drive replacement needed: Drive *X*	None	Hard drive *X* failed or cable is loose or defective. Following a system restart, this message reminds you that drive *X* is defective and fault tolerance is being used.	1. Check loose cables. 2. Replace defective cables. 3. Replace drive X as soon as possible.

continued

Table 3-2
POST Error Messages *continued*

Error Code	Audible Beeps	Probable Source of Problem	Recommended Action
* 1788-Incorrect Drive Replaced: Drive *X* Drive(s) were incorrectly replaced: Drive *Y* Select "F1" to continue – drive array will remain disabled. Select "F2" to reset configuration – all data will be lost.	None	Drives are not installed in their original positions, so the drives have been disabled. See citation note.	Reinstall the drives correctly as indicated. Press **F1** to restart the computer with the drive array disabled. -Or- Press **F2** to use the drives as configured and lose all the data on them.
1789-Drive Not Responding, Physical Drive Check cables or replace physical drive *X*. Select "F1" to continue – drive array will remain disabled. Select "F2" to fail drive(s) that are not responding Interim Recovery Mode will be enabled if configured for fault tolerance.	None	Cable or hard drive failure	1. Check the cable connections. 2. Replace the cables. 3. Replace the drive. If you do not want to replace the drive now, press **F2.**
1790-Disk 0 Configuration Error	None	Hard drive error or wrong drive type	Run the System Configuration Utility and Diagnostics to correct.
1791-Disk 1 Error	None	Hard drive error or wrong drive type	Run the System Configuration Utility and Diagnostics to correct.
1792-Drive Array Reports Valid Data Found in Array Accelerator. Data will automatically be written to drive array.	None	While the system was in use, power was interrupted while data was in the array accelerator memory. Power was then restored within 8 to 10 days, and the data in the array accelerator was flushed to the drive array.	No action necessary and no data has been lost. Perform orderly system shutdowns to eliminate data remaining in the array accelerator.

* The 1788 error message might display inadvertently due to a bad power cable connection to the drive or by noise on the data cable. If this message was due to a bad power cable connection, but not because of an incorrect drive replacement, repair the connection and press **F2.**

-Or-

If this message was not due to a bad power cable connection, and no drive replacement took place, this could indicate noise on the data cable. Check the cable for proper routing.

continued

Table 3-2
POST Error Messages *continued*

Error Code	Audible Beeps	Probable Source of Problem	Recommended Action
1793-Drive Array – Array Accelerator Battery Depleted – Data Lost (Error message 1794 also displays.)	None	While the system was in use, power was interrupted while data was in the array accelerator memory. The array accelerator batteries failed. Power was not restored within 8 to 10 days. Data in the array accelerator has been lost.	Perform orderly system shutdowns to eliminate data remaining in the array accelerator.
1794-Drive Array – Array Accelerator Battery Charge Low. Array Accelerator is temporarily disabled. Array Accelerator will be re-enabled when battery reaches full charge.	None	This is a warning that the battery charge is below 75%. Posted-writes are disabled.	Replace the array accelerator board if batteries do not recharge within 36 power-on hours.
1795-Drive Array – Array Accelerator Configuration Error. Data does not correspond to this drive array. Array Accelerator is temporarily disabled.	None	While the system was in use, power was interrupted while data was in the array accelerator memory. The data stored in the array accelerator does not correspond to this drive array.	Match the array accelerator to the correct drive array, or run the System Configuration Utility to clear the data in the array accelerator.
1796-Drive Array – Array Accelerator Not Responding. Array Accelerator is temporarily disabled.	None	Array accelerator is defective or has been removed.	1. Check that the array accelerator is properly seated. 2. Run the System Configuration Utility to reconfigure the Compaq IDA-2 without the array accelerator.
1797-Drive Array – Array Accelerator Read Error Occurred. Data in Array Accelerator has been lost. Array Accelerator is disabled.	None	Hard parity error while reading data from posted-writes memory.	Enable array accelerator.

continued

Table 3-2
POST Error Messages *continued*

Error Code	Audible Beeps	Probable Source of Problem	Recommended Action
1798-Drive Array – Array Accelerator Write Error Occurred. Array Accelerator is disabled.	None	Hard parity error while writing data to posted-writes memory.	Enable array accelerator.
1799-Drive Array – Drive(s) Disabled due to Array Accelerator Data Loss. Select "F1" to continue with logical drives disabled. Select "F2" to accept data loss and to re-enable logical drives.	None	Volume failed due to loss of data in posted-writes memory.	Press **F1** to continue with logical drives disabled or **F2** to accept data loss and re-enable logical drives.
Beeps only	2 long	No valid memory is present in the system.	Replace failed memory with valid memory.
Beeps only	2 long, 2 short	Power is cycled. Temperature is too hot. Processor fan is not installed or spinning.	Check fans.
(Run System Configuration Utility – F10 key)	None	A configuration error occurred during POST.	Press **F10** to run System Configuration Utility.
(RESUME – F1 key)	None	As indicated to continue	Press **F1.**

Diagnostics Software

The Test Error Codes tables include all test error codes generated by Compaq products. Each code has a corresponding description and recommended actions. Each system generates only those codes that apply to its configuration and options.

When you select Diagnostics and Utilities from the System Configuration Utility main menu, the utility prompts you to test, inspect, upgrade, and diagnose the server.

Diagnostics and Utilities are located on the system partition on the hard drive and must be accessed when a system configuration error is detected during the POST. Compaq Diagnostics software is also available on the Compaq SmartStart and Support Software CD. You can create a Diagnostics diskette from the SmartStart and Support Software CD and run Diagnostics from diskette. See the procedure in the "Running Compaq Utilities" section earlier in this chapter.

The following options are available from the Diagnostics and Utilities menu:

- Test Computer
- Inspect Computer
- Upgrade Firmware
- Remote Utilities
- Diagnose Drive Array

Diagnostic error codes are generated when the Diagnostics software recognizes a problem. These error codes help identify possible defective subassemblies.

Steps for Diagnostics

In each case listed in the following tables, the Recommended Action column lists the steps necessary to correct the problem. After completing each step, run the Diagnostics utility to verify that the error condition has been corrected. If the error code reappears:

1. Perform the next step listed in the table.
2. Run the Diagnostics program again.
3. Follow this procedure until the Diagnostics program no longer detects an error condition.

100–199, Primary Processor Test Error Codes

The 100 series of diagnostic error codes identifies failures with processor and system board functions.

Table 3-3
Primary Processor Test Error Codes

Error Code	Description	Recommended Action
101-xx	CPU test failed.	Replace the processor board and retest.
103-xx	DMA page registers test failed.	Replace the processor board and retest.
104-xx	Interrupt controller master test failed.	
105-xx	Port 61 error	
106-xx	Keyboard controller self-test failed.	
107-xx	CMOS RAM test failed.	1. Replace the battery/clock module and retest.
108-xx	CMOS interrupt test failed.	2. Replace the system board and retest.
109-xx	CMOS clock load data test failed.	
110-xx	Programmable timer load data test failed.	Replace the processor board and retest.
111-xx	Refresh detect test failed.	
112-xx	Speed test slow mode out of range	
113-xx	Protected mode test failed.	
114-xx	Speaker test failed.	1. Verify the speaker connection and retest. 2. Replace the speaker and retest. 3. Replace the system board and retest.
116-xx	Cache test failed.	Replace the system board and retest.
122-xx	Multiprocessor dispatch test failed.	1. Check the system configuration and retest. 2. Replace the processor board and retest.
123-xx	Interprocessor communication test failed.	3. Replace the system board and retest.
199-xx	Installed devices test failed.	1. Check the system configuration and retest. 2. Verify cable connections and retest. 3. Check switch and/or jumper settings and retest. 4. Run the Configuration Utility and retest. 5. Replace the processor board and retest. 6. Replace the system board and retest.

200–299, Memory Test Error Codes

The 200 series of diagnostic error codes identifies failures with the memory subsystem.

Table 3-4
Memory Test Error Codes

Error Code	Description	Recommended Action
200-xx	Invalid memory configuration.	Reinsert memory modules in correct location and retest.
201-xx 202-xx	Memory machine ID test failed. Memory system ROM checksum failed.	1. Replace the system ROM and retest. 2. Replace the processor board and retest. 3. Replace the memory expansion board and retest.
203-xx 204-xx 205-xx 206-xx	Memory write/read test failed. Memory address test failed. Walking I/O test failed. Increment pattern test failed.	1. Replace the memory module and retest. 2. Replace the processor board and retest. 3. Replace the memory expansion board and retest.
207-xx	Invalid memory configuration – check DIMM installation. DIMMs installed have 8K refresh.	Replace DIMMs.
208-xx	Invalid memory speed detected – check DIMM installation. Slow DIMMs may cause data loss.	Replace DIMMs with timing greater than 60 Ns.
210-xx	Random pattern test failed.	1. Replace the memory module and retest. 2. Replace the processor board and retest. 3. Replace the memory expansion board and retest.

300–399, Keyboard Test Error Codes

The 300 series of diagnostic error codes identifies failures with keyboard and system board functions.

Table 3-5
Keyboard Test Error Codes

Error Code	Description	Recommended Action
301-xx	Keyboard short test, 8042 self-test failed.	1. Check the keyboard connection. If disconnected, turn off the computer, connect the keyboard, turn on the power, and retest. 2. Replace the keyboard and retest. 3. Replace the system board and retest.
302-xx	Keyboard long test failed.	
303-xx	Keyboard LED test, 8042 self-test failed.	
304-xx	Keyboard typematic test failed.	

400–499, Parallel Printer Test Error Codes

The 400 series of diagnostic error codes identifies failures with the parallel printer interface or system board functions.

Table 3-6
Parallel Printer Test Error Codes

Error Code	Description	Recommended Action
401-xx	Printer failed or not connected.	1. Connect the printer and retest.
402-xx	Printer data register failed.	2. Check the power to the printer and retest.
403-xx	Printer pattern test failed.	3. Install the loopback connector and retest.
498-xx	Printer failed or not connected.	4. Check the switch on the serial/parallel interface board (if applicable) and retest. 5. Replace the serial/parallel interface board (if applicable) and retest. 6. Replace the system board and retest.

500–599, Video Display Unit Test Error Codes

The 500 series of diagnostic error codes identifies failures with video or system board functions.

Table 3-7
Video Display Unit Test Error Codes

Error Code	Description	Recommended Action
501-xx	Video controller test failed.	1. Replace the monitor and retest.
502-xx	Video memory test failed.	2. Replace the Advanced VGA board and retest.
503-xx	Video attribute test failed.	3. Replace the system board and retest.
504-xx	Video character set test failed.	
505-xx	Video 80 × 25-mode 9 × 14 character cell test failed.	
506-xx	Video 80 × 25-mode 8 × 8 character cell test failed.	
507-xx	Video 40 × 25-mode test failed.	
508-xx	Video 320 × 200-mode color set 0 test failed.	
509-xx	Video 320 × 200-mode color set 1 test failed.	
510-xx	Video 640 × 200-mode test failed.	
511-xx	Video screen memory page test failed.	
512-xx	Video gray scale test failed.	
514-xx	Video white screen test failed.	
516-xx	Video noise pattern test failed.	

600–699, Diskette Drive Test Error Codes

The 600 series of diagnostic error codes identifies failures with diskette, diskette drive, or system board functions.

Table 3-8
Diskette Drive Test Error Codes

Error Code	Description	Recommended Action
600-xx	Diskette ID drive types test failed.	1. Replace the diskette and retest. 2. Check and/or replace the diskette power and signal cables and retest. 3. Replace the diskette drive and retest. 4. Replace the system board and retest.
601-xx	Diskette format failed.	
602-xx	Diskette read test failed.	
603-xx	Diskette write/read/compute test failed.	
604-xx	Diskette random seek test failed.	
605-xx	Diskette ID media failed.	
606-xx	Diskette speed test failed.	
607-xx	Diskette wrap test failed.	
608-xx	Diskette write protect test failed.	
609-xx	Diskette reset controller test failed.	
610-xx	Diskette change line test failed.	
694-xx	Pin 34 is not cut on 360 KB diskette drive.	
697-xx	Diskette type error.	
698-xx	Diskette drive speed not within limits.	
699-xx	Diskette drive/media ID error.	1. Replace the media and retest. 2. Run the Configuration Utility and retest.

800–899, Video Board Test Error Codes

The 800 series of diagnostic error codes identifies failures with video boards or system board functions.

Table 3-9
Video Board Test Error Codes

Error Code	Description	Recommended Action
802-xx	Video memory test failed.	1. Replace monitor and retest.
824-xx	Video text mode test failed.	2. Replace the Advanced VGA board and retest.
		3. Replace the system board and retest.

1100–1199, Serial Test Error Codes

The 1100 series of diagnostic error codes identifies failures with serial/parallel interface board or system board functions.

Table 3-10
Serial Test Error Codes

Error Code	Description	Recommended Action
1101-xx	Serial port test failed.	1. Check the switch settings on the serial/parallel interface board (if applicable) and retest.
1109-xx	Clock register test failed.	2. Replace the serial/parallel interface board (if applicable) and retest.
		3. Replace the system board and retest.

1200–1299, Modem Communications Test Error Codes

The 1200 series of diagnostic error codes identifies failures with the modem.

Table 3-11
Modem Communications Test Error Codes

Error Code	Description	Recommended Action
1201-xx	Modem internal loopback test failed.	1. Refer to the modem documentation for correct setup procedures and retest.
1202-xx	Modem time-out test failed.	2. Check the modem line and retest.
1203-xx	Modem external termination test failed.	3. Replace the modem and retest.
1204-xx	Modem auto originate test failed.	
1206-xx	Dial multi-frequency tone test failed.	
1210-xx	Modem direct connect test failed.	

1700–1799, Hard Drive Test Error Codes

The 1700 series of diagnostic error codes identifies failures with hard drives, hard drive controller boards, hard drive cabling, and system board functions. If the system uses a drive array controller, see the "Array Diagnostic Utility (ADU)" section.

Table 3-12
Hard Drive Test Error Codes

Error Code	Description	Recommended Action
1700-xx	Hard drive ID drive types test failed.	1. Run the System Configuration Utility and verify the drive type. 2. Replace the hard drive signal and power cables and retest. 3. Replace the hard drive controller and retest. 4. Replace the hard drive and retest. 5. Replace the system board and retest.
1701-xx	Hard drive format test failed.	
1702-xx	Hard drive read test failed.	
1703-xx	Hard drive write/ read/ compare test failed.	
1704-xx	Hard drive random seek test failed.	
1705-xx	Hard drive controller test failed.	
1708-xx	Hard drive format bad track test failed.	
1709-xx	Hard drive reset controller test failed.	
1710-xx	Hard drive park head test failed.	
1715-xx	Hard drive head select test failed.	
1716-xx	Hard drive conditional format test failed.	
1717-xx	Hard drive ECC* test failed.	
1719-xx	Hard drive power mode test failed.	
1736-xx	Drive Monitoring failed.	
1799-xx	Invalid hard drive type failed.	

* Error Checking and Correcting

1900–1999, Tape Drive Test Error Codes

The 1900 series of diagnostic error codes identifies failures with tape cartridges, tape drives, tape drive cabling, adapter boards, or the system board assembly.

Table 3-13
Tape Drive Test Error Codes

Error Code	Description	Recommended Action
1900-xx	Tape ID failed.	1. Replace the tape cartridge and retest.
1901-xx	Tape servo write failed.	2. Check and/or replace the signal cable and retest.
1902-xx	Tape format failed.	
1903-xx	Tape drive sensor test failed.	3. Check the switch settings on the adapter board (if applicable).
1904-xx	Tape BOT/EOT test failed.	4. Replace the tape adapter board (if applicable) and retest.
1905-xx	Tape read test failed.	
1906-xx	Tape write/read/compare test failed.	5. Replace the tape drive and retest.
		6. Replace the system board and retest.

2400–2499, Advanced VGA Board Test Error Codes

The 2400 series of diagnostic error codes identifies failures with video boards, monitors, or the system board assembly.

Table 3-14
Advanced VGA Board Test Error Codes

Error Code	Description	Recommended Action
2402-xx	Video memory test failed.	1. Run the System Configuration Utility.
2403-xx	Video attribute test failed.	2. Replace the monitor and retest.
2404-xx	Video character set test failed.	
2405-xx	Video 80 × 25 mode 9 × 14 character cell test failed.	3. Replace the Advanced VGA board or other video board and retest.
2406-xx	Video 80 × 25 mode 8 × 8 character cell test failed.	4. Replace the system board and retest.
2407-xx	Video 40 × 25 mode test failed.	
2408-xx	Video 320 × 320 mode color set 0 test failed.	
2409-xx	Video 320 × 320 mode color set 1 test failed.	

continued

Table 3-14
Advanced VGA Board Test Error Codes *continued*

Error Code	Description	Recommended Action
2410-xx	Video 640 × 200 mode test failed.	1. Run the System Configuration Utility. 2. Replace the monitor and retest. 3. Replace the Advanced VGA board or other video board and retest. 4. Replace the system board and retest.
2411-xx	Video screen memory page test failed.	
2412-xx	Video gray scale test failed.	
2414-xx	Video white screen test failed.	
2416-xx	Video noise pattern test failed.	
2417-xx	Lightpen text mode test failed, no response.	
2418-xx	ECG/VGC memory test failed.	
2419-xx	ECG/VGC ROM checksum test failed.	
2420-xx	ECG/VGC attribute test failed.	
2421-xx	ECG/VGC 640 × 200 graphics mode test failed.	
2422-xx	ECG/VGC 640 × 350 16-color set test failed.	
2423-xx	ECG/VGC 640 × 350 64-color test failed.	
2424-xx	ECG/VGC monochrome text mode test failed.	
2425-xx	ECG/VGC monochrome graphics mode test failed.	
2431-xx	640 × 480 graphics test failure.	
2432-xx	320 × 200 graphics (256-color mode) test failure.	
2448-xx	Advanced VGA Controller test failed.	
2451-xx	132-column Advanced VGA test failed.	
2456-xx	Advanced VGA 256-color test failed.	
2458-xx	Advanced VGA bit BLT test.	1. Run Setup. 2. Replace the system board and retest.
2468-xx	Advanced VGA DAC test.	
2477-xx	Advanced VGA data path test.	
2480-xx	Advanced VGA DAC test.	

6000–6099, Compaq NIC Boards Test Error Codes

The 6000 series of diagnostic error codes identifies failures with 32-bit DualSpeed NetFlex-2/Token Ring Controllers.

Table 3-15
Compaq Network Interface Controller Boards Test Error Codes

Error Code	Description	Recommended Action
6000-xx	Network card ID failed.	1. Check the controller installation in the PCI slot. 2. Check the interrupt type and number setting. 3. Check the media connection at the controller and Multistation Access Unit (MAU). 4. Check the media speed (4/16) and type of Unshielded Twisted Pair/Shielded Twisted Pair (UTP/STP) settings. 5. Check the MAU, cabling, or other network components. 6. Replace the controller.
6001-xx	Network card setup failed.	
6002-xx	Network card transmit failed.	
6014-xx	Network card configuration failed.	
6016-xx	Network card reset failed.	
6028-xx	Network card internal failed.	
6029-xx	Network card external failed.	
6089-xx	Network card open failed.	
6090-xx	Network card initialization failed.	
6091-xx	Network card internal loopback failed.	
6092-xx	Network card external loopback failed.	

6500–6599, SCSI Hard Drive Test Error Codes

The 6500 series of diagnostic error codes identifies failures with SCSI hard drives, SCSI hard drive controller boards, SCSI hard drive cabling, and system board functions. If the system uses a drive array controller, see the "Array Diagnostic Utility" section.

Table 3-16
SCSI Hard Drive Test Error Codes

Error Code	Description	Recommended Action
6500-xx	SCSI disk ID drive types test failed.	1. Run the System Configuration Utility and verify the drive type. 2. Run the System Configuration Utility and verify the drive type. 3. Replace the SCSI disk drive signal and power cables and retest. 4. Replace the SCSI controller and retest. 5. Replace the SCSI disk drive and retest. 6. Replace the system board and retest.
6502-xx	SCSI disk unconditional format test failed.	
6505-xx	SCSI disk read test failed.	
6506-xx	SCSI disk SA/media test failed.	
6509-xx	SCSI disk erase tape test failed.	
6523-xx	SCSI disk random read test failed.	
6528-xx	Media load/unload test failed.	

6600–6699, SCSI/IDE CD-ROM Drive Test Error Codes

The 6600 series of diagnostic error codes identifies failures with the CD-ROM drive cabling, CD-ROM drives, adapter boards, or the system board assembly.

Table 3-17
SCSI/IDE CD-ROM Drive Test Error Codes

Error Code	Description	Recommended Action
6600-xx	CD-ROM ID failed.	1. Replace the CD-ROM media and retest. 2. Check and/or replace the signal cable and retest. 3. Check the switch settings on the adapter board (if applicable). 4. Replace the SCSI controller (if applicable) and retest. 5. Replace the CD-ROM drive and retest. 6. Replace the system board and retest.
6605-xx	CD-ROM read failed.	

6700–6799, SCSI Tape Drive Test Error Codes

The 6700 series of diagnostic error codes identifies failures with tape cartridges, tape drives, media changers, tape drive cabling, adapter boards, or the system board assembly.

Table 3-18
SCSI Tape Drive Test Error Codes

Error Code	Description	Recommended Action
6700-xx	SCSI tape ID drive types test failed.	1. Run the System Configuration Utility and verify the drive type. 2. Replace the SCSI tape drive signal and power cables and retest. 3. Replace the SCSI controller and retest. 4. Replace the SCSI tape drive and retest. 5. Replace the system board and retest.
6706-xx	SCSI disk SA/media test failed.	
6709-xx	SCSI disk erase tape test failed.	
6728-xx	Media load/unload test failed.	

8600–8699, Pointing Device Interface Test Error Codes

The 8600 diagnostic error codes identify failures with the pointing device (mouse, trackball, and so on) or the system board assembly.

Table 3-19
Pointing Device Interface Test Error Codes

Error Code	Description	Recommended Action
8601-xx	Pointing device interface test failed.	1. Replace with a working pointing device and retest. 2. Replace the system board and retest.

Array Diagnostic Utility

The Array Diagnostic Utility (ADU) is a Windows-based software tool designed to run on all Compaq servers that support Compaq array controllers and are configured with SmartStart 4.10 or later. The two main functions of ADU are to collect all possible information about array controllers in the system and to generate a list of detected problems. The error messages and codes listed include all codes generated by Compaq products. The system generates only codes applicable to the configuration and options in the server.

ADU works by issuing multiple commands to the array controllers to determine if a problem exists. This data can then be saved to a file. In severe situations, this file can be sent to Compaq for analysis. In most cases, ADU provides enough information to initiate problem resolution immediately.

NOTE: ADU does not write to the drives, destroy data, or change or remove configuration information.

Starting ADU

1. Insert the SmartStart CD into the CD-ROM drive.
2. Restart the system from the SmartStart CD.
3. Select Array Diagnostic Utility (ADU) from the System Utilities menu.

   A "Please Wait" panel displays, indicating that ADU is identifying the system parameters. ADU gathers information from all of the array controllers in the system. The time it takes to gather this information depends on the size of the system. When the information gathering process is complete, ADU displays the main screen or a panel indicating any problems detected.

   

   CAUTION: Do not cycle the power during this process. ADU must perform low-level operations that, if interrupted, could cause the controller to revert to a previous level of firmware if the firmware was soft-upgraded.

4. To generate an ADU report, select File, then Save Data from the Command menu.

Table 3-20
ADU Diagnostic Messages

Message	Description	Recommended Action
Accelerator board not detected	Array controller did not detect a configured array accelerator board.	Install the array accelerator board on the array controller. If an array accelerator board is already installed, check for proper seating on the array controller board.
Accelerator error log	List of the last 32 parity errors on transfers to or from memory on the array accelerator board; displays starting memory address, transfer count, and operation (read and write).	If there are many parity errors, you may need to replace the array accelerator board.
Accelerator parity read errors: *N*	Number of times that read memory parity errors were detected during transfers from memory on array accelerator board.	If there are many parity errors, you may need to replace the array accelerator board.
Accelerator parity write errors: *N*	Number of times that write memory parity errors were detected during transfers to memory on the array accelerator board.	If there are many parity errors, you may need to replace the array accelerator board.
Accelerator status: Cache was automatically configured during last controller reset.	Cache board was replaced with one of a different size.	Normal operations should continue.
Accelerator status: Data in the cache was lost due to some reason other than the battery being discharged.	Data in the cache was lost, but not because of the battery being discharged.	Ensure that the array accelerator is properly seated. If the error continues, you may need to replace the array accelerator.
Accelerator status: Dirty data detected has reached limit. Cache still enabled, but writes no longer being posted.	The number of cache lines containing dirty data that cannot be flushed (written) to the drives has reached a preset limit. The cache is still enabled, but writes are no longer being posted. This error usually occurs when there is a problem with the drives.	Resolve problem with drives. The controller will then be able to write dirty data to drives and posted write operations will be restored.
Accelerator status: Dirty data detected. Unable to write dirty data to drives.	At least one cache line contains dirty data that the controller has been unable to flush (write) to the drives. This problem usually occurs when there is a problem with the drives.	Resolve the problem with the drives. The controller will then be able to write dirty data to drives.

continued

Table 3-20
ADU Diagnostic Messages *continued*

Message	Description	Recommended Action
Accelerator status: Excessive ECC errors detected in at least one cache line. As a result, at least one cache line is no longer in use.	At least one line in the cache is no longer in use due to excessive ECC errors detected during use of the memory associated with that cache line.	Replace the cache. If cache replacement is not done, the remaining cache lines should continue to operate properly.
Accelerator status: Excessive ECC errors detected in multiple cache lines. As a result, the cache is no longer in use.	The number of cache lines experiencing excessive error checking and correcting (ECC) errors has reached a preset limit. The cache has been shut down.	First, try reseating the cache to the controller. If that doesn't work, replace the cache.
Accelerator status: Obsolete data detected.	During reset initialization, obsolete data was found in cache. This was due to drives being moved and written to by another controller.	Normal operations should continue. The controller will either write data to the drives or discard the data completely.
Accelerator status: Obsolete data was discarded.	During reset initialization, obsolete data was found in cache and was discarded (not written to drives).	Normal operations should continue.
Accelerator status: Obsolete data was flushed (written) to drives.	During reset initialization, obsolete data was found in cache. Obsolete data was written to the drives, but newer data may have been overwritten.	If newer data was overwritten, you may need to restore newer data; otherwise, normal operations should continue.
Accelerator status: Permanently disabled	Array accelerator board has been permanently disabled. It remains disabled until it is reinitialized using the Array Configuration Utility (ACU).	Check the Disable Code field. Run ACU to reinitialize the array accelerator board.
Accelerator status: Possible data loss in cache	Possible data loss detected during power-up due to all batteries being below sufficient voltage level and no presence of identification signatures on the array accelerator board.	There is no way to determine if dirty or bad data was in the cache and is now lost.
Accelerator status: Temporarily disabled	Array accelerator board has been temporarily disabled.	Check the Disable Code field.
Accelerator status: Unrecognized status	A status was returned from the array accelerator board that ADU does not recognize.	Obtain the latest version of ADU.

continued

Table 3-20
ADU Diagnostic Messages *continued*

Message	Description	Recommended Action
Accelerator status: Valid data found at reset	Valid data was found in posted write memory at reinitialization. Data will be flushed to disk.	Not an error or data loss condition. No action required.
Accelerator status: Warranty alert	Catastrophic problem with array accelerator board. Refer to the other messages on Diagnostics screen for exact meaning of this message.	Replace the array accelerator board.
Adapter/NVRAM ID mismatch	EISA nonvolatile RAM has an ID for a different controller from the one physically present in the slot.	Run the System Configuration Utility.
Array accelerator battery pack *X* not fully charged	Battery is not fully charged.	If 75% of batteries present are fully charged, array accelerator is fully operational. If less than 75% of batteries are fully charged, allow 36 hours to recharge them.
Array accelerator battery pack *X* below reference voltage (recharging)	Battery pack on array accelerator is below required voltage levels.	Allow enough time for batteries to recharge (36 hours). If batteries have not recharged after 36 hours, replace the array accelerator board.
Board in use by expand operation	Array accelerator memory is in use by Expand operation.	Operate system without array accelerator board until Expand operation completes.
Board not attached	Array controller configured for use with array accelerator board, but one is not attached.	Attach array accelerator board to array controller.
Configuration signature is zero	ADU detected that nonvolatile RAM contains a configuration signature of zero. Old versions of the System Configuration Utility could cause this.	Run the latest version of System Configuration Utility to configure the controller and nonvolatile RAM.
Configuration signature mismatch	Array accelerator board configured for a different array controller board. Configuration signature on array accelerator board does not match the one stored on the array controller board.	To recognize the array accelerator board, run the Array Configuration Utility.
Controller communication failure occurred	Controller communication failure occurred.	ADU was unable to successfully issue commands to the controller in this slot.
Controller detected. NVRAM configuration not present	EISA nonvolatile RAM does not contain a configuration for this controller.	Run the System Configuration Utility to configure the nonvolatile RAM.
Controller firmware needs upgrading	Controller firmware is below the latest recommended version.	Run Options ROMPaq to upgrade the controller to the latest firmware revision.

continued

Table 3-20
ADU Diagnostic Messages *continued*

Message	Description	Recommended Action
Controller is located in special "video" slot	Controller is installed in slot for special video control signals. If controller is used in this slot, LED indicators on front panel may not function properly.	Install the controller in a different slot and run the System Configuration Utility to configure the controller and nonvolatile RAM. Then run the Array Configuration Utility to configure the controller.
Controller is not configured	Controller is not configured. If controller was previously configured and drive locations were changed, there may be a problem with placement of the drives. ADU examines each physical drive and looks for drives that have been moved to a different drive bay.	Look for messages indicating which drives have been moved. If none appear and drive swapping did not occur, run the Array Configuration Utility to configure the controller and run the System Configuration Utility to configure nonvolatile RAM. **Do not** run either utility if you believe drive swapping has occurred.
Controller reported POST error. Error Code: *X*	The controller returned an error from its internal Power-On Self-Test.	Replace the controller.
Controller restarted with a signature of zero	ADU did not find a valid configuration signature to use to get the data. Nonvolatile RAM may not be present (unconfigured) or the signature present in nonvolatile RAM may not match the signature on the controller.	Run the System Configuration Utility to configure the controller and nonvolatile RAM.
Disable command issued	Posted-writes have been disabled by the Accelerator Disable command. This occurred because of an operating system device driver.	Restart the system. Run the Array Configuration Utility to reinitialize the array accelerator board.
Drive (bay) *X* firmware needs upgrading	Firmware on this physical drive is not the latest recommended version.	Run the Options ROMPaq Utility to upgrade the drive firmware to the latest revision.
Drive (bay) *X* has insufficient capacity for its configuration	Drive has insufficient capacity to be used in this logical drive configuration.	Replace this drive with a larger capacity drive.
Drive (bay) *X* has invalid M&P stamp	Physical drive has invalid monitor and performance data.	Run the System Configuration Utility to properly initialize this drive.
Drive (bay) *X* has loose cable	The array controller could not communicate with this drive at power-up. This drive has not previously failed.	Check all cable connections first. The cables could be bad, loose, or disconnected. Turn on the system and attempt to reconnect signal/power cable to the drive. If this does not work, replace the cable. If that does not work, the drive may need to be replaced.
Drive (bay) *X* is a replacement drive	This drive has been replaced. This message displays if a drive is replaced in a fault tolerant logical volume.	If the replacement was intentional, allow the drive to rebuild.

continued

Table 3-20
ADU Diagnostic Messages *continued*

Message	Description	Recommended Action
Drive (bay) *X* is a replacement drive marked OK	This drive has been replaced and marked OK by the firmware. This may occur if a drive has an intermittent failure (for example, if a drive has previously failed, then when ADU is run, the drive starts working again).	Replace the drive.
Drive (bay) *X* is failed	The indicated physical drive has failed.	Replace the drive.
Drive (bay) *X* is undergoing drive recovery	This drive is being rebuilt from the corresponding mirror or parity data.	Normal operations should occur.
Drive (bay) *X* needs replacing	The 210-Mb hard drive has firmware version 2.30 or 2.31.	Replace the drive.
Drive (bay) *X* upload code not readable	An error occurred while ADU was trying to read the upload code information from this drive.	If there were multiple errors, this drive may need to be replaced.
Drive (bay) *X* was inadvertently replaced	The physical drive was incorrectly replaced after another drive failed.	Replace the drive that was incorrectly replaced and replace the original drive that failed. Do not run the System Configuration Utility and try to reconfigure; data will be lost.
Drive Monitoring features are unobtainable	ADU unable to get monitor and performance data due to fatal command problem such as drive time-out, or unable to get data because these features are not supported on the controller.	Check for other errors (time-outs, and so on). If no other errors occur, upgrade the firmware to a version that supports monitor and performance, if desired.
Drive Monitoring is NOT enabled for SCSI Port *X* Drive ID *X*	The monitor and performance features have not been enabled on this drive.	Run the System Configuration Utility to initialize the monitor and performance features.
Drive time-out occurred on physical drive bay *X*	ADU issued a command to a physical drive and the command was never acknowledged.	The drive or cable may be bad. Check the other error messages on the Diagnostics screen to determine resolution.
Drive *X* indicates position *Y*	Message indicates physical drive that appears to be scrambled or in a drive bay other than the one for which it was originally configured.	Examine the graphical drive representation on ADU to determine proper drive locations. Remove drive *X* and place it in drive position *Y*. Rearrange the drives according to the ADU instructions.
Duplicate write memory error	Data could not be written to the array accelerator board in duplicate due to the detection of parity errors. This is not a data loss situation.	Replace the array accelerator board.

continued

Table 3-20
ADU Diagnostic Messages *continued*

Message	Description	Recommended Action
Error occurred reading RIS copy from SCSI Port *X* Drive ID *X*	An error occurred while ADU was trying to read the RIS from this drive.	If there were multiple errors, this drive may need to be replaced.
FYI: Drive (bay) *X* is third-party supplied	The installed drive was not supplied by Compaq.	If problems exist with this drive, replace it with a Compaq drive.
Identify controller data did not match with NVRAM	The identify controller data from the array controller did not match the information stored in nonvolatile RAM. This could occur if new, previously configured drives have been placed in a system that has also been previously configured. It could also occur if the firmware on the controller has been upgraded and the System Configuration Utility was not run.	Check the identify controller data under the Inspect Utility. If the firmware version field is the only difference between the controller and nonvolatile RAM data, this is not a problem. Otherwise, run the System Configuration Utility.
Identify logical drive data did not match with NVRAM	The identify unit data from the array controller did not match with the information stored in nonvolatile RAM. This could occur if new, previously configured drives have been placed in a system that has also been previously configured.	Run the System Configuration Utility to configure the controller and nonvolatile RAM.
Insufficient adapter resources	The adapter does not have sufficient resources to perform operations to the array accelerator board. Drive rebuild may be occurring.	Operate the system without the array accelerator board until the drive rebuild completes.
Inter-controller link connection could not be established	Unable to communicate over the link connecting the redundant controllers.	Make sure both controllers are using the same hardware and firmware revisions. If one controller is failed, replace it.
Less than 75% batteries at sufficient voltage	Operation of array accelerator board has been disabled due to less than 75% of battery packs being at sufficient voltage level.	Allow sufficient time for batteries to recharge (36 hours). If batteries have not recharged after 36 hours, replace the array accelerator board.
Less than 75% batteries at sufficient voltage. Battery pack *X* below reference voltage.	Battery pack on array accelerator is below required voltage levels.	Allow sufficient time for batteries to recharge (36 hours). If batteries have not recharged after 36 hours, replace the array accelerator board.
Logical drive *X* failed due to cache error	This logical drive failed due to a catastrophic cache error.	Replace the array accelerator board and reconfigure using the Array Configuration Utility.

continued

Table 3-20
ADU Diagnostic Messages *continued*

Message	Description	Recommended Action
Logical Drive *X* status = FAILED	This status could be issued for several reasons. If this logical drive is configured for No Fault Tolerance and one or more drives fail, this status will occur. If mirroring is enabled and any two mirrored drives fail, this status will occur. If Data Guarding is enabled and two or more drives fail, this status will occur. If another configured logical drive is in the WRONG DRIVE REPLACED or LOOSE CABLE DETECTED state, this status may occur.	Check for drive failures, wrong drive replaced, or loose cable messages. If there was a drive failure, replace the failed drives, then restore the data for this logical drive from the tape backup. Otherwise, follow the wrong drive replaced or loose cable detected procedures.
Logical Drive *X* status = INTERIM RECOVERY	A physical drive in this logical drive has failed. The logical drive is operating in interim recovery mode and is vulnerable.	Replace the failed drive as soon as possible.
Logical Drive *X* status = LOOSE CABLE DETECTED	A physical drive has a cabling problem.	Turn the system off and attempt to reattach the cable to the drive. If this does not work, replace the cable.
Logical Drive *X* status = NEEDS RECOVER	A physical drive in this logical drive has failed and has been replaced. This drive needs to be rebuilt from the mirror drive or the parity data.	When starting the system, select the "F1 – rebuild drive" option to rebuild the replaced drive.
Logical Drive *X* status = OVERHEATED	The Intelligent Array Expansion System temperature is beyond safe operating levels, and the system has shut down to avoid damage.	Check the fans and the operating environment.
Logical Drive *X* status = OVERHEATING	The Intelligent Array Expansion System temperature is beyond safe operating levels.	Check the fans and the operating environment.
Logical Drive *X* status = RECOVERING	A physical drive in this logical drive has failed and has been replaced. The replaced drive is rebuilding from the mirror drive or the parity data.	Nothing needs to be done. Normal operations can occur.
Logical Drive *X* status = WRONG DRIVE REPLACED	A physical drive in this logical drive has failed. The incorrect drive was replaced.	Replace the drive that was incorrectly replaced. Then, replace the original drive that failed with a new drive. Do not run the System Configuration Utility to reconfigure because data on the drive will be lost.

continued

Table 3-20
ADU Diagnostic Messages *continued*

Message	Description	Recommended Action
Loose cable detected – logical drives may be marked FAILED until corrected	Controller unable to communicate with one or more physical drives, probably because of a cabling problem. Logical drives may be in a FAILED state until the condition is corrected, preventing access to data on the controller. If logical drives are marked FAILED, those logical drives will be unusable until problem corrected.	Check all controllers and drive cable connections. Turn off the system. Check cables for tight connection to logical drives. Restart the system. If the same message recurs, cables may be bad.
Mirror data miscompare	Data was found at reinitialization in the posted write memory; however, the mirror data compare test failed resulting in data being marked as invalid. Data loss is possible.	Replace the array accelerator board.
No configuration for accelerator board	The array accelerator board has not been configured.	If the array accelerator board is present, run the Array Configuration Utility (ACU) to configure the board.
NVRAM configuration present, controller not detected	EISA nonvolatile RAM has a configuration for an array controller, but there is no board in this slot. Either a board has been removed from the system or a board has been placed in the wrong slot.	Place the array controller in the proper slot or run the System Configuration Utility to reconfigure nonvolatile RAM to reflect the removal or new position.
One or more drives is unable to support redundant controller operation	At least one drive in use does not support redundant controller operation.	Replace the drive that does not support redundant controller operation.
Other controller indicates different hardware model	The other controller in the redundant controller configuration is a different hardware model.	Make sure both controllers are fully seated and using the same hardware model.
Other controller indicates different firmware version	The other controller in the redundant controller configuration is using a different firmware version.	Make sure both controllers are using the same firmware revision.
Other controller indicates different cache size	The other controller in the redundant controller configuration has a different size array accelerator.	Make sure both controllers are using the same capacity array accelerator.

continued

Table 3-20
ADU Diagnostic Messages *continued*

Message	Description	Recommended Action
ProLiant storage unit on SCSI bus *X* cabling error (bus disabled)	This controller has internal and external connectors for the same SCSI bus. Therefore, the SCSI bus can only be cabled to a storage unit using the controller's internal or external connector. The controller firmware has automatically disabled the SCSI bus because the internal and external connectors were both cabled to a storage unit.	Check all cable connections. Disconnect the storage unit cable from the controller's internal or external connector.
ProLiant storage unit on SCSI bus *X* – Wide SCSI transfer failed – check cables	Wide data transfers failed on all wide drives attached to this bus. The firmware then reverted to narrow data transfers on these drives. This may indicate a bad SCSI cable.	Check all cable connections. If there is a problem, keep replacing cables between the controller and drives until the problem goes away.
ProLiant storage unit on SCSI bus *X* is unsupported. SMART-2 requires fast/wide ProLiant Storage System – Drives not activated	The controller may not support the storage unit attached to the controller.	Verify that the controller supports the storage unit connected to the controller. Attach only storage units that are supported by the controller.
ProLiant storage unit on SCSI bus *X* cooling fan malfunction	The fan in the storage unit had an alarm condition.	Check connections to the fan. If error persists, replace the fan.
ProLiant storage unit on SCSI bus *X* overheated condition	The storage unit had a temperature alert.	Make sure the operating environment of the storage unit is within specifications. For better airflow, remove any dust build-up from fans.
ProLiant storage unit on SCSI bus *X* side panel must be closed	The side panel of the storage unit is off.	Make sure the side panel of the storage unit is properly attached.
ProLiant storage unit on SCSI bus *X* redundant power supply malfunction	One of the power supplies on the storage unit is not working.	Check connections. Replace power supply if necessary.
RIS copies between drives do not match	Drives on controller contain copies of RIS that do not match.	Upgrade ADU to the most recent version.
SCSI Port *X* Drive ID *X* has exceeded threshold(s)	Monitor and performance threshold for this drive has been violated.	Check for the particular threshold that has been violated.

continued

Table 3-20
ADU Diagnostic Messages *continued*

Message	Description	Recommended Action
SCSI Port *X* Drive ID *X* is not stamped for monitoring	Drive has not been stamped with monitor and performance features.	Run the Array Configuration Utility (ACU). Changing the configuration and saving should cause ACU to stamp drive with monitor and performance features. To do this without destroying the current configuration, change the array accelerator size and save the configuration. Change the array accelerator back to its original size and save again.
SCSI Port *X* Drive ID *X* RIS copy mismatch	Copies of RIS on drive do not match.	Drive may need to be replaced. Check for other errors.
SCSI Port *X* Drive ID *X* failed – REPLACE (failure message)	ADU found drive that needs to be replaced.	Replace drive or correct condition that caused error.
SCSI Port *X* Drive ID *X* firmware needs upgrading	Drive firmware is below recommended version.	Run Options ROMPaq to upgrade drive to latest firmware revision.
SCSI Port *X* Drive ID *X* may have a loose connection. SMART is unable to communicate with drive	Drive may have a loose connection.	Turn off the system. Check drive cable for tight connection.
SCSI Port *X* Drive ID *X* was replaced on a good volume: (failure message)	ADU found drive was replaced even though volume was fine.	No action needed.
SCSI port *X*, drive ID *Y* firmware needs upgrading	Drive's firmware may cause problems and should be upgraded.	Run Options ROMPaq to upgrade the firmware on the drive to a later version.
Set configuration command issued	The configuration of the array controller has been updated. The array accelerator board may remain disabled until it is reinitialized.	Run the System Configuration Utility to reinitialize the array accelerator board.
Soft Firmware Upgrade required	ADU has determined that the controller is running firmware that has been soft upgraded by the Compaq Upgrade Utility. However, the firmware running is not present on all drives. This could be caused by the addition of new drives in the system.	Run the Compaq Upgrade Utility to place the latest firmware on all drives.

continued

Table 3-20
ADU Diagnostic Messages *continued*

Message	Description	Recommended Action
System board is unable to identify which slots the controllers are in	Slot indicator on motherboard is not working correctly. It appears to the firmware that both controllers are in the same slot.	Make sure that controllers are fully seated. If the problem persists, this might indicate a controller problem or a system board problem. Follow these steps: 1. Remove one of the controllers in the configuration and see if the remaining controller generates a POST message. 2. Move the remaining controller to the other slot and see if it still generates a POST message. 3. Repeat steps 1 and 2 for other controller. If both controllers give POST messages in one slot but not the other, it is a system board problem. If only one controller has a POST message, replace that controller.
This controller cannot see the drives but the other controller can	The other controller in the redundant controller configuration cannot see the drives, but this controller can.	Resolve any other errors and then rerun ADU.
This controller can see the drives but the other controller cannot	The other controller in the redundant controller configuration can see the drives, but this controller cannot.	Resolve any other errors and then rerun ADU.
Unable to communicate with drive on SCSI Port *X*, Drive ID *X*	Controller could not communicate with drive.	If the amber LED on the drive is on, replace the drive.
Unknown disable code	A code was returned from the array accelerator board that the ADU does not recognize.	Obtain the latest version of ADU.
Unrecoverable read error	Read parity errors were detected when attempting to read same data from both sides of mirrored memory. Data loss will occur.	Replace the array accelerator board.
WARNING – Drive Write Cache is enabled on *X*	Drive has its internal write cache enabled. The drive may be a third-party drive, or the operating parameters of the drive may have been altered. This condition may cause data corruption if power to the drive is interrupted.	Replace the drive with a drive supplied by Compaq, or restore the operating parameters of the drive.

continued

Table 3-20
ADU Diagnostic Messages *continued*

Message	Description	Recommended Action
Warning bit detected	A monitor and performance threshold violation may have occurred. Status of a logical drive may not be OK.	Check the other error messages on the diagnosis screen for an indication of the problem.
Write memory error	Data could not be written to cache memory. This typically means that a parity error was detected while writing data to cache. This could be caused by incomplete connection between cache and controller. This is not a data loss circumstance.	With power to system turned off, verify that the cache board is fully connected to controller.
Wrong accelerator	This could mean that either the board was replaced in the wrong slot or placed in a system that was previously configured with another board type. Included with this message is a message indicating the type of adapter sensed by ADU and a message indicating the type of adapter last configured in EISA nonvolatile RAM.	Check the diagnosis screen for other error messages. Run the System Configuration Utility to update the system configuration.

Integrated Management Log

The Compaq Integrated Management Log (IML) records system events and stores them in an easily viewable form. Each event is marked with a time-stamp with one-minute granularity.

Events listed in the IML are categorized as one of four event severity levels:

- **Status**—indicates that the message is informational only.
- **Repaired**—indicates that corrective action has been taken.
- **Caution**—indicates a nonfatal error condition.
- **Critical**—indicates a component failure.

The IML requires Compaq operating system-dependent drivers. Refer to the Compaq Support Software CD for instructions on installing the appropriate drivers.

Multiple Ways of Viewing the Log

You can view an event in the IML from within:

- Compaq Insight Manager
- OS IML Viewer

Compaq Insight Manager

Compaq Insight Manager is a comprehensive management tool used to monitor and control the operation of Compaq servers and clients. Compaq Insight Manager consists of two components: a Windows-based console application, and server- or client-based management data collection agents. Starting with Compaq Insight Manager 4.0, the agents for Windows NT and NetWare are also Web-enhanced; that is, these agents enable Web browser access and monitoring of management information.

The management agents monitor over 1,000 management parameters. Key subsystems are instrumented to make health, configuration, and performance data available to agent software. Agents act upon data by initiating information, such as statistics on network interface or storage subsystem performance.

Viewing the Event List

1. From Compaq Insight Manager, select the appropriate server, then select View Device Data. The selected server displays with buttons around its perimeter.
2. Select the Recovery button, then Integrated Management Log.
3. If a failed component has been replaced, select the event from the list, then select Mark Repaired.

Printing the Event List

NOTE: You can view the event list only from the Recovery/Integrated Management Log screen as described above in the "Viewing the Event List" section.

1. From the Compaq Insight Manager screen, select the appropriate server.
2. Select the Configuration button, then the Recovery button, then Print.

OS IML Viewer

Windows NT and Novell NetWare have OS-specific IML viewers that allow you to view the IML while the server is running and while you are at the server console.

Event List

The Event List displays the affected components and the associated error messages. Although the same basic information displays, the format of the list may differ, depending on how you view the IML: through Compaq Insight Manager or through the OS IML Viewer. An example of the format of an event displayed on the Compaq IML Viewer follows:

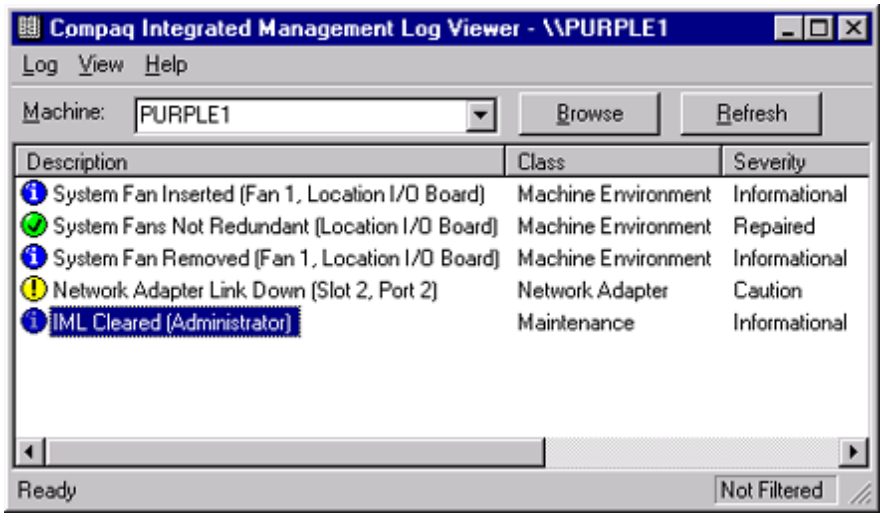

Figure 3-1. Example of Compaq Integrated Management Log Viewer

Event Messages

Table 3-21
Event Messages

Event Type	Event Message	Action
Machine Environment		
Fan Failure	System Fan Failure (Fan *X*, Location).	Replace fan.
Fan Inserted	System Fan Inserted (Fan *X*, Location).	None
Fan Removed	System Fan Removed (Fan *X*, Location).	None
Fans Not Redundant	System Fans Not Redundant.	Add fan.
Overheat Condition	System Overheating (Zone *X*, Location).	Check fans.
Main Memory		
Correctable Error Threshold exceeded	Corrected Memory Error Threshold passed (Slot X, Memory Module *X*).	Replace the defective memory module.
	Corrected Memory Error Threshold passed (System Memory).	Replace the memory modules one at a time (if more than one) and retest the system after each replacement.
	Corrected Memory Error Threshold passed (Memory Module unknown).	Replace the memory modules one at a time (if more than one).
Uncorrectable Error	Uncorrectable Memory Error (Slot *X*, Memory Module *X*).	Replace the defective memory module.
	Uncorrectable Memory Error (System Memory).	Replace the defective memory module.
	Uncorrectable Memory Error (Memory Module unknown).	Replace the memory modules one at a time (if more than one) and retest the system after each replacement.
Processor		
Correctable Error Threshold exceeded	Processor Correctable Error Threshold passed (Slot *X*, Socket *X*).	Replace the processor.
Uncorrectable Error	Unrecoverable Host Bus Data Parity Error.	Replace the processor.
Host Bus Error	Unrecoverable Host Bus Address Parity Error.	Call the service provider or Compaq for diagnosis.
PCI Bus Error	PCI Bus Error (Slot *X*, Bus *X*, Device *X*, Function *X*).	Power down PCI slot and replace board.

continued

Table 3-21
Event Messages *continued*

Event Type	Event Message	Action
Power Subsystem		
Power Supply Failure	System Power Supply Failure (Power Supply *X*).	Replace power supply.
Power Supply Inserted	System Power Supply Inserted (Power Supply *X*).	None
Power Supply Removed	System Power Supply Removed (Power Supply *X*).	None
Power Supply Not Redundant	System Power Supplies Not Redundant.	Add power supply.
AC Voltage Problem	System AC Power Problem (Power Supply *X*).	Check the input power voltage.
Power AC Overload	System AC Power Overload (Power Supply *X*).	1. Change the input power to 220V. 2. Add an additional power supply, or replace with one able to supply present load. 3. Reduce the load.
Automatic Server Recovery–2		
System Lockup	ASR Lockup Detected: Cause	Call the service provider or Compaq for diagnosis.
Operating System		
System Crash	Blue Screen Trap: Cause [NT] Kernel Panic: Cause [UNIX] Abnormal Program Termination: Cause [NetWare]	Refer to the documentation for the operating system.
Automatic OS Shutdown	Automatic Operating System Shutdown Initiated Due to Fan Failure Automatic Operating System Shutdown Initiated Due to Overheat Condition Fatal Exception (Number *X*, Cause)	Refer to the documentation for the operating system.

Rapid Error Recovery

Compaq servers provide rapid recovery services for diagnosing and recovering from errors. These tools are available for local and remote diagnosis and recovery.

Rapid recovery means fast identification and resolution of complex faults. The Rapid Recovery Engine and Insight Management Agents notify the system administrator when a failure occurs, ensuring that the server experiences minimal downtime. You enable these features through the System Configuration Utility. These integrated server management features are:

- Automatic Server Recovery-2 (ASR-2)
- ASR-2 Integrated Management Log Messages
- Storage Fault Recovery Tracking
- Storage Automatic Reconstruction
- Network Interface Fault Recovery Tracking
- Memory Fault Recovery Tracking (with option upgrade kit)

These are discussed in more detail on the server documentation CD.

Automatic Server Recovery-2

Automatic Server Recovery-2 (ASR-2) lets the server restart automatically from the operating system or the Compaq Utilities. To use this feature, you must use the System Configuration Utility to install Compaq Utilities in the system partition.

You can enable the ASR-2 feature to restart a server after a critical hardware or software error occurs. If a critical error occurs, the server records the error information in the Integrated Management Log, restarts the system, and pages you. Using the Compaq System Configuration Utility, configure the system for automatic recovery or for attended local or remote access to diagnostic and configuration tools.

NOTE: ASR-2 is available only on operating systems using the ASR-2 drivers provided by Compaq.

You can also configure ASR-2 to page an administrator when the system restarts. ASR-2 depends on the application and driver that routinely notify the ASR-2 hardware of proper system operations. If the time between ASR-2 notifications exceeds the specified period, ASR-2 assumes a fault has occurred and initiates the recovery process.

To configure ASR-2:

1. Run the System Configuration Utility.
2. Select View and Edit Details.
3. Set the software error recovery status to Enabled.
4. Set the software error recovery timeout.

The available recovery features are:

- **Software Error Recovery**—Automatically restarts the server after a software-induced server failure
- **Environmental Recovery**—Allows the server to restart when temperature, fan, or AC power conditions return to normal

Unattended Recovery

For unattended recovery, ASR-2 performs the following actions:

- Logs the error information to the IML
- Resets the server
- Pages you (if a modem is present and you selected Paging)
- Tries to restart the operating system

Often the server restarts successfully, making unattended recovery the ideal choice for remote locations where trained service personnel are not immediately available.

If ASR-2 cannot restart the server within 10 attempts, it places a critical error in the IML, starts the server into Compaq Utilities, and enables remote access (if you configured remote access).

To use this level of ASR-2, you must configure ASR-2 to load the operating system after restart.

Attended Recovery

For attended recovery, ASR-2 performs the following actions:

- Logs the error information to the IML
- Resets the server
- Pages you (if a modem is present and you selected Paging)
- Starts Compaq Utilities from the hard drive
- Enables remote access

During system configuration, these utilities are placed on the system utilities partition of the hard drive.

If your system is configured for dial-in access and you have a modem with an auto-answer feature installed, you can dial in and remotely diagnose or reconfigure the server.

If you have configured the Compaq Utilities for network access, you can access the utilities over the network. You can use Compaq Insight Manager for dial-in or network access.

Hardware Requirements

To use this level of ASR-2 over a modem, you need the following:

- A third-party PCI or external modem
- System Configuration Utility and Diagnostics Utility installed on the system partition of the hard drive
- ASR-2 configured to load Compaq Utilities after restart

You can also run Compaq Utilities remotely over an IPX or IP network using the Network feature:

- To use Compaq Utilities on an IPX network, you must have Compaq Insight Manager 2.0 or later or an Novell Virtual Terminal (NVT) Terminal Emulator with VT100 or ANSI terminal capabilities.
- To use Compaq Utilities on an IP network, you must have Compaq Insight Manager 2.10 or later, or a Telnet Terminal Emulator with VT100 or ANSI capabilities.

If you are notified that ASR-2 restarted the server and you have restarted to Compaq Utilities, use the Inspect Utility or Compaq Insight Manager to view the critical error in the Critical Error Log. Run Diagnostics to diagnose and resolve the problem.

You can configure ASR-2 to restart the server into Compaq Utilities to diagnose the critical error or to start the operating system to return the server to operational status as rapidly as possible.

When you enable ASR-2 to start the operating system, the server tries to start from the primary partition. In this mode, ASR-2 can page you if a critical error occurs, but you cannot access Compaq Utilities.

When you enable ASR-2 to start Compaq Utilities, the server restarts after a critical error and loads Compaq Utilities from the system partition on the hard drive.

You can configure the server to start Compaq Utilities in four different ways:

- Without remote console support; for example, to run Compaq Utilities from the server console only
- With remote console support using modems for dial-in access
- With remote console support using a modem to dial a predetermined telephone number
- With remote console support through a network connection (IP or IPX)

Table 3-22
ASR-2 Features

Features	Definition
Software error recovery	If enabled, ASR-2 is activated if the OS hangs or has a crash that results in a lockup.
Software error recovery timeout	Determines how long the server waits to enable ASR-2 after an OS lockup.
Standby recovery server option	If enabled, ASR-2 activation initiates a switch to a standby recovery server.
Standby recovery server port	Port used to communicate with the recovery server.
Standby recovery timeout	Determines how long the server waits to initiate switch after ASR-2 activation.
Software error recovery boot option	Allows the server to restart either into the OS or into Compaq Utilities.
Thermal shutdown	If enabled, shuts down the server if a critical thermal error occurs.
UPS shutdown	If enabled, allows the server to perform a shutdown if an UPS is activated.
UPS shutdown threshold	Determines how long the server waits to shut down after the UPS is activated. This number should provide enough time for an administrator to perform any necessary operations or to gracefully shut down the server.

Compaq Integrated Remote Console

The standard Compaq Integrated Remote Console performs a wide range of configuration activities. Console features include:

- Is accessible using ANSI terminal
- Operates independently of the operating system
- Provides for remote server reboot
- Provides access to system configuration
- Uses out-of-band communication with dedicated management modem installed in the server

For more information, see the *Integrated Remote Console User Guide* that shipped with the server.

IMPORTANT: Before configuring ASR-2, verify that the System Configuration Utility and Diagnostics software are installed on the system partition. ASR-2 requires this software to start Compaq Utilities after a system restart. Compaq recommends software installation even if you configure ASR-2 to start the operating system.

Compaq Health Driver

The Compaq Health Driver continually resets the ASR-2 timer according to the frequency you specified in the System Configuration Utility (for example, 10 minutes). If the ASR-2 timer counts down to zero before being reset, due to an operating system crash or a server lockup, ASR-2 restarts the server into either Compaq Utilities or the operating system (as indicated by the System Configuration parameters). The default value is 10 minutes. The allowable settings are 5, 10, 20, and 30 minutes.

For remote and off-site (unattended) servers, setting the software error recovery timeout for 5 minutes reduces server downtime and allows the server to recover quickly. For local (attended) servers located on site, you can set the software error recovery timeout for 20 or 30 minutes, giving you time to arrive at the server if you wish to manually diagnose the problem.

The Compaq Health Driver is independent of the ASR-2 timer. You should load it and enable the ASR-2 timer. This allows the driver to detect and log information in the IML regarding numerous hardware and software errors. However, you cannot enable the ASR-2 timer without loading the Compaq Health Driver.

Before ASR-2 restarts the server, it records any information available about the condition of the operating system in the Critical Error Log, or the IML depending on the server support. This information can be used to diagnose an operating system crash or server lock-up, while still allowing the server to be restarted.

The following ASR-2 flow chart shows you the sequence of events after a hardware or software error occurs:

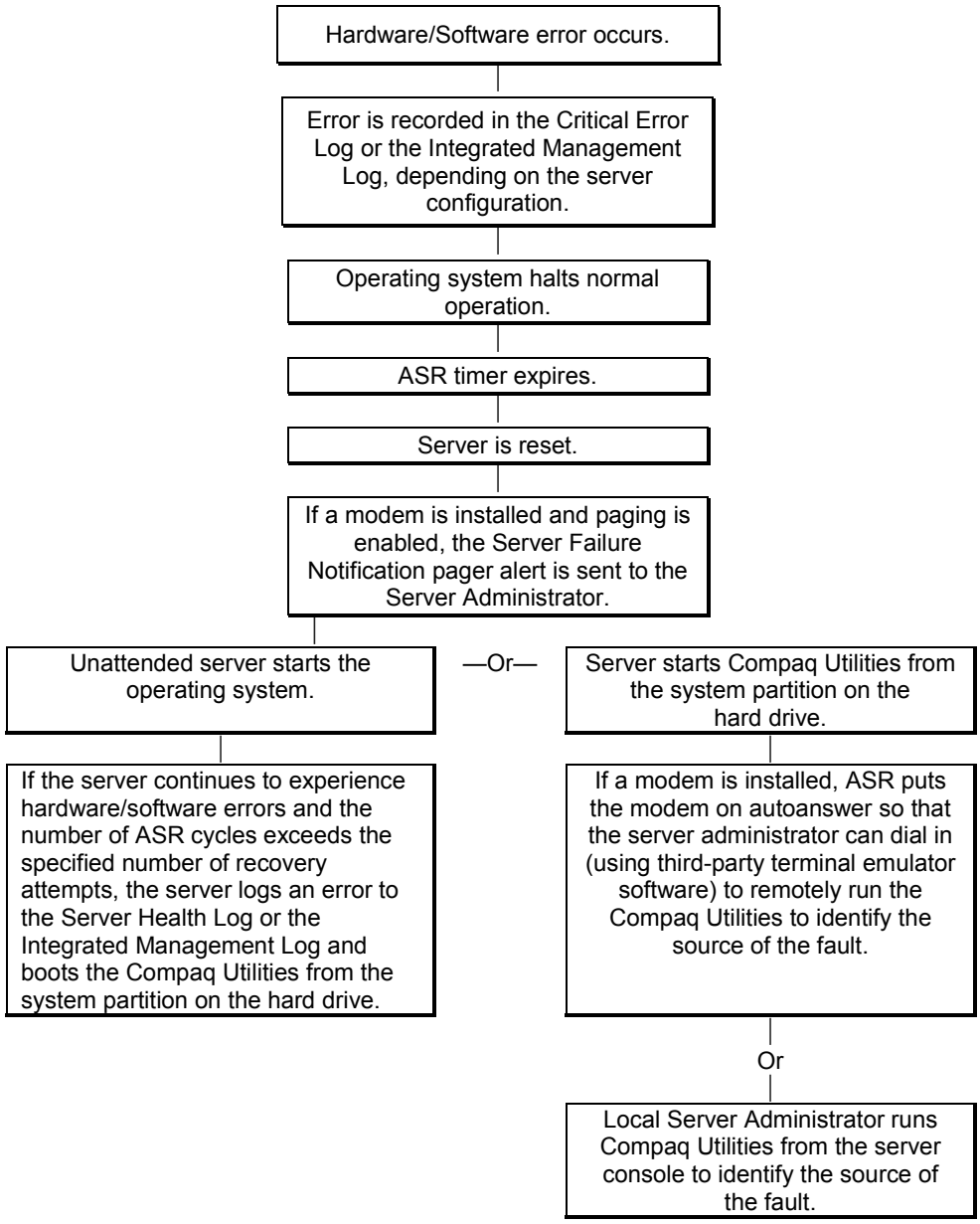

Figure 3-2. ASR-2 flow chart

Booting into Compaq Utilities

When you enable ASR-2 to start into Compaq Utilities and a critical error occurs, the operating system-specific Health Driver logs the error information in the Critical Error Log or the IML and the ASR-2 feature restarts the server. When the system reinitializes, the system pages the designated administrator (if enabled), and starts Compaq Utilities from the hard drive.

If Dial-In status is enabled, the modem is placed in auto-answer mode. If you enable Dial-Out status, you are automatically enabled for Dial-In.

If Network Status is enabled, the appropriate network support software is loaded, depending on the network protocol, IP, or IPX. This allows remote access by means of the network.

IMPORTANT: Compaq Utilities are loaded from a specially created system partition on the hard drive. This partition was configured during server configuration.

You can access the server and view the Server Health Logs (in servers not supporting the IML) remotely by modem, in-band over the network, or directly from the server. For modem access, you must have either Compaq Insight Manager 2.0 or later or have a VT100 or ANSI terminal type device. You may use a standard CRT with VT100 or ANSI emulation capability, or you may use a PC with a VT100 or ANSI terminal emulation package. The communication parameters must be set for 8 data bits, no parity, and 1 stop bit.

You can also enable ASR-2 to allow network access using the Network Status feature in the System Configuration Utility. You must have either Compaq Insight Manager 2.0 or later or a Novell Virtual Terminal (NVT) emulator on an IPX network to use this feature. You must also have version 2.24 or later of the System Configuration Utility. To use this feature with IP access, you must have Compaq Insight Manager 2.10 or later or a Telnet Terminal emulator. You also must have version 2.24 or later of the System Configuration Utility.

The System Configuration Utility settings should resemble the settings in Table 3-23 when you enable ASR-2 to start into Compaq Utilities.

Table 3-23
Compaq System Configuration Utility Pager Settings for Booting into Compaq Utilities

Pager Data	Setting	Description
Pager status	Enabled	Indicates whether the pager feature is enabled or disabled
Pager dial string	ATDT 555-5555	Indicates the pager dial string and delay before the pager message. Pagers typically use one of the following formats: Local pagers: ATDT 555-5555 Wide area pagers: ATDT 1-800-555-5555,1234567#
Pager message	1234567#	Represents a unique number (maximum seven digits, numeric only) that you must designate to identify the server on the pager display. The ROM adds a three-digit code to the front of this number. The first two digits indicate the subsystem, and the third indicates the severity of the error that caused the alert. The # symbol usually terminates the message. If no message is required, delete the # symbol.

continued

Table 3-23
Compaq System Configuration Utility Pager Settings for Booting into Compaq Utilities *continued*

Pager Data	Setting	Description
Pager test	Select to test pager setup	Use this feature to test the current pager settings. Press **Enter** to dial the pager number, and the pager message (if present) displays. You must configure the computer before testing the pager, and the Pager Status must be set to Enabled. Do not test the pager if you are running remotely and are using only one modem.
Serial interface	COM1	Select the communications port for the modem used by the pager and the remote ASR-2 functions. The options are COM1 and COM2.
Dial-in status	Enabled	Set Dial-In Status to Enabled. Be sure the Reset Boot option is set to Boot Compaq Utilities. When the system starts because of an ASR-2 reset, it starts to the Compaq Utilities, sets the Management Modem to auto-answer, and waits for the administrator to dial in and run the Compaq Utilities. You automatically disable this option when you configure the software error recovery start option to Boot Operating System. When ASR-2 pages you, you cannot dial in unless ASR-2 exceeds 10, the threshold number of server restart retries. When this happens, ASR-2 restarts the server into the Compaq Utilities and places the modem in auto-answer mode.
Dial-out status	Enabled	Allows ASR-2 to dial out to a remote workstation. If you selected this option, Dial-In Status is automatically selected. To use the dial-out feature, set Dial-Out Status to Enabled and set the Dial-Out String to the correct phone number. You must also set the Reset Boot option to Boot Compaq Utilities. When the system restarts because of an ASR-2 reset, the administrator is paged by the Pager Status and Pager Dial String, and the system restarts to the Compaq Utilities and dials out to the phone number provided in the Dial-Out string. The dial-out number will be tried five times. If it fails to connect after five attempts, the modem is put in autoanswer mode.
Dial-out string	555-1234	Enter the dial string followed by the remote computer telephone number.
Network status	Enabled	To allow network access to Compaq Utilities, set Network Status to Enabled and ensure that the Reset Boot option is set to Boot Compaq Utilities.
Network protocol		To use IPX network access, set Network Protocol to IPX. When the system restarts to the Compaq Utilities because of an ASR-2 reset, it loads IPX network support. This enables remote access using NVT. To use IP network access, set the Network protocol to IP. Also make sure to set Network IP address, Network IP net mask, and Network IP router address. When the system restarts to the Compaq Utilities because of an ASR-2 reset, it loads IP network support. This enables remote access using Telnet. **Note:** The Network Status must be set to Enabled for network access.
Network controller	Compaq	For all Compaq standard network controllers.

continued

Table 3-23
Compaq System Configuration Utility Pager Settings for Booting into Compaq Utilities *continued*

Pager Data	Setting	Description
Network host name	CPQHOU	Enter the network name of the server. Use underscores instead of spaces within the name, for example, Compaq_Server. If you are using IPX network access to the Compaq Utilities, this server name is used to advertise NVT host services. This server name displays in the Compaq Insight Manager server list when the program determines it can communicate using NVT. Set this name to be the same as the server name you assign when the host OS is running.
Network card slot	Slot #	Select the slot number of the network interface card you wish to use for network access to Compaq Utilities.
Network frame type	ETHERNET_II	Select the frame type for the network. Selections include both Ethernet and Token Ring topologies.
Network IP address		Enter the IP address for this server in standard dot notation. **Note:** This address is not used if you select Custom for Network controller. You must enter the IP address in the NET.CFG file that you load into the system partition.
Network IP net mask		Enter the net mask for this server in standard dot notation. **Note:** This address is not used if you select Custom for network controller. You must enter the IP address in the NET.CFG file that you load into the system partition.
Network IP router address		Enter the router address to be used for this server in standard dot notation. **Note:** This address is not used if you select Custom for network controller. You must enter the IP address in the NET.CFG file that you load into the system partition.

If you configure the server to boot into Compaq Utilities, it prepares for remote communications. You can remotely run Diagnostics software, the Inspect Utility, or the System Configuration Utility using a workstation running terminal emulation software such as Compaq Insight Manager or PC Anywhere.

Booting into the Operating System

When you enable ASR-2 to restart into the operating system and a critical error occurs, ASR-2 logs the error in the Critical Error Log or IML and restarts the server. The system ROM pages the designated administrator, then executes the normal restart process.

IMPORTANT: When you enable ASR-2 to restart into the operating system, Modem Dial-In Status, Network Status, and Modem Dial-Out Status are automatically disabled. In this mode, ASR-2 can page you if a critical error occurs, but you cannot access the server, and the server cannot dial out to a remote workstation.

If the ASR-2 feature cannot restart the server within 10 attempts, it logs a critical error in the Critical Error Log or IML, restarts the server into the Compaq Utilities, and puts the modem into auto-answer mode.

The System Configuration Utility setting should resemble the following when you enable ASR-2 to restart into the operating system:

Table 3-24
OS Restart SCU Setting for ASR-2

Option	Setting
Serial interface	COM1
Dial-in status	Disabled
Dial-out status	Disabled
Dial-out string	555-1234
Network status	Disabled
Network protocol	IPX
Network controller	Compaq
Network host name	CPQHOU
Network card slot	Slot #
Network frame type	ETHERNET_II
Network IP address	xxx.xxx.xxx.xxx
Network IP net mask	xxx.xxx.xxx.xxx
Network IP router address	xxx.xxx.xxx.xxx

ASR-2 Security

The standard Compaq password features function differently during ASR-2 than during a typical system startup. During ASR-2, the system does not prompt for the power-on password. This allows ASR-2 to restart the operating system or Compaq Utilities without user intervention.

To maintain system security, set the server to boot in Network Server Mode (an option in the System Configuration Utility). This option ensures that the server keyboard is locked until you enter the keyboard password.

Select an administrator password (an option in the System Configuration Utility). During attended ASR-2 (local or remote), you must enter this administrator password before any modifications can be made to the server configuration.

ASR-2 Integrated Management Log Messages

The Integrated Management Log (IML) or Critical Error Log for Server Health Log records memory errors, as well as catastrophic hardware and software errors that cause the system to fail. This information helps you quickly identify and correct the problem, thus minimizing downtime.

You can view the IML or Critical Error Log through Compaq Insight Manager. The Diagnostics Utility either resolves the error or suggests corrective action in systems that do not support event logs.

The IML or Critical Error Log identifies and records all of the following errors. Each error type is explained below.

Table 3-25
ASR-2 IML or Critical Error Log Messages

Message	Description
Abnormal Program Termination	The operating system has encountered an abnormal situation that has caused a system failure.
ASR-2 detected by ROM	An ASR-2 activity has been detected and logged by the system ROM.
ASR-2 Test Event	The System Configuration Utility generated a test alert.
Automatic Server Recovery Base Memory Parity Error	The system detected a data error in base memory following a reset due to the ASR-2 timer expiration.
Automatic Server Recovery Extended Memory Parity Error	The system detected a data error in extended memory following a reset due to the ASR-2 timer expiration.
Automatic Server Recovery Memory Parity Error	The system ROM was unable to allocate enough memory to create a stack. Then it was unable to put a message on the screen or continue starting the server.
Automatic Server Recovery Reset Limit Reached	The maximum number of system resets due to ASR-2 timer expiration has been reached, resulting in the loading of Compaq Utilities.
Battery Failing	Low system battery warning. Replace battery within seven days to prevent loss of nonvolatile configuration memory. Failure of the battery supporting the system's nonvolatile RAM is imminent.
Caution: Temperature Exceeded	The operating system has detected that the temperature of the system has exceeded the caution level. Accompanying data in the log notes if an auto shutdown sequence has been invoked by the operating system.
Diagnostic Error	An error was detected by the Diagnostics Utility. See the specific error code in this chapter for a detailed explanation.
Error Detected On Boot Up	The server detected an error during the POST.

continued

Table 3-25
ASR-2 IML or Critical Error Log Messages *continued*

Message	Description
NMI – Automatic Server Recovery Timer Expiration	The operating system has received notice of an impending ASR-2 timer expiration.
NMI – Expansion Board Error	A board on the expansion bus indicated an error condition, resulting in a server failure.
NMI – Expansion Bus Master Time-Out	A bus master expansion board in the indicated slot did not release the bus after its maximum time, resulting in a server failure.
NMI – Expansion Bus Slave Time-Out	A board on the expansion bus delayed a bus cycle beyond the maximum time, resulting in a server failure.
NMI – Fail-Safe Timer Expiration	Software was unable to reset the system fail-safe timer, resulting in a server failure.
NMI – PCI Bus Parity Error	A parity error was detected on the PCI bus.
NMI – Processor Parity Error	The processor detected a data error, resulting in a server failure.
NMI – Software Generated Interrupt Detected Error	Software indicated a system error, resulting in a server failure.
Processor Exception	The indicated processor exception occurred.
Processor Prefailure	A CPU has passed an internal corrected error threshold. There are excessive internal ECC cache errors.
Required System Fan Failure	The required system fan has failed. Accompanying data in the log notes if an auto-shutdown sequence has been invoked by the operating system.
Server Manager Failure	An error occurred with the Server Manager/R.
UPS A/C Line Failure Shutdown or Battery Low	The UPS notified the operating system that the AC power line has failed. Accompanying data indicates whether either an auto-shutdown sequence has been invoked or the battery is nearly depleted.

Revision History Table

Some errors can be resolved by reviewing changes to the server configuration. The server has an Automatic Revision Tracking (ART) feature that helps you review recent changes to the server configuration.

One ART feature is the Revision History Table, which contains the hardware version number of the system board and any other system boards providing ART-compatible revision information. This feature lets you determine the level of functionality of an assembly in a system without opening or powering down the unit. An example of a Revision History Table is shown in Table 3-26.

Table 3-26
Revision History Table

Current Revisions	
Date	10/31/98
System board revision	03
Assembly version	1
Functional revision level	C
Processor 01 revision	01
Assembly version	1
Functional revision level	A
Previous Revisions	
Date	9/21/98
System board revision	03
Assembly version	1
Functional revision level	C
Processor 01 revision	01
Assembly version	1
Functional revision level	A

The Revision History Table is stored in nonvolatile RAM and is accessed through the Inspect Utility and Compaq Insight Manager.

Storage Fault Recovery Tracking

This feature tracks over 12 failure-indication parameters, such as timeouts, spin-up, and self-test errors of SCSI drives. You can use these parameters to pinpoint failed storage subsystem components and to recover from controller or hard drive failure.

Storage Automatic Reconstruction

This feature automatically reconstructs data to an online spare or to a replaced drive if a drive fails. To use the reconstruction feature, you must configure the server for drive mirroring or data guarding. The reconstruction decreases system downtime by allowing rapid recovery to full system operation if a drive fails.

Network Interface Fault Recovery Tracking

This feature tracks over 20 failure indication parameters, such as alignment errors, lost frames, and frame copy errors, of Ethernet and Token Ring network interfaces. It decreases network downtime by enabling diagnosis of actual network interface failures.

Memory Fault Recovery Tracking

This feature inspects the operation of the memory subsystem looking for uncorrectable memory errors.

Remote Service Features

Compaq servers have management features that you can access through a modem or a network, as shown in Table 3-27.

Table 3-27
Compaq Servers Remote Management Features

Feature	Description
Service Session	Provides remote access to all the utilities on the system partition, including Diagnostics utilities, Inspect, ROMPaq, Drive Array Advanced Diagnostics (DAAD), and the System Configuration Utility. Also provides the capability for remote file transfer services to and from the system partition.
Disk-Based Diagnostics	Provides remote diagnostic capability after you configure ASR-2 and the reset restart option to restart from Compaq Utilities. Also allows you to view Health Logs. Disk-based diagnostics can also be run locally. Press **F10** during the restart process when the cursor moves to the upper-right corner of the monitor.
Server Restart	Provides the ability to restart the server remotely from Compaq Insight Manager while the operating system is running. Allows the server to restart back to the operating system or restart to the system partition. Provides a complete system reset to all peripherals. If you select Boot to Compaq Utilities from Compaq Insight Manager, Compaq Utilities loads the appropriate remote services so that remote access is available. If network status is enabled, network support is loaded. If Dial-In status is enabled, the modem is set to auto-answer.
Configuration Utility	Provides the ability to run the remote System Configuration Utility locally. Press **F10** during the restart process when the cursor moves to the upper-right corner of the monitor.
Firmware Updates	Provides the ability to update the server firmware remotely. Uses firmware images on the system partition that might have been previously uploaded with the file transfer services.

ROMPaq Error Recovery Options

From time to time, it may be necessary to upgrade the current system ROM. Some reasons for these errors include:

- Customer requires ROM upgrade
- Customer obtained new SmartStart CD-ROM
- Customer requires server processors upgrade
- Request from Compaq

The process of upgrading the system ROM is referred to as flashing the ROM. Flashing consists of using software to replace the current ROM image with a new one through ROMPaq.

Should an error such as a power failure occur during the upgrade process, the flash operation will not be completed, and the ROM image in the server will be corrupted. Compaq provides two options for ROMPaq recovery, depending on the server and circumstances involved.

ROMPaq Disaster Recovery

Use the following option with any server that does not have a valid ROM image.

1. Build a fresh ROMPaq diskette using the latest version for the server involved.

   NOTE: If the ROM is corrupted by a ROMPaq interruption, the initial ROMPaq attempt may have affected the contents of the original diskette.

2. Turn off the server.
3. Set configuration switches 1, 4, 5, and 6 on the system maintenance switch block to on to enable disaster mode.

Table 3-28
Configuration Switches

Switch	Function
1	Disable on-board video
4	Disable diskette drive
5	Disable password
6	Clear NVRAM

4. Insert the ROMPaq diskette. Although you will use a normal ROMPaq diskette, this situation will not allow you to save the old image.
5. Turn on the server. The keyboard, mouse, and monitor are all inactive.
6. The server makes two long beeps to indicate that you are in Disaster Recovery Mode. The server will continue to beep until you insert the ROMPaq diskette.
7. The server reads the diskette for the latest ROM image.
8. The ROMPaq diskette flashes the system ROM.
9. A quick series of beeps indicates the successful completion of the recovery process.
10. After successful completion of this process:
    a. Turn off the server.
    b. Reset configuration switches 1, 4, 5, and 6. See Table 3-28.
    c. Turn on the server as usual.

After a failed ROMPaq, power down the server and repeat the above process or replace the system board.

Compaq Insight Manager

Compaq Insight Manager is the Compaq application for easily managing network devices. Compaq Insight Manager delivers intelligent monitoring and alerting as well as visual control of the servers.

In Compaq servers, every hardware subsystem, such as disk storage, system memory, and system processor, has a strong set of management capabilities. Compaq Full-Spectrum Fault Management prevents faults before they happen, keeps the system up and running in the unlikely event of a failure, and delivers rapid server recovery to normal operation after a fault.

Features of Compaq Insight Management

Compaq Insight Management features include:

- **Web browser access**—to Compaq Insight Manager Device and Configuration information from anywhere you have network access and a standard Web browser for Windows NT and NetWare servers.
- **Comprehensive fault management**—for all major subsystems, including prefailure alerts in advance of potential system failures.
- **Broad configuration management**—provides effective deployment and maintenance of consistent, manageable configurations with Insight Version Control and Integration Server Maintenance. Version Control and Integration Server Maintenance allows the administrator to monitor and update versions of the server and workstation firmware, drivers, and utilities.
- **Performance management**—sets performance and capacity thresholds for management variables related to CPU and bus utilization, NIC throughput, logical disk capacity, and more.
- **Workstation management**—monitors and manages Compaq Professional Workstations.
- **Client management**—manages faults and assets on Compaq Deskpro computers.
- **Netelligent management**—receives alarms from Netelligent devices. Full management of Netelligent devices is supported through integration with Compaq Netelligent Management Software.
- **Asset management**—exports asset information from the Compaq Insight Manager database to leading database and spreadsheet applications.
- **Remote management**—manages in-band or out-of-band devices, online or offline, from any location.
- **Integration with enterprise management platforms**—provides integration with leading management platforms including HP OpenView, IBM NetView, SunNet Manager, and Microsoft Systems Management Server.
- **Full integration with Compaq Remote Insight Board/PCI and ProLiant Integrated Remote Console**—allows “in-band” and “out-of-band” connection for server management to ensure that customers are in touch with their systems, even when they are offline or without power.

- **SNMP standards**—allow integration with other management products.
- **Flexible network conductivity**—supports multiple transport protocols including IPX, TCP/IP and PPP to operator over LANs, WANs, and modems.
- **Support for these operating systems**:
  - Microsoft Windows NT
  - Novell NetWare and NetWare for Small Business
  - SCO UNIX, OpenServer, and UnixWare
  - IBM OS/2 Warp family of products
- **Reporting**—using Automatic Data Collection, gathers historic performance information for graphing or export purposes.

Compaq Insight Management Software Architecture

The Compaq Insight Management software architecture is typical of other network management solutions. It has a client/server architecture and is composed of agent software (Compaq Insight Management Agents) and the management application software (Compaq Insight Manager).

Insight Management Agents

Insight Management Agents operate on Compaq systems (such as servers and workstations), performing in-depth monitoring of the system's state by collecting and measuring system parameters. These parameters indicate the current state of subsystems by counting the occurrence of particular events (for example, the number of read operations performed on a disk drive) or monitoring the state of a critical function (such as whether the cooling fan is operating).

Insight Desktop Agents operate on Compaq *Deskpro*™ computers, monitoring functions that include temperature sensing and disk prefailure alerting.

Insight Agents provide information to management applications, such as Compaq Insight Manager, and can generate alarm notifications if significant changes occur in the fault or performance aspects of system operation. Information is delivered to and from the Insight Agents by the industry-standard Simple Network Management Protocol (SNMP).

Compaq Insight Manager

Compaq Insight Manager delivers intelligent monitoring and alerting as well as visual control of the Compaq hardware. In the unlikely event of hardware failures, Compaq Insight Manager also provides a full complement of remote maintenance and control facilities.

For additional information, refer to the online *Compaq Insight Manager User Guide* on the server documentation CD that shipped with the server.

Chapter **4**

Connectors, Switches, Jumpers, and LED Indicators

This chapter lists connector, switch, jumper, and LED indicator information for Compaq ProLiant ML530 servers.

Connectors

This section contains information about service connectors, ports, and slots located on Compaq ProLiant ML530 servers.

Rear Panel Connectors

The rear panel connector locations for Compaq ProLiant ML530 servers are shown in Figure 4-1 and described in Figure 4-1.

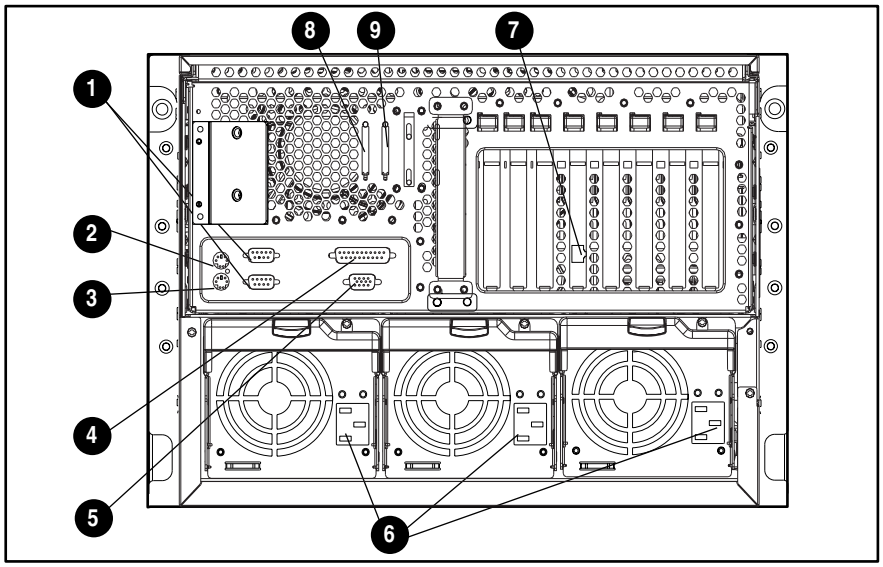

Figure 4-1. Rear panel connectors

Table 4-1
Rear Panel Connectors

Item	Description	Item	Description
❶	Serial ports	❻	AC power connectors
❷	Mouse connector	❼	RJ-45 network connector
❸	Keyboard connector	❽	SCSI cable slot (for options)
❹	Parallel port	❾	External SCSI slot
❺	Video port		

System Board Components

The system board connector locations and descriptions for Compaq ProLiant ML530 servers are shown in Figure 4-2 and described in Table 4-2.

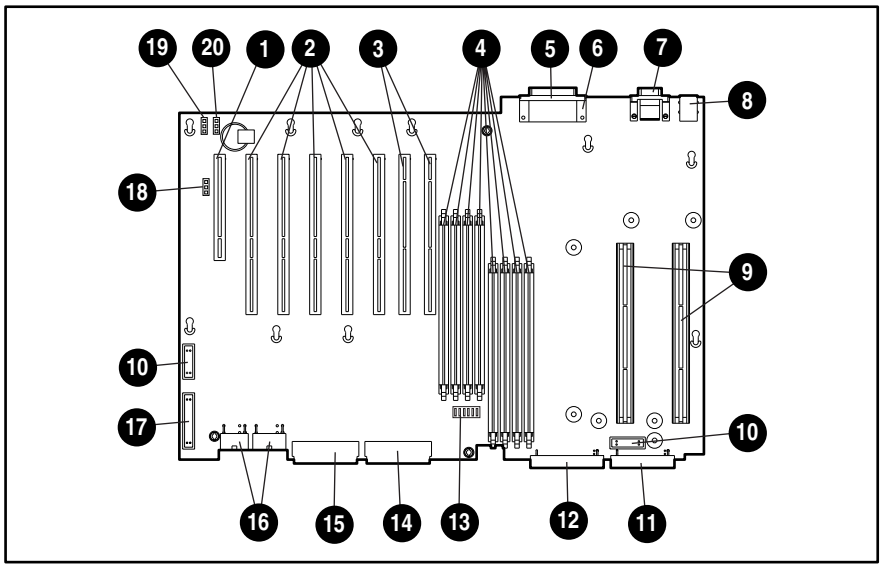

Figure 4-2. System board components

Table 4-2
System Board Components

Item	Description	Item	Description
❶	32-bit, 33-MHz primary PCI bus	⓫	Diskette drive signal cable connector (purple)
❷	64-bit, 33-MHz, tertiary PCI bus	⓬	IDE CD-ROM signal cable connector (orange)
❸	64-bit, 66-MHz, 3-volt only secondary PCI bus	⓭	Configuration switch
❹	2 sets of 4 DIMM memory sockets	⓮	SCSI channel A connector (blue)
❺	Parallel port	⓯	SCSI channel B connector (yellow)
❻	Video port	⓰	Power connectors
❼	Serial ports	⓱	System data connector
❽	Keyboard/mouse interface	⓲	Remote power switch header
❾	Processor slots	⓳	Battery power header
❿	Fan cable connectors (2 locations)	⓴	External battery header

Switches

This section contains information concerning all switches located on Compaq ProLiant ML530 servers. The system board has one DIP switch. The system configuration switch location is shown in Figure 4-3.

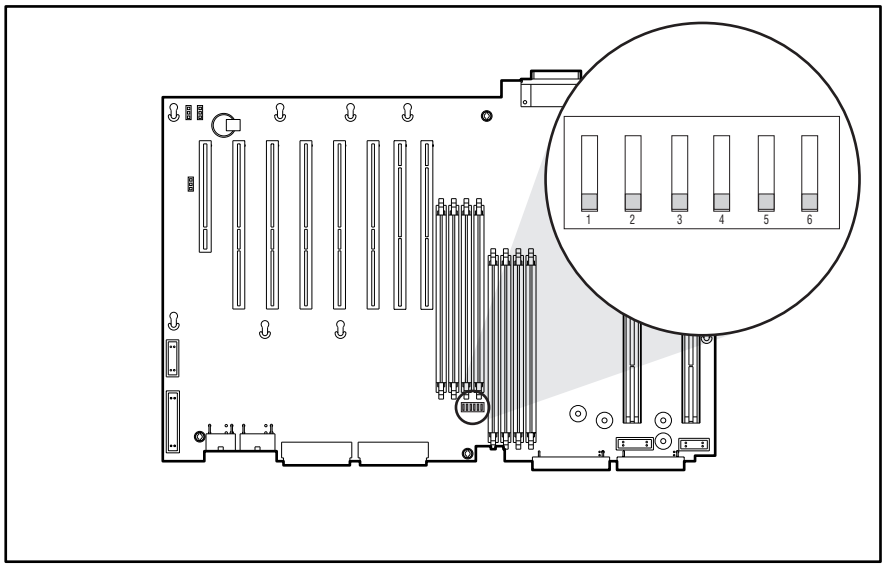

Figure 4-3. System board configuration switch location

NOTE: The processor speed of Compaq ProLiant ML530 servers is determined by the system ROM during Power-On Self-Test (POST). Therefore, it is not necessary to set any processor switch settings.

Configuration Switch Settings

The system board configuration switch settings are described in Table 4-3.

Table 4-3
System Board Configuration Switch Settings

Switch	Function	On	Off (Default)
1	Video	Embedded video disabled	Embedded video enabled ROM controls embedded video
2	Lock configuration	System configuration is locked and cannot be changed	System configuration can be changed
3	Tower-to-rack conversion	Rack-mount configuration	Tower configuration
4	Diskette boot feature	Diskette enabled for booting, overriding System Configuration Utility	Diskette boot controlled through System Configuration Utility
5	Power-on password	Power-on password disabled	Power-on password enabled
6	Maintenance	NVRAM invalidated; configuration lost	NVRAM validated; configuration not lost

Jumpers and Headers

Compaq ProLiant ML530 servers system board contains headers with jumpers for different purposes. The header locations are shown in Figure 4-4.

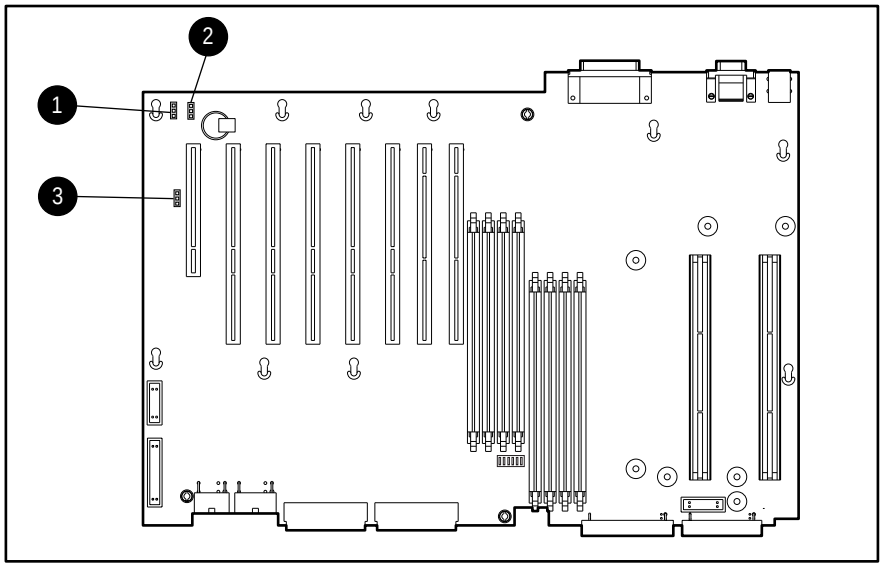

Figure 4-4. Jumper and header locations

Battery Power Jumper

The battery power header ❶ on the system board is shown in Figure 4-4. The battery power jumper is connected to the battery power header and delivers battery power to CMOS and NVRAM. The default setting for the battery power jumper is across pins 1 and 2.

To erase an invalid system configuration, jumper across pins 2 and 3 to ground the connection. This jumper setting clears CMOS and NVRAM within two minutes.

External Battery Header

The external battery header ❷ on the system board is shown in Figure 4-4. The external battery header is the connector used to attach an external battery to the unit.

Remote Power Switch Header

The remote power switch header ❸ on the system board is shown in Figure 4-4. The remote power switch header connects an optional Remote Insight Lights-Out Edition board to the system board of the Compaq ProLiant ML530 server.

LED Indicators

This section contains information about status and diagnostic LED locations and conditions on Compaq ProLiant ML530 servers.

Front Panel Status

Four status LED indicators are located on the front panel near the power switch. Figure 4-5 shows the location of the LEDs. Table 4-4 identifies the LEDs and describes the condition of the device.

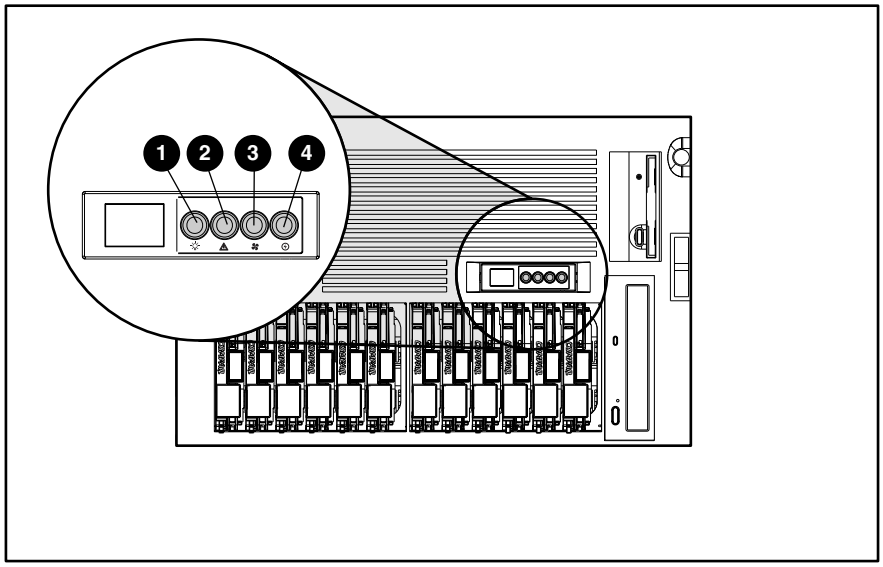

Figure 4-5. Front panel status LED indicators

Table 4-4
Front Panel Status LED Indicators

Item	Description	Status	Condition
❶	Power	Green	System power is on.
		Amber	System power is in standby.
		Amber (flashing)	Temporary shutdown occurred due to thermal event.
❷	Critical system	Green	All memory modules (DIMMs) and processors are operational.
		Amber (flashing)	One or more DIMMs or processors have failed—check system board DIMM or processor LEDs. See "Memory Module" or "Processor" later in this section.
❸	Fans	Green	All fans are operational.
		Amber (flashing)	One or more fans have failed—check fan LEDs. See "Hot-Plug Fan" later in this section.
❹	Power supplies	Green	All power supplies are operational.
		Amber (flashing)	One or more power supplies have failed—check power supply LEDs. See "Hot-Plug Power Supply" later in this section.

Power

The power status LED on the front panel indicates whether the unit has full power (green) or is in standby mode (amber). A flashing amber light indicates a temperature event that causes the unit to shut down for approximately 15 seconds. An unlit LED generally indicates that the unit does not have power.

Critical System

The critical system status LED on the front panel indicates the condition of both the memory modules (DIMMs) and processors. The memory module (DIMM) ❶ and processor ❷ diagnostic LEDs are located on the system board, as shown in Figure 4-6.

NOTE: The blue status LED ❸ indicates that power is supplied to the system board.

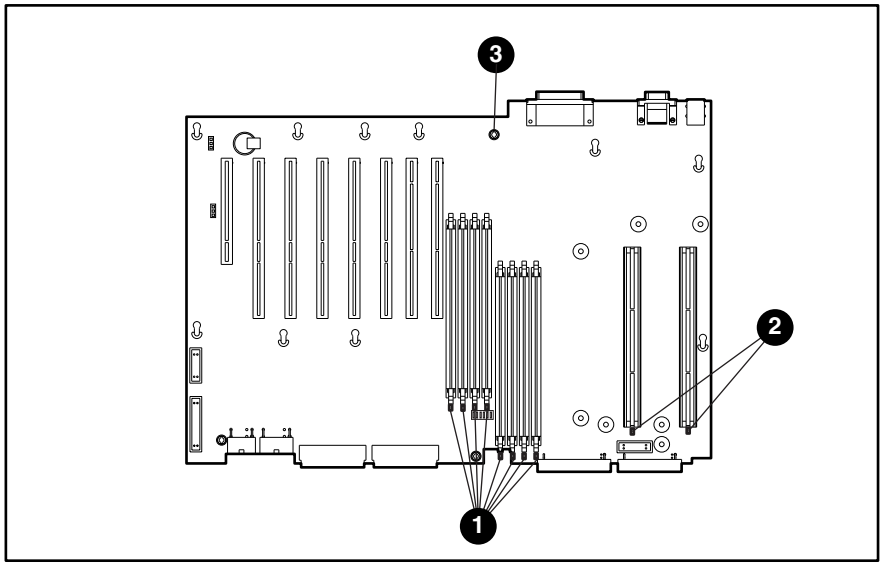

Figure 4-6. Critical system diagnostic and system board status LED indicators

Memory Module

The memory module (DIMM) diagnostic LED, located adjacent to each memory module socket, indicates the condition of each DIMM. If the front panel critical system status LED is amber, check the individual DIMM diagnostic LEDs to determine which DIMM has failed. To view the diagnostic LEDs, remove the access panel of the server. See "Access Panel" in Chapter 2.

Figure 4-6 shows the DIMM diagnostic LED ❶ locations in Compaq ProLiant ML530 servers. Table 4-5 lists the corresponding DIMM diagnostic LED conditions. To replace a DIMM, see "Memory Modules" in Chapter 2. The color of the status and diagnostic LEDs will reset when the DIMM is replaced and system power is restored.

Table 4-5
DIMM Diagnostic LED

Status	Condition
Off	DIMM operational
Amber	DIMM failure—replace DIMM
All DIMMs Amber	No valid memory present

Processor

The processor diagnostic LED, located adjacent to each processor slot, indicates the condition of each processor. If the front panel critical system status LED is amber, check the individual processor diagnostic LEDs to determine which processor has failed. To view the diagnostic LEDs, remove the access panel of the server. See "Access Panel" in Chapter 2.

Figure 4-6 shows the processor diagnostic LEDs ❷ for Compaq ProLiant ML530 servers. Table 4-6 lists the corresponding processor diagnostic LED conditions. To replace a processor, see "Processors" in Chapter 2. The diagnostic LED color will reset when the processor is replaced and the system power is restored.

Table 4-6
Processor Diagnostic LED

Status	Condition
Off	Processor operational
Amber	Processor not seated properly, or processor failure—replace processor

Hot-Plug Fan

The hot-plug fan diagnostic LEDs indicate the condition of each fan in Compaq ProLiant ML530 servers. If the front panel fan status LED is amber, check the individual fan diagnostic LEDs to determine which fan has failed.

The hot-plug fan diagnostic LEDs can be viewed by removing the access panel of the server. To remove the access panel, see "Access Panel" in Chapter 2. Figure 4-7 shows the location of the hot-plug fan diagnostic LEDs. Table 4-7 identifies the diagnostic LED and describes the condition of the fan.

To replace a fan, see "Fans" in Chapter 2. The color of the status and diagnostic LEDs resets when the fan is replaced or system power is cycled.

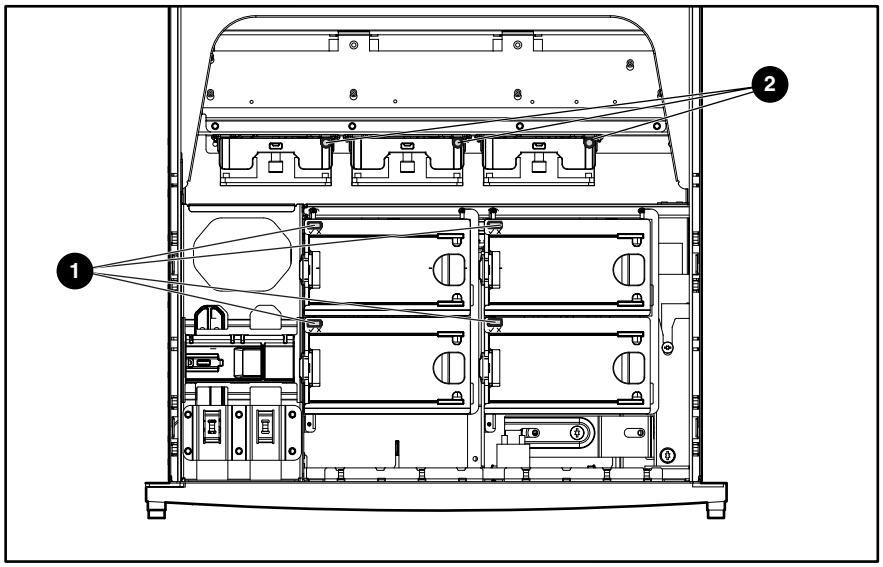

Figure 4-7. Hot-plug fan diagnostic LED indicators

Table 4-7
Hot-Plug Fan Diagnostic LED Indicators

Item	Description	Status	Condition
❶	System fans	Green	Fan operational
		Amber	Fan failure—replace fan
		Off	No power to fan
❷	Drive fans	Green	Fan operational
		Amber	Fan failure—replace fan
		Off	No power to fan

Note: Fans may continue to spin after a temporary failure occurs. Replace failed fans (amber diagnostic LED) even if spinning continues.

Hot-Plug Power Supply

The hot-plug power supply diagnostic LEDs indicate the condition of each hot-plug power supply. If the front panel power supply status LED is amber, check the individual power supply diagnostic LEDs to determine which power supply has failed. View the diagnostic LEDs from the rear of the server.

The power supply diagnostic LEDs and their functions for Compaq ProLiant ML530 servers are shown in Figure 4-8 and Table 4-8. To replace a hot-plug power supply, see "Hot-Plug Power Supplies" in Chapter 2. The color of the status and diagnostic LEDs resets by replacing the power supply or restoring AC power to the power supply.

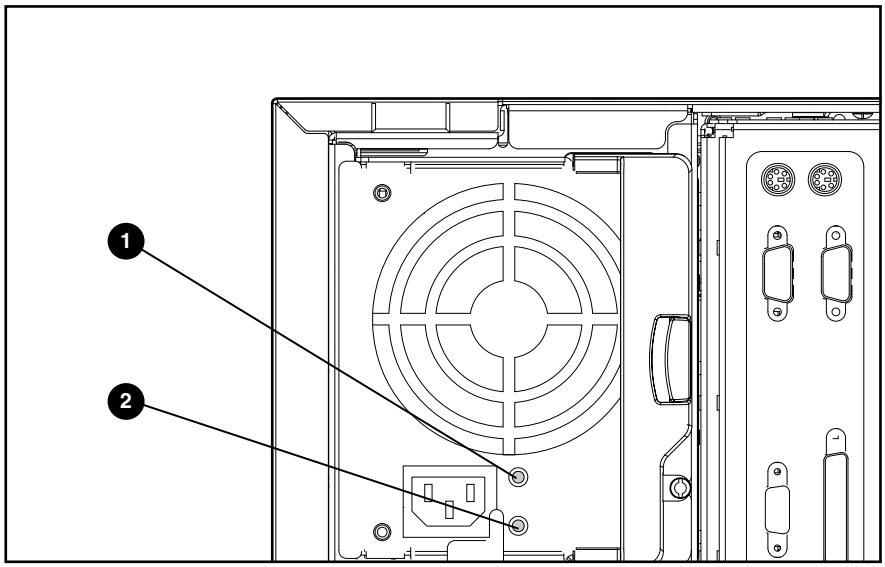

Figure 4-8. Hot-plug power supply diagnostic LED Indicators

Table 4-8
Hot-Plug Power Supply Diagnostic LED Indicators

Item	Description	Status	Condition
❶	AC power	On	System on
	(Green)	Flashing	System in standby
		Off	No AC power present
❷	Error	Off	Power supply operational
	(Amber)	On	Power supply failure—replace power supply
		All on	No AC power present to any power supply
		Flashing	Current power supply limit exceeded

Hot-Plug SCSI Hard Drive

Each hot-plug SCSI hard drive LED indicates the operational status of the hard drive. The hot-plug hard drive LED location, function, and replacement condition for Compaq ProLiant ML530 servers is shown in Figure 4-9 and described in Table 4-9. Refer to the *Compaq ProLiant ML530 Troubleshooting Guide* for further information.

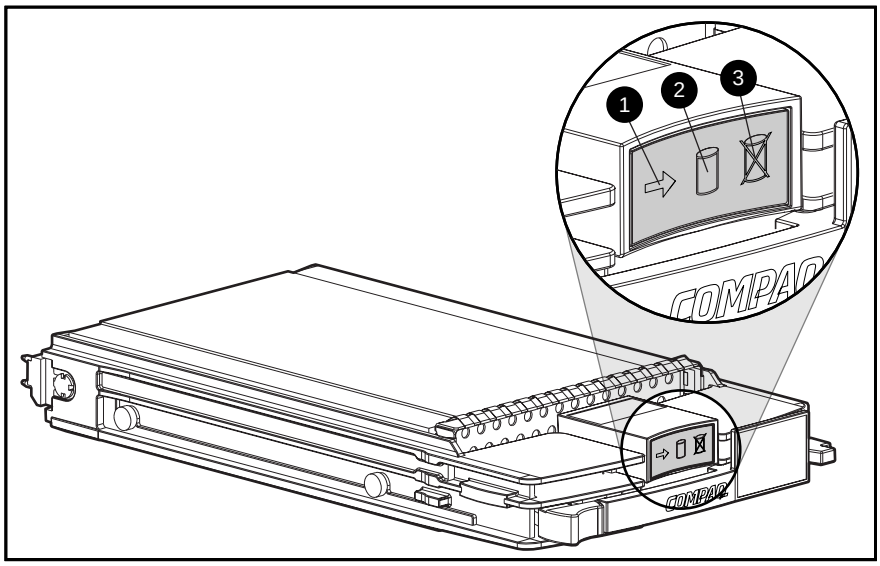

Figure 4-9. Hot-plug SCSI hard drive LED indicators

Table 4-9
Hot-Plug SCSI Hard Drive LED Indicators

Drive Activity LED ❶	Drive Online LED ❷	Drive Fault LED ❸	Condition
Off	Off	Off	Drive is off. OK to remove drive.
Off	Off	Amber	Failed drive. Replace hot-plug SCSI hard drive.
Off	Green	Off	Drive online and configured as part of an array. OK to replace drive if predictive failure alert is received.
Green	Green	Off	Drive online and being accessed. OK to replace drive if predictive failure alert is received.
Green	Off	Off	Drive being accessed. **DO NOT** remove drive.
Green	Flashing Green	Off	Drive being rebuilt. **DO NOT** remove drive.
Flashing Green	Flashing Green	Flashing Amber	Drive being identified by the Compaq Array Configuration Utility. **DO NOT** remove drive.

RJ-45 Network Connector

The RJ-45 network connector status LEDs are located on the rear of Compaq ProLiant ML530 server. These LEDs indicate the condition of the server's network connection.

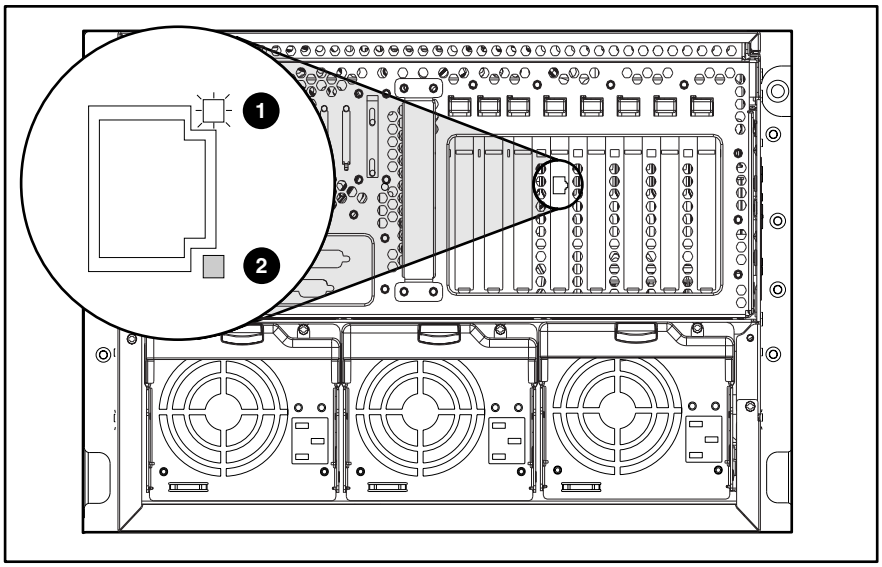

Figure 4-10. RJ-45 network connector status LED indicators

Table 4-10
RJ-45 Network Connector Status LED Indicators

Item	Description	Status	Condition
❶	Link	On	Linked to network
		Off	No network link
❷	Activity	On or flashing	Network activity
		Off	No network activity

CD-ROM Drive

The CD-ROM drive status LED ❶ for Compaq ProLiant ML530 servers is located on the front of the CD-ROM drive near the volume control. The LED is green when the CD-ROM drive is in operation.

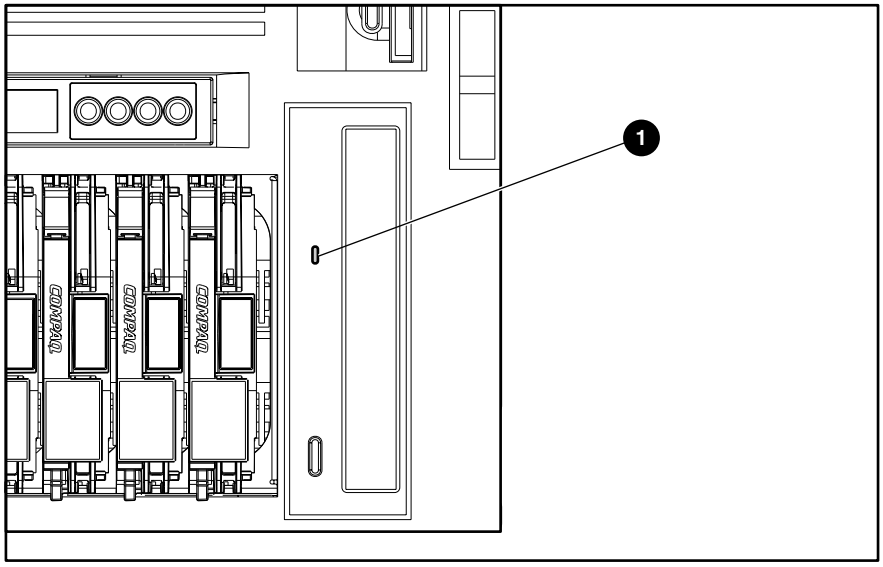

Figure 4-11. CD-ROM drive status LED

Diskette Drive

The diskette drive status LED ❶ for Compaq ProLiant ML530 servers is located on the front of the diskette drive near the bottom left of the diskette drive slot. The LED is green when the diskette is in operation.

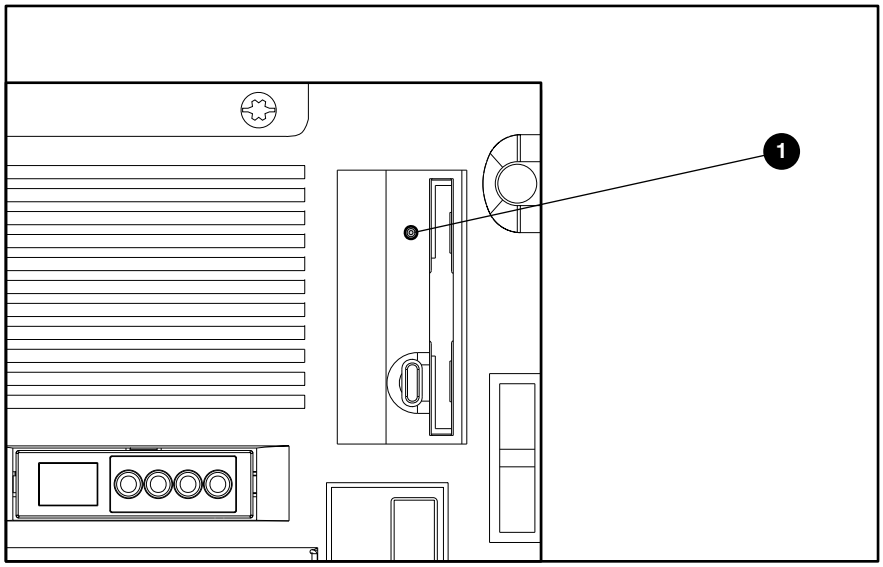

Figure 4-12. Diskette drive status LED

Chapter 5

Physical and Operating Specifications

This chapter provides operating and performance specifications for Compaq ProLiant ML530 servers and optional hardware. Specifications covered in this chapter are:

- System Unit
- Hot-Plug Power Supply
- SDRAM Dual Inline Memory Modules
- 1.44-MB Diskette Drive
- IDE CD-ROM Drive
- Integrated Dual-Channel Wide Ultra2 SCSI Controller
- Hot-Plug Hard Drives

System Unit

Table 5-1
System Unit Specifications

Dimensions	
Height	51.5 cm (20.3 inch)
Depth	69.7 cm (27.5 inch)
Width	32.6 cm (12.9 inch)
Weight	45 kg, minimum (100 lb, minimum)
International input requirements	
Rated input voltage	200 to 240 V
Rated input frequency	50 to 60 Hz
Rated input current	3.8 A
U.S. input requirements	
Rated input voltage	100 to 120 V
Rated input frequency	50 to 60 Hz
Rated input current	7.6 A
Power supply output power	
Rated steady-state power	450 W
Maximum peak power	450 W
Temperature range	
Operating	10° to 35°C (50° to 95°F)
Nonoperating	-30° to 60°C (-20° to 140°F)
Relative humidity (noncondensing)	
Operating	20% to 80%
Nonoperating	5% to 90%
Maximum wet bulb temperature	38.7°C (101.7°F)
Heat dissipation	2400 BTU/h maximum

Hot-Plug Power Supply

Table 5-2
Hot-Plug Power Supply Specifications

International input specifications	
Nominal line voltage	200 to 240 VAC
Range input line	180 to 270 VAC
Frequency range	47 to 63 Hz
Power factor	0.95
Input current	3.8 A at 200 VAC
Inrush current (cold start)	<150 A at 132 VAC
Holdup time	20 ms from zero crossing at 240 VAC
U.S. input specifications	
Nominal line voltage	100 to 120 VAC
Range input line	90 to 132 VAC
Frequency range	47 to 63 Hz
Power factor	0.95
Input current	7.6 A at 100 VAC
Inrush current (cold start)	<150 A at 132 VAC
Holdup time	20 ms from zero crossing at 120 VAC
General specifications	
Full output rating	To 40°C and 1,524 m (To 104°F and 5,000 ft)
	To 32°C and 3,048 m (To 90°F and 10,000 ft) derate linearly
Minimum load	1.0 A on + 5 V output
	1.0 A on +12 V output
	0.5 A on +3.3 V output
Ambient temperature range	
Operating	10° to 40°C (50° to 104°F)
Nonoperating	-40° to 65°C (-40° to 149°F)
Dielectric voltage withstand	
Input to output	3000 VAC (minimum)
Input to ground	1500 VAC (minimum)
Common and differential mode (superimposed on AC line)	2500V, 1 μs, damped sinusoid 600 V, 10 μs pulse 20% step change in AC input voltage

SDRAM Dual Inline Memory Modules

CAUTION: Use only SDRAM DIMMs of the same size, speed, and manufacturer. SDRAM DIMMs from other sources may adversely affect data integrity. The Power-On Self-Test (POST) will warn of nonsupported SDRAM DIMMs.

Table 5-3
SDRAM DIMM Specifications

Size	64-, 128-, 256-, or 512-MB single DIMM 133-MHz SDRAM
Upgrade requirement	SDRAM DIMMs can be installed or removed one at a time

Note: Use only 64-, 128-, 256-, or 512-MB buffered, gold-connector, ECC, 133-MHz SDRAM DIMMs.

1.44-MB Diskette Drive

Table 5-4
1.44-MB Diskette Drive Specifications

Size	3.5 inch
LED indicator (front panel)	Green
Read/Write capacity per diskette (high/low density)	1.44-MB/720 KB
Drives supported	1
Drive height	1/3
Drive rotation	300 rpm
Transfer rate bits/sec (high/low)	500 K/250 K
Bytes per sector	512
Sectors/Track (high/low)	18/9
Tracks/Side (high/low)	80/80
Access times	
Track-to-track (high/low)	3 ms/6 ms
Average (high/low)	169 ms/94 ms
Settling time	15 ms
Latency average	100 ms
Cylinders (high/low)	80/80
Read/Write heads	2

IDE CD-ROM Drive

Table 5-5
32X Max² IDE CD-ROM Drive Specifications

Dimensions	
Height	4.29 cm (1.9 inch)
Width	15 cm (5.9 inch)
Depth	20.8 cm (8.1 inch)
Weight	950 g (2.1 lb)
Capacity	
Mode 1	2048 bytes
Mode 2	2340, 2336, 1024 bytes
CD-DA	2352 bytes
CD-XA	2328 bytes
Data transfer rate	
Sustained	150 KB/s
Burst	2100 to 4800 KB/s
Access times	
Full stroke	100 ms
Random	150 ms
Cache buffer	128 KB/s
Startup time (typical)	<7 s
Stop time	<4 s
Laser parameters	
Type	Semiconductor Laser GaA1As
Wave length	780 +/- 25 nm
Divergence angle	53.5 +/- 1.5 degrees
Output power	0.14 mW
Audio interface, line out	0.7 VRMS @ 47 kΩ
Digital audio out connector	0.6 VRMS @ 32 Ohms

Integrated Dual-Channel Wide Ultra2 SCSI Controller

Table 5-6
Integrated Dual-Channel Wide Ultra2 SCSI Controller Specifications

Drives supported	Up to 12 Wide Ultra2 devices per channel
Data transfer method	64-bit, 33-MHz PCI
SCSI channel transfer rate per channel	80 MB/s
Maximum transfer rate per PCI bus	133 MB/s
SCSI termination	Active termination
SCSI connectors	
Channel A	1 internal
Channel B/external	1 internal/external

Hot-Plug Hard Drives

Table 5-7
Hot-Plug Hard Drive Specifications

	9.1 GB	9.1 GB	9.1 GB	18.2 GB	18.2 GB	18.2 GB
Rotational speed (rpm)	7,200	10,000	10,000	7,200	10,000	10,000
Logical capacity (MB)	9100	9100	9100	18209	18209	18210
Height						
Inches	1.0	1.0	1.0	1.0	1.0	1.0
Centimeters	2.5	2.5	2.5	2.5	2.5	2.5
Width						
Inches	3.5	3.5	3.5	3.5	3.5	3.5
Centimeters	8.9	8.9	8.9	8.9	8.9	8.9
Interface	Wide Ultra2 SCSI	Wide Ultra2 SCSI	Wide Ultra3 SCSI	Wide Ultra2 SCSI	Wide Ultra2 SCSI	Wide Ultra3 SCSI
Transfer rate synchronous (max)	80 MB/s	80 MB/s	40 MB/s	80 MB/s	80 MB/s	40 MB/s
Seek time						
Single track	0.8 ms	0.8 ms	0.8 ms	0.8 ms	0.8 ms	0.8 ms
Average	7.9 ms	5.4 ms	5.4 ms	6.9 ms	5.7 ms	5.7 ms
Full stroke	17.0 ms	12.2 ms	12.2 ms	15.0 ms	12.2 ms	12.2 ms
Physical configuration						
Bytes	512	512	512	512	512	512
Logical blocks (in millions)	17.8	17.8	17.8	35.6	35.6	35.6
Operating temperature						
Fahrenheit	50º to 95º	50º to 95º	50º to 95º	50º to 95º	50º to 95º	50º to 95º
Celsius	10º to 35º	10º to 35º	10º to 35º	10º to 35º	10º to 35º	10º to 35º

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