

Power Systems

*Installation and User's Guide for the
IBM Power PS701 and PS702
(8406-71Y)*



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(8406-71Y)*



Note

Before using this information and the product it supports, read the information in “Notices,” on page 57, “Safety notices” on page v, the *IBM Systems Safety Notices* manual, G229-9054, and the *IBM Environmental Notices and User Guide*, Z125-5823.

This edition applies to IBM Power Systems servers that contain the POWER7 processor and to all associated models.

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Safety notices

Safety notices may be printed throughout this guide:

- **DANGER** notices call attention to a situation that is potentially lethal or extremely hazardous to people.
- **CAUTION** notices call attention to a situation that is potentially hazardous to people because of some existing condition.
- **Attention** notices call attention to the possibility of damage to a program, device, system, or data.

World Trade safety information

Several countries require the safety information contained in product publications to be presented in their national languages. If this requirement applies to your country, a safety information booklet is included in the publications package shipped with the product. The booklet contains the safety information in your national language with references to the U.S. English source. Before using a U.S. English publication to install, operate, or service this product, you must first become familiar with the related safety information in the booklet. You should also refer to the booklet any time you do not clearly understand any safety information in the U.S. English publications.

German safety information

Das Produkt ist nicht für den Einsatz an Bildschirmarbeitsplätzen im Sinne § 2 der Bildschirmarbeitsverordnung geeignet.

Laser safety information

IBM® servers can use I/O cards or features that are fiber-optic based and that utilize lasers or LEDs.

Laser compliance

IBM servers may be installed inside or outside of an IT equipment rack.

DANGER

When working on or around the system, observe the following precautions:

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:

- Connect power to this unit only with the IBM provided power cord. Do not use the IBM provided power cord for any other product.
- Do not open or service any power supply assembly.
- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords.
- Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.
- Connect any equipment that will be attached to this product to properly wired outlets.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

To Disconnect:

1. Turn off everything (unless instructed otherwise).
2. Remove the power cords from the outlets.
3. Remove the signal cables from the connectors.
4. Remove all cables from the devices

To Connect:

1. Turn off everything (unless instructed otherwise).
2. Attach all cables to the devices.
3. Attach the signal cables to the connectors.
4. Attach the power cords to the outlets.
5. Turn on the devices.

(D005)

DANGER

Observe the following precautions when working on or around your IT rack system:

- Heavy equipment—personal injury or equipment damage might result if mishandled.
- Always lower the leveling pads on the rack cabinet.
- Always install stabilizer brackets on the rack cabinet.
- To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.
- Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices.



- Each rack cabinet might have more than one power cord. Be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.
- Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.
- An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.

CAUTION

- Do not install a unit in a rack where the internal rack ambient temperatures will exceed the manufacturer's recommended ambient temperature for all your rack-mounted devices.
- Do not install a unit in a rack where the air flow is compromised. Ensure that air flow is not blocked or reduced on any side, front, or back of a unit used for air flow through the unit.
- Consideration should be given to the connection of the equipment to the supply circuit so that overloading of the circuits does not compromise the supply wiring or overcurrent protection. To provide the correct power connection to a rack, refer to the rating labels located on the equipment in the rack to determine the total power requirement of the supply circuit.
- *(For sliding drawers.)* Do not pull out or install any drawer or feature if the rack stabilizer brackets are not attached to the rack. Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.
- *(For fixed drawers.)* This drawer is a fixed drawer and must not be moved for servicing unless specified by the manufacturer. Attempting to move the drawer partially or completely out of the rack might cause the rack to become unstable or cause the drawer to fall out of the rack.

(R001)

CAUTION:

Removing components from the upper positions in the rack cabinet improves rack stability during relocation. Follow these general guidelines whenever you relocate a populated rack cabinet within a room or building:

- Reduce the weight of the rack cabinet by removing equipment starting at the top of the rack cabinet. When possible, restore the rack cabinet to the configuration of the rack cabinet as you received it. If this configuration is not known, you must observe the following precautions:
 - Remove all devices in the 32U position and above.
 - Ensure that the heaviest devices are installed in the bottom of the rack cabinet.
 - Ensure that there are no empty U-levels between devices installed in the rack cabinet below the 32U level.
- If the rack cabinet you are relocating is part of a suite of rack cabinets, detach the rack cabinet from the suite.
- Inspect the route that you plan to take to eliminate potential hazards.
- Verify that the route that you choose can support the weight of the loaded rack cabinet. Refer to the documentation that comes with your rack cabinet for the weight of a loaded rack cabinet.
- Verify that all door openings are at least 760 x 2030 mm (30 x 80 in.).
- Ensure that all devices, shelves, drawers, doors, and cables are secure.
- Ensure that the four leveling pads are raised to their highest position.
- Ensure that there is no stabilizer bracket installed on the rack cabinet during movement.
- Do not use a ramp inclined at more than 10 degrees.
- When the rack cabinet is in the new location, complete the following steps:
 - Lower the four leveling pads.
 - Install stabilizer brackets on the rack cabinet.
 - If you removed any devices from the rack cabinet, repopulate the rack cabinet from the lowest position to the highest position.
- If a long-distance relocation is required, restore the rack cabinet to the configuration of the rack cabinet as you received it. Pack the rack cabinet in the original packaging material, or equivalent. Also lower the leveling pads to raise the casters off of the pallet and bolt the rack cabinet to the pallet.

(R002)

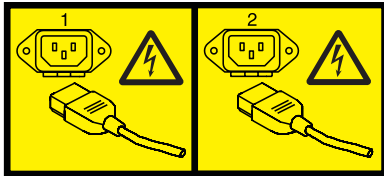
(L001)



(L002)



(L003)



or



All lasers are certified in the U.S. to conform to the requirements of DHHS 21 CFR Subchapter J for class 1 laser products. Outside the U.S., they are certified to be in compliance with IEC 60825 as a class 1 laser product. Consult the label on each part for laser certification numbers and approval information.

CAUTION:

This product might contain one or more of the following devices: CD-ROM drive, DVD-ROM drive, DVD-RAM drive, or laser module, which are Class 1 laser products. Note the following information:

- Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.
- Use of the controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.

(C026)

CAUTION:

Data processing environments can contain equipment transmitting on system links with laser modules that operate at greater than Class 1 power levels. For this reason, never look into the end of an optical fiber cable or open receptacle. (C027)

CAUTION:

This product contains a Class 1M laser. Do not view directly with optical instruments. (C028)

CAUTION:

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following information: laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam. (C030)

Power and cabling information for NEBS (Network Equipment-Building System) GR-1089-CORE

The following comments apply to the IBM servers that have been designated as conforming to NEBS (Network Equipment-Building System) GR-1089-CORE:

The equipment is suitable for installation in the following:

- Network telecommunications facilities
- Locations where the NEC (National Electrical Code) applies

The intrabuilding ports of this equipment are suitable for connection to intrabuilding or unexposed wiring or cabling only. The intrabuilding ports of this equipment *must not* be metalically connected to the interfaces that connect to the OSP (outside plant) or its wiring. These interfaces are designed for use as intrabuilding interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE) and require isolation from the exposed OSP cabling. The addition of primary protectors is not sufficient protection to connect these interfaces metalically to OSP wiring.

Note: All Ethernet cables must be shielded and grounded at both ends.

The ac-powered system does not require the use of an external surge protection device (SPD).

The dc-powered system employs an isolated DC return (DC-I) design. The DC battery return terminal *shall not* be connected to the chassis or frame ground.

Chapter 1. Product overview

The IBM BladeCenter PS701 and PS702 blade server is based on IBM Performance Optimization with Enhanced RISC (POWER®) Architecture technologies. The BladeCenter PS701 and PS702 blade server runs in BladeCenter units to provide a high-density, high-performance blade server environment using advanced processing technology.

Note: Unless otherwise stated, references to the BladeCenter unit apply to BladeCenter (E 8677), BladeCenter H (8852 and 7989), BladeCenter HT (8740 and 8750), and BladeCenter S (8886 and 7779) units.

The *Installation and User's Guide* comes with the blade server on the IBM *BladeCenter Documentation* CD. All of the following information is in the document and also in the online information center:

- Setting up the blade server
- Starting and configuring the blade server
- Installing optional hardware devices
- A reference to more information about installing supported operating systems
- Performing basic troubleshooting of the blade server

Packaged with the hardcopy *Installation and User's Guide* are software CDs that help you to configure hardware, install device drivers, and install the operating system.

The blade server comes with a limited warranty. For information about the terms of the warranty and getting service and assistance, see the online information center or the *Warranty and Support Information* document that is on the IBM *BladeCenter Documentation* CD.

The blade server might have features that are not described in the documentation that comes with the blade server, and the documentation might be updated occasionally to include information about those features, or technical updates might be available to provide additional information that is not included in the original blade server documentation. The most recent version of all BladeCenter PS700 documentation is in the BladeCenter information center.

The online BladeCenter information center is available in the IBM BladeCenter Information Center at <http://publib.boulder.ibm.com/infocenter/bladectr/documentation/index.jsp>.

Download and install updated device drivers and the PS700 firmware. Go to the IBM Support site to download the updates. Select your product, type, model, and operating system, and then click **Go**. Click the **Download** tab, if necessary, for device driver and firmware updates.

Note: Changes are made periodically to the IBM Web site. Procedures for locating firmware and documentation might vary slightly from what is described in this documentation.

Print Table 1 on page 2 and use it to record information about your blade server.

You will need this information when you register the blade server with IBM. You can register the blade server at <http://www.ibm.com/support/mysupport/>.

Table 1 on page 2 includes a place for you to record the PS701 and PS702 vital product data.

To determine the values for your PS701 and PS702 blade server, use the management module and the **lsvpd** command. If you are running Linux, download and install the service and productivity tools for Linux on POWER systems to install the **lsvpd** command.

Table 1. PS701 and PS702 vital product data

Vital product data field	Vital product data	How to find this data
Product name	BladeCenter PS701 and PS702	
Type model number	8406-71Y	Advanced management module HW VPD
Serial number	_____ (7 characters)	Advanced management module HW VPD
System unique ID	_____ (12 characters)	lsvdp grep SU command
WorldWide port number	_____ (12 characters)	lsvdp grep WN command
Brand	B0 (B followed by zero)	lsvdp grep BR command

The model number and serial number are on the ID label that is behind the control panel door on the front of the blade server, and on a label on the side of the blade server that is visible when the blade server is not in the BladeCenter unit.

A set of blank labels comes with the blade server. When you install the blade server in the BladeCenter unit, write identifying information on a label and place the label on the BladeCenter unit bezel. See the documentation for your BladeCenter unit for recommended label placement.

Important: Do not place the label where it will block any ventilation holes on the blade server or the BladeCenter unit.

Related documentation

Documentation for the PS701 and PS702 blade server includes documents in Portable Document Format (PDF) on the IBM *BladeCenter Documentation* CD and the online information center.

The most recent version of all BladeCenter documentation is in the BladeCenter information center.

The online BladeCenter information center is available in the IBM BladeCenter Information Center at <http://publib.boulder.ibm.com/infocenter/bladectr/documentation/index.jsp>.

PDF versions of the following documents are on the IBM *BladeCenter Documentation* CD and in the online information center:

- *Problem Determination and Service Guide*

This document contains information to help you solve problems yourself, and it contains information for service technicians.

- *Safety Information*

This document contains translated caution and danger statements. Each caution and danger statement that appears in the documentation has a number that you can use to locate the corresponding statement in your language in the *Safety Information* document.

- *Warranty and Support Information*

This document contains information about the terms of the warranty and about getting service and assistance.

Additional documents might be included in the online information center and on the IBM *BladeCenter Documentation* CD.

The blade server might have features that are not described in the documentation that comes with the blade server. Occasional updates to the documentation might include information about those features, or technical updates might be available to provide additional information that is not included in the documentation that comes with the blade server.

Review the online information or the *Planning Guide* and the *Installation Guide* for your IBM BladeCenter unit. The information can help you prepare for system installation and configuration. The most current version of each document is available in the BladeCenter information center.

The IBM Documentation CD

You can run the IBM *BladeCenter Documentation* CD on any personal computer that meets the hardware and software requirements.

The IBM *BladeCenter Documentation* CD contains documentation for your blade server in Portable Document Format (PDF) and includes the IBM Documentation Browser to help you find information quickly.

Hardware and software requirements

The IBM *BladeCenter Documentation* CD requires the following minimum hardware and software levels.

- Microsoft Windows XP, Windows 2000, or Red Hat Linux
- 100 MHz microprocessor
- 32 MB of RAM
- Adobe Acrobat Reader 3.0 (or later) or xpdf, which comes with Linux operating systems

Using the Documentation Browser

Use the Documentation Browser to browse the contents of the CD, read brief descriptions of the documents, and view documents, using Adobe Acrobat Reader or xpdf.

The Documentation Browser automatically detects the regional settings in your system and displays the documents in the language for that region (if available). If a document is not available in the language for that region, the English-language version is displayed.

Use one of the following procedures to start the Documentation Browser:

- If Autostart is enabled, insert the CD into the CD or DVD drive. The Documentation Browser starts automatically.
- If Autostart is disabled or is not enabled for all users, use one of the following procedures:
 - If you are using a Windows operating system, insert the CD into the CD or DVD drive and click **Start --> Run**. In the **Open** field, type
`e:\win32.bat`
where *e* is the drive letter of the CD or DVD drive, and click **OK**.
 - If you are using Red Hat Linux, insert the CD into the CD or DVD drive; then, run the following command from the `/mnt/cdrom` directory:
`sh runlinux.sh`

Select the blade server from the **Product** menu. The **Available Topics** list displays all the documents for the blade server. Some documents might be in folders. A plus sign (+) indicates each folder or document that has additional documents under it. Click the plus sign to display the additional documents.

When you select a document, a description of the document is displayed under **Topic Description**. To select more than one document, press and hold the Ctrl key while you select the documents. Click **View Book** to view the selected document or documents in Acrobat Reader or xpdf. If you selected more than one document, all the selected documents are opened in Acrobat Reader or xpdf.

To search all the documents, type a word or word string in the **Search** field and click **Search**. The documents in which the word or word string occurs are listed in order of the most occurrences. Click a document to view it, and press Ctrl+F to use the Acrobat search function, or press Alt+F to use the xpdf search function within the document.

Click **Help** for detailed information about using the Documentation Browser.

Notices and statements

The caution and danger statements in this document are also in the multilingual *Safety Information*. Each statement is numbered for reference to the corresponding statement in your language in the *Safety Information* document.

The following notices and statements are used in this document:

- **Note:** These notices provide important tips, guidance, or advice.
- **Important:** These notices provide information or advice that might help you avoid inconvenient or problem situations.
- **Attention:** These notices indicate potential damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage might occur.
- **Caution:** These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.
- **Danger:** These statements indicate situations that can be potentially lethal or extremely hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

Features and specifications

Features and specifications of the IBM BladeCenter PS701 and PS702 blade server is summarized in this overview.

The PS701 is a single-wide (expandable) blade server. The PS702 is the double-wide SMP unit (FC 8358). The PS701 and PS702 blade server is used in an IBM BladeCenter H (8852 and 7989), BladeCenter HT (8740 and 8750), or BladeCenter S (8886 and 7779) chassis unit.

Notes:

- Power, cooling, removable-media drives, external ports, and advanced system management are provided by the BladeCenter unit.
- The operating system in the blade server must provide support for the Universal Serial Bus (USB), to enable the blade server to recognize and communicate internally with the removable-media drives and front-panel USB ports.

<p>Core electronics:</p> <p>64-bit POWER7 processors (12S technology)</p> <p>PS701 single-wide model:</p> <ul style="list-style-type: none"> • 8-way single wide blade: 1 Socket 8 core@ 3.0 GHz • 16 very low profile (VLP) DIMM slots. Max capacity is 128 GB maximum. Supports 4 GB DDR3 at 1066MHz, and 8 GB DDR3 at 800HMz <p>PS702 double-wide model:</p> <ul style="list-style-type: none"> • 16-way double wide: 8-way base with 8-way expansion (FC 8358) • 32 very low profile (VLP) DIMM slots. Max capacity is 256 GB maximum. Supports 4 GB DDR3 at 1066MHz, and 8 GB DDR3 at 800HMz <p>P5IOC2 I/O hub</p> <p>On-board, integrated features:</p> <ul style="list-style-type: none"> • FSP1 Service Processor - IPMI, SOL • Two 1 GB Ethernet ports (HEA) (two on each side) • SAS controller • USB 2.0 • 1 Serial over LAN (SOL) console using FSP <p>Local Storage:</p> <ul style="list-style-type: none"> • First DASD bay: zero or one 2.5" SAS HDD • SAS HDDs are 300 GB and 600 GB • Hardware mirroring <p>Daughter card I/O options:</p> <ul style="list-style-type: none"> • 1 1Xe expansion card (CIOv) • SAS Pass-through using 1Xe • 1 High-Speed expansion card (CFFh) 	<p>Integrated functions:</p> <ul style="list-style-type: none"> • RS-485 interface for communication with the management module • Automatic server restart (ASR) • SOL through FSP • Two Universal Serial Bus (USB 2.0) buses on base planar for communication with removable-media drives • Optical media available by shared chassis feature <p>Environment:</p> <ul style="list-style-type: none"> • Air temperature: <ul style="list-style-type: none"> – Blade server on: 10° to 35°C (50° to 95°F). Altitude: 0 to 914 m (3000 ft) – Blade server on: 10° to 32°C (50° to 90°F). Altitude: 914 m to 2133 m (3000 ft to 7000 ft) – Blade server off: -40° to 60°C (-40° to 140°F) • Humidity: <ul style="list-style-type: none"> – Blade server on: 8% to 80% – Blade server off: 8% to 80% <p>PS701 and PS702 Size:</p> <ul style="list-style-type: none"> • Height: 24.5 cm (9.7 inches) • Depth: 44.6 cm (17.6 inches) • PS701: Width: 30 mm (1.14 inches) • PS702: 60 mm (2.28 inches) 	<p>Systems management:</p> <ul style="list-style-type: none"> • Supported by BladeCenter chassis management module • Front panel LEDs • IBM Director • Hardware Management Console (HMC) • Integrated Virtualization Manager (IVM) • Energy Scale thermal management for power management/ oversubscription (throttling) and environmental sensing • Active Energy Manager <p>Clusters support for:</p> <ul style="list-style-type: none"> • IBM Director • xCat <p>Virtualization support for:</p> <p>PowerVM® Standard Edition hardware feature, which provides the Integrated Virtualization Manager, Virtual I/O Server, and Director Power Systems™ Manager (DPSM).</p> <p>No HMC support</p> <p>Reliability and service features:</p> <ul style="list-style-type: none"> • Dual alternating current power supply • BladeCenter chassis redundant and hot plug power and cooling modules • Boot-time processor deallocation • Blade server hot plug • Customer setup and expansion • Automatic reboot on power loss • Internal and ambient temperature monitors • ECC, chipkill memory • System management alerts <p>Electrical input: 12 V dc</p>
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See the ServerProven Web site for information about supported operating-system versions and all PS700 blade server optional devices.

What your blade server offers

The design of the blade server takes advantage of advancements in chip technology, memory management, and data storage.

The blade server uses the following features and technologies:

- **Baseboard management controller (BMC)**

The enhanced BMC for the PS701 and PS702 blade server is a flexible service processor that provides support for the following functions:

- Alert Standard Format (ASF) and RS-485 interfaces to the management modules
- Intelligent Platform Management Interface (IPMI)
- The operating system
- Power control and advanced power management
- Reliability, availability, and serviceability (RAS) features
- Serial over LAN (SOL)
- Continuous health monitoring and control
- Configurable notification and alerts
- Event logs that are time stamped and saved in nonvolatile memory and that can be attached to e-mail alerts
- Point-to-point protocol (PPP) support
- Remote power control
- Remote firmware update and access to critical blade server settings

- **Disk drive support**

The blade server supports the following:

- First DASD bay: zero or one 2.5" SAS HDD
- Second DASD bay: zero or one 2.5" SAS HDD

- **IBM Director**

IBM Director is a workgroup-hardware-management tool that you can use to centrally manage PS701 and PS702 blade server, including updating the PS701 and PS702 firmware.

For more information, see the IBM Director documentation on the *IBM Director* CD.

- **Impressive performance using the latest microprocessor technology**

The blade server comes with one POWER7[®] microprocessors.

- **Integrated network support**

The blade server has two integrated (onboard) 1 gigabit-per-second (Gbps) Host Ethernet Adapter (HEA) controllers that provide advanced acceleration features, such as checksum offload, TCP large send, and jumbo frames. Capabilities include virtualized adapter sharing among logical partitions that does not require the shared Ethernet adapters of Virtual I/O Server. TCP advanced features include hardware de-multiplexing and per connection queues.

- **I/O expansion**

The blade server has connectors on the system board for optional 1Xe and High Speed expansion cards, such as Fibre Channel and InfiniBand expansion cards, for adding more network communication capabilities to the blade server.

- **Large system memory capacity**

The memory bus in the PS701 and PS702 Type 8406 server supports up to 64 GB of system memory. For the official list of supported DIMMs, see the ServerProven Web site at <http://www.ibm.com/servers/eserver/serverproven/compat/us/>.

- **Light path diagnostics**

Light path diagnostics provides light-emitting diodes (LEDs) to help you diagnose problems. An LED on the blade server control panel is lit if an unusual condition or a problem occurs. If this happens, you can look at the LEDs on the system board to locate the source of the problem.

For more information, see the online information or the *Problem Determination and Service Guide*.

- **Power throttling**

If your BladeCenter unit supports power management, the power consumption of the blade server can be dynamically managed through the management module. For more information, see the online management-module documentation or the IBM support site at <http://www.ibm.com/systems/support/>.

Reliability, availability, and serviceability features

Three of the most important features in server design are reliability, availability, and serviceability (RAS). The reliability of the BladeCenter PS701 and PS702 blade server starts with components, devices, and subsystems that are fault tolerant.

Reliability, availability, and serviceability protect the integrity of the data that is stored in the blade server, maintain the availability of the blade server when you need it, and enhance the ease with which you can diagnose and correct problems.

Component-level RAS features

The blade server has the following component-level RAS features:

- Alternate processor recovery
- Bit steering
- Chipkill memory for dual inline memory modules (DIMMs)
- Diagnostic support of Ethernet controllers
- Dual inline memory module (DIMM) failure isolation
 - DIMM pair identification through unrecoverable error (UE) checkpointing and message-related recovery actions
 - Single DIMM identification through recoverable component error (CE) checkpointing and gardening
- Dynamic deallocation (runtime POWER7 gardening of microprocessor and memory)
- L2 cache line delete
- Memory chip kill - Chipkill memory for DIMMs
- Memory Predictive Failure Analysis (PFA) alerts through scrubbing and error-checking and correction (ECC)
- Memory scrubbing
- Peripheral component interconnect (PCI) bus parity, ECRC, and surprise link down
- PFA thresholding of correctable hardware errors of the microprocessors and L2 cache
- Processor runtime diagnostics (PRD) that initiates the following actions to recover from errors:
 - Self-healing, such as redundant bit steering for memory
 - Deallocation at runtime of a failing resource, such as a processor core, a memory page
 - Identifying parts for service
 - Runtime error persistent deallocation, if necessary, for I-Cash, D-cash, L2 cache, L3 cache
 - Transparent microprocessor hardware error recovery (for example, for L2 cache errors)
- Single processor checkstop (including a partition checkstop)

Blade-level RAS features

The blade server has the following blade-level RAS features:

- Automatic service processor reset and reload recovery for service processor errors
- Automatic server recovery and restart that provides automatic reboot after boot hangs or detection of checkstop conditions
- Automatic server restart (ASR)
- Built-in monitoring for temperature, voltage, hard disk drives, and flash drives
- Call Home
- Checkstop analysis
- Checkstop detection with automated restart
- Customer-upgradeable basic input/output system (BIOS) code (firmware code)
- Customer support center 24 hours per day, 7 days a week¹
- Degraded boot support (memory and microprocessors)
- Repeat Gard
- Extended Error Handling (EEH) for PCI host and root complex, PCIe link, and PCI adapter failures
- Emergency power off (EPOW) for the blade server and expansion cards
- Environmental monitors and alerts
- Error codes and messages
- ECC memory
- Failover Ethernet support
- First Failure Data Capture (FFDC) for determining failure root cause
- Service processor communication with the management module to enable remote blade server management
- Light emitting diodes (LEDs) for identifying failing customer replaceable units (CRUs) or field replaceable units (FRUs)
- Light path diagnostics
- POWER7 RAS design and objectives
- POWER7 Hypervisor (PHYP) partition recovery or partition termination when unrecoverable errors occur
- Power-on self-test (POST)
- SDRAM with serial presence detect (SPD) and vital product data (VPD)
- System error logging
- System Management Services (SMS) menu support
- System-wide checkstop
- Vital product data (VPD) unique identifiers on blade server and all major electronic components with information stored in nonvolatile memory for remote viewing

1. Service availability will vary by country. Response time will vary depending on the number and nature of incoming calls.

BladeCenter unit-level RAS features

The BladeCenter unit provides the following RAS features:

- Power-supply error detection
- Redundant power supplies
- Remote power control
- Management-module system-event log
- Redundant blowers, I/O modules (switches)
- Hot plug of BladeCenter CRUs (blowers, switches, power supplies)

IBM Director

Use IBM Director to perform network and system management tasks.

With IBM Director, a network administrator can perform the following tasks:

- View the hardware configuration of remote systems, in detail
- Monitor the usage and performance of critical components, such as microprocessors, disks, and memory
- Centrally manage individual or large groups of IBM and non-IBM x86-processor-based servers, desktop computers, workstations, and notebook computers on a variety of platforms

IBM Director provides a comprehensive entry-level workgroup hardware manager. It includes the following key features:

- Advanced self-management capabilities for maximum system availability.
- Multiple operating-system platform support, including Microsoft Windows Server 2003, Windows 2000 Server, Windows XP Professional, Red Hat Linux, SUSE Linux, VMware, Novell NetWare, AIX®, and IBM i operating system (formerly known as i5/OS™). For a complete list of operating systems that support IBM Director, see the IBM Director Compatibility Document. This document is in Portable Document Format (PDF) at <http://www.ibm.com/systems/management/director/resources>. It is updated every 6 to 8 weeks.
- Support for IBM and non-IBM servers, desktop computers, workstations, and notebook computers.
- Support for systems-management industry standards.
- Integration into leading workgroup and enterprise systems-management environments.
- Ease of use, training, and setup.

IBM Director also provides an extensible platform that supports advanced server tools that are designed to reduce the total cost of managing and supporting networked systems. By deploying IBM Director, you can achieve reductions in ownership costs through the following benefits:

- Reduced downtime
- Increased productivity of IT personnel and users
- Reduced service and support costs

Chapter 2. Power, controls, indicators, and connectors

You can use the control panel to turn the blade server on or off and to view some controls and indicators. Other indicators are on the system board. The system board also has connectors for various components.

Blade server control panel buttons and LEDs

Blade server control panel buttons and LEDs provide operational controls and status indicators.

Note: Figure 1 shows the control-panel door in the closed (normal) position. To access the power-control button, you must open the control-panel door.

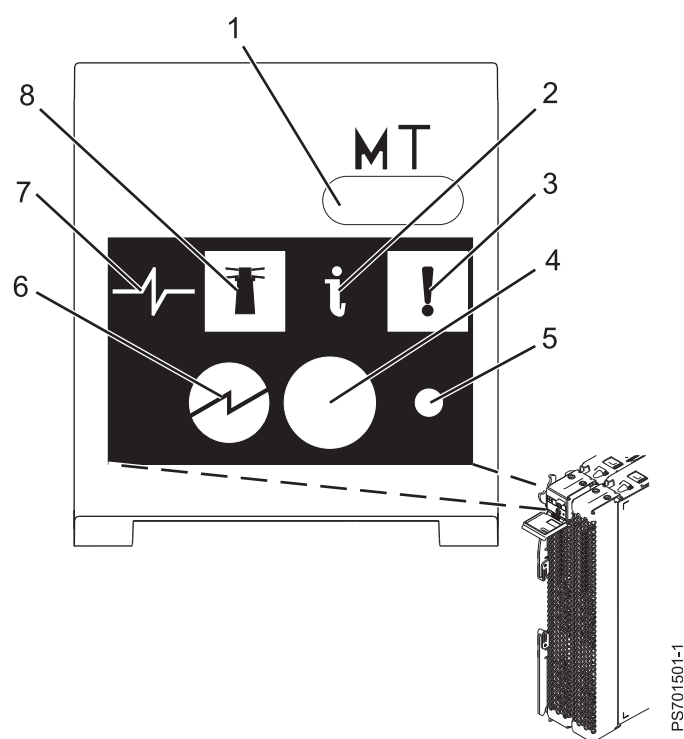


Figure 1. Blade server control panel buttons and LEDs

1 Media-tray select button: Press this button to associate the shared BladeCenter unit media tray (removable-media drives and front-panel USB ports) with the blade server. The LED on the button flashes while the request is being processed, then is lit when the ownership of the media tray has been transferred to the blade server. It can take approximately 20 seconds for the operating system in the blade server to recognize the media tray.

If there is no response when you press the media-tray select button, use the management module to determine whether local control has been disabled on the blade server.

Note: The operating system in the blade server must provide USB support for the blade server to recognize and use the removable-media drives and USB ports.

2 Information LED: When this amber LED is lit, it indicates that information about a system error for the blade server has been placed in the management-module event log. The information LED can be turned off through the Web interface of the management module or through IBM Director Console.

3 Blade-error LED: When this amber LED is lit, it indicates that a system error has occurred in the blade server. The blade-error LED will turn off after one of the following events:

- Correcting the error
- Reseating the blade server in the BladeCenter unit
- Cycling the BladeCenter unit power

4 Power-control button: This button is behind the control panel door. Press this button to turn on or turn off the blade server.

The power-control button has effect only if local power control is enabled for the blade server. Local power control is enabled and disabled through the Web interface of the management module.

Press the power button for 5 seconds to begin powering down the blade server.

5 NMI reset (recessed): The nonmaskable interrupt (NMI) reset dumps the partition. Use this recessed button only as directed by IBM Support.

6 Power-on LED: This green LED indicates the power status of the blade server in the following manner:

- Flashing rapidly: The service processor is initializing the blade server.
- Flashing slowly: The blade server has completed initialization and is waiting for a power-on command.
- Lit continuously: The blade server has power and is turned on.

Note: The enhanced service processor can take as long as three minutes to initialize after you install the BladeCenter PS701 and PS702 blade server, at which point the LED begins to flash slowly.

7 Activity LED: When this green LED is lit, it indicates that there is activity on the hard disk drive or network.

8 Location LED: When this blue LED is lit, it has been turned on by the system administrator to aid in visually locating the blade server. The location LED can be turned off through the Web interface of the management module or through IBM Director Console.

Turning on the blade server

After you connect the blade server to power through the BladeCenter unit, you can start the blade server after the discovery and initialization process is complete.

You can start the blade server in any of the following ways.

- Start the blade server by pressing the power-control button on the front of the blade server.

The power-control button is behind the control panel door, as described in “Blade server control panel buttons and LEDs” on page 11.

After you push the power-control button, the power-on LED continues to blink slowly for about 15 seconds, then is lit solidly when the power-on process is complete.

Wait until the power-on LED on the blade server flashes slowly before you press the blade server power-control button. If the power-on LED is flashing rapidly, the service processor is initializing the blade server. The power-control button does not respond during initialization.

Note: The enhanced service processor can take as long as three minutes to initialize after you install the BladeCenter PS701 and PS702 blade server, at which point the LED begins to flash slowly.

- Start the blade server automatically when power is restored after a power failure.

If a power failure occurs, the BladeCenter unit and then the blade server can start automatically when power is restored. You must configure the blade server to restart through the management module.

- Start the blade server remotely using the management module.

After you initiate the power-on process, the power-on LED blinks slowly for about 15 seconds, then is lit solidly when the power-on process is complete.

Turning off the blade server

When you turn off the blade server, it is still connected to power through the BladeCenter unit. The blade server can respond to requests from the service processor, such as a remote request to turn on the blade server. To remove all power from the blade server, you must remove it from the BladeCenter unit.

Shut down the operating system before you turn off the blade server. See the operating-system documentation for information about shutting down the operating system.

You can turn off the blade server in one of the following ways.

- Turn off the blade server by pressing the power-control button for at least 5 seconds.
The power-control button is on the blade server behind the control panel door. See “Blade server control panel buttons and LEDs” on page 11 for the location.

Note: The power-control LED can remain on solidly for up to 1 minute after you push the power-control button. After you turn off the blade server, wait until the power-control LED is blinking slowly before you press the power-control button to turn on the blade server again.

If the operating system stops functioning, press and hold the power-control button for more than 5 seconds to force the blade server to turn off.

- Use the management module to turn off the blade server.

The power-control LED can remain on solidly for up to 1 minute after you initiate the power-off process. After you turn off the blade server, wait until the power-control LED is blinking slowly before you initiate the power-on process from the AMM to turn on the blade server again.

Use the management-module Web interface to configure the management module to turn off the blade server if the system is not operating correctly.

For additional information, see the online documentation or the *User's Guide* for the management module.

System-board layouts

Illustrations show the connectors and LEDs on the system board. The illustrations might differ slightly from your hardware.

System-board connectors

Blade server components attach to the connectors on the system board.

Figure 2 shows the connectors on the base unit system board in the blade server.

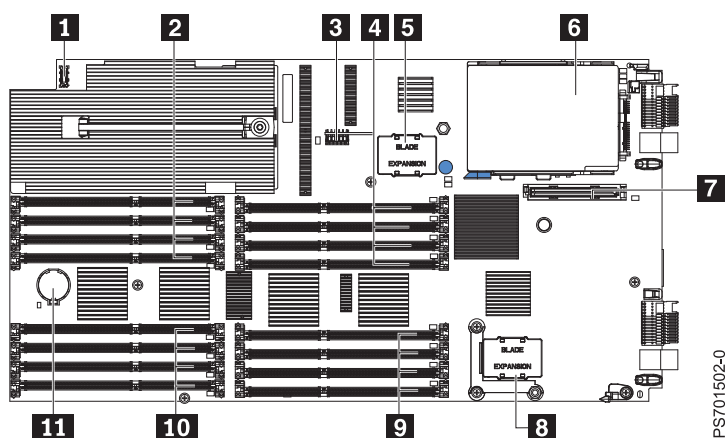


Figure 2. PS701 system-board connectors

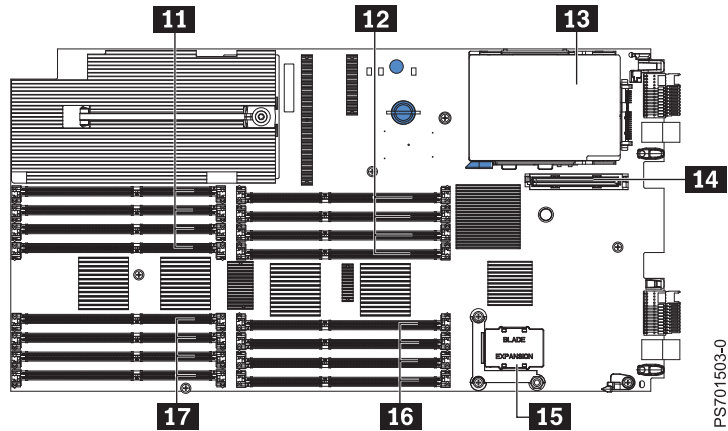


Figure 3. PS702 expansion unit system-board connectors

Table 2 shows connector descriptions.

Table 2. PS701 and PS702 connectors

Callout	PS701 and PS702 blade server connectors
1	Operator panel connector
2	DIMM 1-4 connectors (See Figure 4 on page 16 for individual connectors.)
3	Management card connector (P1-C17)
4	DIMM 9-12 connectors (See Figure 4 on page 16 for individual connectors.) SAS hard disk drive connector (Px-D1)
5	Expansion card connector
6	HDD carrier
7	CIOv (1Xe) expansion card connector (Px-C19)
8	High-Speed (CFFh) expansion card connector (Px-C20)
9	DIMM 13-16 connectors (See Figure 4 on page 16 for individual connectors.)
10	DIMM 5-8 connectors (See Figure 4 on page 16 for individual connectors.)
11	3V lithium battery connector (P1-E1)
12	DIMM 17-20 connectors (See Figure 4 on page 16 for individual connectors.)
13	DIMM 21-24 connectors (See Figure 4 on page 16 for individual connectors.)
14	HDD carrier
15	CIOv (1Xe) expansion card connector (Px-C19)
16	High-Speed (CFFh) expansion card connector (Px-C20)
17	DIMM 25-28 connectors (See Figure 4 on page 16 for individual connectors.)
18	DIMM 29-32 connectors (See Figure 4 on page 16 for individual connectors.)

Figure 4 on page 16 shows individual DIMM connectors. The numbers in parentheses are for the PS702 expansion unit system board.

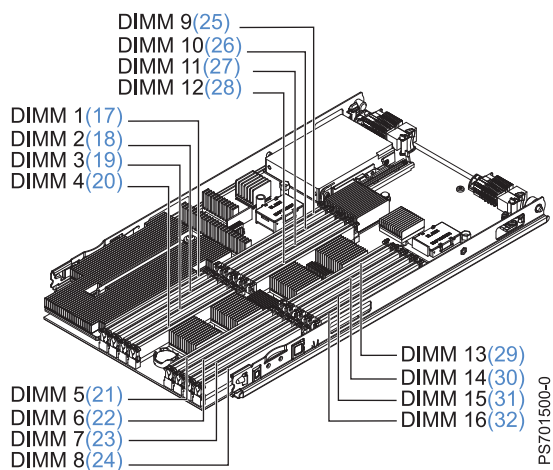


Figure 4. DIMM connectors. Base unit connectors

System-board LEDs

Use the illustration of the LEDs on the system board to identify a light emitting diode (LED).

Remove the blade server from the BladeCenter unit, open the cover, press the blue button to see any error LEDs that were turned on during error processing, and use Figure 5 to identify the failing component.

If the "Check card below LED" is lit on the expansion unit system board, remove the expansion unit and push the blue button on the base unit system board to view LEDs on the system board of the base unit.

Figure 5 shows LEDs on the PS701 blade server.

Figure 6 on page 17 shows LEDs on the PS702 expansion unit.

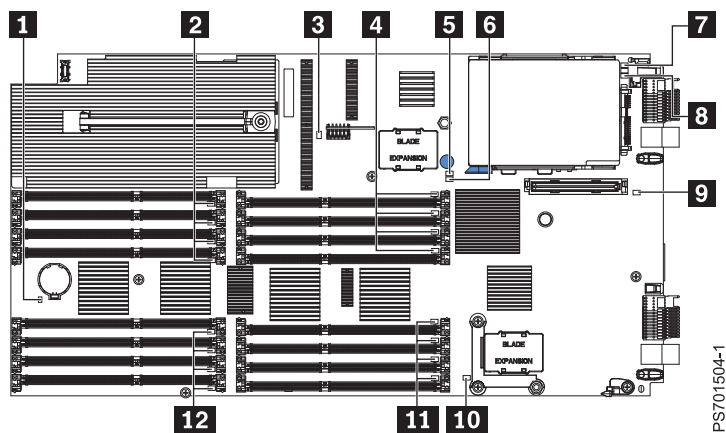


Figure 5. LED locations on the system board of the PS701 blade server

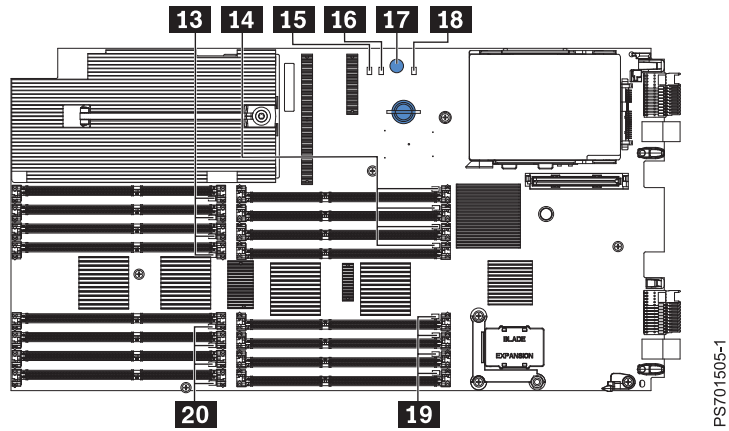


Figure 6. LED locations on the system board of the PS702 expansion unit

Table 3 shows LED descriptions.

Table 3. PS701 and PS702 LEDs

Callout	Unit LEDs
1	3V lithium battery LED
2	DIMM 1-4 LEDs
3	Management card LED
4	DIMM 9-12 LEDs
5	Light path power LED
6	System board LED
7	HDD LED (Px-C18-D1)
8	Interposer LED (Px-C18)
9	CIOv (1Xe) expansion card connector LED (Px-C19)
10	High-Speed (CFFh) expansion card connector LED (Px-C20)
11	DIMM 13-16 LEDs
12	DIMM 5-8 LEDs
13	DIMM 17-20 LEDs
14	DIMM 25-28 LEDs
15	System board LED
16	Light path power LED
17	Light path blue button
18	Check card below LED
19	DIMM 29-32 LEDs
20	DIMM 21-24 LEDs

Chapter 3. Installing and removing options

Install or remove hardware options, such as memory modules or input/output expansion cards. Some installation procedures require you to remove an installed option.

Installation guidelines

Follow these guidelines to remove and replace blade server components.

- Read the safety information in the Safety topic and the guidelines in “Handling static-sensitive devices” on page 20. This information will help you work safely.
- When you install a new blade server, download and apply the most recent firmware updates.

Download and install updated device drivers and the PS700 firmware. Go to the IBM Support site to download the updates. Select your product, type, model, and operating system, and then click **Go**. Click the **Download** tab, if necessary, for device driver and firmware updates.

Note: Changes are made periodically to the IBM Web site. Procedures for locating firmware and documentation might vary slightly from what is described in this documentation.

- Observe good housekeeping in the area where you are working. Place removed covers and other parts in a safe place.
- Back up all important data before you make changes to disk drives.
- Before you remove a hot-swap blade server from the BladeCenter unit, you must shut down the operating system and turn off the blade server. You do not have to shut down the BladeCenter unit itself.
- Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the blade server, open or close a latch, and so on.
- Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that if the blade server and operating system support hot-swap capability, you can remove or install the component while the blade server is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
- When you are finished working on the blade server, reinstall all safety shields, guards, labels, and ground wires.

See the ServerProven Web site for information about supported operating-system versions and all PS700 blade server optional devices.

System reliability guidelines

Follow these guidelines to help ensure proper cooling and system reliability.

- Verify that the ventilation holes on the blade server are not blocked.
- Verify that you are maintaining proper system cooling in the unit.
Do not operate the BladeCenter unit without a blade server, expansion unit, or filler blade installed in each blade bay. See the documentation for your BladeCenter unit for additional information.
- Verify that you have followed the reliability guidelines for the BladeCenter unit.
- Verify that the blade server battery is operational. If the battery becomes defective, replace it immediately, as described in the *Problem Determination and Service Guide*.

Handling static-sensitive devices

Static electricity can damage the blade server and other electronic devices. To avoid damage, keep static-sensitive devices in their static-protective packages until you are ready to install them.

Attention:

To reduce the possibility of damage from electrostatic discharge, observe the following precautions:

- Limit your movement. Movement can cause static electricity to build up around you.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed circuitry.
- Do not leave the device where others can handle and damage it.
- While the device is still in its static-protective package, touch it to an unpainted metal part of the BladeCenter unit or any unpainted metal surface on any other grounded rack component in the rack you are installing the device in for at least 2 seconds. This drains static electricity from the package and from your body.
- Remove the device from its package and install it directly into the blade server without setting down the device. If it is necessary to set down the device, put it back into its static-protective package. Do not place the device on the blade server cover or on a metal surface.
- Take additional care when handling devices during cold weather. Heating dry winter air further reduces its humidity and increases static electricity.

Removing the blade server from a BladeCenter unit

Remove the blade server from the BladeCenter unit to access options, connectors, and system-board indicators.

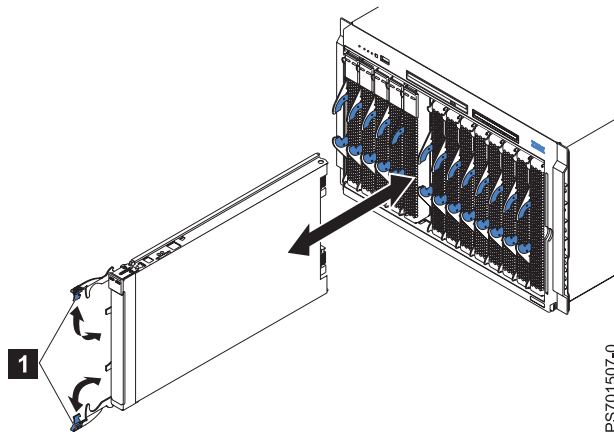


Figure 7. Removing the blade server from the BladeCenter unit

Attention:

- To maintain proper system cooling, do not operate the BladeCenter unit without a blade server, expansion unit, or blade filler installed in each blade bay.
- When you remove the blade server, note the bay number. Reinstalling a blade server into a different bay from the one where it was removed might have unintended consequences. Some configuration information and update options are established according to bay numbers. If you reinstall the blade server into a different bay, you might have to reconfigure the blade server.

Perform the following procedure to remove the blade server.

1. Read the Safety topic and the “Installation guidelines” on page 19.
2. If the blade server is operating, shut down the operating system.
3. Press the power-control button (behind the control-panel door) to turn off the blade server. See “Turning off the blade server” on page 13.
4. Wait at least 30 seconds for the hard disk drive to stop spinning.
5. Open the two release handles, as shown by **1** in Figure 7. The blade server moves out of the bay approximately 0.6 cm (0.25 inch).
6. Pull the blade server out of the bay. Spring-loaded doors farther back in the bay move into place to cover the bay temporarily.
7. Carefully lay the blade server on a flat, static-protective surface, with the cover side up.
8. Place either a blade filler or another blade server in the bay within 1 minute. The recessed spring-loaded doors move out of the way as you insert the blade server or filler blade.

Removing the blade server cover

Remove the blade server from the chassis unit and press the blade server cover releases to open and remove the blade server cover.

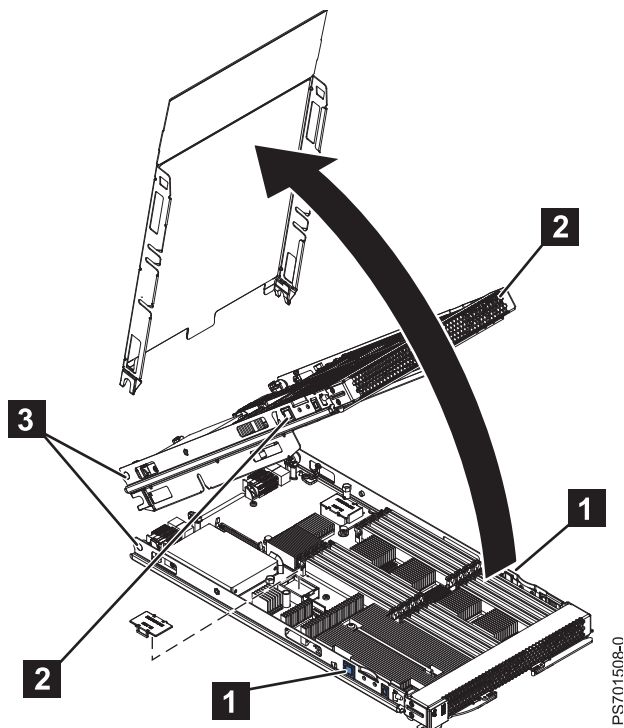


Figure 8. Removing the cover

Perform the following procedure to open and remove the blade server cover.

1. Read the Safety topic and the "Installation guidelines" on page 19.
2. Shut down the operating system, turn off the blade server, and remove the blade server from the BladeCenter unit. See "Removing the blade server from a BladeCenter unit" on page 20.
3. Carefully lay the blade server on a flat, static-protective surface, with the cover side up.
4. Press the blade-cover release (as shown by **1** for the base unit and by **2** for the expansion unit in Figure 8) on each side of the blade server, rotate the cover on the cover pins (**3**) and lift the cover open.
5. Lay the cover flat, or lift it from the cover pins on the blade server and store the cover for future use.

Statement 21



CAUTION:

Hazardous energy is present when the blade server is connected to the power source. Always replace the blade server cover before installing the blade server.

Removing the expansion unit

Remove the expansion unit to operate the PS702 blade server as a PS701 single-width blade server.

1. Read the Safety topic and the “Installation guidelines” on page 19.
2. Shut down the operating system, turn off the blade server, and remove the blade server from the BladeCenter unit. See “Removing the blade server from a BladeCenter unit” on page 20.
3. Carefully lay the blade server on a flat, static-protective surface, with the cover side up.
4. Open and remove the blade server cover. See “Removing the blade server cover” on page 22.
5. Use your thumb to back out the expansion blade retention thumb screw (**4**) by rotating the screw counterclockwise until the connection between the expansion unit and the base unit is loose and the expansion unit is fully separated from the base unit.

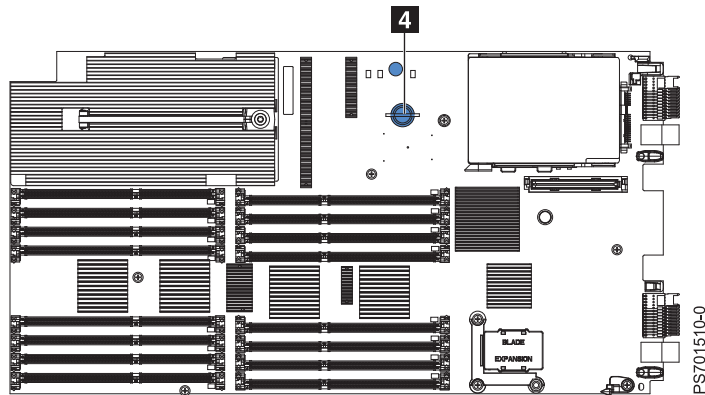


Figure 9. Removing the expansion unit

6. Pivot the expansion unit (**1** in Figure 10 on page 24) up on the cover pins of the base unit (**2**).

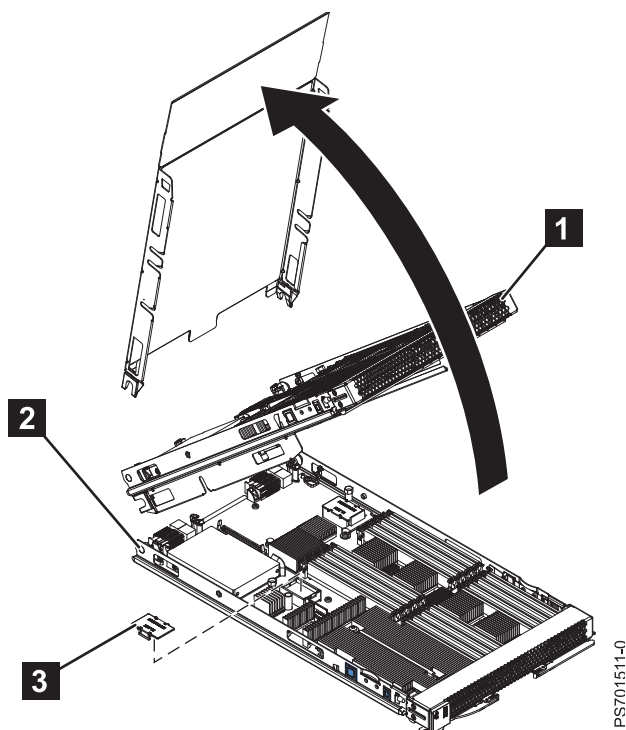


Figure 10. Removing the expansion unit

7. Lift the expansion unit (**1** in Figure 10) from the blade server base unit and store it for future use.
8. If you are not installing another expansion unit, replace the expansion connector cover (**3** in Figure 10).
9. If you are instructed to return the expansion unit, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the expansion unit

Install the expansion unit to operate the PS701 blade server as a PS702 double-width blade server.

1. Read the Safety topic and the “Installation guidelines” on page 19.
2. Shut down the operating system, turn off the blade server, and remove the blade server from the BladeCenter unit. See “Removing the blade server from a BladeCenter unit” on page 20.
3. Carefully lay the blade server on a flat, static-protective surface, with the cover side up.
4. Open and remove the blade server cover. See “Removing the blade server cover” on page 22.
5. Remove the expansion connector cover, as shown by **1** in Figure 11 on page 25.

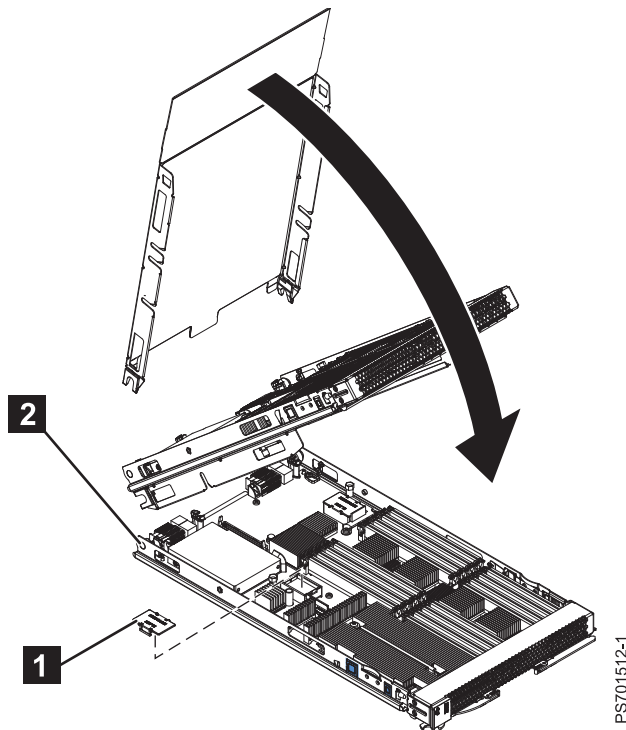


Figure 11. Installing the expansion unit

6. Lift the expansion unit above the blade server base unit and engage the circular pivot bearings onto the cover pins (**2**) of the base unit.
The expansion unit of the PS702 blade server fits on top of the base unit, with the DIMM slots and expansion card slots on top.
7. Pivot the expansion unit on the cover pins of the base unit and lower the expansion unit until it lies flat on the base unit.
8. To access the expansion blade retention thumb screw (shown by **4** in Figure 12).

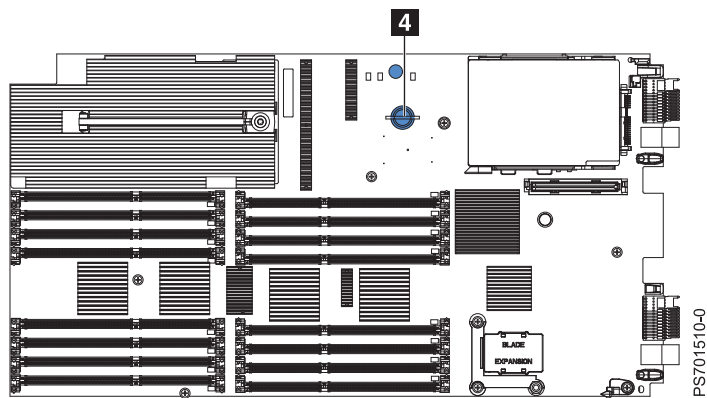


Figure 12. Expansion blade retention screw

9. Tighten the thumb screw (**4**) by rotating the screw clockwise until the connection between the expansion unit and the base unit is secure. Stop tightening when firm resistance is detected.
10. Install and close the blade server cover. See “Installing and closing the blade server cover” on page 37.

Statement 21



CAUTION:

Hazardous energy is present when the blade server is connected to the power source. Always replace the blade server cover before installing the blade server.

11. Install the blade server into the BladeCenter unit. See “Installing the blade server in a BladeCenter unit” on page 39.

Removing a drive

You can remove the SAS hard disk drive in either the base unit or the expansion unit.

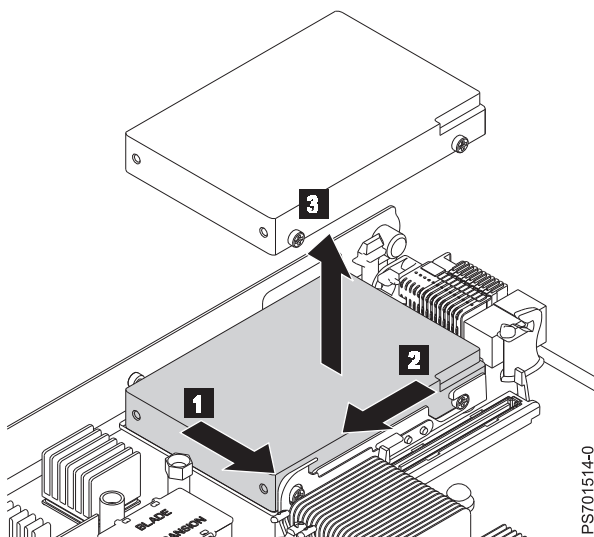


Figure 13. Removing a drive

Perform the following procedure to remove the drive.

1. Back up the data from the drive to another storage device.
2. Read the Safety topic and the “Installation guidelines” on page 19.
3. Shut down the operating system, turn off the blade server, and remove the blade server from the BladeCenter unit. See “Removing the blade server from a BladeCenter unit” on page 20.

4. Carefully lay the blade server on a flat, static-protective surface, with the cover side up.
5. Open and remove the blade server cover. See “Removing the blade server cover” on page 22.
6. Remove the drive:
 - a. Pull and hold the blue release lever **1** at the front of the drive tray.
 - b. Slide the drive forward **2** to disengage the connector.
 - c. Lift the drive **3** out of the drive tray.

Installing a drive

You can install a hard disk drive in the base unit and another one in the expansion unit.

Figure 14 shows how to install the disk drive.

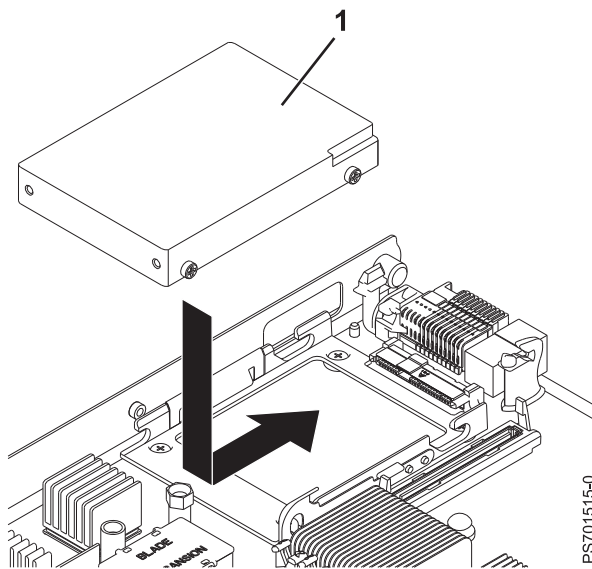


Figure 14. Installing a drive

All drive connectors are on the same bus. If the two drives are both SAS hard disk drives, you can use them to implement and manage a redundant array of independent disks (RAID) level-1 array. See *Configuring a RAID array* for information about RAID configuration.

To install a drive, complete the following steps.

1. Read the Safety topic and the “Installation guidelines” on page 19.
2. Shut down the operating system, turn off the blade server, and remove the blade server from the BladeCenter unit. See “Removing the blade server from a BladeCenter unit” on page 20.
3. Carefully lay the blade server on a flat, static-protective surface, with the cover side up.
4. Open and remove the blade server cover. See “Removing the blade server cover” on page 22.

5. Locate the connector for the drive.
6. Place the drive **1** into the drive tray and push it toward the rear of the blade, into the connector until the drive moves past the lever at the front of the tray.
Attention: Do not press on the top of the drive. Pressing the top might damage the drive.
7. Install and close the blade server cover. See “Installing and closing the blade server cover” on page 37.

Statement 21



CAUTION:

Hazardous energy is present when the blade server is connected to the power source. Always replace the blade server cover before installing the blade server.

8. Install the blade server into the BladeCenter unit. See “Installing the blade server in a BladeCenter unit” on page 39.

Removing a memory module

You can remove a very low profile (VLP) dual-inline memory module (DIMM).

1. Read the Safety topic and the “Installation guidelines” on page 19.
2. Shut down the operating system, turn off the blade server, and remove the blade server from the BladeCenter unit. See “Removing the blade server from a BladeCenter unit” on page 20.
3. Carefully lay the blade server on a flat, static-protective surface, with the cover side up.
4. Open and remove the blade server cover. See “Removing the blade server cover” on page 22.
5. Locate the DIMM connector that contains the DIMM that is to be replaced. If you want to replace DIMM 1-8 on the base unit or DIMM 17-24 on the expansion unit you must remove the bezel. See Removing the bezel assembly

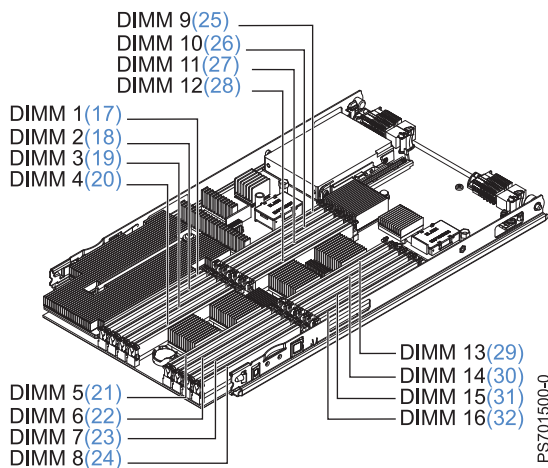


Figure 15. DIMM connectors. Base unit connectors

Attention: To avoid breaking the DIMM retaining clips or damaging the DIMM connectors, open and close the clips gently.

6. Carefully open the retaining clips on each end of the DIMM connector and remove the DIMM.

Note: Install a DIMM filler in any location where a DIMM is not present to avoid machine damage.

7. If you are instructed to return the DIMM, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a memory module

Install dual inline memory modules (DIMMs) in the blade server.

Table 4 shows allowable placement of DIMM modules:

Table 4. Memory module combinations

DIMM count	PS701 and PS702 Base blade unit (P1) DIMM slots and Expansion unit (P2) DIMM slots															
	1 (17)	2 (18)	3 (19)	4 (20)	5 (21)	6 (22)	7 (23)	8 (24)	9 (25)	10 (26)	11 (27)	12 (28)	13 (29)	14 (30)	15 (31)	16 (32)
2	X		X													
4	X		X											X		X
6	X		X			X		X						X		X
8	X		X			X		X	X		X			X		X
10	X	X	X	X		X		X	X		X			X		X
12	X	X	X	X	X	X	X	X	X		X			X		X
14	X	X	X	X	X	X	X	X	X		X		X	X	X	X
16	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

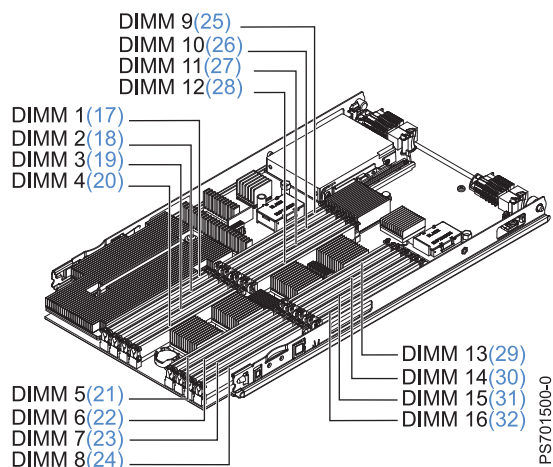


Figure 16. DIMM connectors. Base unit connectors

See “Supported DIMMs” on page 31 for additional information about the type of memory that is compatible with the blade server.

To install a DIMM, complete the following steps:

1. Read the Safety topic and the “Installation guidelines” on page 19.
2. Read the documentation that comes with the DIMMs.
3. Shut down the operating system, turn off the blade server, and remove the blade server from the BladeCenter unit. See “Removing the blade server from a BladeCenter unit” on page 20.
4. Carefully lay the blade server on a flat, static-protective surface, with the cover side up.
5. Open and remove the blade server cover. See “Removing the blade server cover” on page 22.
6. Locate the DIMM connectors on the system board. See the illustration in “System-board connectors” on page 14. Determine the connector into which you will install the DIMM. If you want to install a DIMM in DIMM 1-8 on the base unit or DIMM 17-24 on the expansion unit you must remove the bezel. See Removing the bezel assembly

Note: If you are installing a DIMM in the expansion unit, the expansion unit must be assembled to the base unit. This will provide stability to the assembly when installing a DIMM in the expansion unit. Installing a DIMM in the expansion unit disassembled may result in movement of the unit and potential damage to the board.

7. Touch the static-protective package that contains the part to any *unpainted* metal surface on the BladeCenter unit or any *unpainted* metal surface on any other grounded rack component; then, remove the part from its package.
8. Verify that both of the connector retaining clips are in the fully open position.
9. Turn the DIMM so that the DIMM keys align correctly with the connector on the system board.
Attention: To avoid breaking the DIMM retaining clips or damaging the DIMM connectors, handle the clips gently.
10. Insert the DIMM by pressing the DIMM along the guides into the connector.
Verify that each retaining clip snaps into the closed position.

Important: If there is a gap between the DIMM and the retaining clips, the DIMM is not correctly installed. Open the retaining clips to remove and reinsert the DIMM. Install a DIMM filler in any location where a DIMM is not present to avoid machine damage.

11. Install and close the blade server cover. See “Installing and closing the blade server cover” on page 37. If you had to remove the bezel to install the DIMM see Installing the bezel assembly.

Statement 21



CAUTION:

Hazardous energy is present when the blade server is connected to the power source. Always replace the blade server cover before installing the blade server.

12. Install the blade server into the BladeCenter unit. See “Installing the blade server in a BladeCenter unit” on page 39.

Supported DIMMs

Each planar in the PS701 and PS702 blade server contains 16 very low profile (VLP) memory connectors for registered dual inline memory modules (RDIMMs). The maximum size for a single DIMM is 8 GB. The total memory capacity ranges for PS701 and PS702 from a minimum of 4 GB to a maximum of 256 GB.

See the "Parts Listing" in the online information center or in the *Problem Determination and Service Guide* for memory modules that you can order from IBM.

Memory module rules:

- Install DIMM fillers in unused DIMM slots for proper cooling.
- Install DIMMs in pairs (1 and 3, 2 and 4, 5 and 7, 6 and 8, 9 and 11, 10 and 12, 13 and 15, 14 and 16, 17 and 19, 18 and 20, 21 and 23, 22 and 24, 25 and 27, 26 and 28, 29 and 31, 30 and 32)
- Both DIMMs in a pair must be the same size, speed, type, and technology. You can mix compatible DIMMs from different manufacturers.
- Each DIMM within a processor-support group (1-4, 5-8, 9-12, 13-16, 17-20, 21-24, 25-28, and 29-32) must be the same size and speed.
- Install only supported DIMMs, as described on the ServerProven Web site. See <http://www.ibm.com/servers/eserver/serverproven/compat/us/>.
- Installing or removing DIMMs changes the configuration of the blade server. After you install or remove a DIMM, the blade server is automatically re-configured, and the new configuration information is stored.
- See "System-board connectors" on page 14 for DIMM connector locations.

Table 5 shows allowable placement of DIMM modules:

Table 5. Memory module combinations

DIMM count	PS701 and PS702 Base blade unit (P1) DIMM slots and Expansion unit (P2) DIMM slots															
	1 (17)	2 (18)	3 (19)	4 (20)	5 (21)	6 (22)	7 (23)	8 (24)	9 (25)	10 (26)	11 (27)	12 (28)	13 (29)	14 (30)	15 (31)	16 (32)
2	X		X													
4	X		X											X		X
6	X		X			X		X						X		X
8	X		X			X		X	X		X			X		X
10	X	X	X	X		X		X	X		X			X		X
12	X	X	X	X	X	X	X	X	X		X			X		X
14	X	X	X	X	X	X	X	X	X		X		X	X	X	X
16	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

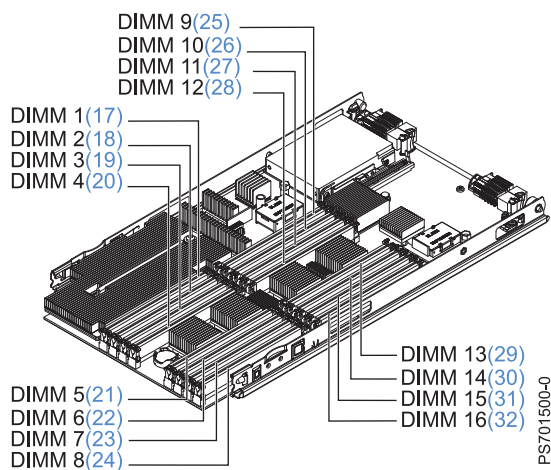


Figure 17. DIMM connectors. Base unit connectors

Removing and installing an I/O expansion card

Add an I/O expansion card to the blade server to provide additional connections for communicating on a network.

The blade server supports various types of I/O expansion cards, including Gigabit Ethernet, Fibre Channel, and Myrinet expansion cards.

Verify that any expansion card that you are using is listed on the ServerProven Web site in the list of supported expansion cards for the PS701 and PS702 blade server. For example, the following expansion cards are not supported by the PS701 and PS702 blade server:

- BladeCenter SFF Gb Ethernet
- Cisco 1X InfiniBand
- Qlogic iSCSI TOE Expansion Card (LFF)
- Broadcom 1Gb Ethernet (CIOv)
- SAS 3Gb Expansion Card (CIOv)
- Emulex 4Gb Fibre Channel Expansion Card (CIOv)
- Qlogic 4Gb SFF Fibre Channel Expansion card (CIOv)

See the ServerProven Web site for information about supported operating-system versions and all PS700 blade server optional devices.

Removing a CIOv form-factor expansion card

You can remove a CIOv form-factor expansion card from the 1Xe connector.

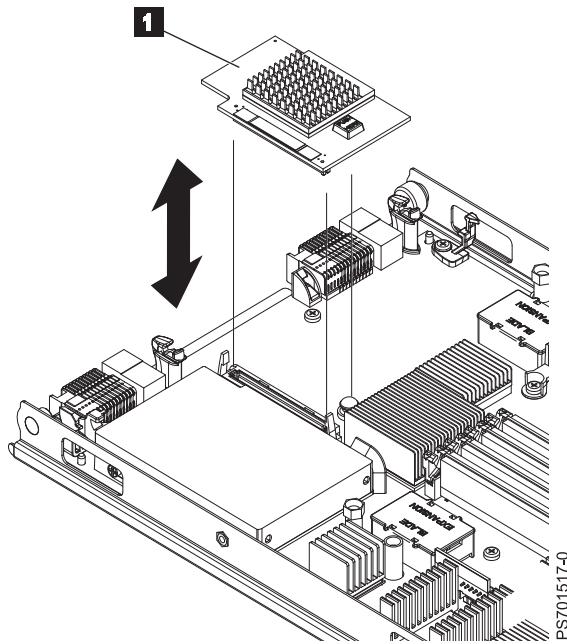


Figure 18. Removing a CIOv form factor expansion card from the 1Xe connector

1. Read the Safety topic and the “Installation guidelines” on page 19.
2. Shut down the operating system, turn off the blade server, and remove the blade server from the BladeCenter unit. See “Removing the blade server from a BladeCenter unit” on page 20.
3. Carefully lay the blade server on a flat, static-protective surface, with the cover side up.
4. Open and remove the blade server cover. See “Removing the blade server cover” on page 22.
5. Lift the expansion card **1** up and away from the 1Xe connector and out of the blade server.
6. If you are instructed to return the expansion card, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a CIOv form-factor expansion card

You can install a CIOv form-factor expansion card on the 1Xe connector to expand the I/O capabilities of the blade server.

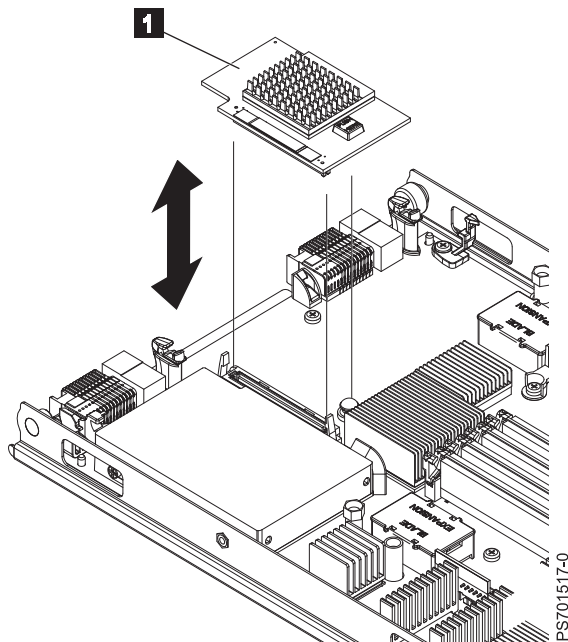


Figure 19. Installing a CIOv form-factor expansion card on the 1Xe connector

To install a CIOv form-factor expansion card, complete the following steps:

1. Read the Safety topic and the "Installation guidelines" on page 19.
2. Shut down the operating system, turn off the blade server, and remove the blade server from the BladeCenter unit. See "Removing the blade server from a BladeCenter unit" on page 20.
3. Open and remove the blade server cover. See "Removing the blade server cover" on page 22.
4. Touch the static-protective package that contains the part to any *unpainted* metal surface on the BladeCenter unit or any *unpainted* metal surface on any other grounded rack component; then, remove the part from its package.
5. Orient the expansion card **1** over the system board.
6. Lower the card to the system board, aligning the connectors on the card with the 1Xe connector on the system board.
7. Install and close the blade server cover. See "Installing and closing the blade server cover" on page 37.

Statement 21



CAUTION:

Hazardous energy is present when the blade server is connected to the power source. Always replace the blade server cover before installing the blade server.

8. Install the blade server into the BladeCenter unit. See “Installing the blade server in a BladeCenter unit” on page 39.
9. Use the documentation that comes with the expansion card to install device drivers and to perform any configuration that the expansion card requires.

Removing a combination-form-factor expansion card

Complete this procedure to remove a combination-form-factor expansion card.

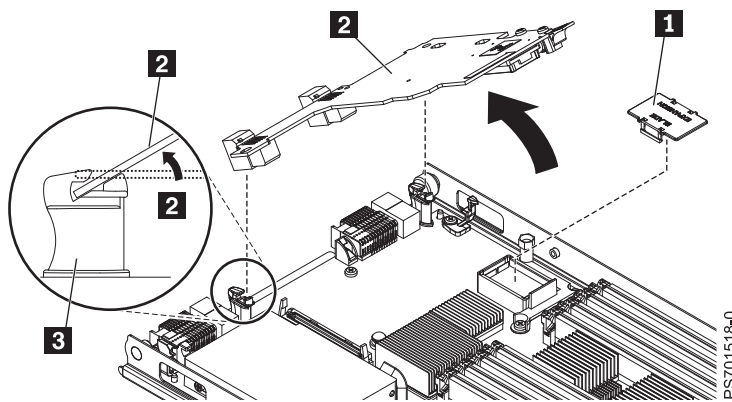


Figure 20. Removing a combination-form-factor expansion card

1. Read the Safety topic and the “Installation guidelines” on page 19.
2. Shut down the operating system, turn off the blade server, and remove the blade server from the BladeCenter unit. See “Removing the blade server from a BladeCenter unit” on page 20.
3. Open and remove the blade server cover. See “Removing the blade server cover” on page 22.
4. Remove the horizontal (CFFh) CFFe expansion card **2**.
 - a. Pull up on the camming lever to disengage the card from the high-speed PCI-Express connector.
 - b. Gently pivot the card up and out of the expansion card standoff **3** on the system board.
 - c. Lift the card out of the blade server.
 - d. Optional: Reattach the plastic cover **1** for the PCI-Express connector, if it is available.
5. If you are instructed to return the expansion card, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a combination-form-factor expansion card

Install a combination-form-factor expansion card to expand the I/O capabilities of the blade server.

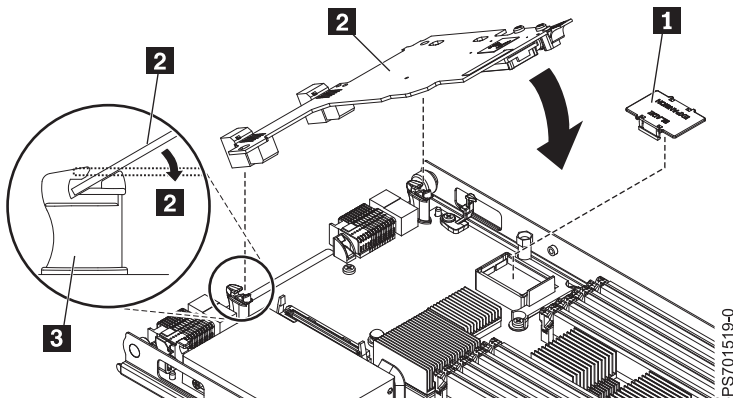


Figure 21. Installing a combination-form-factor expansion card

To install a combination-form-factor expansion card, complete the following steps:

1. Read the Safety topic and the "Installation guidelines" on page 19.
2. Shut down the operating system, turn off the blade server, and remove the blade server from the BladeCenter unit. See "Removing the blade server from a BladeCenter unit" on page 20.
3. Open and remove the blade server cover. See "Removing the blade server cover" on page 22.
4. Remove the plastic cover for the PCI-Express (PCI-e) connector **1**.
5. Touch the static-protective package that contains the part to any *unpainted* metal surface on the BladeCenter unit or any *unpainted* metal surface on any other grounded rack component; then, remove the part from its package.
6. Install the expansion card **2**.
 - a. Slide the card into the expansion card standoff **3** on the system board.
 - b. Gently pivot the card down and attach it to the high speed PCI-Express connector.
7. Install and close the blade server cover. See "Installing and closing the blade server cover" on page 37.

Statement 21



CAUTION:

Hazardous energy is present when the blade server is connected to the power source. Always replace the blade server cover before installing the blade server.

8. Install the blade server into the BladeCenter unit. See “Installing the blade server in a BladeCenter unit” on page 39.
9. Use the documentation that comes with the expansion card to install device drivers and to perform any configuration that the expansion card requires.

Completing the installation

To complete the installation, you must install and close the blade server cover, install the blade server into the BladeCenter unit, and turn on the blade server.

1. Install and close the blade server cover. See “Installing and closing the blade server cover.”

Statement 21



CAUTION:

Hazardous energy is present when the blade server is connected to the power source. Always replace the blade server cover before installing the blade server.

2. Install the blade server into the BladeCenter unit. See “Installing the blade server in a BladeCenter unit” on page 39.
3. Turn on the blade server, as described in “Turning on the blade server” on page 13.

Note: If you have just connected the power cords of the BladeCenter unit to electrical outlets, you must wait until the power-on LED on the blade server flashes slowly before you press the power-control button.

4. If you installed an I/O expansion card, use the documentation that comes with the expansion card to install device drivers and to perform any configuration that the expansion card requires.
5. For certain optional devices, run the blade server SMS Utility program, as described in “Using the SMS utility” on page 46.

Installing and closing the blade server cover

Install and close the cover of the blade server before you insert the blade server into the BladeCenter unit. Do not attempt to override this important protection.

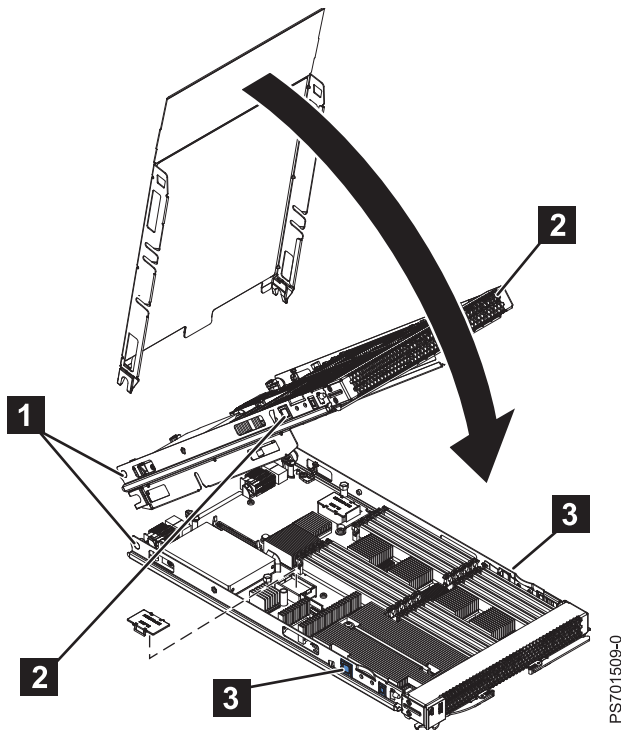


Figure 22. Installing the cover

Statement 21



CAUTION:

Hazardous energy is present when the blade server is connected to the power source. Always replace the blade server cover before installing the blade server.

Perform the following procedure to replace and close the blade server cover.

1. Read the Safety topic and the "Installation guidelines" on page 19.
2. Lower the cover so that the slots at the rear slide down onto the pins (**1** in Figure 22) at the rear of the blade server. Before you close the cover, verify that all components are installed and seated correctly and that you have not left loose tools or parts inside the blade server.
3. Pivot the cover to the closed position until the releases (as shown by **2** in the expansion unit and by **3** in the base unit) click into place in the cover.
4. Install the blade server into the BladeCenter unit. See "Installing the blade server in a BladeCenter unit" on page 39.

Installing the blade server in a BladeCenter unit

Install the blade server in a BladeCenter unit to use the blade server.

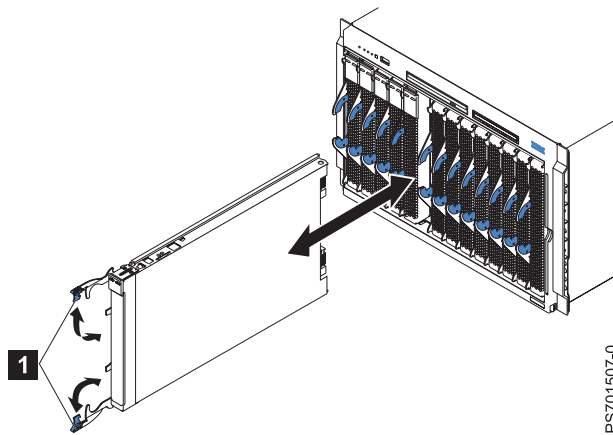


Figure 23. Installing the blade server in a BladeCenter unit

Statement 21



CAUTION:

Hazardous energy is present when the blade server is connected to the power source. Always replace the blade server cover before installing the blade server.

Perform the following procedure to install a blade server in a BladeCenter unit.

1. Go to <http://www.ibm.com/systems/support/> to download the latest firmware for the blade server. Download the firmware so that you can use it later to update the blade server after you start it.
2. Read the Safety topic and the "Installation guidelines" on page 19.
3. If you have not done so already, install any optional devices that you want, such as a SAS drive or memory modules.
4. Select the bay for the blade server.
 - See the online information or the *Installation and User's Guide* that comes with your BladeCenter unit to verify that the bay you choose is powered.
 - Ensure proper cooling, performance, and system reliability by installing a blade server, expansion unit, or blade filler in each blade bay.
 - Reinstall a blade server in the same blade bay to preserve configuration information and update options that are established by blade bay. Reinstalling into a different blade bay can have unintended consequences, which might include re-configuring the blade server.

5. Verify that the release handles on the blade server are in the open position (perpendicular to the blade server, as shown in **1** in Figure 23 on page 39).
6. If you installed a filler blade or another blade server in the bay from which you removed the blade server, remove it from the bay.
7. Slide the blade server into the blade bay from which you removed it until the blade server stops.
The spring-loaded doors farther back in the bay that cover the bay opening move out of the way as you insert the blade server.
8. Push the release handles on the front of the blade server to close and lock them.
The discovery and initialization process can take up to three minutes to complete. The discovery and initialization process is complete when the green LED stops flashing rapidly and begins to flash slowly. At this point, you can power on the blade server.
9. Turn on the blade server. See "Turning on the blade server" on page 13.
10. Verify that the power-on LED on the blade server control panel is lit continuously. The continuous light indicates that the blade server is receiving power and is turned on.
11. Optional: Write identifying information on one of the user labels that come with the blade servers and place the label on the BladeCenter unit bezel.
Important: Do not place the label on the blade server or in any way block the ventilation holes on the blade server. See the online information or the documentation that comes with your BladeCenter unit for information about label placement.
12. Use the SMS Utility program to configure the blade server. See "Using the SMS utility" on page 46.
13. Also use the management module to configure the blade server. See the documentation for the management module to understand the functions that the management module provides.

If you have changed the configuration of the blade server or if this is a different blade server than the one you removed, you must configure the blade server. You might also have to install the blade server operating system.

See the "Installing the operating system" in the online information or the *Installation and User's Guide* PDF for detailed information about these tasks.

See Chapter 5, "Installing the operating system," on page 51.

Input/output connectors and devices

The input/output connectors that are available to the blade server are supplied by the BladeCenter unit.

See the documentation that comes with the BladeCenter unit for information about the input/output connectors.

The blade server has a media-tray select button on the control panel. See “Blade server control panel buttons and LEDs” on page 11 for information about this button and its function.

The Ethernet controllers on the blade server communicate with the network through the Ethernet-compatible I/O modules on the BladeCenter unit. Network signals to and from the blade server or any expansion cards are automatically routed to a same-network-interface I/O module through circuitry in the BladeCenter unit.

Chapter 4. Configuring the blade server

While the firmware is running POST and before the operating system starts, a POST menu with POST indicators is displayed. The POST indicators are the words *Memory*, *Keyboard*, *Network*, *SCSI*, and *Speaker* that are displayed as each component is tested. You can then select configuration utilities from the POST menu.

- **System management services (SMS)**

Use the system management services (SMS) utility to view information about your system or partition and to perform tasks such as setting up remote IPL, changing self configuring SCSI device (SCSD) settings, and selecting boot options. The SMS utility can be used for AIX or Linux partitions. See “Using the SMS utility” on page 46 for more information.

- **Default boot list**

Use this utility to initiate a system boot in service mode through the default service mode boot list. This mode attempts to boot from the first device of each type that is found in the list.

Note: This is the preferred method of starting the stand-alone AIX diagnostics from CD.

- **Stored boot list**

Use this utility to initiate a system boot in service mode, using the customized service mode boot list that was set up by AIX when AIX was first booted, or manually using the AIX service aids.

- **Open firmware prompt**

This utility is for advanced users of the IEEE 1275 specifications only.

- **Management module**

Use the management module to change the boot list, determine which firmware image to boot, and perform other configuration tasks.

Updating the firmware

IBM periodically makes firmware updates available for you to install on the blade server, the management module, or expansion cards in the blade server.

Important: To avoid problems and to maintain proper system performance, always verify that the blade server BIOS, service processor, and diagnostic firmware levels are consistent for all blade servers within the BladeCenter unit. See “Verifying the system firmware levels” on page 45 for more information.

Plan to use a method of applying blade server firmware updates other than the management module. The enhanced service processor has a larger firmware image that makes it impractical to download and install over the RS-485 bus of the management module. Therefore, a firmware update for the blade server is not supported from the management module.

You can still use the other methods of performing firmware updates for the blade server:

- In-band operating system capabilities, such as the **update_flash** command for Linux and AIX or the **ldfware** command for Virtual I/O Server
- The firmware update function of AIX diagnostics
- The firmware update function of the stand-alone *diagnostics* CD

Attention: Before the installation of the new firmware to the temporary side begins, the contents of the temporary side are copied into the permanent side. After the firmware installation begins, the previous level of firmware on the permanent side is no longer available.

Use the following procedure to install updated firmware.

1. Start the TEMP image, as described in “Starting the TEMP image” on page 45.
2. Download the PS701 and PS702 firmware.
 - a. Go to the IBM Support site at <http://www.ibm.com/systems/support/> to download the updates.
 - b. Select your product, type, model, and operating system, and then click **Go**.
 - c. Click the **Download** tab, if necessary, for device driver and firmware updates.
 - d. Download the firmware to the /tmp/fwupdate directory.
3. Log on to the AIX or Linux system as root, or log on to the Virtual I/O Server as padmin.
4. Type `ls /tmp/fwupdate` to identify the name of the firmware.

The result of the command lists any firmware updates that you downloaded to the directory, such as the following update, for example:

01AA7xx_yyy_zzz

5. Install the firmware update with one of the following methods:
 - Install the firmware with the in-band diagnostics of your AIX system, as described in Using the AIX diagnostics to install the server firmware update through AIX.
 - Install the firmware with the **update_flash** command on AIX:

```
cd /tmp/fwupdate
/usr/lpp/diagnostics/bin/update_flash -f 01AA7xx_yyy_zzz
```
 - Install the firmware with the **update_flash** command on Linux:

```
cd /tmp/fwupdate
/usr/sbin/update_flash -f 01AA7_yyy_zzz
```
 - Install the firmware with the **ldfware** command on Virtual I/O Server:

```
cd /tmp/fwupdate
ldfware -file 01AA7xx_yyy_zzz
```

Reference codes CA2799FD and CA2799FF are displayed alternately on the control panel during the server firmware installation process. The system automatically powers off and on when the installation is complete.

To install firmware by using the SDMC, complete the following steps:

- a. Log on to the SDMC console.
- b. Under **Welcome to IBM Systems Director**, click on the **Manage** tab.
- c. Click on **Update Manager**.

The **Update Manager** guides you through the steps to update the firmware. For more information, see the *SDMC User's Guide*.

To install firmware by using the HMC, see Managed system updates.

6. Verify that the update installed correctly, as described in “Verifying the system firmware levels” on page 45.

Starting the TEMP image

Start the TEMP image before you update the firmware.

Perform the following procedure to start the TEMP image.

1. Access the advanced management module.
See the *BladeCenter Management Module Command-Line Interface Reference Guide* or the *BladeCenter Serial-Over-LAN Setup Guide* for more information.
2. Click **Blade Tasks > Configuration > Boot Mode**.
3. Click the applicable PS701 and PS702 blade server in the list of blade servers in the BladeCenter unit.
4. Select **Temporary** to force the system to start from the TEMP image.
5. Restart the blade server.
6. Verify that the system starts from the TEMP image, as described in “Verifying the system firmware levels.”

Verifying the system firmware levels

The diagnostics program displays the current system firmware levels for the TEMP and PERM images. This function also displays which image the blade server used to start up.

1. Start the diagnostics program.
See the online information center or the *Problem Determination and Service Guide* for information about running the diagnostics program.
The online BladeCenter information center is available in the IBM BladeCenter Information Center at <http://publib.boulder.ibm.com/infocenter/bladectr/documentation/index.jsp>.
2. From the **Function Selection** menu, select **Task Selection** and press Enter.
3. From the **Tasks Selection List** menu, select **Update and Manage System Flash** and press Enter.
The **Update and Manage System Flash** menu is displayed. The top of the window displays the system firmware level for the PERM and the TEMP images and the image that the blade server used to start.

Note: If the TEMP image level is more current than the PERM image, commit the TEMP image.

See the online information center or the *Problem Determination and Service Guide* for information about committing the TEMP system firmware image.

4. When you have verified the firmware levels, press F3 until the Diagnostic Operating Instructions window is displayed; then press F3 again to exit the diagnostic program.

Using the SMS utility

Use the System Management Services (SMS) utility to perform a variety of configuration tasks on the PS701 and PS702 blade server.

Starting the SMS utility

Start the SMS utility to configure the blade server.

1. Turn on or restart the blade server, and establish an SOL session with it.
See the *BladeCenter Management Module Command-Line Interface Reference Guide* or the *BladeCenter Serial-Over-LAN Setup Guide* for more information.
2. When the POST menu and indicators are displayed, press the 1 key after the word Keyboard is displayed and before the word Speaker is displayed.
3. Follow the instructions on the screen.

SMS utility menu choices

Select SMS tasks from the SMS utility main menu. Choices on the SMS utility main menu depend on the version of the firmware in the blade server. Some menu choices might differ slightly from these descriptions.

- **Select Language**
Select this choice to change the language that is used to display the SMS menus.
- **Setup Remote IPL (Initial Program Load)**
Select this choice to enable and set up the remote startup capability of the blade server or partition.
- **Change SCSD Settings**
Select this choice to view and change the addresses of the self configuring SCSI device (SCSD) controllers that are attached to the blade server.
- **Select Console**
Select this choice to select the console on which the SMS menus are displayed.
- **Select Boot Options**
Select this choice to view and set various options regarding the installation devices and boot devices.

Note: If a device that you are trying to select (such as a USB CD drive in the BladeCenter media tray) is not displayed in the **Select Device Type** menu, select **List all Devices** and select the device from that menu.

Creating a CE login

If the blade server is running an AIX operating system, you can create a customer engineer (CE) login to perform operating system commands that are required to service the system without being logged in as a root user.

The CE login must have a role of Run Diagnostics and be a primary group of System. This enables the CE login to perform the following tasks:

- Run the diagnostics, including the service aids, certify, and format.
- Run all the operating-system commands that are run by system group users.
- Configure and unconfigure devices that are not in use.

In addition, this login can have Shutdown Group enabled to allow use of the Update System Microcode service aid and the shutdown and reboot operations.

The recommended CE login user name is qserv.

Configuring the Gigabit Ethernet controllers

Two Ethernet controllers are integrated on the blade server system board. You must install a device driver to enable the blade server operating system to address the Ethernet controllers.

Each controller provides a 1000 Mbps full-duplex interface for connecting to one of the Ethernet-compatible I/O modules in I/O-module bays 1 and 2, which enables simultaneous transmission and reception of data on the Ethernet local area network (LAN).

The routing from an Ethernet controller to an I/O-module bay varies, depending on the type of BladeCenter that the blade is installed in. For example, each Ethernet controller on the system board is routed to a different I/O module in I/O module bay 1 or module bay 2 of the BladeCenter H or HT.

See “Blade server Ethernet controller enumeration” on page 48 for information about how to determine the routing from an Ethernet controller to an I/O-module bay for the blade server.

Note: Other types of blade servers, such as the BladeCenter HS20 Type 8678 blade server, in the same BladeCenter unit as the PS701 and PS702 blade server might have different Ethernet controller routing. See the documentation for a blade server for information.

You must install a device driver for the blade server operating system to address the Ethernet controllers. For device drivers and information about configuring Ethernet controllers, see the *Broadcom NetXtreme Gigabit Ethernet Software* CD that comes with the blade server. For updated information about configuring the controllers, see <http://www.ibm.com/systems/support/>.

The Ethernet controllers in your blade server support failover, which provides automatic redundancy for the Ethernet controllers. Failover capabilities vary per BladeCenter unit.

Without failover, only one Ethernet controller can be connected from each server to each virtual LAN or subnet. With failover, you can configure more than one Ethernet controller from each server to attach to the same virtual LAN or subnet. Either one of the integrated Ethernet controllers can be configured as the primary Ethernet controller. If you have configured the controllers for failover and the primary link fails, the secondary controller takes over. When the primary link is restored, the Ethernet traffic switches back to the primary Ethernet controller. See the operating-system device-driver documentation for information about configuring for failover.

Important: To support failover on the blade server Ethernet controllers, the Ethernet switch modules in the BladeCenter unit must have identical configurations.

Blade server Ethernet controller enumeration

The enumeration of the Ethernet controllers in a blade server is operating-system dependent. You can verify the Ethernet controller designations that a blade server uses through the operating-system settings.

The routing of an Ethernet controller to a particular I/O-module bay depends on the type of blade server. You can verify which Ethernet controller is routed to which I/O-module bay by using the following test:

1. Install only one Ethernet switch module or pass-thru module in I/O-module bay 1.
2. Make sure that the ports on the switch module or pass-thru module are enabled. Click **I/O Module Tasks > Admin/Power/Restart** in the management-module Web interface.
3. Enable only one of the Ethernet controllers on the blade server. Note the designation that the blade server operating system has for the controller.
4. Ping an external computer on the network that is connected to the switch module or pass-thru module. If you can ping the external computer, the Ethernet controller that you enabled is associated with the switch module or pass-thru module in I/O-module bay 1. The other Ethernet controller in the blade server is associated with the switch module or pass-thru module in I/O-module bay 2.

If you have installed an I/O expansion card in the blade server, communication from the expansion card should be routed to I/O-module bays 3 and 4, if these bays are supported by your BladeCenter unit. You can verify which controller on the card is routed to which I/O-module bay by performing the same test and using a controller on the expansion card and a compatible switch module or pass-thru module in I/O-module bay 3 or 4.

MAC addresses for host Ethernet adapters

Two integrated Ethernet controllers in the PS701 and PS702 blade server provide a Host Ethernet Adapter (HEA) that, in turn, provides virtual *logical host Ethernet adapters* (LHEAs) to client logical partitions (LPARs). The Virtual I/O Server software uses LHEAs as if they were real physical adapters.

The logical HEAs in the PS701 and PS702 blade server bypass the need for further bridging from Virtual I/O Server, because the LHEAs connect directly to the integrated Ethernet controllers in the blade server, and from there to the I/O modules in the BladeCenter unit.

The PS701 and PS702 blade servers use two physical HEA ports and 14 logical HEA ports to share the two integrated physical Ethernet adapters on the blade server. The 14 logical HEA medium access control (MAC) addresses are in the same range as the two integrated Ethernet controllers (eth0 and eth1) and the two associated physical HEA ports on the blade server.

The MAC addresses of the two physical HEAs are displayed in the advanced management module. The MAC address of the first integrated Ethernet controller (eth0) is listed on a label on the blade server. The label also lists the last MAC address. Table 6 shows the relative addressing scheme.

Table 6. MAC addressing scheme for physical and logical host Ethernet adapters

Node	Name in management module	Relation to the MAC that is listed on the PS701 and PS702 label	Example
Integrated Ethernet controller eth0		Same as first MAC address	00:1A:64:44:0e:c4
Integrated Ethernet controller eth1		MAC + 1	00:1A:64:44:0e:c5
HEA port 0	MAC address 1	MAC + 2	00:1A:64:44:0e:c6
HEA port 1	MAC address 2	MAC + 3	00:1A:64:44:0e:c7

Table 6. MAC addressing scheme for physical and logical host Ethernet adapters (continued)

Node	Name in management module	Relation to the MAC that is listed on the PS701 and PS702 label	Example
Logical HEA ports		MAC +4 to MAC +16	00:1A:64:44:0ec8 to 00:1A:64:44:0ed4
Logical HEA port		MAC +17 Same as last MAC address on the label	00:1A:64:44:0ec8 to 00:1A:64:44:0ed4

For more information about planning, deploying, and managing the use of host Ethernet adapters, see the Configuring section of the PowerVM Information Roadmap.

Updating IBM Director

If you plan to use IBM Director to manage the blade server, you must check for the latest applicable IBM Director updates and interim fixes.

To install the IBM Director updates and any other applicable updates and interim fixes, complete the following steps.

Note: Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this procedure.

1. Check for the latest version of IBM Director:
 - a. Go to the IBM Director download site at <http://www.ibm.com/systems/management/director/downloads.html>.
 - b. If the drop-down list shows a newer version of IBM Director than the version that comes with the blade server, follow the instructions on the Web page to download the latest version.
2. Install IBM Director.
3. Download and install any applicable updates or interim fixes for the blade server:
 - a. Go to the IBM Support site at <http://www.ibm.com/systems/support/>.
 - b. Under **Product support**, click **BladeCenter**.
 - c. Under **Popular links**, click **Software and device drivers**.
 - d. Click **BladeCenter PS701 and PS702** to display the list of downloadable files for the blade server.

Chapter 5. Installing the operating system

Before you install the operating system on the blade server, verify that the blade server is installed in the BladeCenter unit, the management-module firmware is at the latest available level, and the blade server is turned on.

If you are not using an unattended network-installation method to install your operating system, you must first provide a Serial over LAN (SOL) connection to the blade server to install your operating system. If you have not already done so, configure the SOL feature on the blade server to establish an SOL connection, enable the SOL feature, and start an SOL session. For instructions, see the *IBM BladeCenter Serial over LAN Setup Guide* and the *BladeCenter Management Module Command-Line Interface Reference Guide*. For information about SOL commands, see the documentation for your operating system.

Important:

- If you plan to install the operating system through the Ethernet network, you must install and configure a second Ethernet switch module into the applicable I/O-module bay of the BladeCenter unit. For additional information, see:
 - “Configuring the Gigabit Ethernet controllers” on page 47
 - “Blade server Ethernet controller enumeration” on page 48
 - The documentation that comes with the Ethernet switch module that you are using
- After you install the operating system on the blade server, you must install any service packs or update packages that come with the operating system. For additional information, see the instructions that come with your operating-system documentation and the service packs or update packages.
- The blade server has no external USB ports, but communicates with and uses the removable-media drives and USB ports that are in the media tray of the BladeCenter unit.
- The operating system in the blade server must provide USB support for the blade server to recognize and use the removable-media drives in the BladeCenter unit. The BladeCenter unit uses USB for internal communication with these devices.
- For the BladeCenter PS701 and PS702 blade server, if you plan to install an Ethernet expansion card, first install the operating system to enable the onboard ports to be recognized and configured before the ports on the expansion card. If you install the Ethernet expansion card *before* you install the operating system, the expansion card ports will be assigned before the onboard ports.

See the ServerProven Web site for information about supported operating-system versions and all PS700 blade server optional devices.

Locating the installation instructions

You can order the PS701 and PS702 blade server with Virtual I/O Server, or AIX, or IBM i already installed. If you did not, you can install AIX, Linux, or Virtual I/O Server as a native operating system. After installing Virtual I/O Server, you can install AIX, Linux, or IBM i operating system (formerly known as i5/OS) as a client operating system in a logical partition (LPAR).

After you configure the blade server hardware, go to the operating-system documentation for the latest operating-system installation instructions. See the following operating system descriptions for more information:

- **Installing Virtual I/O Server**

See the Installing section of the *PowerVM Information Roadmap*.

If you did not order the PS701 and PS702 blade server with the Virtual I/O Server software installed, you can use the *Virtual I/O Server* DVD in the product package to install Virtual I/O Server and set up a virtual environment that supports client operating systems in logical partitions. You can then install any of the supported operating systems as a client in an LPAR.

The order of installation of Virtual I/O Server and the operating systems is important. You can update the firmware first with the stand-alone *Diagnostics* CD, but you must install the Virtual I/O Server software before you install any other software. The Virtual I/O Server software creates the *Integrated Virtual Manager* administrator console and the first logical partition, which Virtual I/O Server and Integrated Virtual Manager occupy.

After you install Virtual I/O Server, you can use Integrated Virtual Manager and Micro-Partitioning® to create client partitions for client operating systems.

- **Installing Linux**

You can install a Linux operating system by following the installation instructions in the IBM Systems Information Center.

The online Linux installation instructions are available in the *Linux on BladeCenter JS22* topic in the IBM Systems Information Center.

- **Installing IBM i**

You can install the IBM i operating system in a client partition of the Virtual I/O Server.

See the *IBM i on a POWER Blade Read-me First* document on the IBM Web site. Additional installation information and IBM i restrictions are described in i5/OS client partition considerations.

Also see the IBM System i Information Roadmap.

- **Installing AIX**

You can install the AIX operating system by following the installation instructions in the IBM Systems Information Center.

See the online AIX Installation and migration topic for more information. You can find more information about AIX in the IBM System p Information Roadmap on the IBM Web site.

Note: After you install AIX from CD or DVD, using the keyboard and video interface, run the **change console** command and restart the blade server to switch the AIX console to an SOL connection. (The command does not affect the console that is used by partition firmware.) You can use the following commands:

```
chcons /dev/vty0
shutdown -Fr
```

Notes:

1. Some optional devices have device drivers that you must install. See the documentation that comes with the devices for information about installing any required device drivers.

If your operating system does not have the required device drivers, contact your IBM marketing representative or authorized reseller, or see your operating-system documentation for additional information.

2. The IBM Remote Deployment Manager (RDM) program does not support the BladeCenter PS701 and PS702 blade server. However, you can use the following programs for remote deployment:
 - For AIX, Red Hat Linux, or SUSE Linux operating-system deployments, you can use Cluster Systems Management (CSM) from IBM. Go to <http://www.ibm.com/servers/eserver/clusters/software/>.
 - For AIX operating-system deployments, you can use Network Installation Manager (NIM) from IBM. See your AIX operating-system documentation for additional information.
 - For SUSE Linux operating-system deployments, you can use the AutoYast utility program from Novell, Inc. Go to <http://www.suse.de/~nashif/autoinstall/>.

After you install the operating system, install operating system updates; then, install any utilities that apply to your operating system.

Installing service and productivity tools for Linux on POWER

Linux on POWER service and productivity tools include hardware diagnostic aids and productivity tools, and installation aids. The installation aids are provided in the IBM Installation Toolkit for Linux on POWER, a set of tools that aids the installation of Linux on IBM servers with POWER architecture. You can also use the tools to update the PS701 and PS702 blade server firmware.

The hardware diagnostic aids and productivity tools are available as downloadable Red Hat Package Manager (RPM) files for Red Hat Enterprise Linux (RHEL) and SUSE Linux Enterprise Server (SLES). The IBM Installation Toolkit for Linux on POWER is available as an ISO compact disc (CD) image, which you can use to create your own CD. The Service and productivity tools for Linux on POWER systems site describes how to create a CD.

The hardware diagnostic aids and productivity tools are required for such hardware reliability, availability, and serviceability (RAS) functions as first-failure data-capture and error-log analysis. With the tools installed, problem determination and correction are greatly enhanced and the likelihood of an extended system outage is reduced.

For example, the **update_flash** command for installing system firmware updates can be performed only if the hardware diagnostic aids and productivity tools are installed.

Other tools modify various serviceability policies, manipulate system LEDs, update the bootlist, and capture extended error data to aid analysis of intermittent errors.

Other commands and a boot-time scanning script constitute a hardware inventory system. The **lsvpd** command provides vital product data (VPD) about hardware components.

The Error Log Analysis (ELA) tool provides automatic analysis and notification of errors that are reported by the platform firmware. ELA writes analyzed error data to `/var/log/platform` and to the `servicelog`. If a corrective action is required, a notification event sends the event to registered tools and subscribed users.

Install the LINUX operating system before you download and install the hardware diagnostic aids and productivity tools for Linux on POWER. The Installation Toolkit for Linux on Power is provided as-is only. You are not entitled to IBM Software Support for the Installation Toolkit.

Install the Virtual I/O Server and the Integrated Virtualization Manager (IVM) before you install your Linux operating system if you plan to have a virtual environment.

Chapter 6. Solving problems

Use the diagnostic tools that are available to help you solve some common problems that might occur while you are setting up the blade server.

If you install the blade server in the BladeCenter unit and the blade server does not start, perform the following actions:

- Make sure that the BladeCenter unit is correctly connected to a power source.
- Reseat the blade server in the BladeCenter unit, as described in “Installing the blade server in a BladeCenter unit” on page 39.
- If the power-on LED is flashing slowly, turn on the blade server, as described in “Turning on the blade server” on page 13.
- If you have just added a new optional device or component, make sure that it is correctly installed and compatible with the blade server and its components. If the device or component is not compatible, remove it from the blade server, reinstall the blade server in the BladeCenter unit, and then restart the blade server.

If the blade server does not start after you have performed the preceding actions, see the online information or the *Problem Determination and Service Guide* on the IBM BladeCenter Documentation CD.

If you cannot see the AIX console after you install AIX locally by using the keyboard/video select button and local media, run the **change console** command and restart the blade server to switch the AIX console to a SOL connection:

```
chcons /dev/vty0  
shutdown -Fr
```

The commands do not affect the console that is used by partition firmware.

The following tools are available to help you diagnose and solve hardware-related problems:

- **Power-on self-test (POST) firmware checkpoints and error codes**

The firmware checkpoints are progress codes that your blade server writes to the management-module event log during POST.

See the online information or the *Problem Determination and Service Guide* for more information.

- **Firmware error codes and location codes**

For detailed descriptions of the firmware error codes, see the online information or the *Problem Determination and Service Guide*.

Some firmware error codes also include location codes. The location code information is required to identify the failing component. Check the event log in the management module to determine the location code information that corresponds to the firmware error code.

For additional information about location codes, see the online information or the *Problem Determination and Service Guide*.

- **Troubleshooting tables**

Use the troubleshooting tables to find solutions to problems that have identifiable symptoms.

See the online information or the *Problem Determination and Service Guide* for your blade server.

- **Diagnostic utilities for the Linux operating system**

Diagnostic utilities for the Linux operating system are available from IBM. To obtain these utilities and information about them, complete the following steps:

1. Go to <http://www.ibm.com/systems/bladecenter/>.

2. Under **Product support**, click **BladeCenter**.
3. From the **Product family** menu, select **BladeCenter PS701 and PS702**.
4. From the **Operating system** menu, select your Linux operating system, and then click **Go** to display the available downloads.

- **Diagnostic utilities for the AIX operating system**

An AIX operating-system diagnostic CD, also known as the stand-alone *Diagnostics* CD, is available from IBM. You can start the CD from a CD drive or from NIM. To download the CD image, go to <http://www14.software.ibm.com/webapp/set2/sas/f/diags/home.html>.

See the *Problem Determination and Service Guide* for instructions for using the diagnostic utilities.

- **Diagnostic utilities for other operating systems**

Other supported operating systems might have diagnostic tools that are available through the operating system. See your operating-system documentation for more information.

- **Light path diagnostics**

Use light path diagnostics LEDs on the system board to identify system errors. If the system-error LED on the system LED panel on the front or rear of the BladeCenter unit is lit, one or more error LEDs on the BladeCenter unit components also might be lit. These LEDs help identify the cause of the problem.

Notes:

- View the system event log in the BladeCenter management module.
- Before you have the blade server serviced, verify that you provide a Serial over LAN (SOL) connection to the blade server. To do this, you must configure the SOL feature on the blade server and start an SOL session as described in the *IBM BladeCenter Serial over LAN Setup Guide*.
- You can also configure the service processor IP address by using the management module, and set up a SOL connection to the service processor.

Appendix. Notices

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When attaching a monitor to the equipment, you must use the designated monitor cable and any interference suppression devices supplied with the monitor.

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Federal Communications Commission (FCC) statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

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Industry Canada Compliance Statement

This Class A digital apparatus complies with Canadian ICES-003.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

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This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

European Community contact:
IBM Deutschland GmbH
Technical Regulations, Department M456
IBM-Allee 1, 71139 Ehningen, Germany
Tele: +49 7032 15-2937
email: tjahn@de.ibm.com

Warning: This is a Class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

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Japanese Electronics and Information Technology Industries Association (JEITA) Confirmed Harmonics Guideline (products less than or equal to 20 A per phase)

高調波ガイドライン適合品

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高調波ガイドライン準用品

Electromagnetic Interference (EMI) Statement - People's Republic of China

声 明

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IBM Taiwan Contact Information:

台灣IBM 產品服務聯絡方式：
台灣國際商業機器股份有限公司
台北市松仁路7號3樓
電話：0800-016-888

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Verantwortlich für die Einhaltung der EMV Vorschriften ist der Hersteller:
International Business Machines Corp.
New Orchard Road
Armonk, New York 10504
Tel: 914-499-1900

Der verantwortliche Ansprechpartner des Herstellers in der EU ist:
IBM Deutschland GmbH
Technical Regulations, Abteilung M456
IBM-Allee 1, 71139 Ehningen, Germany
Tel: +49 7032 15-2937
email: tjahn@de.ibm.com

Generelle Informationen:

Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 Klasse A.

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дополнительные меры

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If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult an IBM-authorized dealer or service representative for help.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Proper cables and connectors are available from IBM-authorized dealers. IBM is not responsible for any radio or television interference caused by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate this equipment.

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada Compliance Statement

This Class B digital apparatus complies with Canadian ICES-003.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

European Community Compliance Statement

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-IBM option cards.

This product has been tested and found to comply with the limits for Class B Information Technology Equipment according to European Standard EN 55022. The limits for Class B equipment were derived for typical residential environments to provide reasonable protection against interference with licensed communication equipment.

European Community contact:
IBM Deutschland GmbH
Technical Regulations, Department M456
IBM-Allee 1, 71139 Ehningen, Germany
Tele: +49 7032 15-2937
email: tjahn@de.ibm.com

VCCI Statement - Japan

この装置は、クラスB情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。

取扱説明書に従って正しい取り扱いをして下さい。 VCCI-B

Japanese Electronics and Information Technology Industries Association (JEITA) Confirmed Harmonics Guideline (products less than or equal to 20 A per phase)

高調波ガイドライン適合品

**Japanese Electronics and Information Technology Industries Association (JEITA)
Confirmed Harmonics Guideline with Modifications (products greater than 20 A per
phase)**

高調波ガイドライン準用品

IBM Taiwan Contact Information

台灣IBM 產品服務聯絡方式：
台灣國際商業機器股份有限公司
台北市松仁路7號3樓
電話：0800-016-888

Electromagnetic Interference (EMI) Statement - Korea

이 기기는 가정용(B급)으로 전자과적합기기로
서 주로 가정에서 사용하는 것을 목적으로 하
며, 모든 지역에서 사용할 수 있습니다.

Germany Compliance Statement

**Deutschsprachiger EU Hinweis: Hinweis für Geräte der Klasse B EU-Richtlinie zur
Elektromagnetischen Verträglichkeit**

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2004/108/EG zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse B ein.

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Deutschland: Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten

Dieses Produkt entspricht dem "Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG)". Dies ist die Umsetzung der EU-Richtlinie 2004/108/EG in der Bundesrepublik Deutschland.

**Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von
Geräten (EMVG) (bzw. der EMC EG Richtlinie 2004/108/EG) für Geräte der Klasse B**

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen.

Verantwortlich für die Einhaltung der EMV Vorschriften ist der Hersteller:
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Der verantwortliche Ansprechpartner des Herstellers in der EU ist:
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Technical Regulations, Abteilung M456
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Generelle Informationen:

Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 Klasse B.

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