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Compaq ProLiant ML350 Generation 2

Service Overview

Abstract: This white paper describes the Compaq ProLiant ML350 Generation 2 Series of servers. Information provided includes features, models, option and spare part numbers, as well as installation and service considerations for the product.

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Compaq ProLiant ML350 Generation 2 Service Overview© 2001 Compaq Computer Corporation

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Product Description

The ProLiant ML350 Generation 2 (G2) is the second update of the ProLiant ML350 since its introduction in January 2000. Although the model launched in October 2000 was sometimes identified as the second generation ProLiant ML350, it should now be identified as the 1.0GHz model.

The Compaq ProLiant ML350 G2 models support two Intel Pentium® III 1.13GHz or 1.26GHz processors with Flip-Chip Pin Grid Array (FC-PGA) technology and 512KB of Level 2 (L2) ECC cache memory.

What's New

New, upgraded features, or feature offerings that have changed include:

- Support for up to two 1.13 or 1.26GHz Tualatin Pentium® III Processors with FC-PGA technology, and 133MHz front-side bus (FSB)
- Socketed VRM 8.5 Processor Power Modules (PPMs) for each installed CPU
- Integrated 512KB of L2 full speed cache
- Tower or rack form factors (5U)
- 350W hot-pluggable (HP) power supply, redundant power supply option (1+1)
- No hard drive shipped standard
- Ten internal drive bays:
 - Four 5.25" x 1.6" removable media bays, one filled with 40X IDE CD-ROM drive, one filled with 1.44MB carbon floppy diskette drive, two available
 - Six 6" x 1" wide Ultra2/Ultra3 Hot Plug Drive bays
- Internal Two Bay Hot Plug Wide Ultra2/Ultra3 SCSI Drive Cage option
- Internal storage capacity of 436.8GB (6 x 72.8GB 1"), up to 509.6GB (including two 36.4GB non-hot-plug drives in the two available removable bays) or up to 582.4GB (including an optional internal 2-bay hot-plug drive cage with two 72.8GB hot-plug drives installed)
- Seven Non-Hot Pluggable (NHP) expansion slots (6 available):
 - Five 64-bit/33MHz PCI
 - One 32-bit/33MHz PCI
 - The Server Feature Board installed in its own dedicated slot
- Integrated ATI Rage XL video controller — upgraded to 8MB SDRAM and embedded on the Server Feature Board
- Two new ROM technologies:
 - Compaq Remote ROM Flash Utility
 - Redundant ROM

- Upgraded from Automatic Server Recovery (ASR) to ASR-2, and upgraded to SmartStart version 5.20
- Pre-Execution Environment (PXE) support—enables remote configuration and installation of operating system
- Tool free entry to chassis and access to components
- 3-3-3 warranty, Pre-Failure Warranty covering processors, memory and hard drives

Processor Technology

In addition to the changes bulleted above, the FC-PGA2 processors now include an integrated heat spreader above the flip-chip core, making them easier to cool. They also now have an attached heatsink, solving the problems faced when the processor and heatsink were separated and then reattached.

Both processors are powered by socketed +12V input VRM 8.5 Processor Power Modules (PPMs). .13 –micron technology enables smaller, less expensive chips that run faster and require less power.

Compaq Remote ROM Flash Utility

This utility allows administrators to upgrade the system ROMs as well as the supported Compaq Smart Array controllers on multiple servers from a remote location. The ROM upgrades can either be flashed individually or batched together to perform multiple ROM upgrades all at once.

Redundant ROM

If the server either loses power during a ROM flash or if the flash process is otherwise interrupted, redundant ROM allows you to restart the system with the original ROM image.

Redundant ROM also allows you to use RBSU to switch between two ROM images for testing and evaluation purposes. Through **RBSU (F9 Setup) → Advanced Options → Redundant ROM**, you can restart the server using the previous ROM image if a new ROM flash doesn't meet your expectations. This eliminates the need to use the ROMPAQ Flash Utility to fall back to the previous ROM version.

Automatic Server Recovery-2 (ASR-2)

Like ASR, ASR-2 resets the system in the event of a catastrophic operating system error and it restarts the server within a predetermined amount of time after the system stops responding. For ASR-2, however, system administrators can set the interval in the RBSU.

Next Generation Remote Insight Support

The ML350 G2 has two connectors on the system board to support Remote Insight, Lights-Out Edition boards. The 16-pin connector will support the existing board, while the 30-pin connector will support the next generation board.

Hot-Pluggable Power Supplies

The ProLiant ML350 G2 comes standard with a hot-pluggable power supply. The hot-pluggable redundant power supply option offers a 1+1 configuration. In this configuration, both power

supplies send power to the power supply backplane. If one power supply fails, the other will continue to keep the server operational.

Ultra 3 Hot-Plug (HP) Drive Cages

The ProLiant ML350 G2 supports six Low Voltage Differential SCSI (LVDS) Wide Ultra3 SCSI hot-pluggable (HP) hard drives. Each 1-inch bay can hold a 72.8GB 10,000-rpm hard drive (436.8GB total). These drives operate on one channel of the integrated SCSI controller. The second channel can operate either an external secondary storage system or an internal or external tape backup device.

Non-Hot Plug (HP) Media Bays

Two optional non-HP drives can be mounted in the removable media bays to increase the total internal storage capacity to 509.6GB.

Internal Two Bay Hot Plug (HP) Wide Ultra2/Ultra3 SCSI Drive Cage Option

Alternatively, a 2-bay SCSI drive cage with one 1" and one 1.6" drive bay, installed in two available removable media bays is available as an option. This cage supports two HP 72.8GB drives that can increase the internal storage capacity to 582.4GB.

Enhanced Fan Control

A temperature-sensing device located near the processors now monitors the temperatures of both processors and the ambient temperature of the chassis. When any of these three temperatures reaches a predefined limit, the fan speed increases to control the temperature in the system.

Server Feature Bus

The Server Feature Bus is a proprietary bus that has PCI and management signals. Running the management signals through this bus eliminates the need for the System Management Interface Cable (SMIC) that was compulsory in the first generation of the ProLiant ML350.

Server Feature Board

The server feature bus slot, located at the bottom of the system board, houses the Server Feature Board. This board contains the hard drive, NIC, video, and management controllers.

Drive and network activity is passed over the server feature bus to the LEDs on the front of the chassis. This eliminates the need for a System Management Interface Cable (SMIC) on the board and simplifies removal and replacement procedures.

NMI Debug Button

The NMI Debug button is located on the Server Feature Board. NMI is a diagnostic mechanism that allows for crash dump files to be created in situations when a system is hung and unable to respond to traditional debug mechanisms. The NMI Debug button can be used to diagnose software failures by forcing the operating system to invoke the Non-Maskable Interrupt (NMI) handler and generate a crash dump log. This log can provide critical troubleshooting information that may be difficult or impossible to obtain through other means.

The user initiates a Non Maskable Interrupt (NMI) by pressing the NMI Debug button. The NMI can allow a hung system to become responsive enough to generate a crash dump log. The button is enabled/disabled in RBSU.

Warning! The NMI Debug button causes the unit to abruptly fail, as it is designed to do. Therefore, it should never be used during normal operation.

ASR-2 is used when an *automated* crash dump is desired. Normally, ASR-2 provides a system reset; however, ASR-2 can be configured to generate the NMI Crash Dump instead of a reset.

System Status LEDs

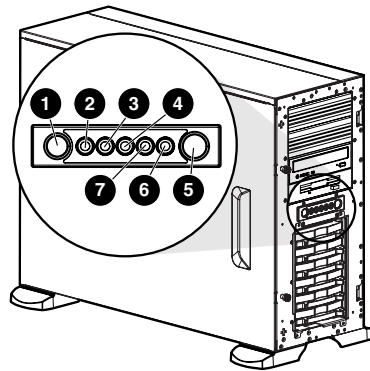


Table 1: UID, Power Button, and System Status LEDs

Item	Description	Status	Means
1	Unit ID button		
2	Unit ID LED	Off	Unit ID LED is not turned on
		Blue	Identification Enabled
		Flashing blue	Remotely managed
3	Internal health LED	Off	System off
		Green	System health is OK
		Amber	System health degraded
		Red	System health critical
4	External health LED	Off	System off; no AC power
		Green	System on; redundant power supply health OK
		Amber	Redundant power supply degraded
5	Power button		
6	Power On/Standby status LED	Off	System off; no AC power.
		Green	System on; AC power available. Do not remove power from system.
		Flashing green	System in standby mode. AC power available. Do not remove power from system.
		Amber	System is off, AC power available.
7	NIC activity LED	Off	No connection
		Green	Linked to network
		Flashing green	System is in standby

Unit Identification (UID) LEDs

Blue Unit Identification (UID) LED indicators on the front and back of the server help identify the server in large rack deployments. If you press the UID button on the front of the server, the corresponding UID LED on the back of the server¹ lights to identify it as the server being serviced.

Server Health LEDs

Three server health LED indicators are located on the front of the ProLiant ML350 G2 between the UID button and the Power On/Standby LED. These indicate the status of the:

- Internally serviceable components (processor, PPM, memory subsystem, temperature control, Server Feature Board, and fans)
- Externally serviceable components (hot-pluggable power supplies)
- Embedded NIC

The NIC information is also represented on the rear panel with the three LEDs located above the RJ-45 connector.

For detailed information on the system status and network controller LEDs, refer to *Appendix E* in the *Setup and Installation Guide*. (See *References* at the end of this document.)

System Board LEDs

In addition to the system status LEDs, the ProLiant ML350 G2 now includes 11 diagnostic LEDs on the system board. These LEDs indicate error conditions, such as processor, PPM, or memory module failures. Refer to the graphic and table on the following pages to determine what these lights indicate.



¹ Located underneath the keyboard connector on tower models and to the right of the keyboard connector on rack models.

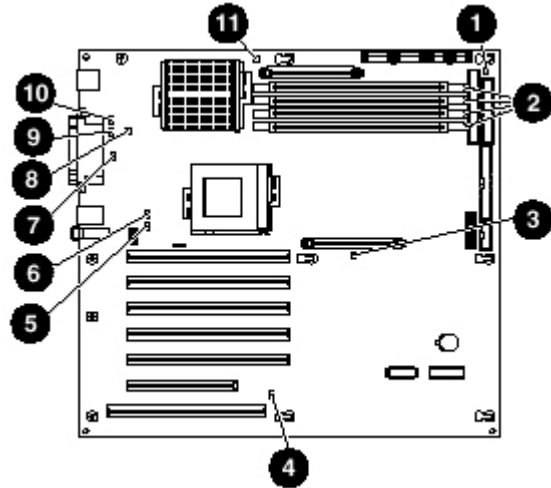


Table 2: System Board LEDs

Item	Description	Status	Means
1	AC power	Off	No AC power Or power supply error detected
		Green	Power supply is on and functioning.
2	DIMM status	Off	DIMM functioning
		Amber	DIMM failed
3	PPM 2 status	Off	PPM 2 functioning
		Amber	PPM 2 failed
4	Server Feature Board Seating status	Off	Server Feature Board is installed properly
		Amber	Server Feature Board is not installed properly
5	Processor 2 thermal	Off	Processor 2 temperature normal
		Amber	Thermal trip detected for processor 2. Verify: <ul style="list-style-type: none"> ▪ Processor and heatsink assembly is properly installed. ▪ Ambient temperature is within an acceptable range².
6	Processor 2 status	Off	Processor 2 functioning
		Amber	Processor 2 failed
7	System Fan status	Off	Fan is functioning
		Amber	Fan is not installed or has failed
8	Temperature threshold	Off	Normal
		Amber	Temperature threshold exceeded

² See Appendix F, “Specifications”, in the *Compaq ProLiant ML350 Generation 2 Server Setup and Installation Guide* for operational temperature requirements. (See *References*.)

Table 2: System Board LEDs (continued)

Item	Description	Status	Means
9	Processor 1 thermal	Off	Normal
		Amber	Thermal trip detected for processor 1. Verify: <ul style="list-style-type: none"> ▪ Processor and heatsink assembly is properly installed. ▪ Ambient temperature is within an acceptable range³.
10	Processor 1 status	Off	Processor 1 functioning
		Amber	Processor 1 failed
11	PPM 1 status	Off	PPM 1 functioning
		Amber	PPM 1 failed

³ See Appendix F, "Specifications," in the *Compaq ProLiant ML350 Generation 2 Server Setup and Installation Guide* for operational temperature requirements. (See *References*.)

Features Carried Over

Features carried over from the ML350 1.0GHz models include:

- 128MB of PC133-MHz ECC registered SDRAM DIMM standard, expandable to 4GB
- Compaq NC3163 Fast Ethernet PCI 10/100 Autoswitching NIC (embedded)
- Compaq Integrated Dual Channel Wide Ultra3 SCSI Adapter
- Two hot-pluggable USB ports
- ACPI 1.0b support (Power States S0, S4 and S5).
- ROM-Based Setup Utility (RBSU) (**F9** setup) for system configuration—simplifies server setup and enables support of the Compaq SmartStart Scripting Toolkit, redundant ROM
- Compaq Insight Manager
- Rack conversion kit option for tower form factors

Adaptec 7899W Dual Channel Wide Ultra3 SCSI Controller

This SCSI controller provides two internal 160/MB/s ports. SCSI port 1 is connected to the SCSI backplane by default.

Both SCSI ports can support either external **or** internal drives. To support external drives, a port can be routed externally through the SCSI knockouts in the back panel using the Internal to External SCSI Cable Option Kit⁴.

SCSI port 2 ships with a two-device cable to support an internal tape drive.

Note: Port 2 is a *single* connector that can be routed externally **or** cabled to connect to internal drives.

ROM-Based Setup Utility (RBSU)

Like its predecessor, RBSU lets you view and establish server configuration settings during initial system startup, as well as modify them after the server has been configured. Because the file operates from the system ROM (unlike previous configuration utilities stored on a hard drive):

- The configuration parameters are always available, even if a drive fails.
- It only takes 3 to 5 seconds to run the utility (vs. 3 to 5 minutes).
- You can quickly install the latest version by flashing the system ROM with the latest ROMPaq version.

In addition, RBSU checks each setting as it is made and immediately resolves possible conflicts without bothering the administrator with an audible warning message. And, because it is embedded in the ROM, you can use the Compaq Remote Insight Lights-Out Edition to remotely access and configure the system.

⁴ 159547-B21 or 159547-B22

Rack Model

Customers can buy the ProLiant ML350G2 in either a tower or rack form factor. A rack conversion kit is available for converting a tower into a rack model.

Models

Table 3 lists configurations for the new models:

Table 3: System Models

Model	Part Number	Config. Code	Processor	Rack or Tower
ML350T02 P1133-512KB, 128MB	236868-xx1	JZP1	1.133GHz	Tower
ML350R02 P1133-512KB, 128MB	236869-xx1	JZP2	1.133GHz	Rack
ML350T02 P1266-512KB, 128MB	225861-xx1	JZP3	1.266GHz	Tower
ML350R02 P1266-512KB, 128MB	225862-xx1	JZP4	1.266GHz	Rack

Option Kits

Table 4: Processor Option/Upgrade Kits

Kit	Part Number
Processor Kits	
Pentium III P1133-512KB Processor Option Kit with VAM and Heatsink	238888-B21
Pentium III P1266-512KB Processor Option Kit with VAM and Heatsink	231117-B21
Memory Kits	
128-MB PC133-MHz Registered ECC SDRAM DIMM Memory Option Kit	128277-B21
256-MB PC133-MHz Registered ECC SDRAM DIMM Memory Option Kit	128278-B21
512-MB PC133-MHz Registered ECC SDRAM DIMM Memory Option Kit	128279-B21
1024-MB PC133-MHz Registered ECC SDRAM DIMM Memory Option Kit	128280-B21
Hard Drive Kits (Hot Plug)	
9.1-GB Wide Ultra3 SCSI 10,000 rpm Drive (1")	142671-B22
18.2-GB Wide Ultra3 SCSI 10,000 rpm Drive (1")	142673-B22
18.2-GB Wide Ultra3 SCSI 15,000 rpm Drive (1")	188122-B22
36.4-GB Wide Ultra3 SCSI 10,000 rpm (1")	176496-B22
72.8-GB Wide Ultra3 SCSI 10,000 rpm Drive (1")	232432-B22
Misc.	
12X DVD-ROM Drive Option Kit	217053-B21
ProLiant ML350 Generation 2 (G2) Tower to Rack Conversion Kit	237045-B21
Hot Plug Redundant Power Supply Option Kit	237046-001*
ML300 series Internal Two Bay Hot Plug Wide Ultra2/Ultra3 SCSI Drive Cage (without fan)	244059-B21
ProLiant ML350 Internal to External SCSI Cable Option Kit	159547-B21
ProLiant ML330/ML350 Internal to External SCSI Cable Option Kit	159547-B22

*This number is for NA and LA. The last three numbers vary based on geography. Check the *QuickSpecs* (See *References*) for the suffix appropriate to your location.

Spare Parts

Ordering information for individual spare processors with heatsinks, system boards, and the hard drive for these models is shown below:

Table 5: Spare Part Numbers

Description	Spare Part Number
Pentium III Processor, 1.133-GHz/133 with heatsink	239324-001
Pentium III Processor, 1.26-GHz/133 with heatsink	230991-001
Processor Power Module (PPM)	228506-001
System board	249930-001
Server Feature Board	249933-001
Power Switch Assembly	249926-001
350-Watt Power Supply with Power Factor Correction (hot-pluggable)	249687-001
Power Supply Blank	249923-001
PC 133-MHz ECC Registered SDRAM DIMM, 128-MB	159226-001
PC 133-MHz ECC Registered SDRAM DIMM, 256-MB	159304-001
PC 133-MHz ECC Registered SDRAM DIMM, 512-MB	159227-001
PC 133-MHz ECC Registered SDRAM DIMM, 1-GB	163902-001
SCSI LVD cable	249931-001
Return kit (tower model only)	249929-001
Return kit (rack model only)	250189-001
Tower-to-Rack Conversion Kit	250841-001

For a full listing of spare parts for the ProLiant ML350 Generation 2 Series of servers, refer to:

- *ProLiant ML350 Generation 2 Server Maintenance and Server Guide* (See *References*.)
- *Quick Reference Guide ProLiant ML350/Generation 2* (listed as *Service Quick Reference Guide: Server Options* on the website)

These documents are available at:

<http://www.compaq.com/support/servers/ProLiantML350.html>

www.compaq.com/support/techpubs

Operating Systems

The ProLiant ML350 supports the following operating systems:

- LINUX products (RedHat, SuSE, Caldera eServer, Open Linux Server)
- Microsoft 2000 BackOffice Small Business Server 2000
- Microsoft Windows 2000 Server and Advanced Server
- Microsoft Windows NT Server 4.0
- SCO OpenServer
- SCO UnixWare 7.1.1
- IBM OS/2 Warp Family for e-business and Warp Server for e-business Convenience Pack
- Novell NetWare 5.1
- Novell NetWare Small Business Suite 5.1

For a more complete listing and current listing of supported operating systems and versions, refer to the following Compaq website:

<ftp.compaq.com/pub/products/servers/os-support-matrix-310.pdf>

Drivers

The ProLiant ML350 Generation 2 servers feature new hardware that does not have driver support on all operating system installation media. Use SmartStart and its Assisted Path feature to install your operating system and the latest driver support.

If you do not use SmartStart to install your operating system, drivers for some of the new hardware are required. These drivers, as well as other option drivers, ROM images, and value-add software can be downloaded from:

www.Compaq.com/support/files/server/us/index.html

Manageability & Utilities

The ProLiant ML350 ships with the following:

- Compaq Insight Manager™ and Compaq Insight Manager XE™
- Compaq SmartStart™ version 5.20 support (minimum)
- Array Configuration Utility (ACU and ACU-XE) with Smart Array controllers
- Compaq Management Agents
- Automatic Server Recovery-2 (ASR-2)
- Drive Parameter Tracking and Dynamic Sector Repairing (both with Smart Array Controller)
- Pre-Failure Warranty (covers processors, memory, and hard disk drives)

Installation Procedures



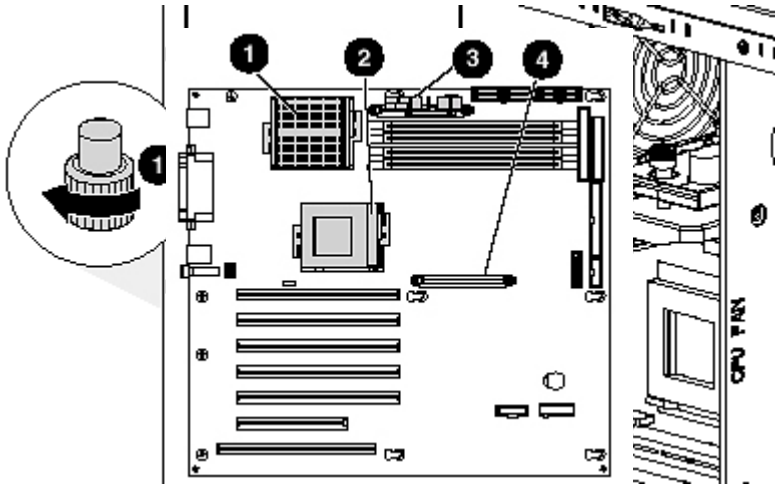
Processors







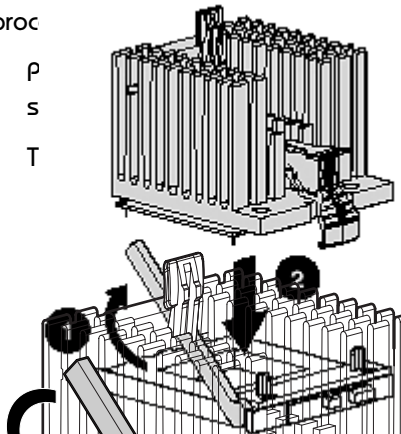


The ProLiant ML350 G2 comes standard with an Intel Pentium III processor. However, an optional processor and Power Processor Module (PPM) can be installed. Processor option kits for the ML350 G2 consist of an Intel Pentium III processor with an attached heatsink and a PPM.

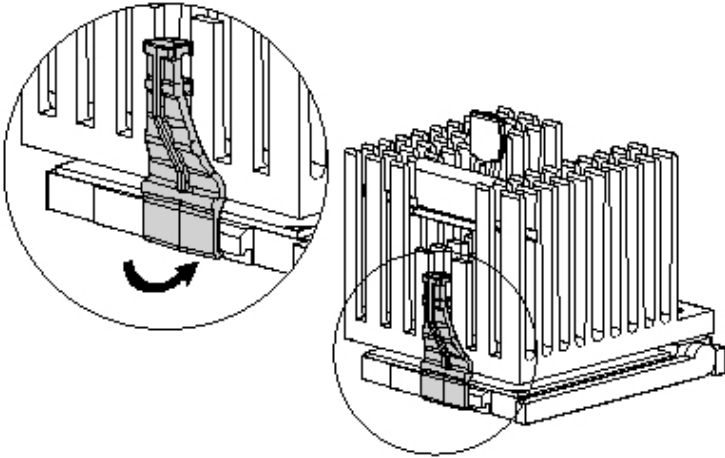
Important:

- If you install more than one processor, both processors must be the same type and speed.
- The CPU1 socket must always be populated before the CPU2 socket.
- Only install the specific PPM provided in the option kit with your processor.

Table 6: Processor Installation

Step	Action
1.	Verify that all critical data has been backed up.
2.	Ensure the server has the most current ROM version. To update the ROM, visit: http://www.compaq.com/support/files/server/us Caution: Failure to flash the ROM before installing a new processor can cause system failure.
3.	Power down and remove the access panel. (Refer to the <i>Setup and Installation Guide</i> , listed under <i>References</i> .)
4.	Remove the internal fan baffle that covers the processor sockets. <ul style="list-style-type: none"> ▪ Loosen the thumbscrew that secures the baffle to the fan . ▪ Slide the baffle out and away from the chassis .
	
5.	Locate the processor socket and corresponding PPM slot:

Step	Action
	<p style="text-align: center;">Item</p> <p>Description</p> <p>Processor socket 1 (populated) </p> <p>Processor socket 2 </p> <p>PPM 1 slot (populated) </p> <p>PPM 2 slot </p>
<p>6.</p> <p>Use the proc</p> <p>Caution: P S</p> <p>Note: T</p>	<p>Raise the processor socket lever , and then place the processor into the socket , as shown below:</p> <p>the processor.</p> <p>order will cause the processor socket on the</p> <p>ed to fit one way only.</p> 
<p>7.</p>	<p>Lower the processor socket lever to  the assembly in the socket, as shown below:</p> 

Step	Action
8.	Lift the heatsink retaining clip over the rear edge of the socket and hook it underneath the socket tabs, as shown below:
	
9.	<p>Clasp the front of the assembly clip over the front edge of the socket, and then press the assembly clip lever down to lock the heatsink and processor assembly in the socket.</p> <p>Caution: Applying too much pressure on the lever could break it. Use care when performing this step.</p>
10.	Install the corresponding PPM before powering up the server. (See <i>Installing the PPM for Processor 2.</i>)
11.	Reinstall the fan baffle and reinstall the access panel by reversing Steps 3 and 4.

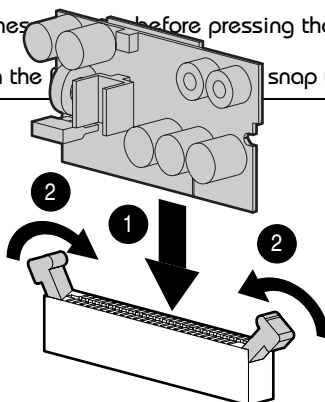
Processor Power Module (PPM)

Important: A new PPM must always be installed with a new processor. Only install the specific PPM provided in the option kit with your processor.

Perform the following steps to install the corresponding PPM:

Table 7: PPM Installation

Step	Action
1.	Locate the corresponding PPM slot and position the PPM above the slot. The PPM is keyed to fit only one way in the slot.
2.	<ul style="list-style-type: none"> Ensure the latches are open before pressing the PPM into the slot. Press evenly on the latches to snap up to secure the module.



Memory

The ProLiant ML350 G2 supports registered 133MHz ECC SDRAM DIMMs. The DIMMs must support CAS Latency 2 or 3. The memory bus and controller are **not** compatible with older 100MHz DIMMs.

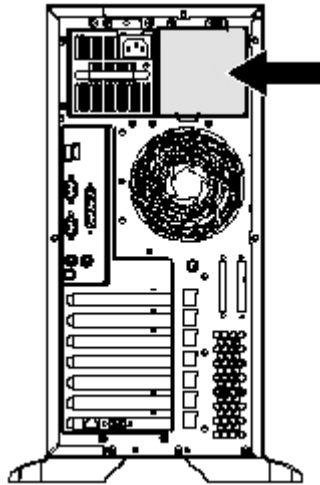
Standard memory in all ML350 G2 models is a single 128MB DIMM. Memory can be expanded one DIMM at a time in any sequence in the four memory sockets provided.

Hot pluggable Redundant Power Supply

Perform the following steps to install the hot pluggable redundant power supply option:

Table 8: Hot pluggable Redundant Power Supply

Step	Action
1.	Prepare the server for redundant power supply installation. ⁵



2.	Identify the redundant power supply bay at the back of the server.
3.	Remove the thumbscrew that secures the redundant power supply blank, and then lift the blank from the back of the server.
4.	<ul style="list-style-type: none"> ▪ Slide the power supply into the power supply bay. ▪ Apply pressure to the power supply until the release/lock lever clicks the power supply securely into the bay.
5.	Connect the AC power cords to the new power supply.
6.	<ul style="list-style-type: none"> ▪ Verify that the existing power supply and the redundant power supply LEDs (located on the back of the power supplies) are green.

⁵ See “Preparing the Server” in Chapter 3 of the Setup and Installation Guide for further preliminary teardown instruction.

Tower to Rack Conversion

System configuration switch 3 must be set to indicate whether the server is being deployed as a tower or a rack. If the switch is *off*, the server is configured as a tower. If it is *on*, the server is configured as a rack.

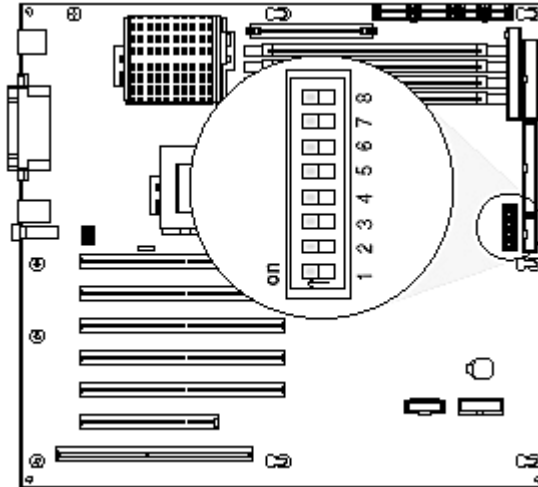


Table 9: System Models

Switch	Default	Function
1	Off	Off = Video enabled On = Video disabled
2	Off	Off = Normal operation On = Configuration locked
3	Off	Off = Tower On = Rack
4	Off	Off = Normal On = Enable diskette boot
5	Off	Off = Normal On = Password disable
6	Off	Off = Normal On = Configuration erased
7	Off	Reserved
8	Off	Reserved

Service Considerations

There are no specific service considerations for the ProLiant ML350 Generation 2 servers.

References

For further information on servicing and troubleshooting the Compaq ProLiant ML350 G2 Server refer to the:

- *Compaq ProLiant ML350 Generation 2 Server Maintenance and Service Guide*, First Edition (August 2001), Part Number 236634-001 or spare part number 250840-001.
- *Compaq ProLiant ML350 Generation 2 Server Setup and Installation Guide*, First Edition (August 2001), Part Number 236843-001.
- *Compaq ProLiant ML350 Generation 2 QuickSpecs*, DA-10960, World Wide, Version 1, October 9, 2001.
- *Quick Reference Guide ProLiant ML350/Generation 2*
- *Servers Troubleshooting Guide*, Part Number 161759-004.

Note: Enter *ML350 G2* to search for information about the ProLiant ML350 G2. Entering *ML350* will bring up only information about the first generation server.
