Power Systems

Problem analysis, system parts, and locations for the 8001-12C, 8001-22C, 8005-12N, and 8005-22N

IBM

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Problem analysis, system parts, and locations for the 8001-12C, 8001-22C, 8005-12N, and 8005-22N

IBM

This edition applies to IBM Power Systems™ servers that contain the POWER8® processor and to all associated models.

Contents

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, safety information documentation is included in the publications package (such as in printed documentation, on DVD, or as part of the product) shipped with the product. The documentation 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 documentation. You should also refer to the safety information documentation any time you do not clearly understand any safety information in the U.S. English publications.

Replacement or additional copies of safety information documentation can be obtained by calling the IBM Hotline at 1-800-300-8751.

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:
- If IBM supplied the power cord(s), 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.
    - For AC power, disconnect all power cords from their AC power source.
    - For racks with a DC power distribution panel (PDP), disconnect the customer's DC power source to the PDP.
- When connecting power to the product ensure all power cables are properly connected.

- For racks with AC power, 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.
- For racks with a DC power distribution panel (PDP), connect the customer's DC power source to the PDP. Ensure that the proper polarity is used when attaching the DC power and DC power return wiring.
- 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.
- Do not attempt to switch on power to the machine until all possible unsafe conditions are corrected.
- Assume that an electrical safety hazard is present. Perform all continuity, grounding, and power checks specified during the subsystem installation procedures to ensure that the machine meets safety requirements.
- Do not continue with the inspection if any unsafe conditions are present.
- Before you open the device covers, unless instructed otherwise in the installation and configuration procedures: Disconnect the attached AC power cords, turn off the applicable circuit breakers located in the rack power distribution panel (PDP), and disconnect any telecommunications systems, networks, and modems.

DANGER:
- 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. For AC power, remove the power cords from the outlets.
  3. For racks with a DC power distribution panel (PDP), turn off the circuit breakers located in the PDP and remove the power from the Customer's DC power source.
  4. Remove the signal cables from the connectors.
  5. 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. For AC power, attach the power cords to the outlets.
  5. For racks with a DC power distribution panel (PDP), restore the power from the Customer's DC power source and turn on the circuit breakers located in the PDP.
  6. Turn on the devices.

  Sharp edges, corners and joints may be present in and around the system. Use care when handling equipment to avoid cuts, scrapes and pinching. (D005)

(R001 part 1 of 2):

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. In addition, do not lean on rack mounted devices and do not use them to stabilize your body position (for example, when working from a ladder).

- Each rack cabinet might have more than one power cord.
  - For AC powered racks, be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.
  - For racks with a DC power distribution panel (PDP), turn off the circuit breaker that controls the power to the system unit(s), or disconnect the customer's DC power source, 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.

(R001 part 2 of 2):

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.

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 (compliance ID RACK-001 or 22U (compliance ID RR001) and above.
  - Ensure that the heaviest devices are installed in the bottom of the rack cabinet.
  - Ensure that there are little-to-no empty U-levels between devices installed in the rack cabinet below the 32U (compliance ID RACK-001 or 22U (compliance ID RR001) level, unless the received configuration specifically allowed it.
- If the rack cabinet you are relocating is part of a suite of rack cabinets, detach the rack cabinet from the suite.
- If the rack cabinet you are relocating was supplied with removable outriggers they must be reinstalled before the cabinet is relocated.
- 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 230 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)

DANGER: Hazardous voltage, current, or energy levels are present inside any component that has this label attached. Do not open any cover or barrier that contains this label. (L001)

(L002)

DANGER: Rack-mounted devices are not to be used as shelves or work spaces. (L002)

(L003)

or

or

or

or

DANGER: Multiple power cords. The product might be equipped with multiple AC power cords or multiple DC power cables. To remove all hazardous voltages, disconnect all power cords and power cables. (L003)

(L007)

CAUTION: A hot surface nearby. (L007)

(L008)

CAUTION: Hazardous moving parts nearby. (L008)

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. Although shining light into one end and looking into the other end of a disconnected optical fiber to verify the continuity of optic fibers many not injure the eye, this procedure is potentially dangerous. Therefore, verifying the continuity of optical fibers by shining light into one end and looking at the other end is not recommended. To verify continuity of a fiber optic cable, use an optical light source and power meter. (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)

CAUTION:
The battery contains lithium. To avoid possible explosion, do not burn or charge the battery.

Do Not:
- **___ Throw or immerse into water**
- **___ Heat to more than 100°C (212°F)**
- **___ Repair or disassemble**

Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C003)

CAUTION:
Regarding IBM provided VENDOR LIFT TOOL:
- Operation of LIFT TOOL by authorized personnel only.
- LIFT TOOL intended for use to assist, lift, install, remove units (load) up into rack elevations. It is not to be used loaded transporting over major ramps nor as a replacement for such designated tools like pallet jacks, walkies, fork trucks and such related relocation practices. When this is not practicable, specially trained persons or services must be used (for instance, riggers or movers).
- Read and completely understand the contents of LIFT TOOL operator's manual before using. Failure to read, understand, obey safety rules, and follow instructions may result in property damage and/or personal injury. If there are questions, contact the vendor's service and support. Local paper manual must remain with machine in provided storage sleeve area. Latest revision manual available on vendor's web site.
- Test verify stabilizer brake function before each use. Do not over-force moving or rolling the LIFT TOOL with stabilizer brake engaged.
- Do not move LIFT TOOL while platform is raised, except for minor positioning.
- Do not exceed rated load capacity. See LOAD CAPACITY CHART regarding maximum loads at center versus edge of extended platform.
- Only raise load if properly centered on platform. Do not place more than 200 lb (91 kg) on edge of sliding platform shelf also considering the load's center of mass/gravity (CoG).
- Do not corner load the platform tilt riser accessory option. Secure platform riser tilt option to main shelf in all four (4x) locations with provided hardware only, prior to use. Load objects are designed to slide on/off smooth platforms without appreciable force, so take care not to push or lean. Keep riser tilt option flat at all times except for final minor adjustment when needed.
- Do not stand under overhanging load.
- Do not use on uneven surface, incline or decline (major ramps).
- Do not stack loads.
- Do not operate while under the influence of drugs or alcohol.
- Do not support ladder against LIFT TOOL.
- Tipping hazard. Do not push or lean against load with raised platform.
- Do not use as a personnel lifting platform or step. No riders.
- Do not stand on any part of lift. Not a step.
- Do not climb on mast.
- Do not operate a damaged or malfunctioning LIFT TOOL machine.
- Crush and pinch point hazard below platform. Only lower load in areas clear of personnel and obstructions. Keep hands and feet clear during operation.
- No Forks. Never lift or move bare LIFT TOOL MACHINE with pallet truck, jack or fork lift.
- Mast extends higher than platform. Be aware of ceiling height, cable trays, sprinklers, lights, and other overhead objects.
- Do not leave LIFT TOOL machine unattended with an elevated load.
- Watch and keep hands, fingers, and clothing clear when equipment is in motion.
- Turn Winch with hand power only. If winch handle cannot be cranked easily with one hand, it is probably over-loaded. Do not continue to turn winch past top or bottom of platform travel. Excessive unwinding will detach handle and damage cable. Always hold handle when lowering, unwinding. Always assure self that winch is holding load before releasing winch handle.
- A winch accident could cause serious injury. Not for moving humans. Make certain clicking sound is heard as the equipment is being raised. Be sure winch is locked in position before releasing handle. Read instruction page before operating this winch. Never allow winch to unwind freely. Freewheeling will cause uneven cable wrapping around winch drum, damage cable, and may cause serious injury. (C048)

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 metallically 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 metallically 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.

The dc-powered system is intended to be installed in a common bonding network (CBN) as described in GR-1089-CORE.

Beginning troubleshooting and problem analysis

This information provides a starting point for analyzing problems.

This information is the starting point for diagnosing and repairing systems. From this point, you are guided to the appropriate information to help you diagnose problems, determine the appropriate repair action, and then complete the necessary steps to repair the system.

Note: Update the system firmware to the latest level before you start problem analysis. If you update the system firmware, you will have the latest available fixes and improvements for error handling, reporting, and isolation. For instructions about updating the system firmware, see Getting fixes.

What type of problem are you dealing with?	Problem analysis procedure
You do not know the type of problem.	Go to "Determining the problem analysis procedure to perform."
A baseboard management controller (BMC) access problem occurred.	Go to "Resolving a BMC access problem" on page 2.
The system does not power on (the power button or the BMC power on command does not power on the system).	Go to "Resolving a power problem" on page 4.
A system firmware boot failure occurred (the system started but was not able to boot to the Petitboot menu).	Go to "Resolving a system firmware boot failure" on page 5.
A video graphics array (VGA) monitor problem occurred (the system started but no video is displayed on the monitor).	Go to "Resolving a VGA monitor problem" on page 6.
An operating system boot failure occurred (the system booted to the Petitboot menu but the operating system did not start).	Go to "Resolving an operating system boot failure" on page 7.
A sensor on the sensor readings GUI display is red.	Go to "Resolving a sensor indicator problem" on page 9.
A processor, memory, power, or cooling hardware failure occurred.	Go to "Resolving a hardware problem" on page 10.
Missing or faulty graphics processing unit (GPU), PCIe adapter, disk drive, or solid-state drive.	Go to Resolving a GPU, PCIe adapter, or device problem.

Determining the problem analysis procedure to perform

Learn how to identify the correct problem analysis procedure to perform.

To determine the correct problem analysis procedure to perform, complete the following steps:

1. After you apply power to the system, are the power supply LEDs green (either steady or flashing)?

If	Then
Yes:	Continue with the next step.
No:	Go to "Resolving a power problem" on page 4.

2. Can you access the baseboard management controller (BMC) across the network?

If	Then
Yes:	Continue with the next step.

If	Then
No:	Go to "Resolving a BMC access problem."

3. Can you boot the system to the Petitboot menu?

If	Then
Yes:	Continue with the next step.
No:	Go to "Resolving a system firmware boot failure" on page 5.

4. Is video displayed on the video graphics array (VGA) monitor?

If	Then
Yes:	Continue with the next step.
No:	Go to "Resolving a VGA monitor problem" on page 6.

5. Can you start the operating system?

If	Then
Yes:	Continue with the next step.
No:	Go to "Resolving an operating system boot failure" on page 7.

6. On the sensor readings GUI display, are any sensors red?

If	Then
Yes:	Go to "Resolving a sensor indicator problem" on page 9.
No:	Continue with the next step.

7. Go to "Resolving a hardware problem" on page 10. **This ends the procedure.**

Resolving a BMC access problem

Learn how to identify the service action that is needed to resolve a baseboard management controller (BMC) access problem.

1. Ensure that the BMC password is not set to the default password. For information about changing the default password, see Logging on to the BMC GUI. Does the problem persist?

If	Then
Yes:	Continue with the next step.
No:	**This ends the procedure.**

2. Are both ends of the network cable seated securely?

If	Then
Yes:	Continue with the next step.
No:	Seat both ends of the cable securely. If the problem persists, continue with the next step.

3. Power off the system and disconnect all ac power cords for 30 seconds. Then, reconnect the ac power cords and power on the system. Does the BMC access problem persist?

If	Then
Yes:	Continue with the next step.

If	Then
No:	This ends the procedure.

4. Verify that the BMC network settings are correct.

   a. Power on the system by using the power button on the front of the system. Wait 1 - 2 minutes for the system to display the Petitboot menu.

   b. When the Petitboot menu is displayed, press any key to interrupt the boot process. Then, select Exit to Shell.

   c. Type the following command and press Enter:

      `ipmitool lan print 1`

   d. Verify that the MAC address and the IP address settings are correct. Then, continue with the next step.

      Note: If the IP address setting is incorrect, go to Configuring the firmware IP address website(http://www.ibm.com/support/knowledgecenter/linuxonibm/liabw/liabwenablenetwork.htm). If the MAC address is 00:00:00:00:00:00, go to "Contacting IBM service and support" on page 71.

5. Are you able to log in to the BMC web interface?

If	Then
Yes:	To update the BMC firmware, click **Maintenance** > **Firmware update**. Select the firmware file and click **upload**. If the problem persists, go to step 12 on page 4.
No:	Continue with the next step.

6. Complete the following steps:

   a. Connect a VGA monitor to the system.

   b. Press the power button to power on the system.

   c. Boot the system to the Petitboot menu. From the Petitboot menu, select **Exit to shell**.

7. Are you mounting the storage that contains the pUpdate utility and the BMC firmware file from a network storage location?

If	Then
Yes:	Continue with the next step.
No:	Go to step 9 on page 4.

8. To update the BMC firmware by using a network storage location, complete the following steps:

   a. Type `mkdir /tmp/media` and press Enter.

   b. Type the following command and press Enter:

      `mount -t nfs` *xxx.xxx.xx.xx*`:/path/of/files /tmp/media`, where *xxx.xxx.xx.xx* is the IP address of the system to which you want to establish the connection.

   c. Type `cd /tmp/media` and press Enter.

   d. To update the BMC firmware, type the following command and press Enter:

      `./pUpdate -f` *bmc.bin* `-i bt`, where *bmc.bin* is the name of the BMC image file.

   e. Allow at least 2 minutes for the BMC to reboot. Does the problem persist?

If	Then
Yes:	Go to step 12 on page 4.
No:	This ends the procedure.

9. Update the BMC firmware by using a USB device. Complete the following steps:

   a. Ensure that the USB device is formatted by using the **VFAT** file system.

   b. Insert the USB device into the system if you have not already done so.

   c. Type `mount` and press Enter.

   Is the following output displayed?

   `/dev/mapper/sdb1 mounted on /var/petitboot/mnt/dev/sdb1`

If	Then
Yes:	Continue with the next step.
No:	Go to step 11.

10. Complete the following steps:

    a. Type `cd /var/petitboot/mnt/dev/sdb1` and press Enter.

    b. To update the BMC firmware, type the following command and press Enter:

       `./pUpdate -f` *bmc.bin* `-i bt`, where *bmc.bin* is the name of the BMC image file.

    c. Allow at least 2 minutes for the BMC to reboot. Does the problem persist?

If	Then
Yes:	Go to step 12.
No:	**This ends the procedure.**

11. Complete the following steps:

    a. Type `mkdir /tmp/media` and press Enter.

    b. Type `mount /dev/mapper/sdb1 /tmp/media` and press Enter.

    c. Type `cd /tmp/media` and press Enter.

    d. To update the BMC firmware, type the following command and press Enter:

       `./pUpdate -f` *bmc.bin* `-i bt`, where *bmc.bin* is the name of the BMC image file.

    e. Allow at least 2 minutes for the BMC to reboot. Does the problem persist?

If	Then
Yes:	Go to step 12.
No:	**This ends the procedure.**

12. Replace the system backplane.

    • If your system is an 8001-12C or 8005-12N, go to "8001-12C or 8005-12N locations" on page 73 to identify the physical location and the removal and replacement procedure. **This ends the procedure.**

    • If your system is an 8001-22C or 8005-22N, go to "8001-22C or 8005-22N locations" on page 87 to identify the physical location and the removal and replacement procedure. **This ends the procedure.**

Resolving a power problem

Learn how to identify the service action that is needed to resolve a power problem.

1. Is the identify LED on the front of the system flashing red slowly at 0.25 Hz? For more information about LEDs, see LEDs on the 8001-12C and 8005-12N system or LEDs on the 8001-22C and 8005-22N system.

If	Then
Yes:	Continue with the next step.
No:	No service action is required. **This ends the procedure.**

2. Perform the following actions, one at a time, until the problem is resolved:

   a. Ensure that all of the power cords are fully seated in the power supplies.

   b. Ensure that the power supply is fully seated in the system.

   c. Ensure that the power supply fan is not blocked.

   d. Ensure that all of the power cords are fully seated in the power distribution units (PDUs) or wall outlets.

   e. If the power cords are plugged into PDUs, ensure that the PDUs are turned on.

   f. Replace the power cords.

   g. Replace the power supplies.

   - If your system is an 8001-12C or 8005-12N, go to "8001-12C or 8005-12N locations" on page 73 to identify the physical location and the removal and replacement procedure.

   - If your system is an 8001-22C or 8005-22N, go to "8001-22C or 8005-22N locations" on page 87 to identify the physical location and the removal and replacement procedure.

   This ends the procedure.

Resolving a system firmware boot failure

Learn how to identify the service action that is needed to resolve a failure while booting your system firmware.

1. Does the baseboard management controller (BMC) respond to commands and are you able to access the BMC web interface?

   Note: To determine whether the BMC responds to commands, run the following **ipmitool** command:

   ```
   ipmitool -I lanplus -U <username> -P <password> -H <bmc ip or bmc hostname> chassis status
   ```

If	Then
Yes:	Continue with step 3.
No:	Continue with the next step.

2. Complete the following actions, one at a time, until the problem is resolved:

   a. Reset the BMC remotely by entering the following command:

   ```
   ipmitool -I lanplus -U <username> -P <password> -H <bmc ip or bmc hostname> mc reset cold
   ```

   b. Disconnect the power cords from the system for 30 seconds. Reconnect the power cords, wait 5 minutes, and then go to step 1.

   c. Update the BMC firmware by using the pUpdate command with the block transfer (BT) option. For instructions, see "Resolving a BMC access problem" on page 2.

   d. Replace the system backplane.

   - If your system is an 8001-12C or 8005-12N, go to "8001-12C or 8005-12N locations" on page 73 to identify the physical location and the removal and replacement procedure.

   - If your system is an 8001-22C or 8005-22N, go to "8001-22C or 8005-22N locations" on page 87 to identify the physical location and the removal and replacement procedure.

   This ends the procedure.

3. After you pressed the power button, did the system turn on but fail to display the Petitboot menu?

If	Then
Yes:	Continue with the next step.
No:	**This ends the procedure.**

4. Complete the following actions, one at a time, until the problem is resolved:
   a. Disconnect the power cords from the system for 30 seconds. Reconnect the power cords, wait 5 minutes, and then go to step 3 on page 5.
   b. Update the PNOR firmware. For instructions, see Getting fixes.
   c. Replace the system backplane.
      - If your system is an 8001-12C or 8005-12N, go to "8001-12C or 8005-12N locations" on page 73 to identify the physical location and the removal and replacement procedure.
      - If your system is an 8001-22C or 8005-22N, go to "8001-22C or 8005-22N locations" on page 87 to identify the physical location and the removal and replacement procedure.

   This ends the procedure.

Resolving a VGA monitor problem

Learn how to identify the service action that is needed to resolve a video graphics array (VGA) monitor problem.

1. Is the system powered on and is the VGA monitor connected to the VGA display port, but no video is displayed?

If	Then
Yes:	Continue with the next step.
No:	**This ends the procedure.**

2. Complete the following steps, one at a time until the problem is resolved:
   a. Ensure that the VGA cable is properly seated to the server port and to the monitor port.
   b. Verify that your monitor and your VGA cable are working properly by testing them on a system that is known to be working properly. If the monitor or the VGA cable does not work properly, replace it.
   c. Verify that the system is powered on by activating a serial over LAN (SOL) session through the baseboard management controller (BMC). If the system is not active, go to "Resolving a system firmware boot failure" on page 5.
   d. Replace the system backplane.
      - If your system is an 8001-12C or 8005-12N, go to "8001-12C or 8005-12N locations" on page 73 to identify the physical location and the removal and replacement procedure.
      - If your system is an 8001-22C or 8005-22N, go to "8001-22C or 8005-22N locations" on page 87 to identify the physical location and the removal and replacement procedure.

   This ends the procedure.

Resolving an operating system boot failure

Learn how to identify the service action that is needed to resolve a failure while booting your operating system.

1. Was the system recently installed, serviced, moved, or upgraded?

If	Then
Yes:	Ensure that all cables are properly seated in the connection path to the designated boot device. **This ends the procedure.**
No:	Continue with the next step.

2. Are you booting the operating system from a network location?

If	Then
Yes:	Continue with the next step.
No:	Continue with step 4.

3. Complete the following actions, one at a time until the problem is resolved:
   a. Ensure that a problem does not exist with the connection to the network location.
   b. Ensure that the adapter has a valid IP address for the network.
   c. Replace the network adapter.
      - If your system is an 8001-12C or 8005-12N, go to "8001-12C or 8005-12N locations" on page 73 to identify the physical location and the removal and replacement procedure.
      - If your system is an 8001-22C or 8005-22N, go to "8001-22C or 8005-22N locations" on page 87 to identify the physical location and the removal and replacement procedure.

4. Petitboot displays all recognized bootable images to use by default. Is the boot image recognized by Petitboot?

If	Then
Yes:	Continue with step 10 on page 9.
No:	Select the Petitboot menu option to refresh the boot images. If the problem persists, continue with the next step.

5. To determine the command to type on the Petitboot command line to verify that the boot drive is recognized and in optimal status, use Table 1.

Table 1. Determine the command to verify that the boot drive is recognized and in optimal status

Boot drive configuration	Commands
Virtual drive configured through an LSI SAS3 9361-8I adapter	`storcli /c0 /vall show all`
Virtual drive configured through an LSI S3008L-L8I adapter	`sas3ircu 0 display` **Note:** A status of **okay** indicates optimal status.

Boot drive configuration	Commands
Non-Volatile Memory Express (NVMe) drive	Use the `nvme list` command to verify that the boot drive is recognized: • `nvme list` Use the `nvme smart-log` command to verify the smart status of the boot drive: • `nvme smart-log /dev/nvmeX`, where *X* is the ID that is associated with the drive. **Note:** If you do not know which drive is the boot drive, check the smart status of all of the drives that are listed in the `nvme list` command output.
Virtual drive connected directly to the system backplane	• `mvcli` • `info -o vd`
Physical drive connected directly to the system backplane	• `mvcli` • `info -o pd`

Is the boot drive recognized and in optimal status?

If	Then
Yes:	Reinstall the operating system on the boot drive. **This ends the procedure.**
No:	Continue with the next step.

6. Are the drives properly seated in their respective drive bays?

   Note:
   - If your system is an 8001-12C or 8005-12N, go to "8001-12C or 8005-12N locations" on page 73 to identify the physical location and the removal and replacement procedure.
   - If your system is an 8001-22C or 8005-22N, go to "8001-22C or 8005-22N locations" on page 87 to identify the physical location and the removal and replacement procedure.

If	Then
Yes:	Continue with the next step.
No:	Properly seat the drives in the drive bays. Then, go to step 4 on page 7.

7. Refresh the Petitboot boot options. Is the boot image on the boot drive recognized?

If	Then
Yes:	Boot the operating system. Then, continue with step 10 on page 9.
No:	Continue with the next step.

8. To determine the command to type on the Petitboot command line to verify that the drives that are known to be in a RAID array are recognized, use Table 2.

Table 2. Determine the command to verify that the drives that are known to be in a RAID array are recognized

Drive configuration	Commands
Virtual drive configured through an LSI SAS3 9361-8I adapter	`storcli /c0 /vall show all`
Virtual drive configured through an LSI S3008L-L8I adapter	`sas3ircu 0 display` **Note:** A status of **okay** indicates optimal status.

Table 2. Determine the command to verify that the drives that are known to be in a RAID array are recognized (continued)

Drive configuration	Commands
Drive connected directly to the system backplane	• `mvcli` • `info -o vd` • `info -o pd`

Are the drives that are known to be in the RAID array recognized?

If	Then
Yes:	Reinstall the operating system on the boot drive. **This ends the procedure.**
No:	Continue with the next step.

9. Complete the following actions, one at a time until the physical drives are recognized in the RAID array:

   Note:
   - If your system is an 8001-12C or 8005-12N, go to "8001-12C or 8005-12N locations" on page 73 to identify the physical location and the removal and replacement procedure.
   - If your system is an 8001-22C or 8005-22N, go to "8001-22C or 8005-22N locations" on page 87 to identify the physical location and the removal and replacement procedure.

   a. Ensure that the SAS cable is securely seated in the RAID adapter and the disk drive backplane. If the drive is an NVMe drive, ensure that the NVMe cable is connected from the disk drive backplane to the NVMe PCIe host bus adapter (HBA). If the drive is connected directly to the system backplane, ensure that the mini-SAS cable and SATA cables are properly seated in the disk drive backplane and system backplane.

   b. If the drive is configured through a RAID adapter, replace the RAID adapter.

   c. Replace the SAS, SATA, or NVMe cable.

   d. If the drive is connected directly to the system backplane, replace the system backplane.

   This ends the procedure.

10. Does an operating system error occur during the boot?

If	Then
Yes:	Recover the operating system with the tools for the operating system. If that does not resolve the problem, reinstall the operating system. **This ends the procedure.**
No:	Reinstall the operating system. **This ends the procedure.**

Resolving a sensor indicator problem

Learn how to resolve a sensor indicator problem.

To determine whether a service action is required, complete the following procedure:

Note: For more information about sensors, see Sensor readings GUI display.

1. If the system is not powered on, boot the system to the operational state. Log in to the BMC web interface. Then, click **Server Health** > **Sensor Readings**.

   Are any of the sensor indicator LEDs red?
   - **Yes:** Continue with the next step.
   - **No: This ends the procedure.**

2. Record the names of any sensors that have a red LED indicator status.

   Note: Repeat steps 3 - 6 for every sensor that you record in this step.
3. Use one of the following commands to list the sensor event logs (SELs).
   - To list SELs by using an in-band network, enter the following command:

     `ipmitool sel elist`
   - To list SELs remotely over the LAN, enter the following command:

     `ipmitool -I lanplus -U <username> -P <password> -H <BMC IP addres or BMC hostname> sel elist`
4. Review the list of SELs and locate the log entry that meets the following criteria:
   - The name of any of the sensors you recorded in step 2.
   - A service action keyword is present. For a list of service action keywords, see "Identifying service action keywords in system event logs" on page 26.
   - **Asserted** is in the description.

   Did you identify a log entry that meets the above criteria?
   - **Yes:** Continue with the next step.
   - **No:** Go to "Collecting diagnostic data" on page 71. Then, go to "Contacting IBM service and support" on page 71. **This ends the procedure.**
5. Use one of the following options to display the SEL details for the sensor:

   Note: You must specify the SEL record ID in hexadecimal format. For example: 0x1a.
   - To display SEL details by using an in-band network, enter the following command:

     `ipmitool sel get <SEL record ID>`
   - To display SEL details remotely over the LAN, enter the following command:

   `ipmitool -I lanplus -U <username> -P <password> -H <BMC IP address or BMC hostname> sel get <SEL record ID>`
6. The sensor ID field contains sensor information in the sensor name (sensor ID) format. Record the sensor name, sensor ID, and event description. Then, use this information to determine the service action to perform:
   - If your system is an 8001-12C or 8005-12N, go to "Identifying a service action by using sensor and event information for the 8001-12C and 8005-12N" on page 27 to determine the service action to perform. **This ends the procedure.**
   - If your system is an 8001-22C or 8005-22N, go to "Identifying a service action by using sensor and event information for the 8001-22C and 8005-22N" on page 43 to determine the service action to perform. **This ends the procedure.**

Resolving a hardware problem

Learn how to identify the service action that is needed to resolve a hardware problem.
1. If you have not already done so, manually boot the system.
2. Go to "Identifying a service action by using system event logs" on page 21. Then, continue with the next step.
3. Was a service action identified?

If	Then
Yes:	Continue with the next step.
No:	Go to step 5 on page 11.

4. Did the service action fix the problem?

If	Then
Yes:	**This ends the procedure.**

If	Then
No:	Go to step 5.

5. Go to "Resolving a GPU, PCIe adapter, or device problem." Then, continue with the next step.
6. Was a service action identified?

If	Then
Yes:	Continue with the next step.
No:	Go to "Collecting diagnostic data" on page 71. Then, go to "Contacting IBM service and support" on page 71. **This ends the procedure.**

7. Did the service action fix the problem?

If	Then
Yes:	**This ends the procedure.**
No:	Go to "Collecting diagnostic data" on page 71. Then, go to "Contacting IBM service and support" on page 71. **This ends the procedure.**

Resolving a GPU, PCIe adapter, or device problem

Learn how to access log files, information to identify types of events, and a list of potential problems and service actions.

1. To identify the correct service procedure to perform by using operating system log information, complete the following steps:
   a. Log in as the root user.
   b. At the command prompt, type **dmesg** and press Enter.
2. Scan the operating system logs for the first occurrence of keywords, such as fail, failure, or failed. When you find a keyword that accompanies one or more of the resource names in Table 3, a service action is required.

   Did you find an operating system log that requires a service action?

If	Then
Yes:	Use Table 3 to determine the service procedure to perform for your type of problem. **This ends the procedure.**
No:	Continue with the next step.

Table 3. Resource names, examples, and service procedures for different types of operating system logs.

Resource name	Example of a log requiring a service action	Type of problem	Service procedure
mpt3sas	PCI error detected 2	RAID	Go to "Resolving a RAID adapter problem" on page 12.
eth1, eth2, eth3	Failed to re-initialize device	Network	Go to "Resolving a network adapter problem" on page 13.
NVRM	aborting RmInitAdapter failed!	Graphics	Go to "Resolving a graphics processing unit problem" on page 15.

Table 3. Resource names, examples, and service procedures for different types of operating system logs. (continued)

Resource name	Example of a log requiring a service action	Type of problem	Service procedure
nvme	`Failed status: ffffffff, reset controller`	NVMe Flash adapter	Go to "Resolving an NVMe Flash adapter problem" on page 15.
ata1, ata2	`SError: { RecovComm PHYRdyChg 10B8B Dispar }`	Marvell storage adapter	Go to "Resolving a storage device problem" on page 16.
sda, sdb, sdc	`FAILED Result`	Storage	

3. Are all of the adapters in the system missing or failed?

If	Then
Yes:	Perform the following actions, one at a time until the problem is resolved: 1. Ensure that the PCIe risers are fully seated in the system. 2. Replace system processor CPU 1. 3. Replace the system backplane. **Note:** • If your system is an 8001-12C or 8005-12N, go to "8001-12C or 8005-12N locations" on page 73 to identify the physical location and the removal and replacement procedure. • If your system is an 8001-22C or 8005-22N, go to "8001-22C or 8005-22N locations" on page 87 to identify the physical location and the removal and replacement procedure.
No:	Go to "Collecting diagnostic data" on page 71. Then, go to "Contacting IBM service and support" on page 71.

Resolving a RAID adapter problem

Learn about the possible problems and service actions that you can perform to resolve a RAID adapter problem.

Note: To determine the location of the PCIe adapter, see "Identifying the location of the PCIe adapter by using the slot number" on page 18.

Table 4. RAID adapter problems and service actions.

Problem	Service action
System unable to find adapter	1. Verify that the adapter is properly seated in a compatible slot. 2. Install the adapter in a different compatible slot. 3. Verify that the drivers for the adapter are installed. 4. Verify that the most recent firmware is installed on the system, or install the most recent firmware if it is not already installed. 5. Restart the system. 6. Replace the adapter. 7. Replace the system backplane. 8. Replace the central processing unit (CPU).

Table 4. RAID adapter problems and service actions (continued).

Problem	Service action
Adapter suddenly stops working	1. If the system was recently installed, moved, serviced, or upgraded, verify that the adapter is seated properly and all associated cables are connected correctly. 2. Inspect the PCIe socket and verify that there is no dirt or debris in the socket. 3. Inspect the card and verify that it is not physically damaged. 4. Verify that all cables are properly seated and are not physically damaged. If you recently added one or more new adapters, remove them and then test to determine whether the failing adapter is functioning properly again. If the RAID adapter is functioning again, review the IBM support tips to confirm that there are no PCI address, driver, or firmware conflicts. Then, reinstall the new adapters again one at a time until all adapters function properly. 5. Replace the adapter. 6. Replace the system backplane. 7. Replace the CPU.
One or more drives are not recognized	1. If more than one drive is not recognized, verify that the cables are properly attached to the RAID card. 2. Verify that the drive or drives are fully seated in the system. 3. Verify that all of the cables that attach to the backplane are properly seated. 4. Verify that the drive or drives are compatible with the RAID adapter. 5. Verify that the most recent firmware is installed for the RAID adapter, or install the most recent firmware if it is not already installed. 6. If more than one drive is not recognized, replace the drive. 7. Replace the RAID adapter. 8. Replace the system backplane. 9. Replace the cable or cables.
Other problems	For information about adapter diagnostics, see Supporting diagnostics. For information about adapter user information, see "User guides for GPUs and PCIe adapters" on page 21.

Resolving a network adapter problem

Learn about the possible problems and service actions that you can perform to resolve a network adapter problem.

Note: To determine the location of the PCIe adapter, see "Identifying the location of the PCIe adapter by using the slot number" on page 18.

Table 5. Network adapter problems and service actions.

Problem	Service action
System unable to find adapter	1. Verify that the adapter is properly seated in a compatible slot. 2. Install the adapter in a different compatible slot. 3. Verify that the drivers for the adapter are installed. 4. Verify that the most recent firmware is installed on the system, or install the most recent firmware if it is not already installed. 5. Restart the system. 6. Replace the adapter. 7. Replace the system backplane. 8. Replace the central processing unit (CPU).
Adapter suddenly stops working	1. If the system was recently installed, moved, serviced, or upgraded, verify that the adapter is seated properly and all associated cables are correctly connected. 2. Inspect the PCIe socket and verify that there is no dirt or debris in the socket. 3. Inspect the card and verify that it is not physically damaged. 4. Verify that all cables are properly seated and are not physically damaged. If you recently added one or more new adapters, remove them and then test to determine whether the failing adapter is functioning properly again. If the network adapter is functioning again, review the IBM support tips to confirm that there are no PCI address, driver, or firmware conflicts. Then, reinstall the new adapters again one at a time until all adapters function properly. 5. Replace the adapter. 6. Replace the system backplane. 7. Replace the CPU.
Link indicator light on the adapter is off	1. Verify that the cable functions properly by testing it with a known working connection. 2. Verify that the port or ports on the switch are enabled and functional. 3. Verify that the switch and adapter are compatible. 4. Replace the adapter.
Link light on the adapter is on, but there is no communication from the adapter	1. Verify that the most recent driver is installed, or install the most recent driver if it is not already installed. 2. Verify that the adapter and its link have compatible settings, such as speed and duplex configuration.
Other problems	For information about adapter diagnostics, see Supporting diagnostics. For information about adapter user information, see "User guides for GPUs and PCIe adapters" on page 21.

Resolving a graphics processing unit problem

Learn about the possible problems and service actions that you can perform to resolve a graphics processing unit (GPU) problem.

Note: To determine the location of the GPU, see "Identifying the location of the GPU by using the slot number" on page 19.

Table 6. GPU problems and service actions

Problem	Service action
System unable to find GPU	1. Verify that the GPU is properly seated in a compatible slot. 2. Install the GPU in a different compatible slot. 3. Verify that the drivers for the GPU are installed. 4. Verify that the most recent firmware is installed on the system, or install the most recent firmware if it is not already installed. 5. Restart the system. 6. Replace the GPU. 7. Replace the system backplane. 8. Replace the central processing unit (CPU).
GPU suddenly stops working	1. If the system was recently installed, moved, serviced, or upgraded, verify that the GPU is seated properly and all associated cables are connected correctly. 2. Inspect the PCIe socket and verify that there is no dirt or debris in the socket. 3. Inspect the card and verify that it is not physically damaged. 4. Verify that all cables are properly seated and are not physically damaged. If you recently added one or more new adapters, remove them and then test to determine whether the failing adapter is functioning properly again. If the graphics adapter is functioning again, review the IBM support tips to confirm that there are no PCI address, driver, or firmware conflicts. Then, reinstall the new adapters again one at a time until all adapters function properly. 5. Replace the GPU. 6. Replace the system backplane. 7. Replace the central processing unit (CPU).
Other problems	For information about adapter diagnostics, see Supporting diagnostics. For information about adapter user information, see "User guides for GPUs and PCIe adapters" on page 21.

Resolving an NVMe Flash adapter problem

Learn about the possible problems and service actions that you can perform to resolve a Non-Volatile Memory Express (NVMe) Flash adapter problem.

Note: To determine the location of the NVMe Flash adapter, see "Identifying the location of the NVMe Flash adapter" on page 20.

Table 7. NVMe Flash adapter problems and service actions

Problem	Service action
System is unable to find the NVMe Flash adapter	1. If the system was recently installed, moved, serviced, or upgraded, verify that the NVMe Flash adapter is seated and installed properly. 2. Verify that the NVMe Flash adapter is compatible with the system. 3. Verify that the most recent firmware is installed on the system. Otherwise install the most recent firmware if it is not already installed. 4. Replace the NVMe Flash adapter.
NVMe Flash adapter stops working suddenly	1. Check the system logs to verify whether the system detected a problem. 2. Replace the NVMe Flash adapter.
NVMe Flash adapter maximum write capability is depleted	To determine whether the maximum write capability of a PCIe3 1.6 TB NVMe Flash adapter is depleted, see PCIe3 1.6 TB NVMe Flash adapter (FC EKN2).
Other problems	Check the messages and resolve any other problems that are detected. Then, test the NVMe Flash adapter again.

Resolving a storage device problem

Learn about the possible problems and service actions that you can perform to resolve a storage device problem.

Note: To determine the location of the storage device, see "Identifying the location of the storage device" on page 20.

Table 8. Storage device problems and service actions

Problem	Service action

System is unable to find more than one storage device	1. If the system was recently installed, moved, serviced, or upgraded, verify that the device is seated and installed properly.
	2. Verify that the device is compatible with your system.
	3. Verify that all internal cables are properly seated and are not physically damaged.
	4. Verify that the most recent firmware is installed on the system, or install the most recent firmware if it is not already installed.
	5. If the devices are part of a RAID configuration, ensure that the device has been enabled and is part of an array.
	6. If the devices are connected to a RAID adapter, replace the RAID adapter.
	7. If the devices are small form factor NVMe drives, replace the following items one at a time until the problem is resolved:
	  • NVMe host bus adapter
	  • Cables
	  • Disk drive backplane
	  • Small form factor NVMe drives
	8. Replace the cable that connects the disk drive backplane to the RAID adapter. If the system does not have a RAID adapter, replace the cable that connects the disk drive backplane to the system backplane.

System unable to find a storage device	1. If the system was recently installed, moved, serviced, or upgraded, verify that the device is seated and installed properly. 2. Verify that the device is compatible with your system. 3. Verify that all internal cables are properly seated and are not physically damaged. 4. Verify that the most recent firmware is installed on the system, or install the most recent firmware if it is not already installed. 5. If the device is part of a RAID configuration, ensure that the device has been enabled and is part of an array. 6. Install the device in an open or free slot. If the device is able to be found replace the component with the failing connector. 7. Replace the storage device. 8. Replace any applicable attached cable.

Table 8. Storage device problems and service actions (continued)

Problem	Service action

More than one storage device suddenly stops working	1. If the system was recently installed, moved, serviced, or upgraded, verify that the device is seated and installed properly.
	2. Check the system logs to verify whether the system detected a problem.
	3. If the devices are connected to a RAID adapter, replace the RAID adapter.
	4. If the devices are small form factor NVMe drives, replace the following items one at a time until the problem is resolved:
	  • NVMe host bus adapter
	  • Cables
	  • Disk drive backplane
	  • Small form factor NVMe drives
	5. Replace the cable that connects the disk drive backplane to the RAID adapter. If the system does not have a RAID adapter, replace the cable that connects the disk drive backplane to the system backplane.

One storage device suddenly stops working	1. Verify that all internal cables are properly seated and are not physically damaged. 2. Check the system logs to verify whether the system detected a problem. 3. Replace the drive. 4. Replace the system backplane. 5. Replace the cable. 6. If you have a RAID adapter that is installed, replace it.
Other problems	Check the messages and resolve any other problems that were detected. Then, test the drive again. If the drive continues not to function, refer to the documentation for the drive.

Identifying the location of the PCIe adapter by using the slot number

The error message provides information to help you to determine the location of the PCIe adapter.

For example, the log might contain an error similar to the following text:

```
[131779.752714] EEH: PHB#0 failure detected, location: WIO Slot1
```

Use the following table to map the slot number information in the operating system log to the PCIe adapter description and service action.

Table 9. Slot numbers, adapter descriptions, and service action for the 8001-12C and 8005-12N

Slot information from log	PCIe adapter description	Service action
UIO Network	PCIe adapter 1	Replace the PCIe adapter indicated in the PCIe adapter description column. Go to "8001-12C or 8005-12N locations" on page 73 to identify the physical location and the removal and replacement procedure.
UIO Slot1	PCIe adapter 2	
PLX Slot1	PCIe adapter 3	
WIO Slot1	PCIe adapter 4	
WIO Slot2	PCIe adapter 5	

Table 10. Slot numbers, adapter descriptions, and service action for the 8001-22C and 8005-22N

Slot information from log	PCIe adapter description	Service action
UIO Network	PCIe adapter 1	Replace the PCIe adapter indicated in the PCIe adapter description column. Go to "8001-22C or 8005-22N locations" on page 87 to identify the physical location and the removal and replacement procedure.
UIO Slot2	PCIe adapter 2	
UIO Slot1	PCIe adapter 3	
PLX Slot1	PCIe adapter 4	
WIO Slot1	PCIe adapter 5	
WIO Slot2	PCIe adapter 6	
WIO Slot3	PCIe adapter 7	

Identifying the location of the GPU by using the slot number

The error message provides information to help you to determine the location of the graphics processing unit (GPU).

For example, the log might contain an error similar to the following text:

```
[ 9288.123418] EEH: PHB#0 failure detected, location: WIO Slot1
```

Use the following table to map the slot number information in the operating system log to the GPU description and service action.

Table 11. Slot numbers, GPU descriptions, and service action for the 8001-12C and 8005-12N

Slot information from the log	GPU description	Service action
WIO Slot1	GPU	Replace the GPU indicated in the GPU description column. Go to "8001-12C or 8005-12N locations" on page 73 to identify the physical location and the removal and replacement procedure.

Table 12. Slot numbers, GPU descriptions, and service action for the 8001-22C and 8005-22N

Slot information from the log	GPU description	Service action
UIO Slot1	GPU 1	Replace the GPU indicated in the GPU description column. Go to "8001-22C or 8005-22N locations" on page 87 to identify the physical location and the removal and replacement procedure.
WIO Slot1	GPU 2	

Identifying the location of the NVMe Flash adapter

Use this procedure to identify the location of a Non-Volatile Memory Express (NVMe) Flash adapter.

1. Does the operating system log contain the slot number? For example, the log might contain an error message similar to the following text:

   ```
   [131779.752714] EEH: PHB#0 failure detected, location: WIO Slot1
   ```

If	Then
Yes:	If your system is an 8001-12C or 8005-12N, use Table 13 to map the slot number information to the PCIe adapter description and service action. If your system is an 8001-22C or 8005-22N, use Table 14 to map the slot number information to the PCIe adapter description and service action. **This ends the procedure.**
No:	Continue with the next step.

2. Locate the NVMe Flash adapter by using the PCI address:

   a. The operating system log contains information about the NVMe Flash adapter in the form of a PCI address. Record the PCI address information for the NVMe Flash adapter that has failed. For example, in the operating system log message `nvme 0006:01:00.0: Failed status: ffffffff, reset controller`, the PCI address of the failing NVMe Flash adapter is 0006:01:00.0.

   b. At the command line, type `lscfg -vl pciaddress`, where `pciaddress` is the NVMe Flash adapter information that you recorded in step 2.a. Then, press Enter.

   c. Record the slot number information that is in the location code field.

   d. If your system is an 8001-12C or 8005-12N, use Table 13 to map the slot number information to the PCIe adapter description and service action. If your system is an 8001-22C or 8005-22N, use Table 14 to map the slot number information to the PCIe adapter description and service action. **This ends the procedure.**

Table 13. Slot numbers, adapter descriptions, and service action for the 8001-12C and 8005-12N

Slot information from the log	PCIe adapter description	Service action
UIO Slot1	PCIe adapter 2	Replace the NVMe Flash adapter indicated in the PCIe adapter description column. Go to "8001-12C or 8005-12N locations" on page 73 to identify the physical location and the removal and replacement procedure.
PLX Slot1	PCIe adapter 3	
WIO Slot1	PCIe adapter 4	
WIO Slot2	PCIe adapter 5	

Table 14. Slot numbers, adapter descriptions, and service action for the 8001-22C and 8005-22N

Slot information from the log	PCIe adapter description	Service action
UIO Slot1	PCIe adapter 3	Replace the NVMe Flash adapter indicated in the PCIe adapter description column. Go to "8001-22C or 8005-22N locations" on page 87 to identify the physical location and the removal and replacement procedure.
PLX Slot1	PCIe adapter 4	
WIO Slot1	PCIe adapter 5	
WIO Slot2	PCIe adapter 6	
WIO Slot3	PCIe adapter 7	

Identifying the location of the storage device

Use this procedure to identify the location of a storage device.

The storage device location is determined in the drive removal and replacement procedures for your system. See Removing a disk drive from the 8001-12C, 8001-22C, 8005-12N, or 8005-22N system.

User guides for GPUs and PCIe adapters

Use this information to find the user guide for your graphics processing unit (GPU) or PCIe adapter.

Use the following table to find the user guide for the GPU or PCIe adapter that you are using.

Table 15. GPU and PCIe adapter user guides

Name	User guide
Avago	Avago Technologies website (http://www.avagotech.com/products/server-storage/raid-controllers/)
Broadcom	Broadcom website (http://www.broadcom.com)
Emulex	Emulex website (http://www.emulex.com/products/ethernet-networking-storage-connectivity/ethernet-networking-adapters/ibm-branded/selection-guide/)
Marvell	Marvell website (http://www.marvell.com/storage/system-solutions/sata-controllers/)
Mellanox	Mellanox Technologies website (http://mymellanox.force.com/support/VF_SerialSearch)
NVIDIA	NVIDIA website (http://www.nvidia.com)
QLogic	QLogic website (http://driverdownloads.qlogic.com/QLogicDriverDownloads_UI/IBM_Search.aspx)

Identifying a service action

Use the following procedures to help you identify the service action that is needed.

Identifying a service action by using system event logs

Use the Intelligent Platform Management Interface (IPMI) program to examine system event logs (SELs) to identify a service action.

1. Use the **ipmitool** command to examine SELs.
   - To list SELs by using an in-band network, use the following command:
     ```
     ipmitool sel elist
     ```
   - To list SELs remotely over the LAN, use the following command:
   ```
   ipmitool -I lanplus -U <username> -P <password> -H <BMC IP addres or BMC hostname> sel elist
   ```
2. Scan the SELs for an event with the value OEM record de. Did you find a SEL with the value OEM record de?

If	Then
Yes:	Continue with the next step.
No	Go to step 4 on page 23.

3. The OEM record de specific log information is indicated by the rightmost digits of the SEL with the value OEM record de. Use Table 1 to determine the service action to perform.

Table 16. OEM record de specific log information and service action

OEM record de specific log information	Service action
00xxxxxxxxxx	Go to Getting fixes and update the system firmware to the most recent level of firmware that is available. If this SEL event continues to be logged, go to "Collecting diagnostic data" on page 71. Then, go to "Contacting IBM service and support" on page 71.
01xxxxxxxxxx	Go to the "EPUB_PRC_FIND_DECONFIGURE_PART isolation procedure" on page 61.
04xxxxxxxxxx	Go to the "EPUB_PRC_SP_CODE isolation procedure" on page 61.
05xxxxxxxxxx	Go to the "EPUB_PRC_PHYP_CODE isolation procedure" on page 61.
08xxxxxxxxxx	Go to the "EPUB_PRC_ALL_PROCS isolation procedure" on page 62.
09xxxxxxxxxx	Go to the "EPUB_PRC_ALL_MEMCRDS isolation procedure" on page 62.
0Axxxxxxxxxx	Go to Getting fixes and update the system firmware to the most recent level of firmware that is available. If this SEL event continues to be logged, go to "Collecting diagnostic data" on page 71. Then, go to "Contacting IBM service and support" on page 71.
10xxxxxxxxxx	Go to the "EPUB_PRC_LVL_SUPPORT isolation procedure" on page 63.
16xxxxxxxxxx	Go to Getting fixes and update the system firmware to the most recent level of firmware that is available. If this SEL event continues to be logged, go to "Collecting diagnostic data" on page 71. Then, go to "Contacting IBM service and support" on page 71.
1Cxxxxxxxxxx	Go to Getting fixes and update the system firmware to the most recent level of firmware that is available. If this SEL event continues to be logged, go to "Collecting diagnostic data" on page 71. Then, go to "Contacting IBM service and support" on page 71.
22xxxxxxxxxx	Go to the "EPUB_PRC_MEMORY_PLUGGING_ERROR isolation procedure" on page 63.
2Dxxxxxxxxxx	Go to the "EPUB_PRC_FSI_PATH isolation procedure" on page 63.
30xxxxxxxxxx	Go to the "EPUB_PRC_PROC_AB_BUS isolation procedure" on page 64.
31xxxxxxxxxx	Go to the "EPUB_PRC_PROC_XYZ_BUS isolation procedure" on page 64.
34xxxxxxxxxx	Go to Getting fixes and update the system firmware to the most recent level of firmware that is available. If this SEL event continues to be logged, go to "Collecting diagnostic data" on page 71. Then, go to "Contacting IBM service and support" on page 71.
37xxxxxxxxxx	Go to the "EPUB_PRC_EIBUS_ERROR isolation procedure" on page 65.
3Fxxxxxxxxxx	Go to the "EPUB_PRC_POWER_ERROR isolation procedure" on page 66.

Table 16. OEM record de specific log information and service action (continued)

OEM record de specific log information	Service action
4D*xxxxxxxxxx*	Go to Getting fixes and update the system firmware to the most recent level of firmware that is available. If this SEL event continues to be logged, go to "Collecting diagnostic data" on page 71. Then, go to "Contacting IBM service and support" on page 71.
4F*xxxxxxxxxx*	Go to the "EPUB_PRC_MEMORY_UE isolation procedure" on page 66.
55*xxxxxxxxxx*	Go to the "EPUB_PRC_HB_CODE isolation procedure" on page 66.
56*xxxxxxxxxx*	Go to the "EPUB_PRC_TOD_CLOCK_ERR isolation procedure" on page 67.
5C*xxxxxxxxxx*	Go to the "EPUB_PRC_COOLING_SYSTEM_ERR isolation procedure" on page 68.

This ends the procedure.

4. Scan the SELs for an event with the value `OEM record df`. Did you find a SEL with the value `OEM record df`?

If	Then
Yes:	Continue with the next step.
No	Go to step 10 on page 24.

5. One or more events might be logged around the same time as the event with the value `OEM record df`. These events require a service action if they meet the following criteria:
   - A service action keyword is present. For a list of service action keywords, see "Identifying service action keywords in system event logs" on page 26.
   - **Asserted** is in the description.
   - **OEM record** is not in the description.
   - The event has a time stamp in close proximity to the time stamp of the event with the value `OEM record df`.

6. Did you find any SEL events that require a service action as defined in step 5?

If	Then
Yes:	Continue with the next step.
No:	Go to "Collecting diagnostic data" on page 71. Then, go to "Contacting IBM service and support" on page 71.

7. Did you find only one SEL event that requires a service action as defined in step 5?

If	Then
Yes:	Continue with the next step.
No:	Go to step 9 on page 24.

8. Record the SEL record ID for the event you identified in step 5. The SEL record ID is indicated by the leftmost digits of the SEL. Use the **ipmitool** command to display the SEL details.
   - To display SEL details by using an in-band network, use the following command:
     ```
     ipmitool sel get <SEL record ID>
     ```

   Note: The SEL record ID must be entered in hexadecimal format. For example: 0x1a.

- To display SEL details remotely over the LAN, use the following command:

```
ipmitool -I lanplus -U <username> -P <password> -H <BMC IP address or BMC hostname> sel
get <SEL record ID>
```

  Note: The SEL record ID must be entered in hexadecimal format. For example: 0x1a.

  The sensor ID field contains sensor information in the format sensor name (sensor ID). Record the sensor name, sensor ID, and event description. Then, use the following information to determine the service action to perform:
  - If your system is an 8001-12C or 8005-12N, go to "Identifying a service action by using sensor and event information for the 8001-12C and 8005-12N" on page 27. **This ends the procedure.**
  - If your system is an 8001-22C or 8005-22N, go to "Identifying a service action by using sensor and event information for the 8001-22C and 8005-22N" on page 43. **This ends the procedure.**

  This ends the procedure.

9. You identified more than one event in step 5 on page 23. The service actions for all of the events that were identified in step 5 on page 23 must be performed to successfully complete the repair. Record the SEL record IDs for the events that you identified in step 5 on page 23. The SEL record ID is indicated by the leftmost digits of the SEL. Use the **ipmitool** command to display SEL details for each SEL record ID that you recorded.

  - To display SEL details by using an in-band network, use the following command:

```
ipmitool sel get <SEL record ID>
```

    Note: The SEL record ID must be entered in hexadecimal format. For example: 0x1a.

  - To display SEL details remotely over the LAN, use the following command:

```
ipmitool -I lanplus -U <username> -P <password> -H <BMC IP address or BMC hostname> sel
get <SEL record ID>
```

    Note: The SEL record ID must be entered in hexadecimal format. For example: 0x1a.

  The sensor ID field contains sensor information in the format sensor name (sensor ID). Record the sensor name, sensor ID, and event description. Then, use this information to determine the service action to perform:
  - If your system is an 8001-12C or 8005-12N, go to "Identifying a service action by using sensor and event information for the 8001-12C and 8005-12N" on page 27. **This ends the procedure.**
  - If your system is an 8001-22C or 8005-22N, go to "Identifying a service action by using sensor and event information for the 8001-22C and 8005-22N" on page 43. **This ends the procedure.**

  This ends the procedure.

10. Scan the SEL for an event with the value `OEM record c0`.

11. Did you find an event with the value `OEM record c0`?

If	Then
Yes:	Continue with the next step.
No:	Go to step 13 on page 25.

12. The OEM record c0 specific log information is indicated by the rightmost digits of the SEL with the value `OEM record c0`. Use Table 17 to determine the service action to perform.

Table 17. OEM record c0 specific log information, description, and service action

OEM record c0 specific log information	Description	Service action
`2aff6ffxxxxx`	A session audit event occurred	No service action is required.

Table 17. OEM record c0 specific log information, description, and service action (continued)

OEM record c0 specific log information	Description	Service action
cd*xx*6fffffff	An automatic shutdown event occurred due to high system temperature	• Search for SEL events that are related to high system temperature and resolve them. • Ensure that the room temperature meets the requirements that are specified for the system. • Ensure that there are no air flow obstructions at the front or at the rear of the system.
ceff6fffffff	A machine check event occurred	Search for serviceable SEL events and resolve them.
cfff6fffffff	An unexpected problem occurred with the voltage regulator output	If a machine check event is present with a time stamp close to the time stamp of this event, search for serviceable SEL events and resolve them. If a machine check event is not present with a time stamp close to the time stamp of this event, reboot the system to recover from the system hang. If the problem persists, replace the system backplane.

13. One or more SEL events might require a service action. These events require a service action if they meet the following criteria:

   • A service action keyword is present. For a list of service action keywords, see "Identifying service action keywords in system event logs" on page 26.
   • **Asserted** is in the description.
   • **OEM record** is not in the description.

14. Did you find one or more SEL events that require a service action as defined in step 13?

If	Then
Yes:	Continue with the next step.
No:	**This ends the procedure.**

15. The service actions for all of the events that were identified in step 13 must be performed to successfully complete the repair. Record the SEL record IDs for the events that you identified in step 13. The SEL record ID is indicated by the leftmost digits of the SEL. Use the ipmitool command to display SEL details for each SEL record ID that you recorded.

   • To display SEL details by using an in-band network, use the following command:

     ```
     ipmitool sel get <SEL record ID>
     ```

     Note: The SEL record ID must be entered in hexadecimal format. For example: 0x1a.

   • To display SEL details remotely over the LAN, use the following command:

     ```
     ipmitool -I lanplus -U <username> -P <password> -H <BMC IP address or BMC hostname> sel
     get <SEL record ID>
     ```

     Note: The SEL record ID must be entered in hexadecimal format. For example: 0x1a.

The sensor ID field contains sensor information in the format sensor name (sensor ID). Record the sensor name, sensor ID, and event description. Then, use this information to determine the service action to perform:

- If your system is an 8001-12C or 8005-12N, go to "Identifying a service action by using sensor and event information for the 8001-12C and 8005-12N" on page 27. **This ends the procedure.**
- If your system is an 8001-22C or 8005-22N, go to "Identifying a service action by using sensor and event information for the 8001-22C and 8005-22N" on page 43. **This ends the procedure.**

This ends the procedure.

Identifying service action keywords in system event logs

System event logs (SELs) that have **Asserted** and any of the keywords indicated below in the description require a service action.

Temperature and voltage service action keywords

- Transition to Critical from Less Severe
- Transition to Critical from Non-recoverable
- Transition to Non-recoverable
- Transition to Non-recoverable from Less Severe

Backplane service action keywords

- State Asserted

Chassis service action keywords

- General Chassis intrusion

Fan service action keywords

- Transition to Critical from Less Severe
- Transition to Non-recoverable from Less Severe
- Transition to Critical from Non-recoverable
- Device Removed / Device Absent
- Transition to degraded
- Install error
- Redundancy lost
- Non-redundant insufficient resources

Memory service action keywords

- Configuration Error
- Transition to Non-recoverable
- Predictive Failure

Processor service action keywords

- IERR
- Transition to Non-recoverable
- Predictive Failure
- Device Disabled

Power supply service action keywords

- Power Supply Failure Detected
- Predictive Failure

- Power Supply Input Lost or AC DC
- Power Supply Input Lost Or Out of Range
- Power Supply Input Out of Range But Present

System event service action keywords

- Undetermined system hardware failure

Watchdog service action keywords

- Hard Reset
- Power Down
- Power Cycle
- Timer Interrupt

Identifying a service action by using sensor and event information

You can use sensor and event information from the system event log (SEL) to determine a service action.

Identifying a service action by using sensor and event information for the 8001-12C and 8005-12N

You can use the sensor and event information from the system event log to determine a service action to perform for the IBM Power® System S821LC (8001-12C) and IBM Hyperconverged Systems powered by Nutanix (8005-12N).

If you have not done so already, complete "Identifying a service action by using system event logs" on page 21. Then, use the following table to determine the service action to perform.

Table 18. Sensor information, event description, and service action for the 8001-12C and 8005-12N

Sensor name (Sensor ID)	Event description	Service action
System Temp (0x01)	• Transition to Critical from Less Severe • Transition to Non-recoverable from Less Severe • Transition to Critical from Non-recoverable	Ensure that there are no air flow obstructions at the front or at the rear of the system. Ensure that the fans are operating properly.
	• Lower Non-critical – going low • Lower Non-critical – going high • Lower Critical – going low • Lower Critical – going high • Lower Non-recoverable – going low • Lower Non-recoverable – going high • Upper Non-critical – going low • Upper Non-critical – going high • Upper Critical - going low • Upper Critical - going high • Upper Non-recoverable – going low • Upper Non-recoverable – going high	No service action is required.

Table 18. Sensor information, event description, and service action for the 8001-12C and 8005-12N (continued)

Sensor name (Sensor ID)	Event description	Service action
Peripheral Temp (0x02)	• Transition to Critical from Less Severe • Transition to Non-recoverable from Less Severe • Transition to Critical from Non-recoverable	Ensure that the room temperature meets the requirements that are specified for the system. Ensure that there are no air flow obstructions at the front or at the rear of the system.
	• Lower Non-critical – going low • Lower Non-critical – going high • Lower Critical – going low • Lower Critical – going high • Lower Non-recoverable – going low • Lower Non-recoverable – going high • Upper Non-critical – going low • Upper Non-critical – going high • Upper Critical - going low • Upper Critical - going high • Upper Non-recoverable – going low • Upper Non-recoverable – going high	No service action is required.
• OCC Active 1 (0x08) • OCC Active 2 (0x09)	Device Disabled	If the sensor name is OCC Active 1, replace CPU 1. If the sensor name is OCC Active 2, replace CPU 2. Go to "8001-12C or 8005-12N locations" on page 73 to identify the physical location and removal and replacement procedure.
	• State Deasserted • Device Enabled	No service action is required.

Table 18. Sensor information, event description, and service action for the 8001-12C and 8005-12N (continued)

Sensor name (Sensor ID)	Event description	Service action
• CPU1 Temp (0x0B) • CPU2 Temp (0x0D)	• Transition to Critical from Less Severe • Transition to Non-recoverable from Less Severe • Transition to Critical from Non-recoverable	Ensure that there are no air flow obstructions at the front or at the rear of the system. Ensure that the fans are operating properly.
	• Lower Non-critical – going low • Lower Non-critical – going high • Lower Critical - going low • Lower Critical – going high • Lower Non-recoverable – going low • Lower Non-recoverable – going high • Upper Non-critical – going low • Upper Non-critical – going high • Upper Critical - going low • Upper Critical - going high • Upper Non-recoverable – going low • Upper Non-recoverable – going high	No service action is required.

Table 18. Sensor information, event description, and service action for the 8001-12C and 8005-12N (continued)

Sensor name (Sensor ID)	Event description	Service action
• CPU Func 1 (0x0C) • CPU Func 2 (0x0E)	• IERR • Transition to Non-recoverable • Predictive Failure	If the sensor name is CPU Func 1, replace CPU 1. If the sensor name is CPU Func 2, replace CPU 2. Go to "8001-12C or 8005-12N locations" on page 73 to identify the physical location and removal and replacement procedure.
	• Thermal Trip • FRB1 BIST Failure • FRB2 Hang In POST Failure • FRB3 Processor Startup Initialization Failure • Configuration Error • SMBIOS Uncorrectable CPU Complex Error • Processor Disabled • Terminator Presence Detected • Processor Automatically Throttled • Machine Check Exception • Correctable Machine Check Error • State Deasserted • Device Disabled • Transition to Critical from Less Severe • Transition to Non-recoverable from Less Severe • Transition to Critical from Non-recoverable • Processor Presence Detected • State Asserted • Device Enabled • Transition to OK • Transition to Non-Critical from OK • Transition to Non-Critical from More Severe • Monitor • Informational	No service action is required.

Table 18. Sensor information, event description, and service action for the 8001-12C and 8005-12N (continued)

Sensor name (Sensor ID)	Event description	Service action
• P1M1-DIMMA Func (0x10) • P1M1-DIMMB Func (0x11) • P1M1-DIMMC Func (0x12) • P1M1-DIMMD Func (0x13) • P1M2-DIMMA Func (0x14) • P1M2-DIMMB Func (0x15) • P1M2-DIMMC Func (0x16) • P1M2-DIMMD Func (0x17) • P2M1-DIMMA Func (0x18) • P2M1-DIMMB Func (0x19) • P2M1-DIMMC Func (0x1A) • P2M1-DIMMD Func (0x1B) • P2M2-DIMMA Func (0x1C) • P2M2-DIMMB Func (0x1D) • P2M2-DIMMC Func (0x1E) • P2M2-DIMMD Func (0x1F)	• Memory Device Disabled • Uncorrectable Memory Error • Memory Scrub Failed • State Deasserted • Device Disabled • Transition to Critical from Less Severe • Transition to Non-recoverable from Less Severe • Transition to Critical from Non-recoverable • Correctable Memory Error • Parity • Correctable Memory Error Logging Limit Reached • Memory Automatically Throttled • Critical Over temperature • Presence Detected • Spare • State Asserted • Device Enabled • Transition to OK • Transition to Non-Critical from OK • Transition to Non-Critical from More Severe • Monitor • Informational	No service action is required.
	• Transition to Non-recoverable • Predictive Failure	If the sensor name is P1M1-DIMMA Func, replace P1M1-DIMMA. If the sensor name is P1M1-DIMMB Func, replace P1M1-DIMMB. And so on. Go to "8001-12C or 8005-12N locations" on page 73 to identify the physical location and removal and replacement procedure.

Table 18. Sensor information, event description, and service action for the 8001-12C and 8005-12N (continued)

Sensor name (Sensor ID)	Event description	Service action
• P1M1-DIMMA Func (0x10) • P1M1-DIMMB Func (0x11) • P1M1-DIMMC Func (0x12) • P1M1-DIMMD Func (0x13) • P1M2-DIMMA Func (0x14) • P1M2-DIMMB Func (0x15) • P1M2-DIMMC Func (0x16) • P1M2-DIMMD Func (0x17) • P2M1-DIMMA Func (0x18) • P2M1-DIMMB Func (0x19) • P2M1-DIMMC Func (0x1A) • P2M1-DIMMD Func (0x1B) • P2M2-DIMMA Func (0x1C) • P2M2-DIMMB Func (0x1D) • P2M2-DIMMC Func (0x1E) • P2M2-DIMMD Func (0x1F)	Configuration Error	Complete the following steps: 1. If the sensor name is P1M1-DIMMA Func, ensure that P1M1-DIMMA is seated properly. If the sensor name is P1M1-DIMMB Func, ensure that P1M1-DIMMB is seated properly. And so on. 2. If you recently installed or replaced memory DIMMs, ensure that the DIMMs are plugged in the correct memory slots. 3. If the sensor name is P1M1-DIMMA Func, replace P1M1-DIMMA. If the sensor name is P1M1-DIMMB Func, replace P1M1-DIMMB. And so on. Go to "8001-12C or 8005-12N locations" on page 73 to identify the physical location and removal and replacement procedure.
VBAT (0x33)	• Transition to Non-recoverable • Lower Non-recoverable – going low	Replace the time-of-day battery. Go to "8001-12C or 8005-12N locations" on page 73 to identify the physical location and removal and replacement procedure.
	• Lower Non-critical – going low • Lower Non-critical – going high • Lower Critical – going low • Lower Critical – going high • Lower Non-recoverable – going high • Upper Non-critical – going low • Upper Non-critical – going high • Upper Critical - going low • Upper Critical - going high • Upper Non-recoverable – going low • Upper Non-recoverable – going high	No service action is required.
Backplane Fault (0x34)	State Deasserted	No service action is required.
	State Asserted	Replace the system backplane. Go to "8001-12C or 8005-12N locations" on page 73 to identify the physical location and removal and replacement procedure.

Table 18. Sensor information, event description, and service action for the 8001-12C and 8005-12N (continued)

Sensor name (Sensor ID)	Event description	Service action
System Event (0x35)	Undetermined system hardware failure	Go to "Collecting diagnostic data" on page 71. Then, go to "Contacting IBM service and support" on page 71.
	• System Reconfigured • OEM System boot event • Entry added to auxiliary log • PEF Action • Timestamp Clock Sync	No service action is required.
• Membuf Func 1 (0x40) • Membuf Func 2 (0x41) • Membuf Func 3 (0x42) • Membuf Func 4 (0x43)	• Configuration Error • Transition to Non-recoverable • Predictive Failure	Replace the system backplane. Go to "8001-12C or 8005-12N locations" on page 73 to identify the physical location and removal and replacement procedure.
• Turbo Allowed (0x48) • TPM Required (0x49)	• State Deasserted • State Asserted	No service action is required.
• SAS Temp (0x4A) • HDD Temp (0x4B)	• Transition to Critical from Less Severe • Transition to Non-recoverable from Less Severe • Transition to Critical from Non-recoverable	Ensure that the ambient temperature is within operating specifications. Ensure that there are no blockages to the air inlet and outlets. If blockages are found, remove them. Ensure that all of the fans are working properly by looking for serviceable events related to fans and resolving them.
	• Lower Non-critical – going low • Lower Non-critical – going high • Lower Critical – going low • Lower Critical – going high • Lower Non-recoverable – going low • Lower Non-recoverable – going high • Upper Non-critical – going low • Upper Non-critical – going high • Upper Critical - going low • Upper Critical - going high • Upper Non-recoverable – going low • Upper Non-recoverable – going high	No service action is required.
HDD Status (0x4C)	• State Deasserted • State Asserted	No service action is required.

Table 18. Sensor information, event description, and service action for the 8001-12C and 8005-12N (continued)

Sensor name (Sensor ID)	Event description	Service action
• GPU1 Temp (0x52) • GPU2 Temp (0x53)	• Transition to Critical from Less Severe • Transition to Non-recoverable from Less Severe • Transition to Critical from Non-recoverable	Ensure that there are no air flow obstructions at the front or at the rear of the system. Ensure that the fans are operating properly.
	• Lower Non-critical – going low • Lower Non-critical – going high • Lower Critical – going low • Lower Critical – going high • Lower Non-recoverable – going low • Lower Non-recoverable – going high • Upper Non-critical – going low • Upper Non-critical – going high • Upper Critical - going low • Upper Critical - going high • Upper Non-recoverable – going low • Upper Non-recoverable – going high	No service action required.
MB_10G Temp (0x5A)	• Transition to Critical from Less Severe • Transition to Non-recoverable from Less Severe • Transition to Critical from Non-recoverable	Ensure that there are no air flow obstructions at the front or at the rear of the system. Ensure that the fans are operating properly.
	• Lower Non-critical – going low • Lower Non-critical – going high • Lower Critical – going low • Lower Critical – going high • Lower Non-recoverable – going low • Lower Non-recoverable – going high • Upper Non-critical – going low • Upper Non-critical – going high • Upper Critical - going low • Upper Critical - going high • Upper Non-recoverable – going low • Upper Non-recoverable – going high	No service action is required.

Table 18. Sensor information, event description, and service action for the 8001-12C and 8005-12N (continued)

Sensor name (Sensor ID)	Event description	Service action
NVMe_SSD Temp (0x5B)	• Transition to Critical from Less Severe • Transition to Non-recoverable from Less Severe • Transition to Critical from Non-recoverable	Ensure that there are no air flow obstructions at the front or at the rear of the system. Ensure that the fans are operating properly.
	• Lower Non-critical – going low • Lower Non-critical – going high • Lower Critical – going low • Lower Critical – going high • Lower Non-recoverable – going low • Lower Non-recoverable – going high • Upper Non-critical – going low • Upper Non-critical – going high • Upper Critical - going low • Upper Critical - going high • Upper Non-recoverable – going low • Upper Non-recoverable – going high	No service action is required.
• Mem Buf Temp 1 (0x5E) • Mem Buf Temp 2 (0x5F) • Mem Buf Temp 3 (0x60) • Mem Buf Temp 4 (0x61)	• Transition to Critical from Less Severe • Transition to Non-recoverable from Less Severe • Transition to Critical from Non-recoverable	Ensure that there are no air flow obstructions at the front or at the rear of the system. Ensure that the fans are operating properly.
	• Lower Non-critical – going low • Lower Non-critical – going high • Lower Critical – going low • Lower Critical – going high • Lower Non-recoverable – going low • Lower Non-recoverable – going high • Upper Non-critical – going low • Upper Non-critical – going high • Upper Critical - going low • Upper Critical - going high • Upper Non-recoverable – going low • Upper Non-recoverable – going high	No service action is required.

Sensor name (Sensor ID)	Event description	Service action
• P1M1-DIMMA Temp (0x66) • P1M1-DIMMB Temp (0x67) • P1M1-DIMMC Temp (0X68) • P1M1-DIMMD Temp (0x69) • P1M2-DIMMA Temp (0x6A) • P1M2-DIMMB Temp (0x6B) • P1M2-DIMMC Temp (0x6C) • P1M2-DIMMD Temp (0x6D) • P2M1-DIMMA Temp (0x6E) • P2M1-DIMMB Temp (0x6F) • P2M1-DIMMC Temp (0x70) • P2M1-DIMMD Temp (0x71) • P2M2-DIMMA Temp (0x72) • P2M2-DIMMB Temp (0x73) • P2M2-DIMMC Temp (0x74) • P2M2-DIMMD Temp (0x75)	• Transition to Critical from Less Severe • Transition to Non-recoverable from Less Severe • Transition to Critical from Non-recoverable	Ensure that there are no air flow obstructions at the front or at the rear of the system. Ensure that the fans are operating properly.
	• Lower Non-critical – going low • Lower Non-critical – going high • Lower Critical – going low • Lower Critical – going high • Lower Non-recoverable – going low • Lower Non-recoverable – going high • Upper Non-critical – going low • Upper Non-critical – going high • Upper Critical - going low • Upper Critical - going high • Upper Non-recoverable – going low • Upper Non-recoverable – going high	No service action is required.
VBAT (0x9C)	• Transition to Non-recoverable • Lower Non-recoverable – going low	Replace the time-of-day battery. Go to "8001-12C or 8005-12N locations" on page 73 to identify the physical location and removal and replacement procedure.
	• Lower Non-critical – going low • Lower Non-critical – going high • Lower Critical – going low • Lower Critical – going high • Lower Non-recoverable – going high • Upper Non-critical – going low • Upper Non-critical – going high • Upper Critical - going low • Upper Critical - going high • Upper Non-recoverable – going low • Upper Non-recoverable – going high	No service action is required.

Table 18. Sensor information, event description, and service action for the 8001-12C and 8005-12N (continued)

Sensor name (Sensor ID)	Event description	Service action
Total Power (0xA0)	• Lower Non-critical – going low • Lower Non-critical – going high • Lower Critical – going low • Lower Critical – going high • Lower Non-recoverable – going low • Lower Non-recoverable – going high • Upper Non-critical – going low • Upper Non-critical – going high • Upper Critical - going low • Upper Critical - going high • Upper Non-recoverable – going low • Upper Non-recoverable – going high	No service action is required.
• CPU1 Power or Proc0 Power (0xA2) • CPU2 Power or Proc1 Power (0xA3) • PCIE CPU1 Pwr or PCIE Proc0 Pwr (0xA6) • PCIE CPU2 Pwr or PCIE Proc1 Pwr (0xA7)	• Lower Non-critical – going low • Lower Non-critical – going high • Lower Critical – going low • Lower Critical – going high • Lower Non-recoverable – going low • Lower Non-recoverable – going high • Upper Non-critical – going low • Upper Non-critical – going high • Upper Critical - going low • Upper Critical - going high • Upper Non-recoverable – going low • Upper Non-recoverable – going high	No service action required.

Table 18. Sensor information, event description, and service action for the 8001-12C and 8005-12N (continued)

Sensor name (Sensor ID)	Event description	Service action
• Freq Limit OT 1 (0xA8) • Mem Thrttl OT 1 (0xAA) • Freq Limit OT 2 (0xAC) • Mem Thrttl OT 2 (0xAE)	Performance Met	If **Asserted** is in the event description, no service action is required. If **Deasserted** is in the event description, ensure that the ambient temperature is within operating specifications. Ensure that there are no blockages to the air inlet and outlets. If blockages are found, remove them. Ensure that all of the fans are working properly by looking for serviceable events related to fans and resolving them.
	Performance Lags	If **Deasserted** is in the event description, no service action is required. If **Asserted** is in the event description, ensure that the ambient temperature is within operating specifications. Ensure that there are no blockages to the air inlet and outlets. If blockages are found, remove them. Ensure that all of the fans are working properly by looking for serviceable events related to fans and resolving them.
• Freq Limit Pwr 1 (0xA9) • Freq Limit Pwr 2 (0xAD)	Performance Met	If **Asserted** is in the event description, no service action is required. If **Deasserted** is in the event description, ensure that both power supplies are working properly. Search for serviceable events related to system power and voltage and resolve them. Ensure all fans are working properly by looking for serviceable events related to fans and resolving them.
	Performance Lags	If **Deasserted** is in the event description, no service action is required. If **Asserted** is in the event description, ensure that both power supplies are working properly. Search for serviceable events related to system power and voltage and resolve them. Ensure all fans are working properly by looking for serviceable events related to fans and resolving them.

Table 18. Sensor information, event description, and service action for the 8001-12C and 8005-12N (continued)

Sensor name (Sensor ID)	Event description	Service action
• CPU Core Temp 1 (0xB0) • CPU Core Temp 2 (0xB1) • CPU Core Temp 3 (0xB2) • CPU Core Temp 4 (0xB3) • CPU Core Temp 5 (0xB4) • CPU Core Temp 6 (0xB5) • CPU Core Temp 7 (0xB6) • CPU Core Temp 8 (0xB7) • CPU Core Temp 9 (0xB8) • CPU Core Temp 10 (0xB9) • CPU Core Temp 11 (0xBA) • CPU Core Temp 12 (0xBB)	• Lower Non-critical – going low • Lower Non-critical – going high • Lower Critical – going low • Lower Critical – going high • Lower Non-recoverable – going low • Lower Non-recoverable – going high • Upper Non-critical – going low • Upper Non-critical – going high • Upper Critical - going low • Upper Critical - going high • Upper Non-recoverable – going low • Upper Non-recoverable – going high	No service action is required.
• CPU Core Temp 13 (0xBC) • CPU Core Temp 14 (0xBD) • CPU Core Temp 15 (0xBE) • CPU Core Temp 16 (0xBF) • CPU Core Temp 17 (0xC0) • CPU Core Temp 18 (0xC1) • CPU Core Temp 19 (0xC2) • CPU Core Temp 20 (0xC3) • CPU Core Temp 21 (0xC4) • CPU Core Temp 22 (0xC5) • CPU Core Temp 23 (0xC6) • CPU Core Temp 24 (0xC7)	• Lower Non-critical – going low • Lower Non-critical – going high • Lower Critical – going low • Lower Critical – going high • Lower Non-recoverable – going low • Lower Non-recoverable – going high • Upper Non-critical – going low • Upper Non-critical – going high • Upper Critical - going low • Upper Critical - going high • Upper Non-recoverable – going low • Upper Non-recoverable – going high	No service action is required.

Table 18. Sensor information, event description, and service action for the 8001-12C and 8005-12N (continued)

Sensor name (Sensor ID)	Event description	Service action
• CPU Core Func 1 (0xC8) • CPU Core Func 2 (0xC9) • CPU Core Func 3 (0xCA) • CPU Core Func 4 (0xCB) • CPU Core Func 5 (0xCC) • CPU Core Func 6 (0xCD) • CPU Core Func 7 (0xCE) • CPU Core Func 8 (0xCF) • CPU Core Func 9 (0xD0) • CPU Core Func 10 (0xD1) • CPU Core Func 11 (0xD2) • CPU Core Func 12 (0xD3)	• IERR • Transition to Non-recoverable • Predictive Failure	Replace system processor CPU 1. Go to "8001-12C or 8005-12N locations" on page 73 to identify the physical location and removal and replacement procedure.
	• FRB1 BIST Failure • FRB2 Hang In POST Failure • FRB3 Processor Startup Initialization Failure • Configuration Error • SMBIOS Uncorrectable CPU Complex Error • Processor Disabled • Terminator Presence Detected • Machine Check Exception • Correctable Machine Check Error • State Deasserted • Device Disabled • Transition to Critical from Less Severe • Transition to Non-recoverable from Less Severe • Transition to Critical from Non-recoverable • Thermal Trip • Processor Automatically Throttled • Processor Presence Detected • State Asserted • Device Enabled • Transition to OK • Transition to Non-Critical from OK • Transition to Non-Critical from More Severe • Monitor • Informational	No service action is required.

Table 18. Sensor information, event description, and service action for the 8001-12C and 8005-12N (continued)

Sensor name (Sensor ID)	Event description	Service action
• CPU Core Func 13 (0xD4) • CPU Core Func 14 (0xD5) • CPU Core Func 15 (0xD6) • CPU Core Func 16 (0xD7) • CPU Core Func 17 (0xD8) • CPU Core Func 18 (0xD9) • CPU Core Func 19 (0xDA) • CPU Core Func 20 (0xDB) • CPU Core Func 21 (0xDC) • CPU Core Func 22 (0xDD) • CPU Core Func 23 (0xDE) • CPU Core Func 24 (0xDF)	• IERR • Transition to Non-recoverable • Predictive Failure	Replace system processor CPU 2. Go to "8001-12C or 8005-12N locations" on page 73 to identify the physical location and removal and replacement procedure.
	• FRB1 BIST Failure • FRB2 Hang In POST Failure • FRB3 Processor Startup Initialization Failure • Configuration Error • SMBIOS Uncorrectable CPU Complex Error • Processor Disabled • Terminator Presence Detected • Machine Check Exception • Correctable Machine Check Error • State Deasserted • Device Disabled • Transition to Critical from Less Severe • Transition to Non-recoverable from Less Severe • Transition to Critical from Non-recoverable • Thermal Trip • Processor Automatically Throttled • Processor Presence Detected • State Asserted • Device Enabled • Transition to OK • Transition to Non-Critical from OK • Transition to Non-Critical from More Severe • Monitor • Informational	No service action is required.
Chassis Intru (0xE2)	• Drive Bay intrusion • I/O Card area intrusion • Processor area intrusion • System unplugged from LAN • Unauthorized dock • FAN area intrusion	No service action is required.
	General Chassis intrusion	Ensure that the top cover is properly installed on the system. See Installing the service access cover on an 8001-12C or 8005-12N system.

Table 18. Sensor information, event description, and service action for the 8001-12C and 8005-12N (continued)

Sensor name (Sensor ID)	Event description	Service action
• FAN1 (0xE3) • FAN2 (0xE4) • FAN3 (0xE5) • FAN4 (0xE6) • FAN5 (0xE7) • FAN6 (0xE8) • FAN7 (0xE9) • FAN8 (0xEA)	• Transition to Critical from Less Severe • Transition to Non-recoverable from Less Severe • Transition to Critical from Non-recoverable	If the sensor name is FAN1, replace Fan 1. If the sensor name is FAN2, replace Fan 2. And so on. Go to "8001-12C or 8005-12N locations" on page 73 to identify the physical location and removal and replacement procedure.
	• Lower Non-critical – going low • Lower Non-critical – going high • Lower Critical – going low • Lower Critical – going high • Lower Non-recoverable – going low • Lower Non-recoverable – going high • Upper Non-critical – going low • Upper Non-critical – going high • Upper Critical - going low • Upper Critical - going high • Upper Non-recoverable – going low • Upper Non-recoverable – going high • Device Inserted/Device Present	No service action is required.
	• Device Removed/Device Absent • Transition to degraded • Install error • Redundancy lost • Non-redundant insufficient resources	Ensure that all fans are seated securely. Go to "8001-12C or 8005-12N locations" on page 73 to identify the physical location and removal and replacement procedure.

Table 18. Sensor information, event description, and service action for the 8001-12C and 8005-12N (continued)

Sensor name (Sensor ID)	Event description	Service action
• PS1 Status (0xF3) • PS2 Status (0xF4)	• Predictive Failure • Power Supply Input Out of Range But Present	If the sensor name is PS1 Status, replace PSU 1. If the sensor name is PS2 Status, replace PSU 2. Go to "8001-12C or 8005-12N locations" on page 73 to identify the physical location and removal and replacement procedure.
	Power Supply Failure Detected	An assert event immediately followed by a deassert event indicates that a power cycle of the system occurred. No service action is required. If there is no deassert event immediately following the assert event, replace the power supply. If the sensor name is PS1 Status, replace PSU 1. If the sensor name is PS2 Status, replace PSU 2. Go to "8001-12C or 8005-12N locations" on page 73 to identify the physical location and removal and replacement procedure.
	• Power Supply Input Lost or AC DC • Power Supply Input Lost Or Out Of Range	• Ensure that ac power is supplied to the rack. • Ensure that the system power cords are plugged tightly into both the power supply and the rack power distribution unit (PDU) for both system power supplies.
	• State Deasserted • State Asserted • Presence Detected	No service action is required.
Watchdog (0xFF)	• Timer Expired • Reserved1 • Reserved2 • Reserved3 • Reserved4	No service action is required.
	• Hard Reset • Power Down • Power Cycle • Timer Interrupt	Search for serviceable SEL events that have a time stamp close to the time stamp of this SEL event. If you found a serviceable SEL event, perform the service action that is indicated in this table for the SEL event. If you cannot boot the system to the Petitboot menu, go to "Resolving a system firmware boot failure" on page 5.

Identifying a service action by using sensor and event information for the 8001-22C and 8005-22N

You can use the sensor and event information from the system event log to determine a service action to perform for the IBM Power System S822LC for Big Data (8001-22C) and IBM Hyperconverged Systems powered by Nutanix (8005-22N).

If you have not done so already, complete "Identifying a service action by using system event logs" on page 21. Then, use the following table to determine the service action to perform.

Table 19. Sensor information, event description, and service action for the 8001-22C and 8005-22N

Sensor name (Sensor ID)	Event description	Service action
System Temp (0x01)	• Transition to Critical from Less Severe • Transition to Non-recoverable from Less Severe • Transition to Critical from Non-recoverable	Ensure that there are no air flow obstructions at the front or at the rear of the system. Ensure that the fans are operating properly.
	• Lower Non-critical – going low • Lower Non-critical – going high • Lower Critical – going low • Lower Critical – going high • Lower Non-recoverable – going low • Lower Non-recoverable – going high • Upper Non-critical – going low • Upper Non-critical – going high • Upper Critical - going low • Upper Critical - going high • Upper Non-recoverable – going low • Upper Non-recoverable – going high	No service action is required.
Peripheral Temp (0x02)	• Transition to Critical from Less Severe • Transition to Non-recoverable from Less Severe • Transition to Critical from Non-recoverable	Ensure that the room temperature meets the requirements that are specified for the system. Ensure that there are no air flow obstructions at the front or at the rear of the system.
	• Lower Non-critical – going low • Lower Non-critical – going high • Lower Critical – going low • Lower Critical – going high • Lower Non-recoverable – going low • Lower Non-recoverable – going high • Upper Non-critical – going low • Upper Non-critical – going high • Upper Critical - going low • Upper Critical - going high • Upper Non-recoverable – going low • Upper Non-recoverable – going high	No service action is required.

Sensor name (Sensor ID)	Event description	Service action
• OCC Active 1 (0x08) • OCC Active 2 (0x09)	Device Disabled	If the sensor name is OCC Active 1, replace CPU 1. If the sensor name is OCC Active 2, replace CPU 2. Go to "8001-22C or 8005-22N locations" on page 87 to identify the physical location and removal and replacement procedure.
	• State Deasserted • Device Enabled	No service action is required.
• CPU1 Temp (0x0B) • CPU2 Temp (0x0D)	• Transition to Critical from Less Severe • Transition to Non-recoverable from Less Severe • Transition to Critical from Non-recoverable	Ensure that there are no air flow obstructions at the front or at the rear of the system. Ensure that the fans are operating properly.
	• Lower Non-critical – going low • Lower Non-critical – going high • Lower Critical - going low • Lower Critical – going high • Lower Non-recoverable – going low • Lower Non-recoverable – going high • Upper Non-critical – going low • Upper Non-critical – going high • Upper Critical - going low • Upper Critical - going high • Upper Non-recoverable – going low • Upper Non-recoverable – going high	No service action is required.

Table 19. Sensor information, event description, and service action for the 8001-22C and 8005-22N (continued)

Sensor name (Sensor ID)	Event description	Service action
• CPU Func 1 (0x0C) • CPU Func 2 (0x0E)	• IERR • Transition to Non-recoverable • Predictive Failure	If the sensor name is CPU Func 1, replace CPU 1. If the sensor name is CPU Func 2, replace CPU 2. Go to "8001-22C or 8005-22N locations" on page 87 to identify the physical location and removal and replacement procedure.
	• Thermal Trip • FRB1 BIST Failure • FRB2 Hang In POST Failure • FRB3 Processor Startup Initialization Failure • Configuration Error • SMBIOS Uncorrectable CPU Complex Error • Processor Disabled • Terminator Presence Detected • Processor Automatically Throttled • Machine Check Exception • Correctable Machine Check Error • State Deasserted • Device Disabled • Transition to Critical from Less Severe • Transition to Non-recoverable from Less Severe • Transition to Critical from Non-recoverable • Processor Presence Detected • State Asserted • Device Enabled • Transition to OK • Transition to Non-Critical from OK • Transition to Non-Critical from More Severe • Monitor • Informational	No service action is required.

Sensor name (Sensor ID)	Event description	Service action
• P1M1-DIMMA Func (0x10) • P1M1-DIMMB Func (0x11) • P1M1-DIMMC Func (0x12) • P1M1-DIMMD Func (0x13) • P1M2-DIMMA Func (0x14) • P1M2-DIMMB Func (0x15) • P1M2-DIMMC Func (0x16) • P1M2-DIMMD Func (0x17) • P2M1-DIMMA Func (0x18) • P2M1-DIMMB Func (0x19) • P2M1-DIMMC Func (0x1A) • P2M1-DIMMD Func (0x1B) • P2M2-DIMMA Func (0x1C) • P2M2-DIMMB Func (0x1D) • P2M2-DIMMC Func (0x1E) • P2M2-DIMMD Func (0x1F)	• Memory Device Disabled • Uncorrectable Memory Error • Memory Scrub Failed • State Deasserted • Device Disabled • Transition to Critical from Less Severe • Transition to Non-recoverable from Less Severe • Transition to Critical from Non-recoverable • Correctable Memory Error • Parity • Correctable Memory Error Logging Limit Reached • Memory Automatically Throttled • Critical Over temperature • Presence Detected • Spare • State Asserted • Device Enabled • Transition to OK • Transition to Non-Critical from OK • Transition to Non-Critical from More Severe • Monitor • Informational	No service action is required.
	• Transition to Non-recoverable • Predictive Failure	If the sensor name is P1M1-DIMMA Func, replace P1M1-DIMMA. If the sensor name is P1M1-DIMMB Func, replace P1M1-DIMMB. And so on. Go to "8001-22C or 8005-22N locations" on page 87 to identify the physical location and removal and replacement procedure.

Table 19. Sensor information, event description, and service action for the 8001-22C and 8005-22N (continued)

Sensor name (Sensor ID)	Event description	Service action
• P1M1-DIMMA Func (0x10) • P1M1-DIMMB Func (0x11) • P1M1-DIMMC Func (0x12) • P1M1-DIMMD Func (0x13) • P1M2-DIMMA Func (0x14) • P1M2-DIMMB Func (0x15) • P1M2-DIMMC Func (0x16) • P1M2-DIMMD Func (0x17) • P2M1-DIMMA Func (0x18) • P2M1-DIMMB Func (0x19) • P2M1-DIMMC Func (0x1A) • P2M1-DIMMD Func (0x1B) • P2M2-DIMMA Func (0x1C) • P2M2-DIMMB Func (0x1D) • P2M2-DIMMC Func (0x1E) • P2M2-DIMMD Func (0x1F)	Configuration Error	Complete the following steps: 1. If the sensor name is P1M1-DIMMA Func, ensure that P1M1-DIMMA is seated properly. If the sensor name is P1M1-DIMMB Func, ensure that P1M1-DIMMB is seated properly. And so on. 2. If you recently installed or replaced memory DIMMs, ensure that the DIMMs are plugged in the correct memory slots. 3. If the sensor name is P1M1-DIMMA Func, replace P1M1-DIMMA. If the sensor name is P1M1-DIMMB Func, replace P1M1-DIMMB. And so on. Go to "8001-22C or 8005-22N locations" on page 87 to identify the physical location and removal and replacement procedure.
VBAT (0x33)	• Transition to Non-recoverable • Lower Non-recoverable – going low	Replace the time-of-day battery. Go to "8001-22C or 8005-22N locations" on page 87 to identify the physical location and removal and replacement procedure.
	• Lower Non-critical – going low • Lower Non-critical – going high • Lower Critical – going low • Lower Critical – going high • Lower Non-recoverable – going high • Upper Non-critical – going low • Upper Non-critical – going high • Upper Critical - going low • Upper Critical - going high • Upper Non-recoverable – going low • Upper Non-recoverable – going high	No service action is required.
Backplane Fault (0x34)	State Deasserted	No service action is required.
	State Asserted	Replace the system backplane. Go to "8001-22C or 8005-22N locations" on page 87 to identify the physical location and removal and replacement procedure.

Sensor name (Sensor ID)	Event description	Service action
System Event (0x35)	Undetermined system hardware failure	Go to "Collecting diagnostic data" on page 71. Then, go to "Contacting IBM service and support" on page 71.
	• System Reconfigured • OEM System boot event • Entry added to auxiliary log • PEF Action • Timestamp Clock Sync	No service action is required.
• Membuf Func 1 (0x40) • Membuf Func 2 (0x41) • Membuf Func 3 (0x42) • Membuf Func 4 (0x43)	• Configuration Error • Transition to Non-recoverable • Predictive Failure	Replace the system backplane. Go to "8001-22C or 8005-22N locations" on page 87 to identify the physical location and removal and replacement procedure.
• Turbo Allowed (0x48) • TPM Required (0x49)	• State Deasserted • State Asserted	No service action is required.
• SAS Temp (0x4A) • HDD Temp (0x4B)	• Transition to Critical from Less Severe • Transition to Non-recoverable from Less Severe • Transition to Critical from Non-recoverable	Ensure that the ambient temperature is within operating specifications. Ensure that there are no blockages to the air inlet and outlets. If blockages are found, remove them. Ensure that all of the fans are working properly by looking for serviceable events related to fans and resolving them.
	• Lower Non-critical – going low • Lower Non-critical – going high • Lower Critical – going low • Lower Critical – going high • Lower Non-recoverable – going low • Lower Non-recoverable – going high • Upper Non-critical – going low • Upper Non-critical – going high • Upper Critical - going low • Upper Critical - going high • Upper Non-recoverable – going low • Upper Non-recoverable – going high	No service action is required.
HDD Status (0x4C)	• State Deasserted • State Asserted	No service action is required.

Sensor name (Sensor ID)	Event description	Service action
• GPU1 Temp (0x52) • GPU2 Temp (0x53)	• Transition to Critical from Less Severe • Transition to Non-recoverable from Less Severe • Transition to Critical from Non-recoverable	• If the system is an 8001-22C, ensure that the system does not have more drives than are supported with the number of GPUs that are installed. For more information, see Drive installation information for the 8001-22C system. • Ensure that there are no air flow obstructions at the front or at the rear of the system. • Ensure that the fans are operating properly.
	• Lower Non-critical – going low • Lower Non-critical – going high • Lower Critical – going low • Lower Critical – going high • Lower Non-recoverable – going low • Lower Non-recoverable – going high • Upper Non-critical – going low • Upper Non-critical – going high • Upper Critical - going low • Upper Critical - going high • Upper Non-recoverable – going low • Upper Non-recoverable – going high	No service action required.

Table 19. Sensor information, event description, and service action for the 8001-22C and 8005-22N (continued)

Sensor name (Sensor ID)	Event description	Service action
MB_10G Temp (0x5A)	• Transition to Critical from Less Severe • Transition to Non-recoverable from Less Severe • Transition to Critical from Non-recoverable	Ensure that there are no air flow obstructions at the front or at the rear of the system. Ensure that the fans are operating properly.
	• Lower Non-critical – going low • Lower Non-critical – going high • Lower Critical – going low • Lower Critical – going high • Lower Non-recoverable – going low • Lower Non-recoverable – going high • Upper Non-critical – going low • Upper Non-critical – going high • Upper Critical - going low • Upper Critical - going high • Upper Non-recoverable – going low • Upper Non-recoverable – going high	No service action is required.
NVMe_SSD Temp (0x5B)	• Transition to Critical from Less Severe • Transition to Non-recoverable from Less Severe • Transition to Critical from Non-recoverable	Ensure that there are no air flow obstructions at the front or at the rear of the system. Ensure that the fans are operating properly.
	• Lower Non-critical – going low • Lower Non-critical – going high • Lower Critical – going low • Lower Critical – going high • Lower Non-recoverable – going low • Lower Non-recoverable – going high • Upper Non-critical – going low • Upper Non-critical – going high • Upper Critical - going low • Upper Critical - going high • Upper Non-recoverable – going low • Upper Non-recoverable – going high	No service action is required.

Table 19. Sensor information, event description, and service action for the 8001-22C and 8005-22N (continued)

Sensor name (Sensor ID)	Event description	Service action
• Mem Buf Temp 1 (0x5E) • Mem Buf Temp 2 (0x5F) • Mem Buf Temp 3 (0x60) • Mem Buf Temp 4 (0x61)	• Transition to Critical from Less Severe • Transition to Non-recoverable from Less Severe • Transition to Critical from Non-recoverable	Ensure that there are no air flow obstructions at the front or at the rear of the system. Ensure that the fans are operating properly.
	• Lower Non-critical – going low • Lower Non-critical – going high • Lower Critical – going low • Lower Critical – going high • Lower Non-recoverable – going low • Lower Non-recoverable – going high • Upper Non-critical – going low • Upper Non-critical – going high • Upper Critical - going low • Upper Critical - going high • Upper Non-recoverable – going low • Upper Non-recoverable – going high	No service action is required.
• P1M1-DIMMA Temp (0x66) • P1M1-DIMMB Temp (0x67) • P1M1-DIMMC Temp (0X68) • P1M1-DIMMD Temp (0x69) • P1M2-DIMMA Temp (0x6A) • P1M2-DIMMB Temp (0x6B) • P1M2-DIMMC Temp (0x6C) • P1M2-DIMMD Temp (0x6D) • P2M1-DIMMA Temp (0x6E) • P2M1-DIMMB Temp (0x6F) • P2M1-DIMMC Temp (0x70) • P2M1-DIMMD Temp (0x71) • P2M2-DIMMA Temp (0x72) • P2M2-DIMMB Temp (0x73) • P2M2-DIMMC Temp (0x74) • P2M2-DIMMD Temp (0x75)	• Transition to Critical from Less Severe • Transition to Non-recoverable from Less Severe • Transition to Critical from Non-recoverable	Ensure that there are no air flow obstructions at the front or at the rear of the system. Ensure that the fans are operating properly.
	• Lower Non-critical – going low • Lower Non-critical – going high • Lower Critical – going low • Lower Critical – going high • Lower Non-recoverable – going low • Lower Non-recoverable – going high • Upper Non-critical – going low • Upper Non-critical – going high • Upper Critical - going low • Upper Critical - going high • Upper Non-recoverable – going low • Upper Non-recoverable – going high	No service action is required.

Table 19. Sensor information, event description, and service action for the 8001-22C and 8005-22N (continued)

Sensor name (Sensor ID)	Event description	Service action
VBAT (0x9C)	• Transition to Non-recoverable • Lower Non-recoverable – going low	Replace the time-of-day battery. Go to "8001-22C or 8005-22N locations" on page 87 to identify the physical location and removal and replacement procedure.
	• Lower Non-critical – going low • Lower Non-critical – going high • Lower Critical – going low • Lower Critical – going high • Lower Non-recoverable – going high • Upper Non-critical – going low • Upper Non-critical – going high • Upper Critical - going low • Upper Critical - going high • Upper Non-recoverable – going low • Upper Non-recoverable – going high	No service action is required.
Total Power (0xA0)	• Lower Non-critical – going low • Lower Non-critical – going high • Lower Critical – going low • Lower Critical – going high • Lower Non-recoverable – going low • Lower Non-recoverable – going high • Upper Non-critical – going low • Upper Non-critical – going high • Upper Critical - going low • Upper Critical - going high • Upper Non-recoverable – going low • Upper Non-recoverable – going high	No service action is required.

Sensor name (Sensor ID)	Event description	Service action
• CPU1 Power or Proc0 Power (0xA2) • CPU2 Power or Proc1 Power (0xA3) • PCIE CPU1 Pwr or PCIE Proc0 Pwr (0xA6) • PCIE CPU2 Pwr or PCIE Proc1 Pwr (0xA7)	• Lower Non-critical – going low • Lower Non-critical – going high • Lower Critical – going low • Lower Critical – going high • Lower Non-recoverable – going low • Lower Non-recoverable – going high • Upper Non-critical – going low • Upper Non-critical – going high • Upper Critical - going low • Upper Critical - going high • Upper Non-recoverable – going low • Upper Non-recoverable – going high	No service action required.
• Freq Limit OT 1 (0xA8) • Mem Thrttl OT 1 (0xAA) • Freq Limit OT 2 (0xAC) • Mem Thrttl OT 2 (0xAE)	Performance Met	If **Asserted** is in the event description, no service action is required. If **Deasserted** is in the event description, ensure that the ambient temperature is within operating specifications. Ensure that there are no blockages to the air inlet and outlets. If blockages are found, remove them. Ensure that all of the fans are working properly by looking for serviceable events related to fans and resolving them.
	Performance Lags	If **Deasserted** is in the event description, no service action is required. If **Asserted** is in the event description, ensure that the ambient temperature is within operating specifications. Ensure that there are no blockages to the air inlet and outlets. If blockages are found, remove them. Ensure that all of the fans are working properly by looking for serviceable events related to fans and resolving them.

Table 19. Sensor information, event description, and service action for the 8001-22C and 8005-22N (continued)

Sensor name (Sensor ID)	Event description	Service action
• Freq Limit Pwr 1 (0xA9) • Freq Limit Pwr 2 (0xAD)	Performance Met	If **Asserted** is in the event description, no service action is required. If **Deasserted** is in the event description, ensure that both power supplies are working properly. Search for serviceable events related to system power and voltage and resolve them. Ensure all fans are working properly by looking for serviceable events related to fans and resolving them.
	Performance Lags	If **Deasserted** is in the event description, no service action is required. If **Asserted** is in the event description, ensure that both power supplies are working properly. Search for serviceable events related to system power and voltage and resolve them. Ensure all fans are working properly by looking for serviceable events related to fans and resolving them.
• CPU Core Temp 1 (0xB0) • CPU Core Temp 2 (0xB1) • CPU Core Temp 3 (0xB2) • CPU Core Temp 4 (0xB3) • CPU Core Temp 5 (0xB4) • CPU Core Temp 6 (0xB5) • CPU Core Temp 7 (0xB6) • CPU Core Temp 8 (0xB7) • CPU Core Temp 9 (0xB8) • CPU Core Temp 10 (0xB9) • CPU Core Temp 11 (0xBA) • CPU Core Temp 12 (0xBB)	• Lower Non-critical – going low • Lower Non-critical – going high • Lower Critical – going low • Lower Critical – going high • Lower Non-recoverable – going low • Lower Non-recoverable – going high • Upper Non-critical – going low • Upper Non-critical – going high • Upper Critical - going low • Upper Critical - going high • Upper Non-recoverable – going low • Upper Non-recoverable – going high	No service action is required.

Table 19. Sensor information, event description, and service action for the 8001-22C and 8005-22N (continued)

Sensor name (Sensor ID)	Event description	Service action
• CPU Core Temp 13 (0xBC) • CPU Core Temp 14 (0xBD) • CPU Core Temp 15 (0xBE) • CPU Core Temp 16 (0xBF) • CPU Core Temp 17 (0xC0) • CPU Core Temp 18 (0xC1) • CPU Core Temp 19 (0xC2) • CPU Core Temp 20 (0xC3) • CPU Core Temp 21 (0xC4) • CPU Core Temp 22 (0xC5) • CPU Core Temp 23 (0xC6) • CPU Core Temp 24 (0xC7)	• Lower Non-critical – going low • Lower Non-critical – going high • Lower Critical – going low • Lower Critical – going high • Lower Non-recoverable – going low • Lower Non-recoverable – going high • Upper Non-critical – going low • Upper Non-critical – going high • Upper Critical - going low • Upper Critical - going high • Upper Non-recoverable – going low • Upper Non-recoverable – going high	No service action is required.

Table 19. Sensor information, event description, and service action for the 8001-22C and 8005-22N (continued)

Sensor name (Sensor ID)	Event description	Service action
• CPU Core Func 1 (0xC8) • CPU Core Func 2 (0xC9) • CPU Core Func 3 (0xCA) • CPU Core Func 4 (0xCB) • CPU Core Func 5 (0xCC) • CPU Core Func 6 (0xCD) • CPU Core Func 7 (0xCE) • CPU Core Func 8 (0xCF) • CPU Core Func 9 (0xD0) • CPU Core Func 10 (0xD1) • CPU Core Func 11 (0xD2) • CPU Core Func 12 (0xD3)	• IERR • Transition to Non-recoverable • Predictive Failure	Replace system processor CPU 1. Go to "8001-22C or 8005-22N locations" on page 87 to identify the physical location and removal and replacement procedure.
	• FRB1 BIST Failure • FRB2 Hang In POST Failure • FRB3 Processor Startup Initialization Failure • Configuration Error • SMBIOS Uncorrectable CPU Complex Error • Processor Disabled • Terminator Presence Detected • Machine Check Exception • Correctable Machine Check Error • State Deasserted • Device Disabled • Transition to Critical from Less Severe • Transition to Non-recoverable from Less Severe • Transition to Critical from Non-recoverable • Thermal Trip • Processor Automatically Throttled • Processor Presence Detected • State Asserted • Device Enabled • Transition to OK • Transition to Non-Critical from OK • Transition to Non-Critical from More Severe • Monitor • Informational	No service action is required.

Table 19. Sensor information, event description, and service action for the 8001-22C and 8005-22N (continued)

Sensor name (Sensor ID)	Event description	Service action
• CPU Core Func 13 (0xD4) • CPU Core Func 14 (0xD5) • CPU Core Func 15 (0xD6) • CPU Core Func 16 (0xD7) • CPU Core Func 17 (0xD8) • CPU Core Func 18 (0xD9) • CPU Core Func 19 (0xDA) • CPU Core Func 20 (0xDB) • CPU Core Func 21 (0xDC) • CPU Core Func 22 (0xDD) • CPU Core Func 23 (0xDE) • CPU Core Func 24 (0xDF)	• IERR • Transition to Non-recoverable • Predictive Failure	Replace system processor CPU 2. Go to "8001-22C or 8005-22N locations" on page 87 to identify the physical location and removal and replacement procedure.
	• FRB1 BIST Failure • FRB2 Hang In POST Failure • FRB3 Processor Startup Initialization Failure • Configuration Error • SMBIOS Uncorrectable CPU Complex Error • Processor Disabled • Terminator Presence Detected • Machine Check Exception • Correctable Machine Check Error • State Deasserted • Device Disabled • Transition to Critical from Less Severe • Transition to Non-recoverable from Less Severe • Transition to Critical from Non-recoverable • Thermal Trip • Processor Automatically Throttled • Processor Presence Detected • State Asserted • Device Enabled • Transition to OK • Transition to Non-Critical from OK • Transition to Non-Critical from More Severe • Monitor • Informational	No service action is required.
Chassis Intru (0xE2)	• Drive Bay intrusion • I/O Card area intrusion • Processor area intrusion • System unplugged from LAN • Unauthorized dock • FAN area intrusion	No service action is required.
	General Chassis intrusion	Ensure that the top cover is properly installed on the system. See Installing the service access cover on an 8001-22C or 8005-22N system.

Table 19. Sensor information, event description, and service action for the 8001-22C and 8005-22N (continued)

Sensor name (Sensor ID)	Event description	Service action
• FAN1 (0xE3) • FAN2 (0xE4) • FAN3 (0xE5) • FAN4 (0xE6) • FAN5 (0xE7) • FAN6 (0xE8) • FAN7 (0xE9) • FAN8 (0xEA)	• Transition to Critical from Less Severe • Transition to Non-recoverable from Less Severe • Transition to Critical from Non-recoverable	If the sensor name is FAN1, FAN4, FAN5, or FAN8, no service action is required. If the sensor name is FAN2, replace Fan 2. If the sensor name is FAN3, replace Fan 3. If the sensor name is FAN6, replace Fan 6. If the sensor name is FAN7, replace Fan 7. Go to "8001-22C or 8005-22N locations" on page 87 to identify the physical location and removal and replacement procedure.
	• Lower Non-critical – going low • Lower Non-critical – going high • Lower Critical – going low • Lower Critical – going high • Lower Non-recoverable – going low • Lower Non-recoverable – going high • Upper Non-critical – going low • Upper Non-critical – going high • Upper Critical - going low • Upper Critical - going high • Upper Non-recoverable – going low • Upper Non-recoverable – going high • Device Inserted/Device Present	No service action is required.
	• Device Removed/Device Absent • Transition to degraded • Install error • Redundancy lost • Non-redundant insufficient resources	Ensure that all fans are seated securely. Go to "8001-22C or 8005-22N locations" on page 87 to identify the physical location and removal and replacement procedure.

Sensor name (Sensor ID)	Event description	Service action
• PS1 Status (0xF3) • PS2 Status (0xF4)	• Predictive Failure • Power Supply Input Out of Range But Present	If the sensor name is PS1 Status, replace PSU 1. If the sensor name is PS2 Status, replace PSU 2. Go to "8001-22C or 8005-22N locations" on page 87 to identify the physical location and removal and replacement procedure.
	Power Supply Failure Detected	An assert event immediately followed by a deassert event indicates that a power cycle of the system occurred. No service action is required. If there is no deassert event immediately following the assert event, replace the power supply. If the sensor name is PS1 Status, replace PSU 1. If the sensor name is PS2 Status, replace PSU 2. Go to "8001-22C or 8005-22N locations" on page 87 to identify the physical location and removal and replacement procedure.
	• Power Supply Input Lost or AC DC • Power Supply Input Lost Or Out Of Range	• Ensure that ac power is supplied to the rack. • Ensure that the system power cords are plugged tightly into both the power supply and the rack power distribution unit (PDU) for both system power supplies.
	• State Deasserted • State Asserted • Presence Detected	No service action is required.
Watchdog (0xFF)	• Timer Expired • Reserved1 • Reserved2 • Reserved3 • Reserved4	No service action is required.
	• Hard Reset • Power Down • Power Cycle • Timer Interrupt	Search for serviceable SEL events that have a time stamp close to the time stamp of this SEL event. If you found a serviceable SEL event, perform the service action that is indicated in this table for the SEL event. If you cannot boot the system to the Petitboot menu, go to "Resolving a system firmware boot failure" on page 5.

Isolation procedures

Use this information to isolate problems that might occur with your system.

EPUB_PRC_FIND_DECONFIGURE_PART isolation procedure

A part vital to the system has been deconfigured.

1. Use the `ipmitool` command to examine system event logs (SELs).
   - To list SELs by using an in-band network, use the following command:

     `ipmitool sel elist`
   - To list SELs remotely over the LAN, use the following command:

     `ipmitool -I lanplus -U <username> -P <password> -H <BMC IP addres or BMC hostname> sel elist`
2. Identify all SELs with the value `OEM record df` and **Correctable Machine Check Error** or **Transition to Non-recoverable** in the description. Did you find one or more SELs with the value `OEM record df` and **Correctable Machine Check Error** or **Transition to Non-recoverable** in the description?

If	Then
Yes:	Continue with the next step.
No:	Go to "Contacting IBM service and support" on page 71. **This ends the procedure.**

3. For each of the SELs that you identified in step 2, determine the sensor name that is associated with each SEL. Replace the following items, one at a time, until the problem is resolved:

   Note: If your system is an 8001-12C or 8005-12N, go to "8001-12C or 8005-12N locations" on page 73 to identify the physical location and removal and replacement procedure. If your system is an 8001-22C or 8005-22N, go to "8001-22C or 8005-22N locations" on page 87 to identify the physical location and removal and replacement procedure.
   - If the sensor name is CPU Func 1 or CPU Core Func x, where x is 1 - 12, replace system processor CPU 1.
   - If the sensor name is CPU Func 2 or CPU Core Func x, where x is 13 - 24, replace system processor CPU 2.

   Does the problem persist?

If	Then
Yes:	Replace the system backplane. If the replacement of the system backplane does not resolve the problem, go to "Contacting IBM service and support" on page 71. **This ends the procedure.**
No:	**This ends the procedure.**

EPUB_PRC_SP_CODE isolation procedure

A problem was detected in the system firmware.

Update the system firmware image. Go to Getting fixes and update the system firmware with the most recent level of firmware. Then, reboot the system. If the system firmware update does not resolve the problem, go to "Contacting IBM service and support" on page 71. **This ends the procedure.**

EPUB_PRC_PHYP_CODE isolation procedure

A problem was detected in the system firmware.

Update the system firmware image. Go to Getting fixes and update the system firmware with the most recent level of firmware. Then, reboot the system. If the system firmware update does not resolve the problem, go to "Contacting IBM service and support" on page 71. **This ends the procedure.**

EPUB_PRC_ALL_PROCS isolation procedure

A problem was detected with a system processor.

Use the following table to determine the service action:

Table 20. EPUB_PRC_ALL_PROCS service actions

System	Service action
8001-12C or 8005-12N	Replace the following items, one at a time, in the order that is shown until the problem is resolved: 1. System processor CPU 1 2. System processor CPU 2 3. System backplane Go to "8001-12C or 8005-12N locations" on page 73 to identify the physical location and removal and replacement procedure. If the replacement of the system processors and the system backplane does not resolve the problem, go to "Contacting IBM service and support" on page 71. **This ends the procedure.**
8001-22C or 8005-22N	Replace the following items, one at a time, in the order that is shown until the problem is resolved: 1. System processor CPU 1 2. System processor CPU 2 3. System backplane Go to "8001-22C or 8005-22N locations" on page 87 to identify the physical location and removal and replacement procedure. If the replacement of the system processors and the system backplane does not resolve the problem, go to "Contacting IBM service and support" on page 71. **This ends the procedure.**

EPUB_PRC_ALL_MEMCRDS isolation procedure

A problem was detected with a memory DIMM, but it cannot be isolated to a specific memory DIMM.

1. Use the `ipmitool` command to examine system event logs (SELs).
   - To list SELs by using an in-band network, use the following command:
     ```
     ipmitool sel elist
     ```
   - To list SELs remotely over the LAN, use the following command:
     ```
     ipmitool –I lanplus –U <username> –P <password> –H <BMC IP addres or BMC hostname> sel elist
     ```
2. Identify all SELs with the value `OEM record df` and **Transition to Non-recoverable** in the description. Did you find one or more SELs with the value `OEM record df` and **Transition to Non-recoverable** in the description?

If	Then
Yes:	Continue with the next step.
No:	Go to "Contacting IBM service and support" on page 71. **This ends the procedure.**

3. For each of the SELs that you identified in step 2, determine the sensor name that is associated with each SEL. Replace the following items, one at a time, until the problem is resolved:

Note: If your system is an 8001-12C or 8005-12N, go to "8001-12C or 8005-12N locations" on page 73 to identify the physical location and removal and replacement procedure. If your system is an 8001-22C or 8005-22N, go to "8001-22C or 8005-22N locations" on page 87 to identify the physical location and removal and replacement procedure.

- If the sensor name is Membuf Func *x*, replace the system backplane.
- If the sensor name is P1M1-DIMMA Func, replace P1M1-DIMMA. If the sensor name is P1M1-DIMMB Func, replace P1M1-DIMMB. And so on.

Does the problem persist?

If	Then
Yes:	If you have not already done so, replace the system backplane. If the replacement of the system backplane does not resolve the problem, go to "Contacting IBM service and support" on page 71. **This ends the procedure.**
No:	**This ends the procedure.**

EPUB_PRC_LVL_SUPPORT isolation procedure

Contact your next level of support for assistance.

Go to "Contacting IBM service and support" on page 71.

EPUB_PRC_MEMORY_PLUGGING_ERROR isolation procedure

Memory DIMMs are plugged in a configuration that is not valid.

If the system is an 8001-12C or 8001-22C, go to Placement rules for memory in the 8001-12C or 8001-22C system. Otherwise, contact your next level of support. **This ends the procedure.**

EPUB_PRC_FSI_PATH isolation procedure

The system detected an error with the FSI path.

Use the following table to determine the service action:

Table 21. EPUB_PRC_FSI_PATH service actions

System	Service action
8001-12C or 8005-12N	Replace the following items, one at a time, in the order that is shown until the problem is resolved: 1. System processor CPU 1 2. System processor CPU 2 3. System backplane Go to "8001-12C or 8005-12N locations" on page 73 to identify the physical location and removal and replacement procedure. If the replacement of the system processors and the system backplane does not resolve the problem, go to "Contacting IBM service and support" on page 71. **This ends the procedure.**

System	Service action
8001-22C or 8005-22N	Replace the following items, one at a time, in the order that is shown until the problem is resolved: 1. System processor CPU 1 2. System processor CPU 2 3. System backplane Go to "8001-22C or 8005-22N locations" on page 87 to identify the physical location and removal and replacement procedure. If the replacement of the system processors and the system backplane does not resolve the problem, go to "Contacting IBM service and support" on page 71. **This ends the procedure.**

EPUB_PRC_PROC_AB_BUS isolation procedure

A diagnostic function detected an external processor interface problem.

Use the following table to determine the service action:

Table 22. EPUB_PRC_PROC_AB_BUS service actions

System	Service action
8001-12C or 8005-12N	Replace the system backplane. If replacing the system backplane does not resolve the problem, replace system processor CPU 1. If replacing system processor CPU 1 does not resolve the problem, replace system processor CPU 2. Go to "8001-12C or 8005-12N locations" on page 73 to identify the physical location and removal and replacement procedure. If replacing the system backplane and both system processors does not resolve the problem, go to "Contacting IBM service and support" on page 71. **This ends the procedure.**
8001-22C or 8005-22N	Replace the system backplane. If replacing the system backplane does not resolve the problem, replace system processor CPU 1. If replacing system processor CPU 1 does not resolve the problem, replace system processor CPU 2. Go to "8001-22C or 8005-22N locations" on page 87 to identify the physical location and removal and replacement procedure. If replacing the system backplane and both system processors does not resolve the problem, go to "Contacting IBM service and support" on page 71. **This ends the procedure.**

EPUB_PRC_PROC_XYZ_BUS isolation procedure

A diagnostic function detected an internal processor interface problem.

Use the following table to determine the service action:

Table 23. EPUB_PRC_PROC_XYZ_BUS service actions

System	Service action
8001-12C or 8005-12N	Replace system processor CPU 1. If replacing system processor CPU 1 does not resolve the problem, replace system processor CPU 2. If replacing both system processors does not resolve the problem, replace the system backplane. Go to "8001-12C or 8005-12N locations" on page 73 to identify the physical location and removal and replacement procedure. If replacing the system backplane and both system processors does not resolve the problem, go to "Contacting IBM service and support" on page 71. **This ends the procedure.**
8001-22C or 8005-22N	Replace system processor CPU 1. If replacing system processor CPU 1 does not resolve the problem, replace system processor CPU 2. If replacing both system processors does not resolve the problem, replace the system backplane. Go to "8001-22C or 8005-22N locations" on page 87 to identify the physical location and removal and replacement procedure. If replacing the system backplane and both system processors does not resolve the problem, go to "Contacting IBM service and support" on page 71. **This ends the procedure.**

EPUB_PRC_EIBUS_ERROR isolation procedure

A bus error occurred.

1. Use the `ipmitool` command to examine system event logs (SELs).

   - To list SELs by using an in-band network, use the following command:

     `ipmitool sel elist`

   - To list SELs remotely over the LAN, use the following command:

     `ipmitool -I lanplus -U <username> -P <password> -H <BMC IP addres or BMC hostname> sel elist`

2. Identify all SELs with the value `OEM record df` and **Correctable Machine Check Error** or **Transition to Non-recoverable** in the description. Did you find one or more SELs with the value `OEM record df` and **Correctable Machine Check Error** or **Transition to Non-recoverable** in the description?

If	Then
Yes:	Continue with the next step.
No:	Go to "Contacting IBM service and support" on page 71. **This ends the procedure.**

3. For each of the SELs that you identified in step 2, determine the sensor name that is associated with each SEL. Replace the following items, one at a time, until the problem is resolved:

   Note: If your system is an 8001-12C or 8005-12N, go to "8001-12C or 8005-12N locations" on page 73 to identify the physical location and removal and replacement procedure. If your system is an 8001-22C or 8005-22N, go to "8001-22C or 8005-22N locations" on page 87 to identify the physical location and removal and replacement procedure.

   - If the sensor name is CPU Func 1 or CPU Core Func x, where x is 1 - 12, replace system processor CPU 1.

   - If the sensor name is CPU Func 2 or CPU Core Func x, where x is 13 - 24, replace system processor CPU 2.

Does the problem persist?

If	Then
Yes:	Replace the system backplane. If the replacement of the system backplane does not resolve the problem, go to "Contacting IBM service and support" on page 71. **This ends the procedure.**
No:	**This ends the procedure.**

EPUB_PRC_POWER_ERROR isolation procedure

A power problem occurred.

Perform the service action indicated for any system event logs that are related to power and occurred prior to the problem that you are working on. Go to "Identifying a service action by using system event logs" on page 21. **This ends the procedure.**

EPUB_PRC_MEMORY_UE isolation procedure

An uncorrectable memory problem occurred.

1. Look for system event logs that are related to memory and occurred around the same time as the problem that you are working on. Go to "Identifying a service action by using system event logs" on page 21. Did you find any system event logs that are related to memory?

If	Then
Yes:	Perform the service actions indicated for the system event logs that are related to memory. **This ends the procedure.**
No:	Continue with the next step.

2. Use the following table to determine the service action:

Table 24. EPUB_PRC_MEMORY_UE service actions

System	Service action
8001-12C or 8005-12N	Replace system processor CPU 1. If replacing system processor CPU 1 does not resolve the problem, replace system processor CPU 2. Go to "8001-12C or 8005-12N locations" on page 73 to identify the physical location and removal and replacement procedure. **This ends the procedure.**
8001-22C or 8005-22N	Replace system processor CPU 1. If replacing system processor CPU 1 does not resolve the problem, replace system processor CPU 2. Go to "8001-22C or 8005-22N locations" on page 87 to identify the physical location and removal and replacement procedure. **This ends the procedure.**

EPUB_PRC_HB_CODE isolation procedure

The service processor detected a problem during the early boot process.

1. Update the system firmware image. Go to Getting fixes and update the system firmware with the most recent level of firmware. Then, reboot the system. Does the problem persist?

If	Then
Yes:	Continue with the next step.

If	Then
No:	**This ends the procedure.**

2. Use the `ipmitool` command to examine system event logs (SELs).
   - To list SELs by using an in-band network, use the following command:

     `ipmitool sel elist`
   - To list SELs remotely over the LAN, use the following command:

     `ipmitool -I lanplus -U <username> -P <password> -H <BMC IP addres or BMC hostname> sel elist`

3. Identify all SELs with the value `OEM record df` and **Correctable Machine Check Error** or **Transition to Non-recoverable** in the description. Did you find one or more SELs with the value `OEM record df` and **Correctable Machine Check Error** or **Transition to Non-recoverable** in the description?

If	Then
Yes:	Continue with the next step.
No:	Go to "Contacting IBM service and support" on page 71. **This ends the procedure.**

4. For each of the SELs that you identified in step 3, determine the sensor name that is associated with each SEL. Replace the following items, one at a time, until the problem is resolved:

   Note: If your system is an 8001-12C or 8005-12N, go to "8001-12C or 8005-12N locations" on page 73 to identify the physical location and removal and replacement procedure. If your system is an 8001-22C or 8005-22N, go to "8001-22C or 8005-22N locations" on page 87 to identify the physical location and removal and replacement procedure.
   - If the sensor name is CPU Func 1 or CPU Core Func *x*, where *x* is 1 - 12, replace system processor CPU 1.
   - If the sensor name is CPU Func 2 or CPU Core Func *x*, where *x* is 13 - 24, replace system processor CPU 2.

   Does the problem persist?

If	Then
Yes:	Replace the system backplane. If the replacement of the system backplane does not resolve the problem, go to "Contacting IBM service and support" on page 71. **This ends the procedure.**
No:	**This ends the procedure.**

EPUB_PRC_TOD_CLOCK_ERR isolation procedure

A diagnostic function detected a problem with the time of day or clock function.

Use the following table to determine the service action:

Table 25. EPUB_PRC_TOD_CLOCK_ERR service actions

System	Service action
8001-12C or 8005-12N	Replace the system backplane. If replacing the system backplane does not resolve the problem, replace system processor CPU 1. If replacing system processor CPU 1 does not resolve the problem, replace system processor CPU 2. Go to "8001-12C or 8005-12N locations" on page 73 to identify the physical location and removal and replacement procedure. If replacing the system backplane and both system processors does not resolve the problem, go to "Contacting IBM service and support" on page 71. **This ends the procedure.**
8001-22C or 8005-22N	Replace the system backplane. If replacing the system backplane does not resolve the problem, replace system processor CPU 1. If replacing system processor CPU 1 does not resolve the problem, replace system processor CPU 2. Go to "8001-22C or 8005-22N locations" on page 87 to identify the physical location and removal and replacement procedure. If replacing the system backplane and both system processors does not resolve the problem, go to "Contacting IBM service and support" on page 71. **This ends the procedure.**

EPUB_PRC_COOLING_SYSTEM_ERR isolation procedure

One or more processor sensors detected an over temperature condition.

To resolve the over temperature condition, complete the following steps:

1. Is the room temperature less than 35°C (95°F)?

If	Then
No:	Bring the room temperature to within the allowable operating range. **This ends the procedure.**
Yes:	Continue with the next step.

2. Are the system front and rear doors free of obstructions?

If	Then
No:	The system must be free of obstructions for proper air flow. Remove any obstructions. **This ends the procedure.**
Yes:	Continue with the next step.

3. Perform the service action indicated for any system event logs that are related to fans and occurred prior to the problem that you are working on. Go to "Identifying a service action by using system event logs" on page 21. **This ends the procedure.**

Verifying a repair

Learn how to verify hardware operation after you make repairs to the system.

1. Power on the system.
2. Did you replace a graphics processing unit (GPU), PCIe adapter, disk drive, or solid-state drive?

If	Then
Yes:	Go to step 5.
No:	Continue with the next step.

3. Scan the system event logs (SELs) for serviceable events that occurred after system hardware was replaced. For information about SELs that require a service action, see "Identifying a service action by using system event logs" on page 21.
4. Did any serviceable SEL events occur after hardware was replaced?

If	Then
Yes:	The problem is not resolved. Go to "Identifying a service action by using system event logs" on page 21 and complete the service actions indicated. **This ends the procedure.**
No:	The problem is resolved. **This ends the procedure.**

5. Use the following table to determine the verification action to complete:

Table 26. Determining a verification action for GPUs, PCIe adapters, and devices

Adapter type	Verification action
Devices that are controlled by a RAID adapter	If the RAID adapter is an LSI SAS3 9361-8I adapter, complete the following steps: 1. Install the storcli utility for the RAID adapter. 2. Type `storcli /cx /eall /sall show` at the command line and press Enter. 3. Verify that the command reports that all of the drives are connected and have a status of **OK**. If the RAID adapter is an LSI S3008L-L8I adapter, complete the following steps: 1. Install the sas3ircu utility for the RAID adapter. 2. Type `sas3ircu 0 display` at the command line and press Enter. 3. Verify that the command reports that all of the drives are connected and have a status of **OK**.

Table 26. Determining a verification action for GPUs, PCIe adapters, and devices (continued)

Adapter type	Verification action
Devices that are not controlled by a RAID adapter	If the device is a SAS or SATA drive, complete the following steps: 1. Install the mvcli utility. 2. Type `mvcli` at the command line and press Enter. 3. Type `smart -p X` at the command line, where *X* is the ID that is associated with the drive. Then, press Enter. 4. Verify that the SMART health assessment passed. If the device is an NVMe drive, complete the following steps: 1. Install the nvme-cli utility. 2. Type `nvme smart-log /dev/nvmeX` at the command line, where *X* is the number that is associated with the drive. Then, press Enter. 3. Verify that the SMART health assessment passed.
GPU	Complete the following steps: 1. Type `nvidia-smi -L` at the command line and press Enter. Verify that the GPU is listed. 2. Type `nvidia-smi -q` at the command line and press Enter. Verify that no errors are listed.
Network adapter	Complete the following steps: 1. At the command line, type `ethtool ethx`, where *x* is the number of the physical port that you are testing. Verify that the connection speed that is indicated in the output is correct. 2. Perform a ping test to verify the network connectivity.
RAID adapter	If the RAID adapter is an LSI SAS3 9361-8I adapter, complete the following steps: 1. Install the storcli utility for the RAID adapter. 2. Type `storcli /cx show all` at the command line and press Enter. 3. Verify that the adapter is at the required firmware level and has a SAS address. The presence of a SAS address indicates that the adapter is properly configured. If the RAID adapter is an LSI S3008L-L8I adapter, complete the following steps: 1. Install the sas3ircu utility for the RAID adapter. 2. Type `sas3ircu 0 display` at the command line and press Enter. 3. Verify that the adapter is at the required firmware level and has a SAS address. The presence of a SAS address indicates that the adapter is properly configured.

Collecting diagnostic data

Learn how to collect diagnostic data to send to IBM service and support.

To collect diagnostic data, complete the following steps:

1. Is the operating system available?

If	Then
Yes:	Continue with step 2.
No:	Continue with step 3.

2. To collect diagnostic data from the operating system, complete the following steps:
    a. Log in as root user.
    b. At the command prompt, type `sosreport` and press Enter.
    c. You are prompted for additional information. When the command is complete, the location of the output file is displayed. Note the location of the output file. Then, continue with the next step.
3. To collect system event logs, complete the following steps:
    a. Go to the IBM Support Portal (http://www.ibm.com/support/entry/portal/support).
    b. In the search field, enter your machine type and model. Then, click the correct product support entry for your system.
    c. From the **Downloads** list, click the **Scale-out LC System Event Log Collection Tool** for your machine type and model.
    d. Follow the instructions to install and run the system event log collection tool. Then, continue with the next step.
4. Send the data that you collected during this procedure to IBM service and support. **This ends the procedure**.

Contacting IBM service and support

You can contact IBM service and support by telephone or through the IBM Support Portal.

Before you contact IBM service and support, go to "Beginning troubleshooting and problem analysis" on page 1 and complete all of the service actions indicated. If the service actions do not resolve the problem, or if you are directed to contact support, go to "Collecting diagnostic data." Then, use the information below to contact IBM service and support.

Customers in the United States, United States territories, or Canada can place a hardware service request online. To place a hardware service request online, go to the IBM Support Portal(http://www.ibm.com/support/entry/portal/product/power/scale-out_lc).

For up-to-date telephone contact information, go to the Directory of worldwide contacts website (www.ibm.com/planetwide/).

Table 27. Service and support contacts

Type of problem	Call
• Advice • Migrating • "How to" • Operating • Configuring • Ordering • Performance • General information	• 1-800-IBM-CALL (1–800–426–2255) • 1-800-IBM-4YOU (1–800–426–4968)
Software: • Fix information • Operating system problem • IBM application program • Loop, hang, or message Hardware: • IBM system hardware broken • Hardware reference code • IBM input/output (I/O) problem • Upgrade	1-800-IBM-SERV (1–800–426–7378)

Finding parts and locations

Locate physical part locations and identify parts with system diagrams.

Locate the FRU

Use the graphics and tables to locate the field-replaceable unit (FRU) and identify the FRU part number.

8001-12C or 8005-12N locations

Use this information to find the location of a FRU in the system unit.

Rack views

The following diagrams show field-replaceable unit (FRU) layouts in the system. Use these diagrams with the following tables.
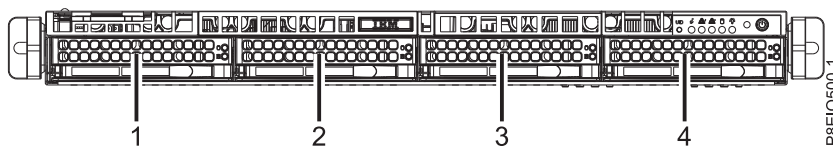
Figure 1. Front view

Table 28. Front view locations

Index number	FRU description	FRU removal and replacement procedures
1	HDD 0 or NVMe 0*	See Removing and replacing a storage drive in the 8001-12C or 8005-12N.
2	HDD 1 or NVMe 1*	See Removing and replacing a storage drive in the 8001-12C or 8005-12N.
3	HDD 2 or NVMe 2*	See Removing and replacing a storage drive in the 8001-12C or 8005-12N.
4	HDD 3 or NVMe 3*	See Removing and replacing a storage drive in the 8001-12C or 8005-12N.

*8005-12N systems do not support NVMe drives.

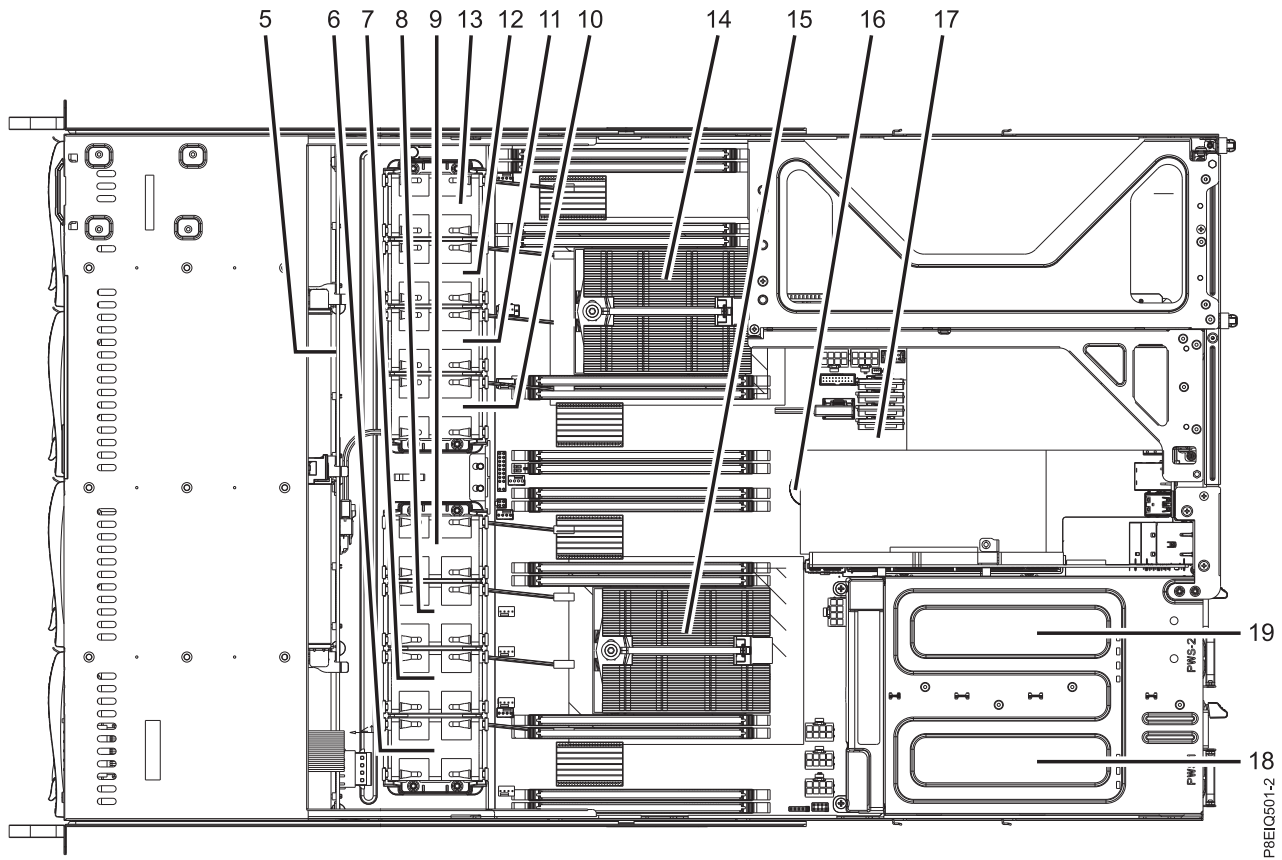*Figure 2. Top view*

Table 29. Top view locations

Index number	FRU description	FRU removal and replacement procedures
5	Disk drive backplane	See Removing and replacing the disk drive backplane in the 8001-12C or 8005-12N.
6	Fan 1	See Removing and replacing fans in the 8001-12C or 8005-12N.
7	Fan 2	See Removing and replacing fans in the 8001-12C or 8005-12N.
8	Fan 3	See Removing and replacing fans in the 8001-12C or 8005-12N.
9	Fan 4	See Removing and replacing fans in the 8001-12C or 8005-12N.
10	Fan 5	See Removing and replacing fans in the 8001-12C or 8005-12N.
11	Fan 6	See Removing and replacing fans in the 8001-12C or 8005-12N.
12	Fan 7	See Removing and replacing fans in the 8001-12C or 8005-12N.
13	Fan 8	See Removing and replacing fans in the 8001-12C or 8005-12N.

Table 29. Top view locations (continued)

Index number	FRU description	FRU removal and replacement procedures
14	CPU 2	See Removing and replacing a system processor module for the 8001-12C or 8005-12N.
15	CPU 1	See Removing and replacing a system processor module for the 8001-12C or 8005-12N.
16	Time-of-day battery	See Removing and replacing the time-of-day battery in the 8001-12C or 8005-12N.
17	System backplane	See Removing and replacing the system backplane in the 8001-12C or 8005-12N.
18	PSU 1	See Removing and replacing a power supply in the 8001-12C, 8001-22C, 8005-12N, or 8005-22N.
19	PSU 2	See Removing and replacing a power supply in the 8001-12C, 8001-22C, 8005-12N, or 8005-22N.
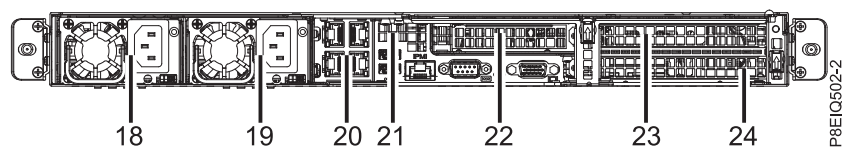
Figure 3. Rear view

Table 30. Rear view locations

Index number	FRU description	FRU removal and replacement procedures
18	PSU 1	See Removing and replacing a power supply in the 8001-12C, 8001-22C, 8005-12N, or 8005-22N.
19	PSU 2	See Removing and replacing a power supply in the 8001-12C, 8001-22C, 8005-12N, or 8005-22N.
20	PCIe adapter 1 (UIO Network)	See Removing and replacing PCIe adapters in the 8001-12C or 8005-12N.
21	PCIe adapter 2 (UIO Slot1)	See Removing and replacing PCIe adapters in the 8001-12C or 8005-12N.
22	PCIe adapter 3 (PLX Slot1)	See Removing and replacing PCIe adapters in the 8001-12C or 8005-12N.

Table 30. Rear view locations (continued)

Index number	FRU description	FRU removal and replacement procedures
23	PCIe adapter 4 or GPU (WIO Slot1)	For PCIe adapters, see Removing and replacing PCIe adapters in the 8001-12C or 8005-12N. For the graphics processing unit, see Removing and replacing a graphics processing unit in the 8001-12C. **Note:** 8005-12N systems do not support GPUs.
24	PCIe adapter 5 (WIO Slot2) **Note:** PCIe adapter 5 is not present on the 8001-12C if a GPU is installed.	See Removing and replacing PCIe adapters in the 8001-12C or 8005-12N.

Memory locations

The following diagram shows memory DIMMs and their corresponding field-replaceable unit (FRU) layouts in the system. Use this diagram with the following table.
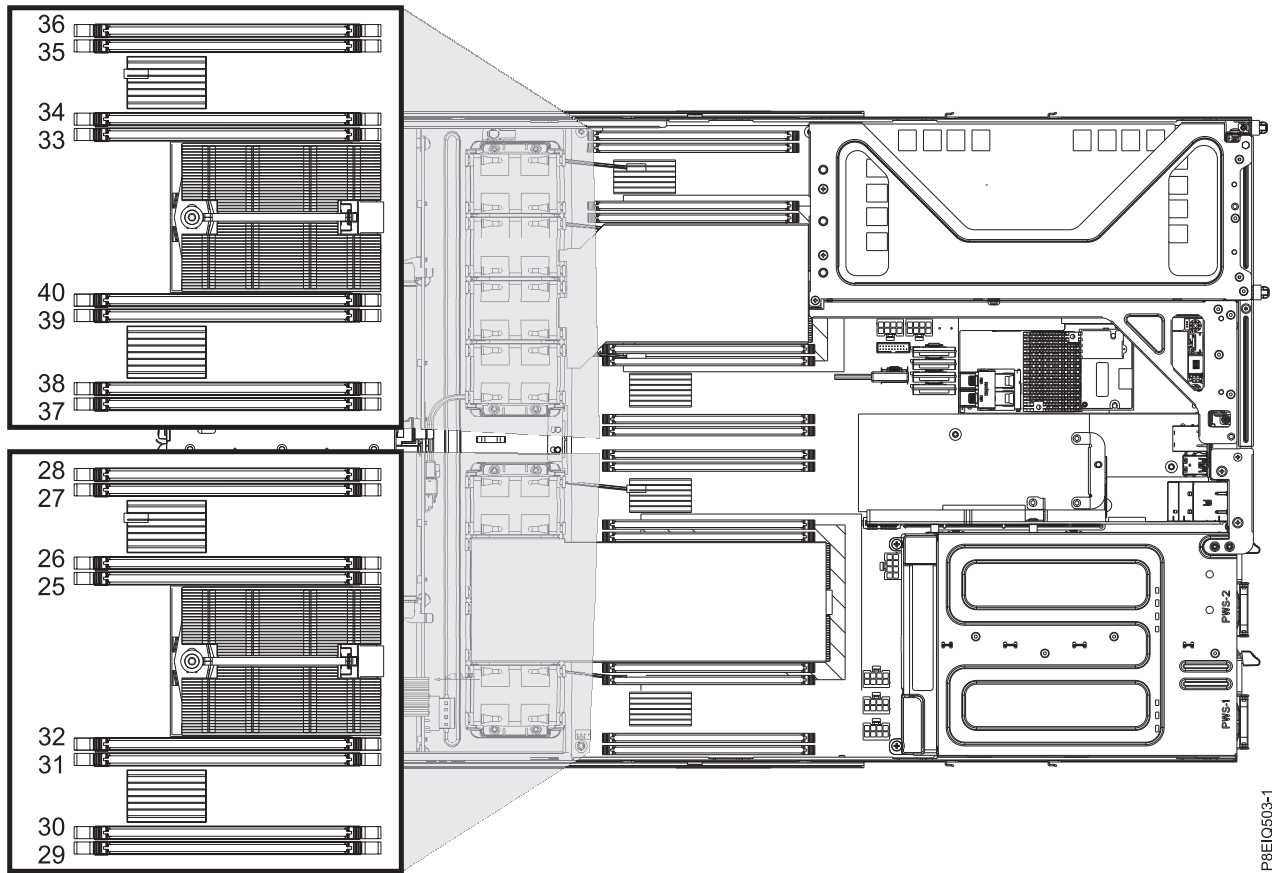

Figure 4. Memory locations

The following table provides the memory locations.

Table 31. Memory locations

Index number	FRU description	FRU removal and replacement procedures
25	P1M1-DIMMA	See Removing and replacing memory in the 8001-12C or 8005-12N.
26	P1M1-DIMMB	See Removing and replacing memory in the 8001-12C or 8005-12N.
27	P1M1-DIMMC	See Removing and replacing memory in the 8001-12C or 8005-12N.
28	P1M1-DIMMD	See Removing and replacing memory in the 8001-12C or 8005-12N.
29	P1M2-DIMMA	See Removing and replacing memory in the 8001-12C or 8005-12N.
30	P1M2-DIMMB	See Removing and replacing memory in the 8001-12C or 8005-12N.
31	P1M2-DIMMC	See Removing and replacing memory in the 8001-12C or 8005-12N.
32	P1M2-DIMMD	See Removing and replacing memory in the 8001-12C or 8005-12N.
33	P2M1-DIMMA	See Removing and replacing memory in the 8001-12C or 8005-12N.
34	P2M1-DIMMB	See Removing and replacing memory in the 8001-12C or 8005-12N.
35	P2M1-DIMMC	See Removing and replacing memory in the 8001-12C or 8005-12N.
36	P2M1-DIMMD	See Removing and replacing memory in the 8001-12C or 8005-12N.
37	P2M2-DIMMA	See Removing and replacing memory in the 8001-12C or 8005-12N.
38	P2M2-DIMMB	See Removing and replacing memory in the 8001-12C or 8005-12N.
39	P2M2-DIMMC	See Removing and replacing memory in the 8001-12C or 8005-12N.
40	P2M2-DIMMD	See Removing and replacing memory in the 8001-12C or 8005-12N.

Drive on module (DOM) locations

The following diagram shows drive on module (DOM)s and their corresponding field-replaceable unit (FRU) layouts in the system. Use this diagram with the following table.
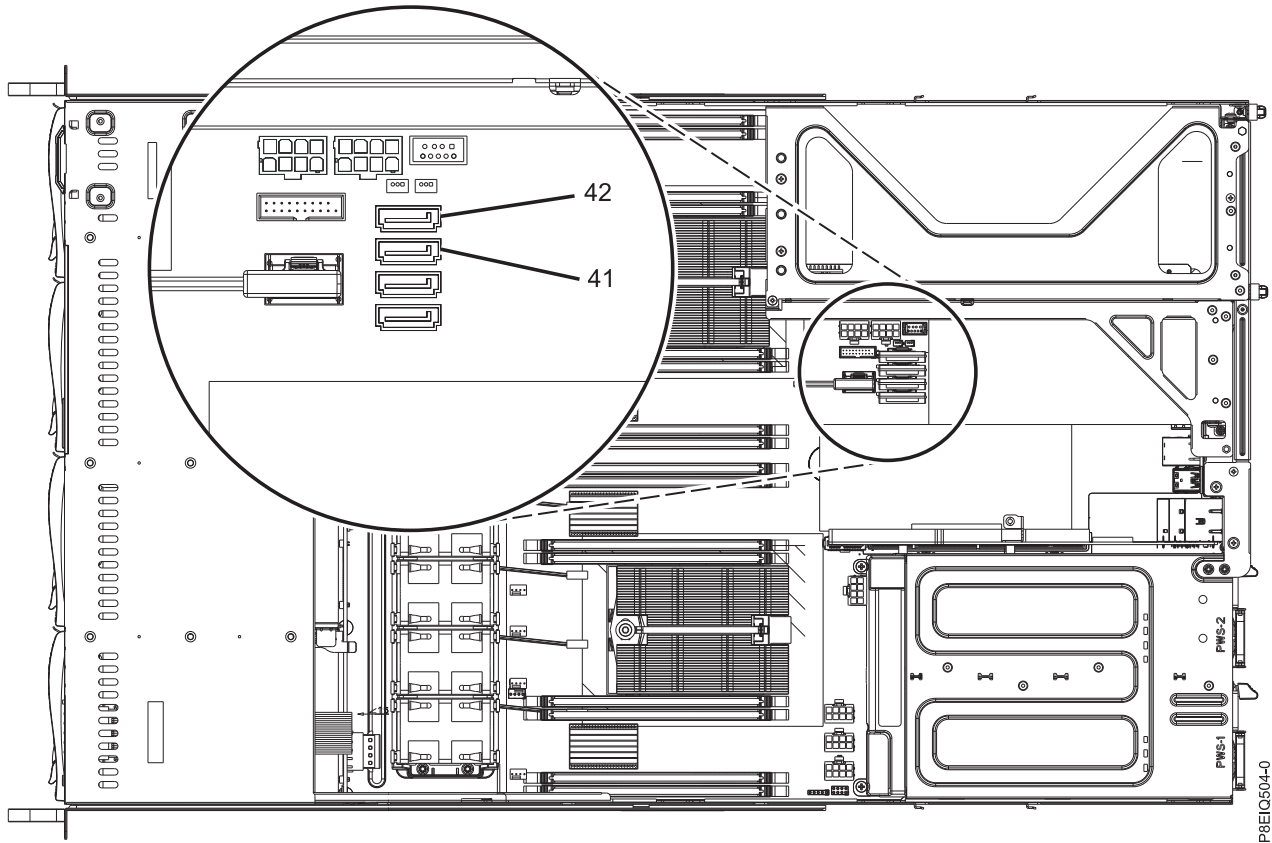
Figure 5. Drive on module (DOM) locations

The following table provides the drive on module (DOM) locations.

Table 32. Drive on module (DOM) locations

Index number	FRU description	FRU removal and replacement procedures
41	Drive on module (DOM) 0	See Removing and replacing a storage drive in the 8001-12C or 8005-12N.
42	Drive on module (DOM) 1	See Removing and replacing a storage drive in the 8001-12C or 8005-12N.

8001-12C or 8005-12N parts

Use this information to find the field-replaceable unit (FRU) part number.

After you identify the part number of the part that you want to order, go to Advanced Part Exchange Warranty Service. Registration is required. If you are not able to identify the part number, go to Contacting IBM service and support.
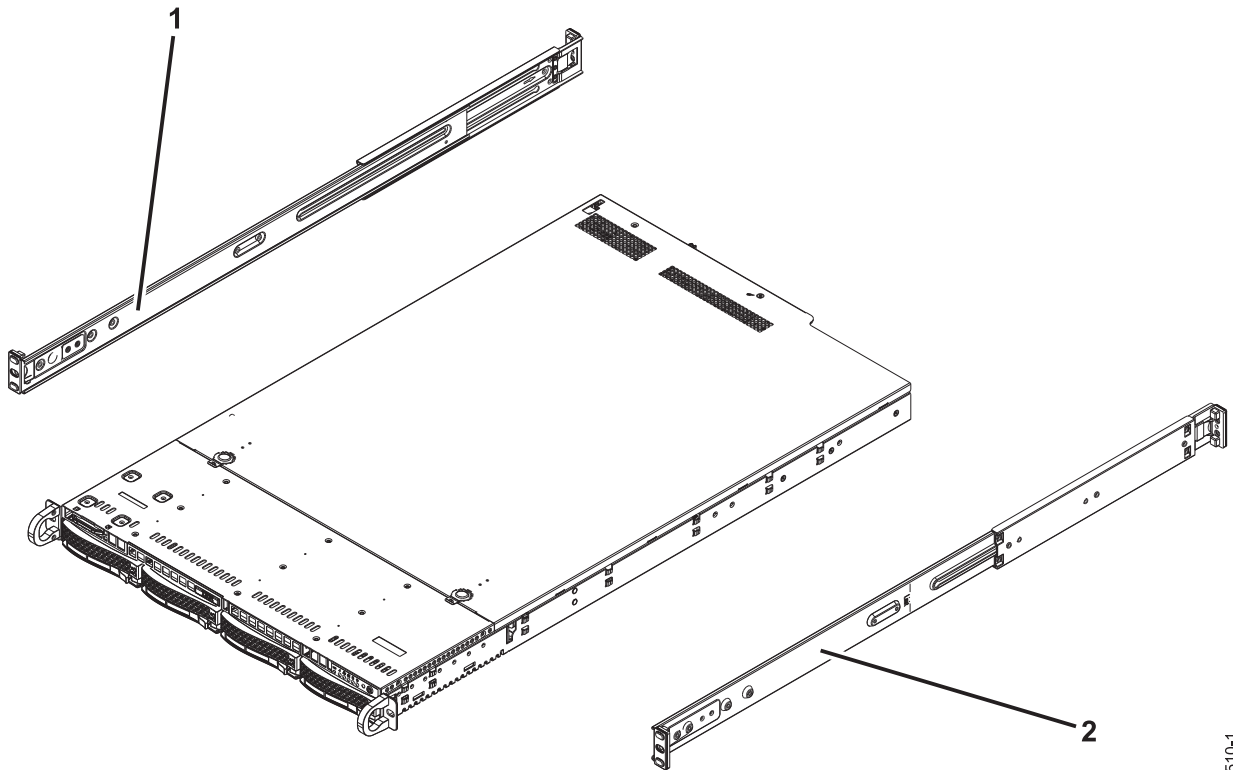
Rack final assembly

Figure 6. Rack final assembly

Table 33. Rack final assembly part numbers

Index number	Part number	Units per assembly	Description
1	MCP-290-00052-0N	1	Slide rail kit - contains left and right slide rails and attaching screws (8001-12C)
	MCP-290-00102-0N	1	Slide rail kit - contains left and right slide rails and attaching screws (8005-12N)
2	MCP-290-00052-0N	1	Slide rail kit - contains left and right slide rails and attaching screws (8001-12C)
	MCP-290-00102-0N	1	Slide rail kit - contains left and right slide rails and attaching screws (8005-12N)

System parts
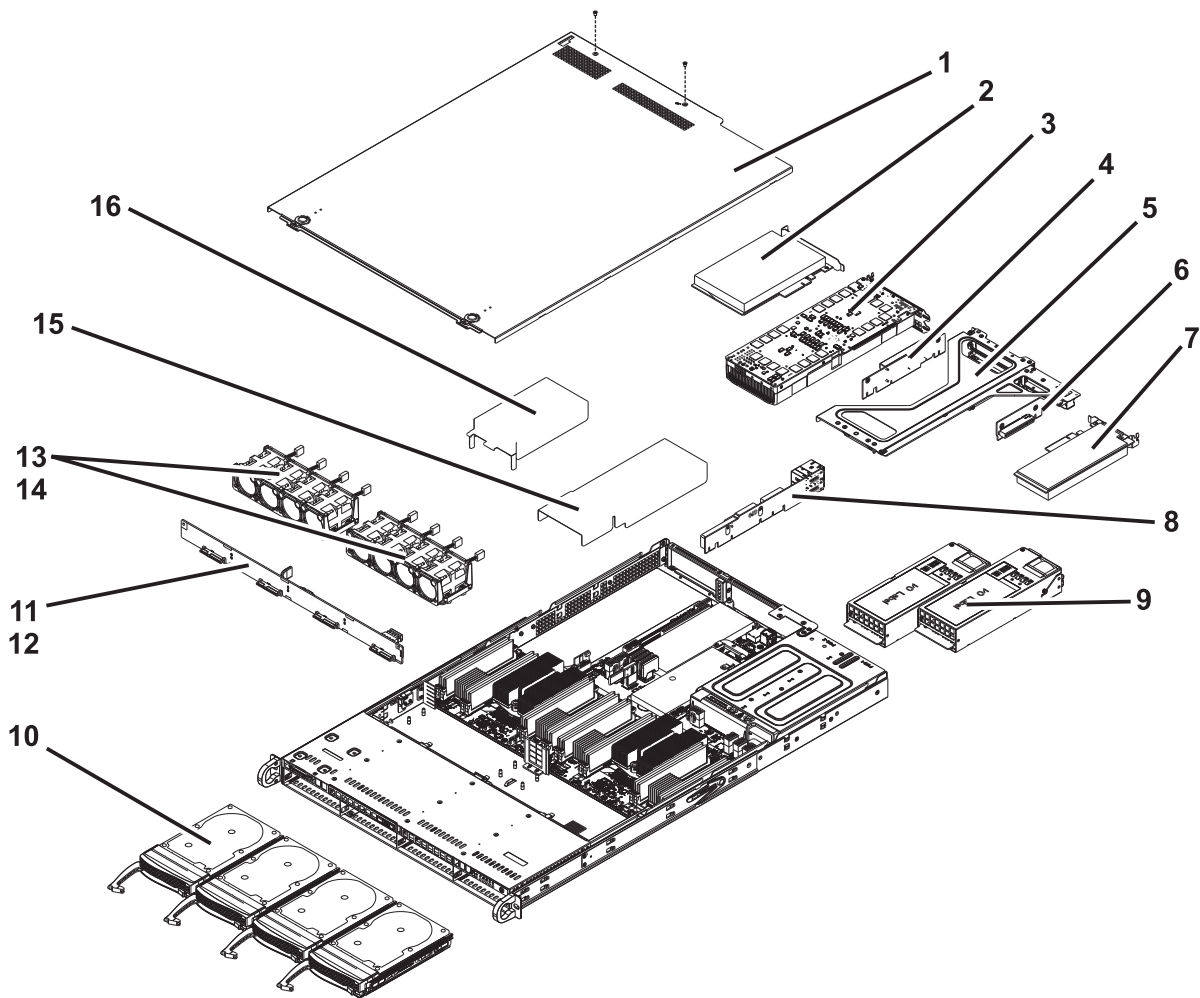
Figure 7. System parts

Table 34. System parts

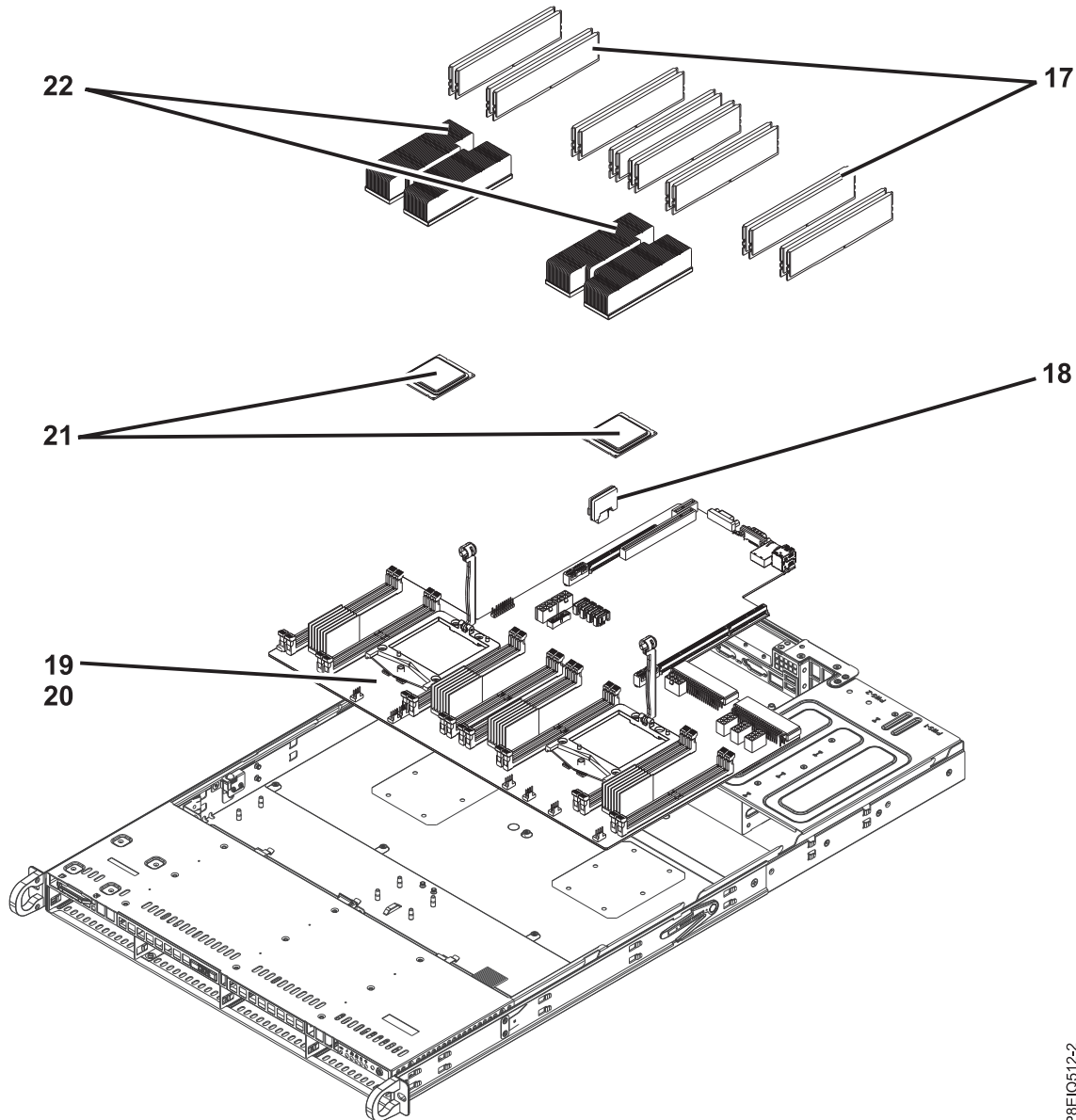| Index number	Part number	Units per assembly	Description
1		1	Top cover assembly
		2	Screws
2		2	PCIe adapters. Use the feature type of the adapter to find the FRU number in PCIe adapter information by feature type for the 8001-12C or 8005-12N.
3		1	GPU. Use the feature type of the GPU to find the FRU number in PCIe adapter information by feature type for the 8001-12C or 8005-12N. **Note:** 8005-12N systems do not support GPUs.
4	RSC-W-66P	1	PCIe riser for PCIe adapters or GPU. Use the feature type of the adapter to find the FRU number in PCIe adapter information by feature type for the 8001-12C or 8005-12N.
5		1	PCIe cage
6	RSC-R1UW-E8R	1	PCIe riser

Table 34. System parts (continued)

Index number	Part number	Units per assembly	Description
7		1	PCIe adapter. Use the feature type of the adapter to find the FRU number in PCIe adapter information by feature type for the 8001-12C or 8005-12N.
8	AOC-UR-i4XTF	1	1U UIO NIC PCIe adapter with integrated 4-port 10 GbE Base-T, Intel XL710, and CAPI **Note:** This PCIe adapter is also a PCIe riser.
9	PWS-1K02A-1R	2	Power supply (8001-12C)
9	PWS-1K62A-1R	2	Power supply (8005-12N)
10	HDD-A2000-ST2000NM003401	4	2 TB 3.5 inch SAS disk drive (8001-12C)
10	HDD-A4000-ST4000NM003401 or HDD-A4TB-HUS726040AL5210	4	4 TB 3.5 inch SAS disk drive (8001-12C)
10	HDD-A6000-ST6000NM003401	4	6 TB 3.5 inch SAS disk drive (8001-12C)
10	HDD-A8000-ST8000NM0075	4	8 TB 3.5 inch SAS disk drive (8001-12C)
10	HDD-A4000-ST4000NM0075	4	4 TB 3.5 inch self-encrypting SAS disk drive (8001-12C)
10	HDD-A8000-ST8000NM0095	4	8 TB 3.5 inch self-encrypting SAS disk drive (8001-12C)
10	HDD-T2000-ST2000NM002401	4	2 TB 3.5 inch SATA disk drive (8001-12C)
10	HDD-T4000-ST4000NM002401	4	4 TB 3.5 inch SATA disk drive (8001-12C)
10	HDD-T6000-ST6000NM002401	4	6 TB 3.5 inch SATA disk drive (8001-12C)
10	HDD-T8000-ST8000NM0055	4	8 TB 3.5 inch SATA disk drive (8001-12C)
10	HDS-KIT-2A-1920-IB001	4	1.9 TB small form factor SAS solid-state drive (1 drive write per day) (8001-12C)
10	HDS-KIT-2A-3840-IB001	4	3.8 TB small form factor SAS solid-state drive (1 drive write per day) (8001-12C)
10	HDS-KIT-2T-160-IB001	4	160 GB small form factor SATA solid-state drive (8001-12C)
10	HDS-KIT-2T-240-IB001	4	240 GB small form factor SATA solid-state drive (8001-12C)
10	HDS-KIT-2T-960-IB001	4	960 GB small form factor SATA solid-state drive (8001-12C)
10	HDS-KIT-2T-1900-IB001	4	1.9 GB small form factor SATA solid-state drive (8001-12C)
10	HDS-KIT-2T-3800-IB001	4	3.8 GB small form factor SATA solid-state drive (8001-12C)
10	HDS-KIT-3N-800-IB001	4	800 GB small form factor NVMe drive (3 drive writes per day) (8001-12C)

Table 34. System parts (continued)

Index number	Part number	Units per assembly	Description
10	HDS-KIT-3N-1200-IB001	4	1.2 TB small form factor NVMe drive (3 drive writes per day) (8001-12C)
10	HDS-KIT-3N-1600-IB001	4	1.6 TB small form factor NVMe drive (3 drive writes per day) (8001-12C)
10	HDS-KIT-3N-2000-IB001	4	2.0 TB small form factor NVMe drive (3 drive writes per day) (8001-12C)
10	HDS-KIT-5N-800-IB001	4	800 GB small form factor NVMe drive (5 drive writes per day) (8001-12C)
10	HDS-KIT-5N-3200-IB001	4	3.2 TB small form factor NVMe drive (5 drive writes per day) (8001-12C)
10	HDS-KIT-2T-480-IB001	4	480 GB 2.5 inch SATA solid-state drive (3.5 drive writes per day) (8005-12N)
10	HDS-KIT-2T-960S-IB001	4	960 GB 2.5 inch SATA solid-state drive (3.5 drive writes per day) (8005-12N)
10	HDS-KIT-2T-1920-IB001	4	1.92 TB 2.5 inch SATA solid-state drive (3.5 drive writes per day) (8005-12N)
11	BPN-SAS3-815TQ-N4	1	Disk drive backplane
12		2	Screws
13	FAN-0141L4	8	Fan
14		2	Fan holder
15	MCP-310-81909-0B	1	CPU 1 air baffle
16	MCP-310-81908-0B	1	CPU 2 air baffle

Additional system parts

Figure 8. Additional system parts

Table 35. Additional system parts

Index number	Part number	Units per assembly	Description
17	MTA9ASF51272PZ-2G3B1	16	4 GB, 2400 MHz 1RX8 DDR4 RDIMM (Micron Technology, Inc.)* (8001-12C)
17	MTA9ASF1G72PZ-2G3B1	16	8 GB, 2400 MHz 1RX8 DDR4 RDIMM (Micron Technology, Inc.)* (8001-12C)
17	MTA18ASF2G72PZ-2G3B1	16	16 GB, 2400 MHz 1RX4 DDR4 RDIMM (Micron Technology, Inc.)* (8001-12C)
17	MTA36ASF4G72PZ-2G3A1	16	32 GB, 2400 MHz 2RX4 DDR4 RDIMM (Micron Technology, Inc.)* (8001-12C)

Table 35. Additional system parts (continued)

Index number	Part number	Units per assembly	Description
17	M393A1G40DB0-CPB	16	8 GB, 2133 MHz 1RX4 DDR4 RDIMM (Samsung Electronics Co., Ltd.)* (8001-12C)
17	M393A2G40DB0-CPB	16	16 GB, 2133 MHz 2RX4 DDR4 RDIMM (Samsung Electronics Co., Ltd.)* (8001-12C)
17	M393A4K40BB0-CPB	16	32 GB, 2133 MHz 2RX4 DDR4 RDIMM (Samsung Electronics Co., Ltd.)* (8001-12C)
17	HMA41GR7AFR4N-TF	16	8 GB, 2133 MHz 1RX4 DDR4 RDIMM (SK hynix, Inc.)* (8001-12C)
17	HMA42GR7AFR4N-TF	16	16 GB, 2133 MHz 2RX4 DDR4 RDIMM (SK hynix, Inc.)* (8001-12C)
17	HMA84GR7MFR4N-TFT1	16	32 GB, 2133 MHz 2RX4 DDR4 RDIMM (SK hynix, Inc.)* (8001-12C)
17	MEM-DR480L-HL02-ER21, MEM-DR480L-SL01-ER21, or MEM-DR480L-CL03-ER24	16	8 GB, 2133 MHz 2RX4 DDR4 ISRDIMM (Super Micro Computer, Inc.)* (8005-12N)
17	MEM-DR416L-CL03-ER24, MEM-DR416L-SL01-ER21, or MEM-DR416L-HL02-ER21	16	16 GB, 2133 MHz 2RX4 DDR4 ISRDIMM (Super Micro Computer, Inc.)*
18	SSD-DM064-PHI	2	64 GB SATA drive on module (DOM) (8001-12C)
18	SSD-DM064-SMCMVN1	2	64 GB SATA drive on module (DOM) (8005-12N)
18	SSD-DM128-SMCMVN1	2	128 GB SATA drive on module (DOM) (8001-12C)
19	MBD-P8DTU-1U-IB001, MCP-74Y4912-IB001, and MCP-01AF132-IB001	1	System backplane kit (includes system backplane, tray, and vacuum pen) **Note:** You must order all three part numbers to receive all of the kit contents.
20		14	Screws
21	CPU-KIT-00E4887-IB001	2	8 core 2.328 GHz system processor module kit (includes system processor, tray, and vacuum pen) (8001-12C)
	CPU-KIT-01EM061-IB001	2	10 core 2.095 GHz system processor module kit (includes system processor, tray, and vacuum pen)
22	SNK-P0052P-IB001	2	Heat sink kit (includes heat sink and thermal interface material)

*All of the memory in a 8001-12C system must be the same size and from the same supplier. The 8001-12C system does not support mixing different sizes of memory or mixing memory from different suppliers. All of the memory in a 8005-12N system must be the same size and from the same supplier. The 8005-12N system does not support mixing different sizes of memory or mixing memory from different suppliers.

Miscellaneous parts

Table 36. Miscellaneous parts

Description	Part number
Rail adapter kit for round hole racks	MCP-290-91904-0N (8005-12N)

Finding parts and locations

Locate physical part locations and identify parts with system diagrams.

Locate the FRU

Use the graphics and tables to locate the field-replaceable unit (FRU) and identify the FRU part number.

8001-22C or 8005-22N locations

Use this information to find the location of a FRU in the system unit.

Rack views

The following diagrams show field-replaceable unit (FRU) layouts in the system. Use these diagrams with the following tables.
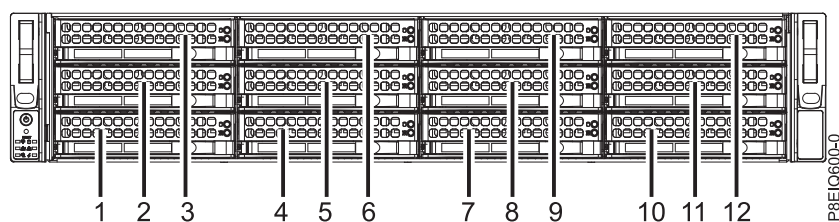

Figure 9. Front view

Table 37. Front view locations

Index number	FRU description	FRU removal and replacement procedures
1	HDD 0	See Removing and replacing a storage drive in the 8001-22C or 8005-22N.
2	HDD 1	See Removing and replacing a storage drive in the 8001-22C or 8005-22N.
3	HDD 2	See Removing and replacing a storage drive in the 8001-22C or 8005-22N.
4	HDD 3	See Removing and replacing a storage drive in the 8001-22C or 8005-22N.
5	HDD 4	See Removing and replacing a storage drive in the 8001-22C or 8005-22N.
6	HDD 5	See Removing and replacing a storage drive in the 8001-22C or 8005-22N.

Table 37. Front view locations (continued)

Index number	FRU description	FRU removal and replacement procedures
7	HDD 6	See Removing and replacing a storage drive in the 8001-22C or 8005-22N.
8	HDD 7	See Removing and replacing a storage drive in the 8001-22C or 8005-22N.
9	HDD 8 or NVMe 0*	See Removing and replacing a storage drive in the 8001-22C or 8005-22N.
10	HDD 9 or NVMe 1*	See Removing and replacing a storage drive in the 8001-22C or 8005-22N.
11	HDD 10 or NVMe 2*	See Removing and replacing a storage drive in the 8001-22C or 8005-22N.
12	HDD 11 or NVMe 3*	See Removing and replacing a storage drive in the 8001-22C or 8005-22N.

*For more information about the placement of HDD and NVMe FRUs in 8001-22C systems, see Drive installation information for the 8001-22C system.

*8005-22N systems do not support hard disk drives in this location. 8005-22N systems do not support NVMe drives.
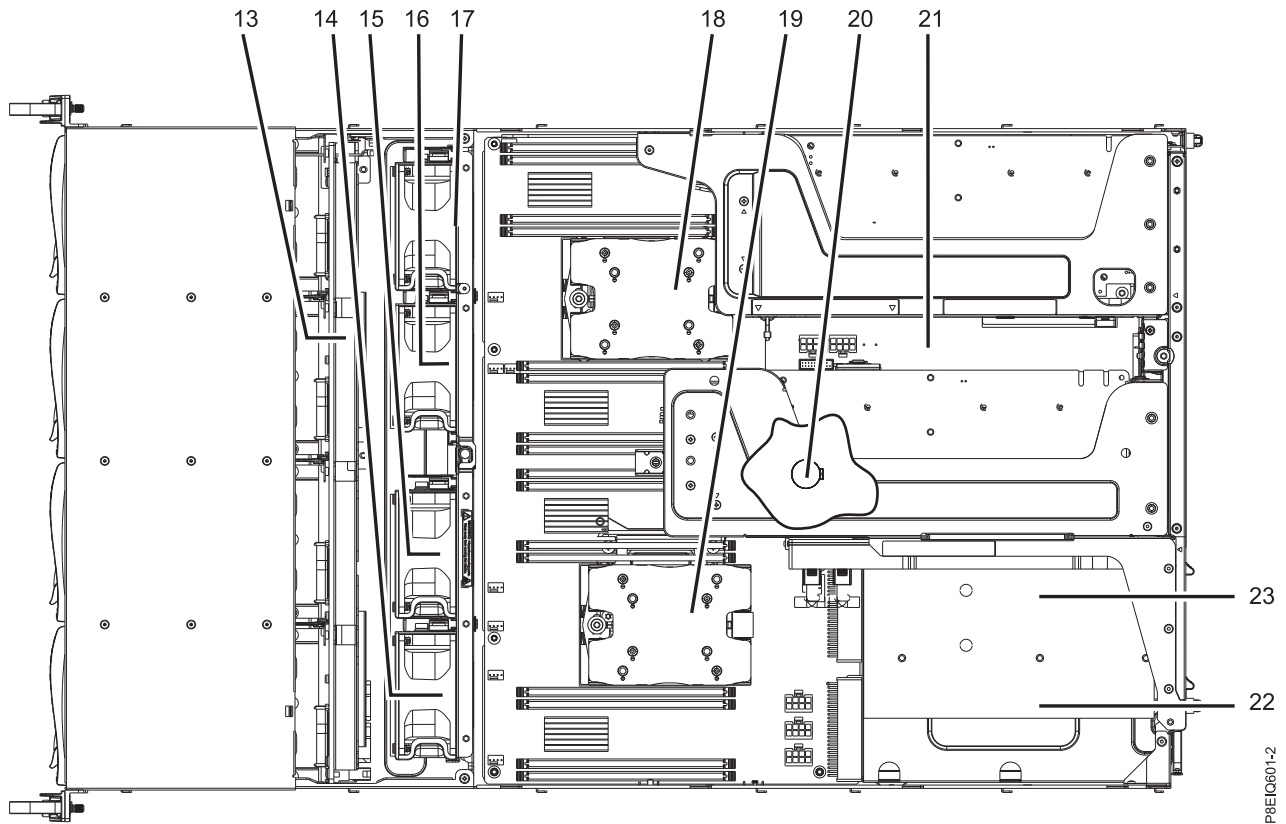
Figure 10. Top view

Table 38. Top view locations

Index number	FRU description	FRU removal and replacement procedures
13	Disk drive backplane	See Removing and replacing the disk drive backplane in the 8001-22C or 8005-22N.
14	Fan 2	See Removing and replacing fans in the 8001-22C or 8005-22N.
15	Fan 3	See Removing and replacing fans in the 8001-22C or 8005-22N.
16	Fan 6	See Removing and replacing fans in the 8001-22C or 8005-22N.
17	Fan 7	See Removing and replacing fans in the 8001-22C or 8005-22N.
18	CPU 2	See Removing and replacing a system processor module for the 8001-22C or 8005-22N.
19	CPU 1	See Removing and replacing a system processor module for the 8001-22C or 8005-22N.
20	Time-of-day battery	See Removing and replacing the time-of-day battery in the 8001-22C or 8005-22N.

Table 38. Top view locations (continued)

Index number	FRU description	FRU removal and replacement procedures
21	System backplane	See Removing and replacing the system backplane in the 8001-22C or 8005-22N.
22	PSU 1	See Removing and replacing a power supply in the 8001-12C, 8001-22C, 8005-12N, or 8005-22N.
23	PSU 2	See Removing and replacing a power supply in the 8001-12C, 8001-22C, 8005-12N, or 8005-22N.

Figure 11. Rear view

Table 39. Rear view locations

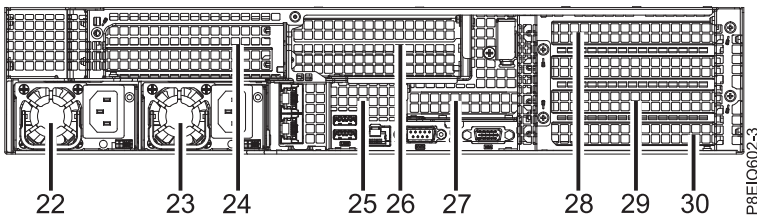| Index number	FRU description	FRU removal and replacement procedures
22	PSU 1	See Removing and replacing a power supply in the 8001-12C, 8001-22C, 8005-12N, or 8005-22N.
23	PSU 2	See Removing and replacing a power supply in the 8001-12C, 8001-22C, 8005-12N, or 8005-22N.
24	PCIe adapter 2 (UIO Slot2) **Note:** This location is reserved for the super capacitor card when a host bus adapter is present.	See Removing and replacing PCIe adapters in the 8001-22C or 8005-22N.
25	PCIe adapter 1 (UIO Network)	See Removing and replacing PCIe adapters in the 8001-22C or 8005-22N.
26	PCIe adapter 3 or GPU 1 (UIO Slot1)	For PCIe adapters, see Removing and replacing PCIe adapters in the 8001-22C or 8005-22N. For the graphics processing unit, see Removing and replacing a graphics processing unit in the 8001-22C. **Note:** 8005-22N systems do not support GPUs.
27	PCIe adapter 4 (PLX Slot1)	See Removing and replacing PCIe adapters in the 8001-22C or 8005-22N.

Table 39. Rear view locations (continued)

Index number	FRU description	FRU removal and replacement procedures
28	PCIe adapter 5 or GPU 2 (WIO Slot1)	For PCIe adapters, see Removing and replacing PCIe adapters in the 8001-22C or 8005-22N. For the graphics processing unit, see Removing and replacing a graphics processing unit in the 8001-22C. **Note:** 8005-22N systems do not support GPUs.
29	PCIe adapter 6 (WIO Slot2)	See Removing and replacing PCIe adapters in the 8001-22C or 8005-22N.
30	PCIe adapter 7 (WIO Slot3)	See Removing and replacing PCIe adapters in the 8001-22C or 8005-22N.

Memory locations

The following diagram shows memory DIMMs and their corresponding field-replaceable unit (FRU) layouts in the system. Use this diagram with the following table.
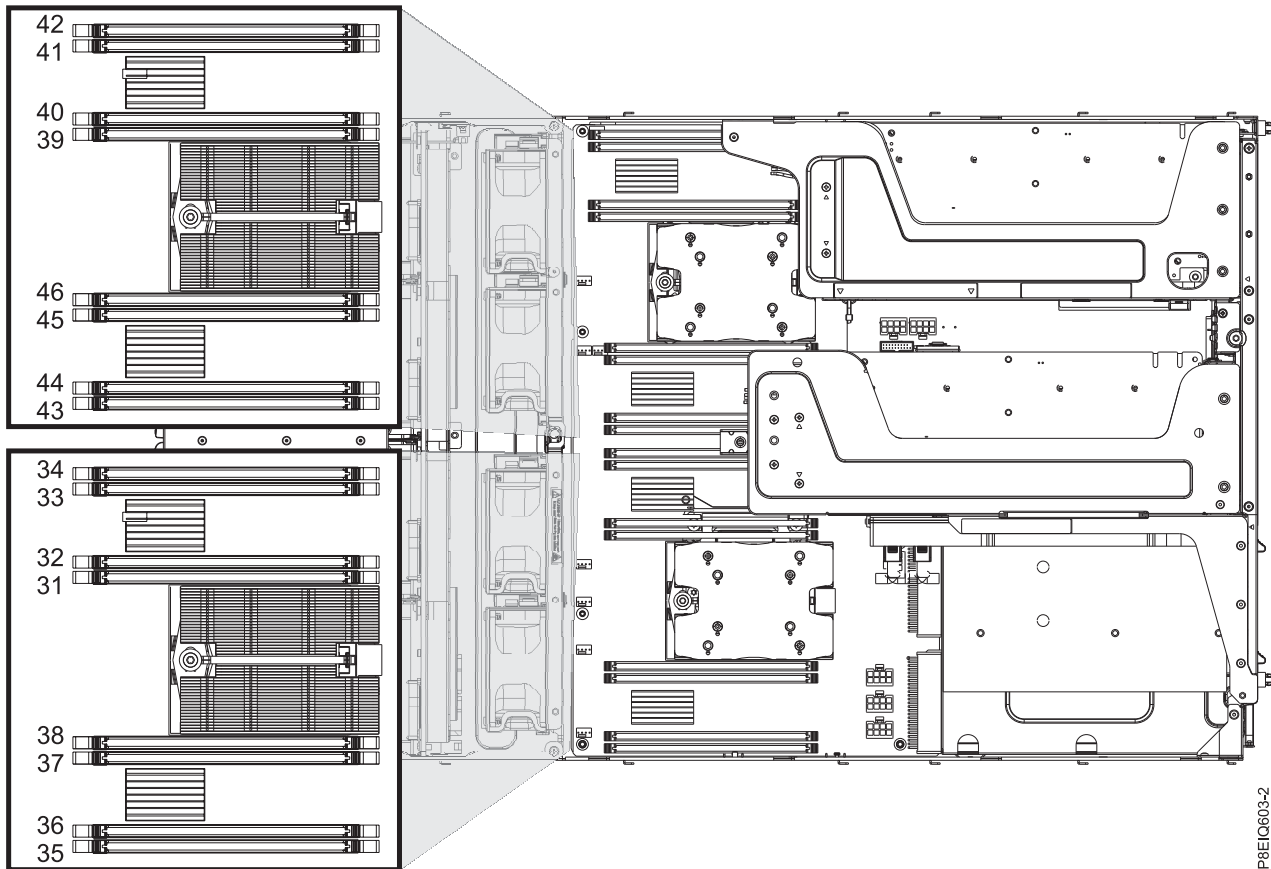

Figure 12. Memory locations

The following table provides the memory locations.

Table 40. Memory locations

Index number	FRU description	FRU removal and replacement procedures
31	P1M1-DIMMA	See Removing and replacing memory in the 8001-22C or 8005-22N.
32	P1M1-DIMMB	See Removing and replacing memory in the 8001-22C or 8005-22N.
33	P1M1-DIMMC	See Removing and replacing memory in the 8001-22C or 8005-22N.
34	P1M1-DIMMD	See Removing and replacing memory in the 8001-22C or 8005-22N.
35	P1M2-DIMMA	See Removing and replacing memory in the 8001-22C or 8005-22N.
36	P1M2-DIMMB	See Removing and replacing memory in the 8001-22C or 8005-22N.
37	P1M2-DIMMC	See Removing and replacing memory in the 8001-22C or 8005-22N.
38	P1M2-DIMMD	See Removing and replacing memory in the 8001-22C or 8005-22N.
39	P2M1-DIMMA	See Removing and replacing memory in the 8001-22C or 8005-22N.
40	P2M1-DIMMB	See Removing and replacing memory in the 8001-22C or 8005-22N.
41	P2M1-DIMMC	See Removing and replacing memory in the 8001-22C or 8005-22N.
42	P2M1-DIMMD	See Removing and replacing memory in the 8001-22C or 8005-22N.
43	P2M2-DIMMA	See Removing and replacing memory in the 8001-22C or 8005-22N.
44	P2M2-DIMMB	See Removing and replacing memory in the 8001-22C or 8005-22N.
45	P2M2-DIMMC	See Removing and replacing memory in the 8001-22C or 8005-22N.
46	P2M2-DIMMD	See Removing and replacing memory in the 8001-22C or 8005-22N.

Drive on module (DOM) locations

The following diagram shows drive on module (DOM)s and their corresponding field-replaceable unit (FRU) layouts in the system. Use this diagram with the following table.
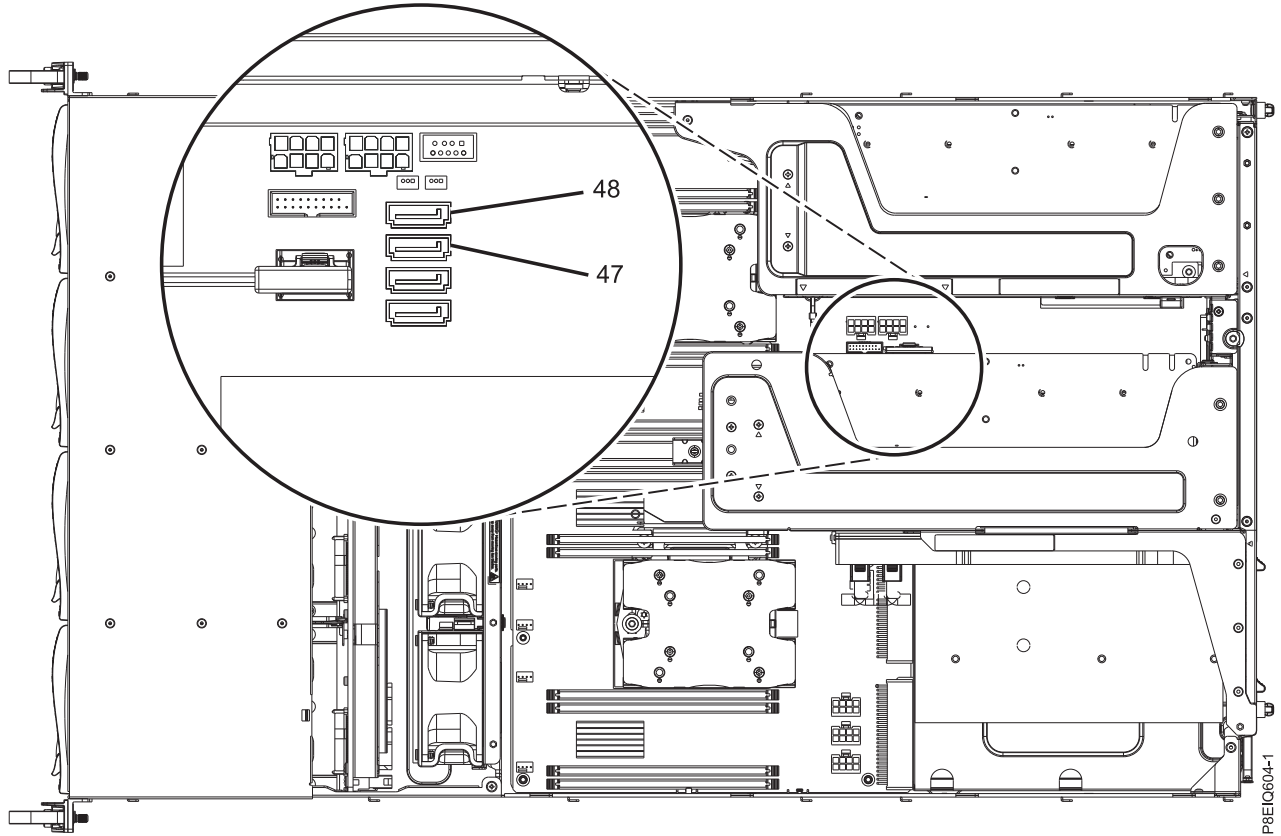
Figure 13. Drive on module (DOM) locations

The following table provides the drive on module (DOM) locations.

Table 41. Drive on module (DOM) locations

Index number	FRU description	FRU removal and replacement procedures
47	Drive on module (DOM) 0	See Removing and replacing a storage drive in the 8001-22C or 8005-22N.
48	Drive on module (DOM) 1	See Removing and replacing a storage drive in the 8001-22C or 8005-22N.

8001-22C or 8005-22N parts

Use this information to find the field-replaceable unit (FRU) part number.

After you identify the part number of the part that you want to order, go to Advanced Part Exchange Warranty Service. Registration is required. If you are not able to identify the part number, go to Contacting IBM service and support.
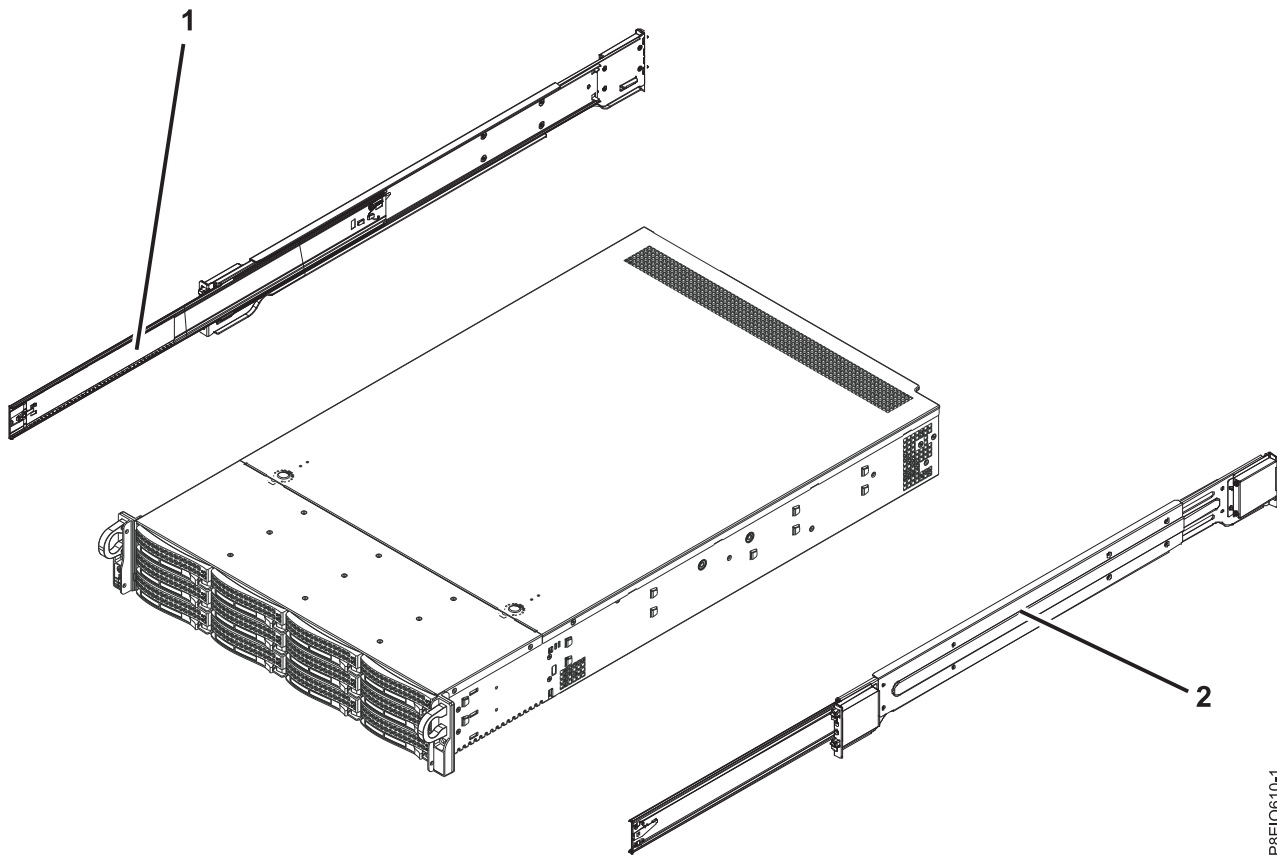
Rack final assembly

Figure 14. Rack final assembly

Table 42. Rack final assembly part numbers

Index number	Part number	Units per assembly	Description
1	MCP-290-00057-0N	1	Slide rail kit - contains left and right slide rails and attaching screws
2	MCP-290-00057-0N	1	Slide rail kit - contains left and right slide rails and attaching screws

System parts
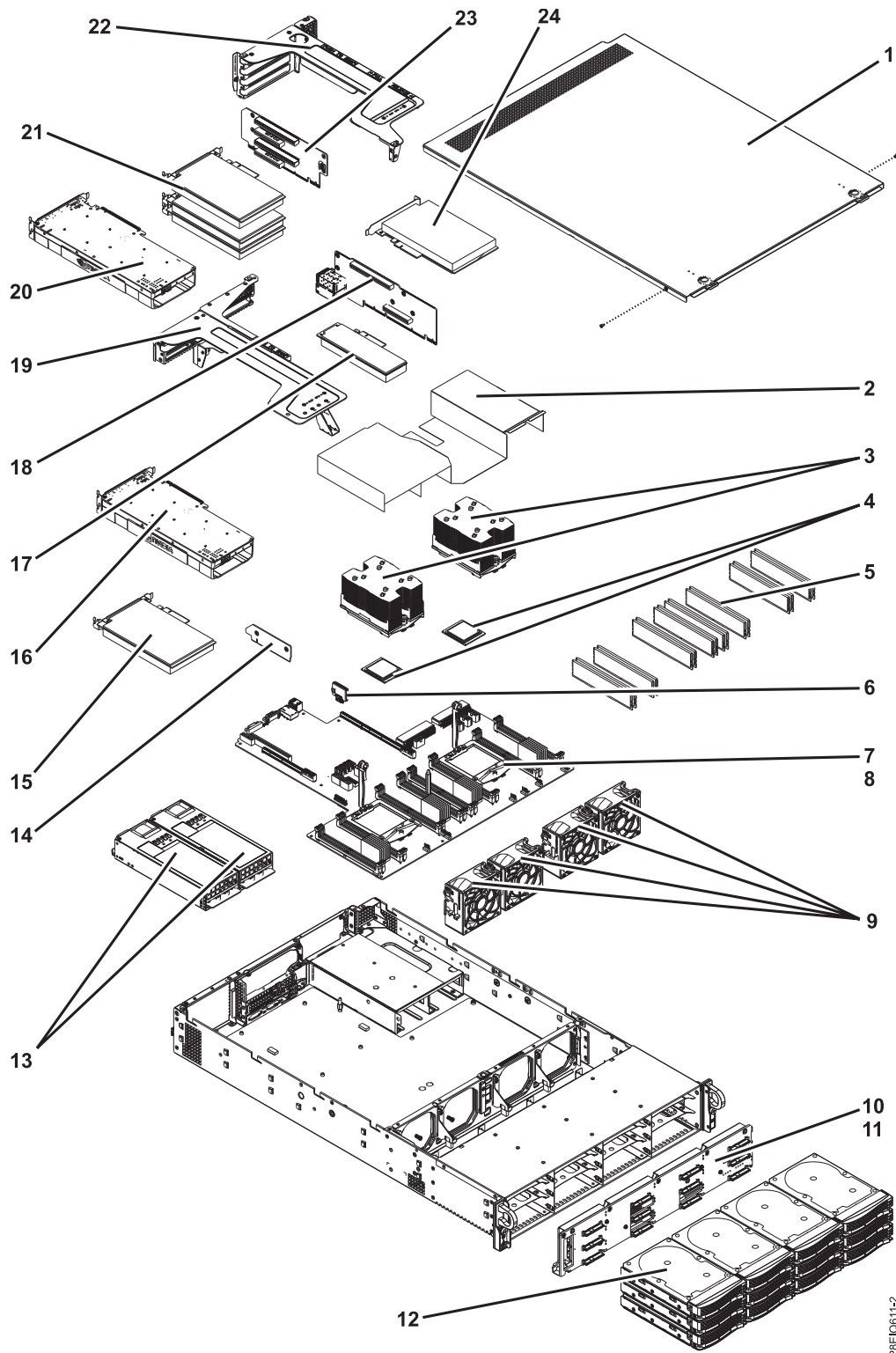
Figure 15. System parts

Table 43. System parts

Index number	Part number	Units per assembly	Description
1		1	Top cover assembly
		2	Screws
2	MCP-310-82914-0B	1	CPU air baffle (8001-22C)
2	MCP-310-82908-0B	1	CPU air baffle (8005-22N)
3	SNK-P0053P-IB001	2	Heat sink kit (includes heat sink and thermal interface material)
4	CPU-KIT-01EM062-IB001	2	8 core 3.325 GHz system processor module kit (includes system processor, tray, and vacuum pen) (8001-22C)
	CPU-KIT-01EM063-IB001	2	10 core 2.926 GHz system processor module kit (includes system processor, tray, and vacuum pen) (8001-22C)
	PP8-MP00UL010-11C, MCP-74Y4912-IB001, and MCP-01AF132-IB001	2	11 core 2.893 GHz system processor module kit (includes system processor, tray, and vacuum pen) **Note:** You must order all three part numbers to receive all of the kit contents.
5	MTA9ASF51272PZ-2G3B1	16	4 GB, 2400 MHz 1RX8 DDR4 RDIMM (Micron Technology, Inc.)* (8001-22C)
5	MTA9ASF1G72PZ-2G3B1	16	8 GB, 2400 MHz 1RX8 DDR4 RDIMM (Micron Technology, Inc.)* (8001-22C)
5	MTA18ASF2G72PZ-2G3B1	16	16 GB, 2400 MHz 1RX4 DDR4 RDIMM (Micron Technology, Inc.)* (8001-22C)
5	MTA36ASF4G72PZ-2G3A1	16	32 GB, 2400 MHz 2RX4 DDR4 RDIMM (Micron Technology, Inc.)* (8001-22C)
5	M393A1G40DB0-CPB	16	8 GB, 2133 MHz 1RX4 DDR4 RDIMM (Samsung Electronics Co., Ltd.)* (8001-22C)
5	M393A2G40DB0-CPB	16	16 GB, 2133 MHz 2RX4 DDR4 RDIMM (Samsung Electronics Co., Ltd.)* (8001-22C)
5	M393A4K40BB0-CPB	16	32 GB, 2133 MHz 2RX4 DDR4 RDIMM (Samsung Electronics Co., Ltd.)* (8001-22C)
5	HMA41GR7AFR4N-TF	16	8 GB, 2133 MHz 1RX4 DDR4 RDIMM (SK hynix, Inc.)* (8001-22C)
5	HMA42GR7AFR4N-TF	16	16 GB, 2133 MHz 2RX4 DDR4 RDIMM (SK hynix, Inc.)* (8001-22C)
5	HMA84GR7MFR4N-TFT1	16	32 GB, 2133 MHz 2RX4 DDR4 RDIMM (SK hynix, Inc.)* (8001-22C)
5	MEM-DR416L-CL03-ER24, MEM-DR416L-SL01-ER21, or MEM-DR416L-HL02-ER21	16	16 GB, 2133 MHz 2RX4 DDR4 ISRDIMM (Super Micro Computer, Inc.)*
5	MEM-DR432L-SL01-ER21, MEM-DR432L-CL01-ER24, MEM-DR432L-HL01-ER21	16	32 GB, 2133 MHz 2RX4 DDR4 ISRDIMM (Super Micro Computer, Inc.)*

Table 43. System parts (continued)

Index number	Part number	Units per assembly	Description
6	SSD-DM064-PHI	2	64 GB SATA drive on module (DOM) (8001-22C)
6	SSD-DM064-SMCMVN1	2	64 GB SATA drive on module (DOM) (8005-22N)
6	SSD-DM128-SMCMVN1	2	128 GB SATA drive on module (DOM) (8001-22C)
7	MBD-P8DTU-2U-IB001, MCP-74Y4912-IB001, and MCP-01AF132-IB001	1	System backplane kit (includes system backplane, tray, and vacuum pen) **Note:** You must order all three part numbers to receive all of the kit contents.
8		10	Screws
9	FAN-0166L4	4	Fan
10	BPN-SAS3-826A	1	Disk drive backplane (supports 12 SAS or SATA drives)
	BPN-SAS3-826EL1-N4	1	Disk drive backplane (supports 8 SAS or SATA drives and 4 SAS, SATA, or NVMe drives) (8001-22C)
11		7	Screws
12	HDD-A2000-ST2000NM003401	12	2 TB 3.5 inch SAS disk drive (8001-22C)
12	HDD-A4000-ST4000NM003401 or HDD-A4TB-HUS726040AL5210	12	4 TB 3.5 inch SAS disk drive (8001-22C)
12	HDD-A6000-ST6000NM003401	12	6 TB 3.5 inch SAS disk drive (8001-22C)
12	HDD-A8000-ST8000NM0075	12	8 TB 3.5 inch SAS disk drive (8001-22C)
12	HDD-A4000-ST4000NM0075	12	4 TB 3.5 inch self-encrypting SAS disk drive (8001-22C)
12	HDD-A8000-ST8000NM0095	12	8 TB 3.5 inch self-encrypting SAS disk drive (8001-22C)
12	HDD-T2000-ST2000NM002401	12	2 TB 3.5 inch SATA disk drive (8001-22C)
12	HDD-T4000-ST4000NM002401	12	4 TB 3.5 inch SATA disk drive (8001-22C)
12	HDD-T6000-ST6000NM002401	12	6 TB 3.5 inch SATA disk drive (8001-22C)
12	HDD-T8000-ST8000NM0055	12	8 TB 3.5 inch SATA disk drive (8001-22C)
12	HDS-KIT-2A-1920-IB001	12	1.9 TB small form factor SAS solid-state drive (1 drive write per day) (8001-22C)
12	HDS-KIT-2A-3840-IB001	12	3.8 TB small form factor SAS solid-state drive (1 drive write per day) (8001-22C)
12	HDS-KIT-2T-160-IB001	12	160 GB 2.5 inch small form factor SATA solid-state drive (8001-22C)
12	HDS-KIT-2T-240-IB001	12	240 GB 2.5 inch small form factor SATA solid-state drive (8001-22C)

Table 43. System parts (continued)

Index number	Part number	Units per assembly	Description
12	HDS-KIT-2T-960-IB001	12	960 GB 2.5 inch small form factor SATA solid-state drive (8001-22C)
12	HDS-KIT-2T-1900-IB001	12	1.9 TB 2.5 inch small form factor SATA solid-state drive (8001-22C)
12	HDS-KIT-2T-3800-IB001	12	3.8 TB 2.5 inch small form factor SATA solid-state drive (8001-22C)
12	HDS-KIT-3N-800-IB001	4	800 GB 2.5 inch small form factor NVMe drive (3 drive writes per day) (8001-22C)
12	HDS-KIT-3N-1200-IB001	4	1.2 TB 2.5 inch small form factor NVMe drive (3 drive writes per day) (8001-22C)
12	HDS-KIT-3N-1600-IB001	4	1.6 TB 2.5 inch small form factor NVMe drive (3 drive writes per day) (8001-22C)
12	HDS-KIT-3N-2000-IB001	4	2.0 TB 2.5 inch small form factor NVMe drive (3 drive writes per day) (8001-22C)
12	HDS-KIT-5N-800-IB001	4	800 GB 2.5 inch small form factor NVMe drive (5 drive writes per day) (8001-22C)
12	HDS-KIT-5N-3200-IB001	4	3.2 TB 2.5 inch small form factor NVMe drive (5 drive writes per day) (8001-22C)
12	HDS-KIT-2T-480-IB001	4	480 GB 2.5 inch SATA solid-state drive (3.5 drive writes per day) (8005-22N)
12	HDS-KIT-2T-960S-IB001	4	960 GB 2.5 inch SATA solid-state drive (3.5 drive writes per day) (8005-22N)
12	HDS-KIT-2T-1920-IB001	4	1.92 TB 2.5 inch SATA solid-state drive (3.5 drive writes per day) (8005-22N)
13	PWS-1K62A-1R	2	Power supply
14	RSC-R1UW-E8R	1	PCIe riser for PCIe adapter 3 (PLX Slot1)
15		1	PCI adapter. Use the feature type of the adapter to find the FRU number in PCIe adapter information by feature type for the 8001-22C or 8005-22N.
16		1	GPU. Use the feature type of the GPU to find the FRU number in PCIe adapter information by feature type for the 8001-22C or 8005-22N. **Note:** 8005-22N systems do not support GPUs.
17		1	PCI adapter. Use the feature type of the adapter to find the FRU number in PCIe adapter information by feature type for the 8001-22C or 8005-22N. **Note:** 8005-22N systems do not support this PCIe adapter.
18	AOC-2UR66-i4XTF	1	2U UIO NIC PCIe adapter with integrated 4-port 10 GbE Base-T, Intel XL710, and CAPI **Note:** This PCIe adapter is also a PCIe riser.
19		1	PCIe cage
20		1	GPU. Use the feature type of the GPU to find the FRU number in PCIe adapter information by feature type for the 8001-22C or 8005-22N. **Note:** 8005-22N systems do not support GPUs.

Table 43. System parts (continued)

Index number	Part number	Units per assembly	Description
21		3	PCIe adapters. Use the feature type of the adapter to find the FRU number in PCIe adapter information by feature type for the 8001-22C or 8005-22N. **Note:** 8005-22N systems do not support this PCIe adapter.
22		1	PCIe riser
23	RSC-W2-688P	1	PCIe riser PCIe adapter 4 or GPU 2 (WIO Slot1), PCIe adapter 5 (WIO Slot2), and PCIe adapter 6 (WIO Slot3) **Note:** 8005-22N systems do not support GPUs.
24		1	PCI adapter. Use the feature type of the adapter to find the FRU number in PCIe adapter information by feature type for the 8001-22C or 8005-22N.

*All of the memory in a 8001-22C system must be the same size and from the same supplier. The 8001-22C system does not support mixing different sizes of memory or mixing memory from different suppliers. All of the memory in a 8005-22N system must be the same size and from the same supplier. The 8005-22N system does not support mixing different sizes of memory or mixing memory from different suppliers.

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Accessibility features assist users who have a disability, such as restricted mobility or limited vision, to use information technology content successfully.

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The IBM Power Systems servers include the following major accessibility features:
- Keyboard-only operation
- Operations that use a screen reader

The IBM Power Systems servers use the latest W3C Standard, WAI-ARIA 1.0 (www.w3.org/TR/wai-aria/), to ensure compliance with US Section 508 (www.access-board.gov/guidelines-and-standards/ communications-and-it/about-the-section-508-standards/section-508-standards) and Web Content Accessibility Guidelines (WCAG) 2.0 (www.w3.org/TR/WCAG20/). To take advantage of accessibility features, use the latest release of your screen reader and the latest web browser that is supported by the IBM Power Systems servers.

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Keyboard navigation

This product uses standard navigation keys.

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The IBM Power Systems servers user interfaces do not have content that flashes 2 - 55 times per second.

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CAN ICES-3 (A)/NMB-3(A)

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European Community contact:
IBM Deutschland GmbH
Technical Regulations, Abteilung M456
IBM-Allee 1, 71139 Ehningen, Germany
Tel: +49 800 225 5426
email: halloibm@de.ibm.com

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Japan Electronics and Information Technology Industries Association Statement

This statement explains the Japan JIS C 61000-3-2 product wattage compliance.

（一社）電子情報技術産業協会　高調波電流抑制対策実施
要領に基づく定格入力電力値：　Knowledgeの各製品の
仕様ページ参照

This statement explains the Japan Electronics and Information Technology Industries Association (JEITA) statement for products less than or equal to 20 A per phase.

高調波電流規格　JIS C 61000-3-2 適合品

This statement explains the JEITA statement for products greater than 20 A, single phase.

高調波電流規格　JIS C 61000-3-2 準用品

本装置は、「高圧又は特別高圧で受電する需要家の高調波抑制対策ガイドライン」対象機器（高調波発生機器）です。
・回路分類　：6（単相、ＰＦＣ回路付）
・換算係数　：0

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・換算係数　：0

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声　明
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在这种情况下，可能需要用户对其
干扰采取切实可行的措施。

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種情況下，使用者會被要
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Deutschsprachiger EU Hinweis: Hinweis für Geräte der Klasse A EU-Richtlinie zur Elektromagnetischen Verträglichkeit

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2014/30/EU zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaatenund hält die Grenzwerte der EN 55022 / EN 55032 Klasse A ein.

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EN 55022 / EN 55032 Klasse A Geräte müssen mit folgendem Warnhinweis versehen werden: "Warnung: Dieses ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funk-Störungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen zu ergreifen und dafür aufzukommen."

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 2014/30/EU in der Bundesrepublik Deutschland.

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) (bzw. der EMC Richtlinie 2014/30/EU) für Geräte der Klasse A

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:
International Business Machines Corp.
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Armonk, New York 10504
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IBM Deutschland GmbH
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IBM-Allee 1, 71139 Ehningen, Germany
Tel: +49 (0) 800 225 5426
email: HalloIBM@de.ibm.com

Generelle Informationen:

Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 / EN 55032 Klasse A.

Electromagnetic Interference (EMI) Statement - Russia

ВНИМАНИЕ! Настоящее изделие относится к классу А.
В жилых помещениях оно может создавать
радиопомехи, для снижения которых необходимы
дополнительные меры

Class B Notices

The following Class B statements apply to features designated as electromagnetic compatibility (EMC) Class B in the feature installation information.

Federal Communications Commission (FCC) Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

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

CAN ICES-3 (B)/NMB-3(B)

European Community Compliance Statement

This product is in conformity with the protection requirements of EU Council Directive 2014/30/EU 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.

European Community contact:
IBM Deutschland GmbH
Technical Regulations, Abteilung M456
IBM-Allee 1, 71139 Ehningen, Germany
Tel: +49 800 225 5426
email: halloibm@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

Japan Electronics and Information Technology Industries Association Statement

This statement explains the Japan JIS C 61000-3-2 product wattage compliance.

（一社）電子情報技術産業協会 高調波電流抑制対策実施
要領に基づく定格入力電力値： Knowledge Centerの各製品の
仕様ページ参照

This statement explains the Japan Electronics and Information Technology Industries Association (JEITA) statement for products less than or equal to 20 A per phase.

高調波電流規格 JIS C 61000-3-2 適合品

This statement explains the JEITA statement for products greater than 20 A, single phase.

高調波電流規格 JIS C 61000-3-2 準用品

本装置は、 「高圧又は特別高圧で受電する需要家の高調波抑制対
策ガイドライン」 対象機器（高調波発生機器）です。
・回路分類 ：6 （単相、ＰＦＣ回路付）
・換算係数 ：0

This statement explains the JEITA statement for products greater than 20 A per phase, three-phase.

高調波電流規格　JIS C 61000-3-2 準用品

本装置は、「高圧又は特別高圧で受電する需要家の高調波抑制対策ガイドライン」対象機器（高調波発生機器）です。
・回路分類　：５（３相、ＰＦＣ回路付）
・換算係数　：０

IBM Taiwan Contact Information

台灣IBM 產品服務聯絡方式：
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台北市松仁路7號3樓
電話：0800-016-888

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 2014/30/EU zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaatenund hält die Grenzwerte der EN 55022/ EN 55032 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 2014/30/EU in der Bundesrepublik Deutschland.

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) (bzw. der EMC Richtlinie 2014/30/EU) 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:
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 Relations Europe, Abteilung M456
IBM-Allee 1, 71139 Ehningen, Germany
Tel: +49 (0) 800 225 5426
email: HalloIBM@de.ibm.com

Generelle Informationen:

Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022/ EN 55032 Klasse B.

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