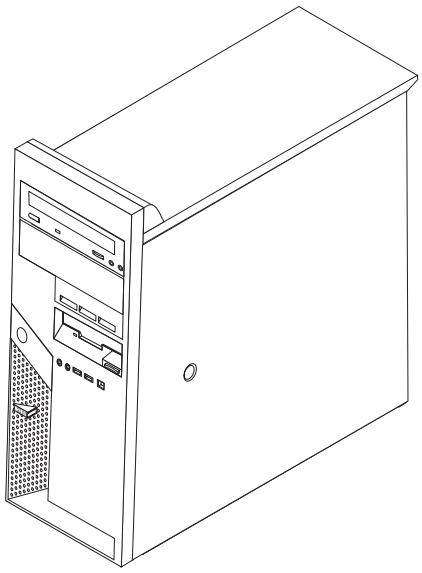
ThinkCentre™

IBM

Hardware Replacement Guide
Types 9212 9213



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Hardware Replacement Guide
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Second Edition (March 2005)

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Overview

This guide is intended to be used by customers who are replacing Customer Replaceable Units (CRUs) as well as trained service personnel who are replacing Field Replaceable Units (FRUs). In this guide, CRUs and FRUs will often be referred to as parts.

This guide does not include procedures for all parts. It is expected that cables, switches, and certain mechanical parts can be replaced by trained service personnel without the need for step-by-step procedures.

Note: Use only the parts provided by IBM.

This guide contains procedures for replacing the following parts:
- Power supply
- System board
- Microprocessor
- Memory modules
- PCI adapter
- Hard disk drive
- Optical drive
- Diskette drive
- Keyboard
- Mouse
- Internal speaker

Safety information for replacing CRUs

Do not open your computer or attempt any repair before reading the "Important safety information" in the *Quick Reference* that was included with your computer. If you no longer have this copy of the Quick Reference, you can obtain one online from the World Wide Web at http://www.ibm.com/pc/support/.

Safety information for replacing FRUs

Do not attempt any repair before reading the "Important safety information" in the *Hardware Maintenance Manual* (HMM) for the computer. You can find the HMM on the World Wide Web at http://www.ibm.com/pc/support/.

Additional information resources

If you have Internet access, the most up-to-date information for your computer is available from the World Wide Web.

You can find the following information:
- CRU removal and installation instructions
- Publications
- Troubleshooting information
- Parts information
- Downloads and drivers
- Links to other useful sources of information

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To access this information, point your browser to http://www.ibm.com/pc/support/.

Tools required

To replace some parts in your computer, you might need a flat-blade or Phillips screwdriver. Additional tools might be needed for certain parts.

Handling static-sensitive devices

Static electricity, although harmless to you, can seriously damage computer components.

When you are replacing a part, do *not* open the static-protective package containing the new part until the defective part has been removed from the computer and you are ready to install the new part.

When you handle parts and other computer components, take these precautions to avoid static-electricity damage:

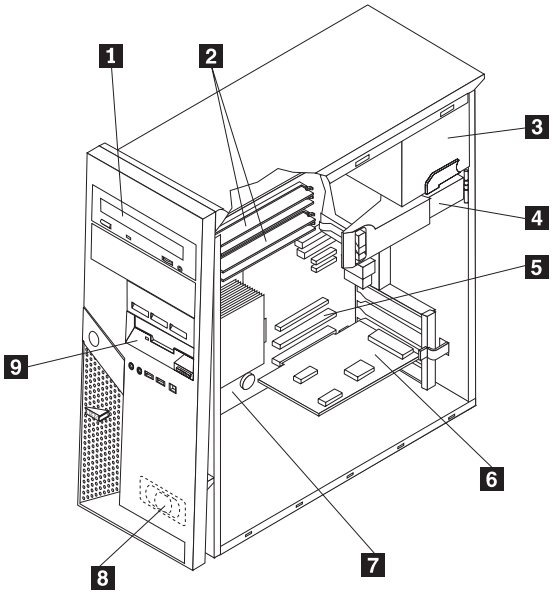
- Limit your movement. Movement can cause static-electricity to build up around you.
- Always handle parts and other computer components carefully. Handle adapters, memory modules, system boards, and microprocessors by the edges. Never touch any exposed circuitry.
- Prevent others from touching the parts and other computer components.
- Before you replace a new part, touch the static-protective package containing the part to a metal expansion-slot cover or other unpainted metal surface on the computer for at least two seconds. This reduces static electricity in the package and your body.
- When possible, remove the new part from the static-protective packaging, and install it directly in the computer without setting the part down. When this is not possible, place the static-protective package that the part came in on a smooth, level surface and place the part on it.
- Do not place the part on the computer cover or other metal surface.

Chapter 1. Locations

This chapter provides illustrations to help locate the various connectors, controls and components of the computer. To remove the cover, see “Removing the cover” on page 5.

Locating components

The following illustration will help you locate the various components in your computer.



1 Optical drive
2 Memory modules
3 Power supply
4 Hard disk drive
5 PCI adapter connector
6 Optional PCI adapter
7 System board
8 Internal speaker
9 Diskette drive

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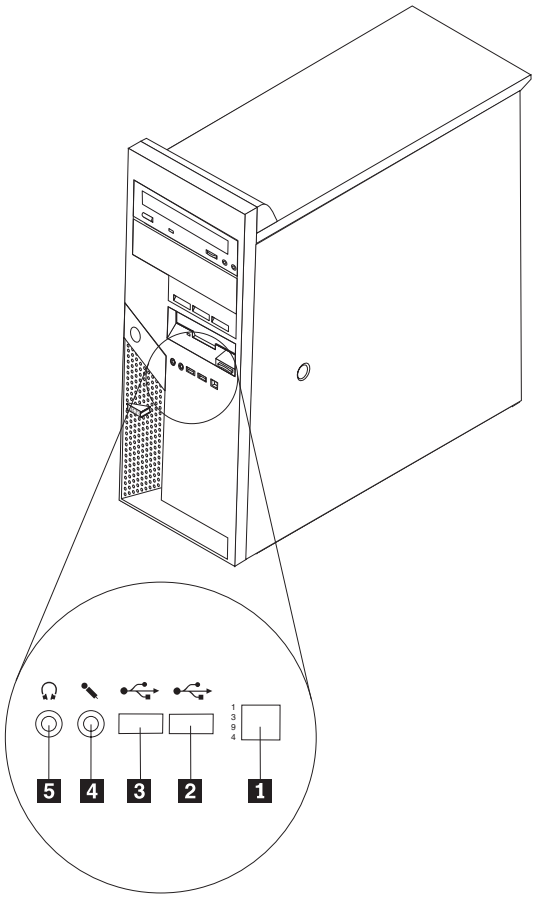
Locating connectors on the front of the computer

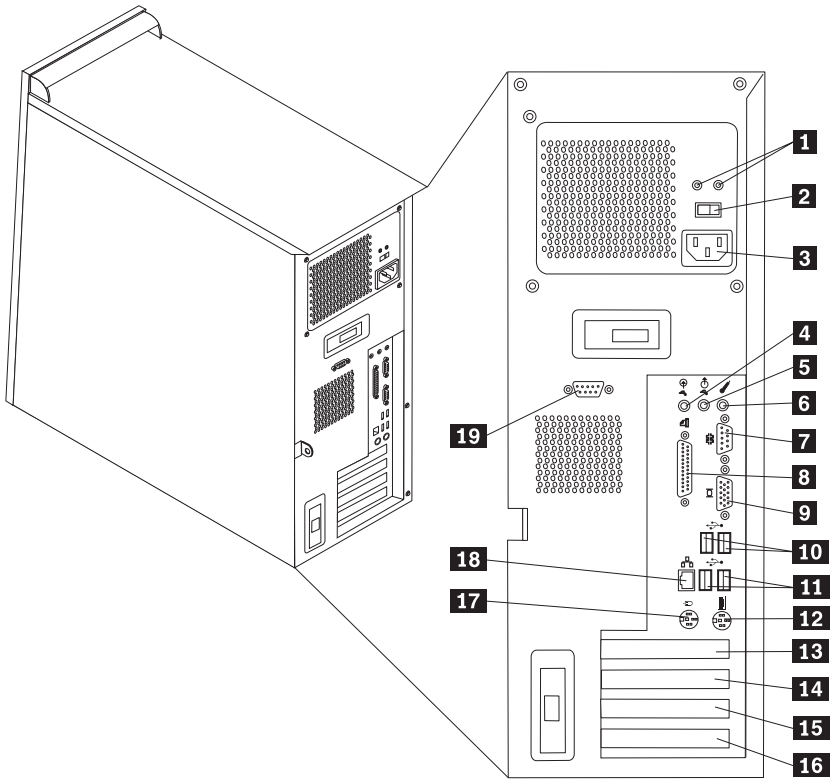
This section shows the various external connectors on the computer to which you can attach external devices.



1	IEEE 1394 connector	4	Microphone connector
2	USB connector	5	Headphone connector
3	USB connector		

Locating connectors on the rear of the computer

The following illustration shows the location of connectors on the rear of the computer.

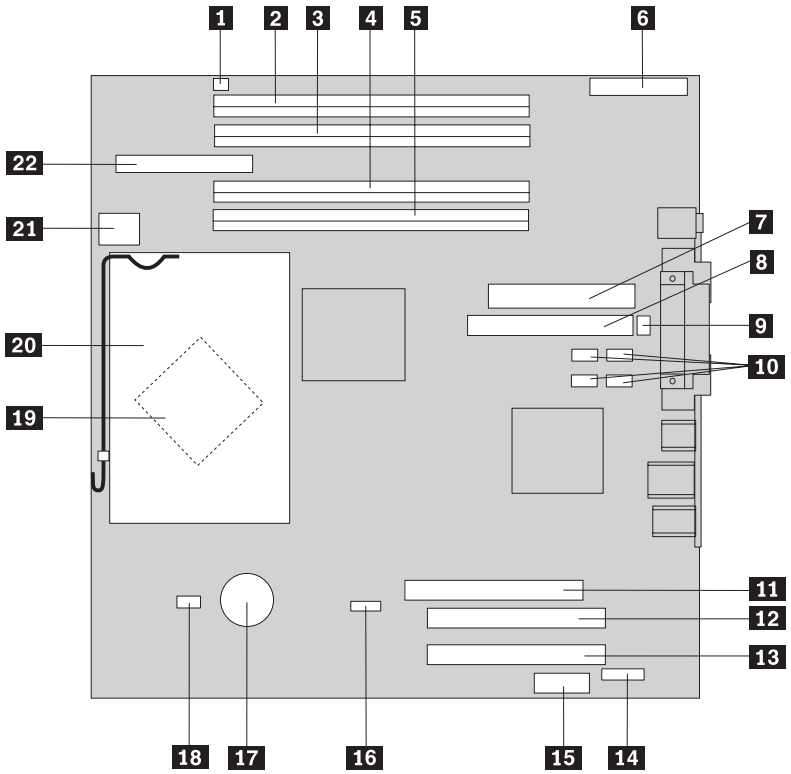


1	Power supply diagnostic LEDs	11	USB connectors (2)
2	Voltage selection switch	12	Standard keyboard connector
3	Power connector	13	PCI Express x16 adapter connector (some models)
4	Audio line in connector	14	PCI adapter connector
5	Audio line out connector	15	PCI adapter connector
6	Microphone connector	16	PCI Express x1 adapter connector
7	Serial connector (COM 1)	17	Standard mouse connector
8	Parallel connector	18	Ethernet connector
9	VGA monitor connector	19	Serial connector (COM 2) (some models)
10	USB connectors (2)		

Identifying parts on the system board

The system board (sometimes called the *planar* or *motherboard*) is the main circuit board in your computer. It provides basic computer functions and supports a variety of devices.

The following illustration shows the locations of parts on the system board.



1	Speaker connector	12	PCI adapter connector
2	Memory connector 4	13	PCI adapter connector
3	Memory connector 3	14	Serial connector (COM 2)
4	Memory connector 2	15	PCI Express x1 adapter connector
5	Memory connector 1	16	Clear CMOS/Recovery jumper
6	Front Panel connector	17	Battery
7	Power supply connector	18	Microprocessor fan connector
8	PATA IDE connector	19	Microprocessor
9	System fan connector	20	Microprocessor heat sink
10	SATA IDE connectors (4)	21	12V power connector
11	PCI Express x16 adapter connector	22	Diskette drive connector

Chapter 2. Replacing hardware

Attention:

Do not open your computer or attempt any repair before reading the "Important safety information" in the *Quick Reference* that was included with your computer or in the *Hardware Maintenance Manual* (HMM) for the computer. To obtain copies of the *Quick Reference* or *HMM*, go to http://www.ibm.com/pc/support/.

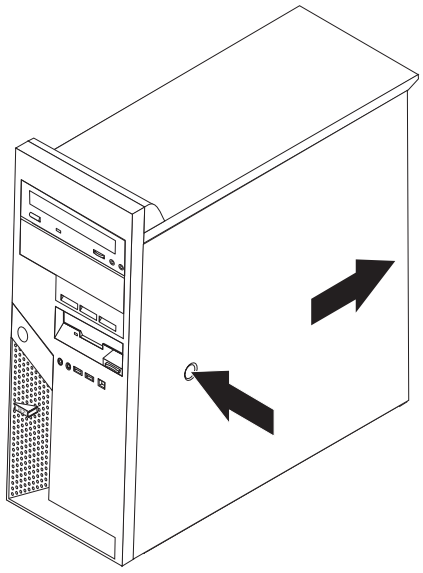
Note: Use only the parts provided by IBM.

Removing the cover

Important

Turn off the computer and wait 3 to 5 minutes to let the computer cool before removing the computer cover.

1. Remove any media (diskettes, CDs, or tapes) from the drives, shut down your operating system, and turn off all attached devices.
2. Unplug all power cords from electrical outlets.
3. Disconnect all cables attached to the computer. This includes power cords, input/output (I/O) cables, and any other cables that are connected to the computer. See "Locating connectors on the front of the computer" on page 2 and "Locating connectors on the rear of the computer" on page 3.
4. Remove any locking devices such as a padlock or Kensington lock that secure the computer cover.
5. Press the cover-release button on the right side cover, slide the cover to the rear, and remove.



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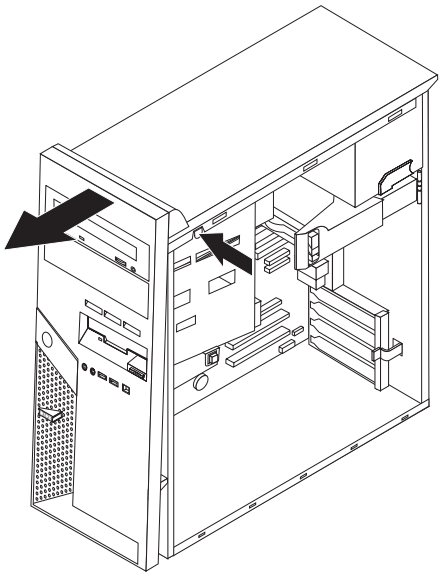
To replace the cover, go to “Completing the parts replacement” on page 31.

Removing and replacing the front bezel

1. Remove the computer cover. See “Removing the cover” on page 5.
2. To release the front bezel from the chassis, press the blue button at the top of the chassis and pull the bezel outward as shown.



3. To install the bezel, align the tabs on the bottom of the bezel with the corresponding holes in the chassis. Pivot the bezel until it snaps into position at the top of the chassis.
4. Go to “Completing the parts replacement” on page 31

Replacing the power supply

Attention:

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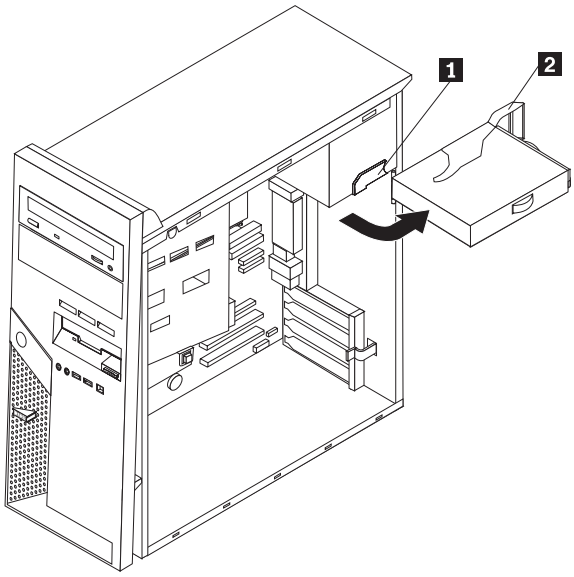
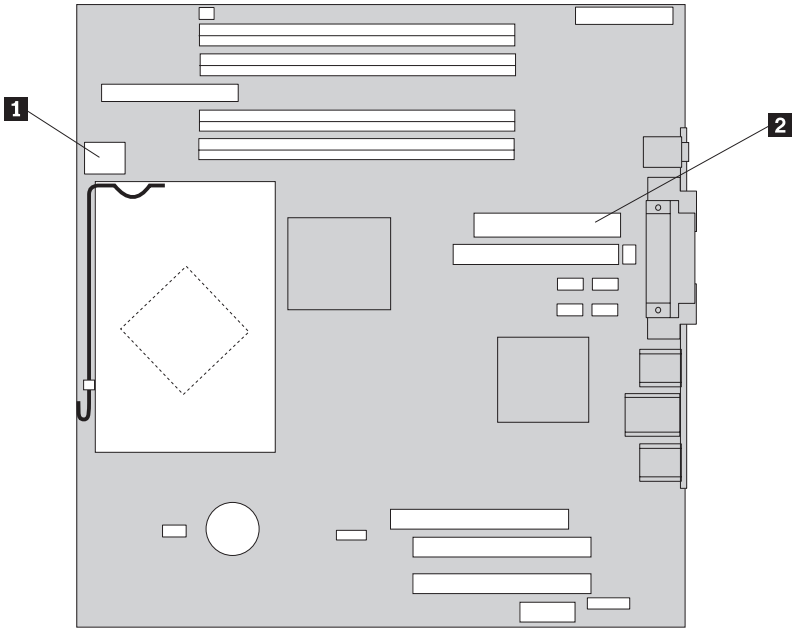
This procedure requires a flat-blade screwdriver.

1. Remove the computer cover. See “Removing the cover” on page 5.
2. Disconnect the power supply connectors at each of the drives.

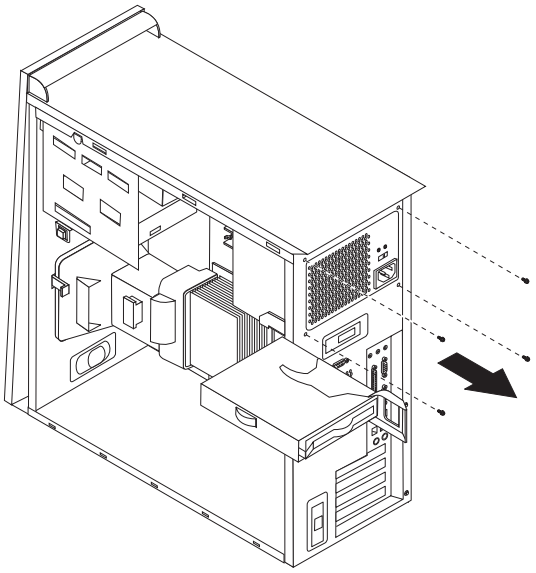
3. Push the blue release lever **1** to the left and pull the blue handle **2** outward. Pivot the hard disk drive outward to the fully open position as shown.



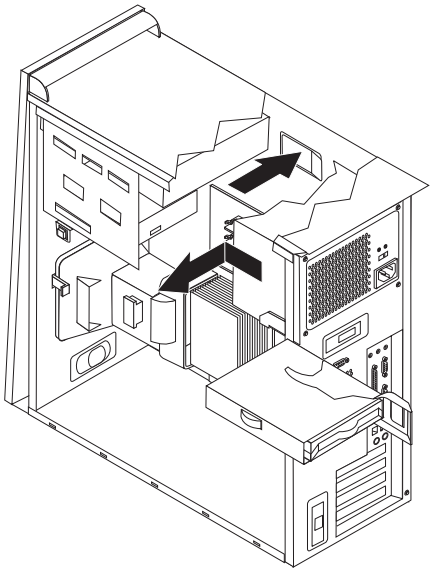
4. Disconnect the power supply cables **1** and **2** connected to the system board.



5. Remove the four screws at the rear of the chassis that secure the power supply.



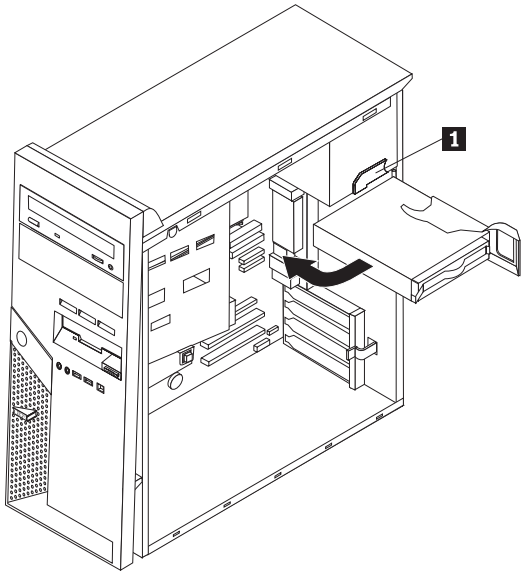
6. Press inward on the metal retainer inside the chassis and remove the power supply from the computer.



7. Install the new power supply into the chassis so that the screw holes in the power supply align with those in the chassis.

   Note: Use only the screws provided.
8. Install and tighten the four screws at the rear of the chassis that secure the power supply.
9. Reconnect the power supply connectors to the system board. For additional information, see "Identifying parts on the system board" on page 4.
10. Reconnect the power supply connectors to each of the drives.

11. Push the blue lever **1** and pivot the hard disk drive inward until it is latched into position.



12. Go to “Completing the parts replacement” on page 31.

Replacing the system board assembly

Attention:

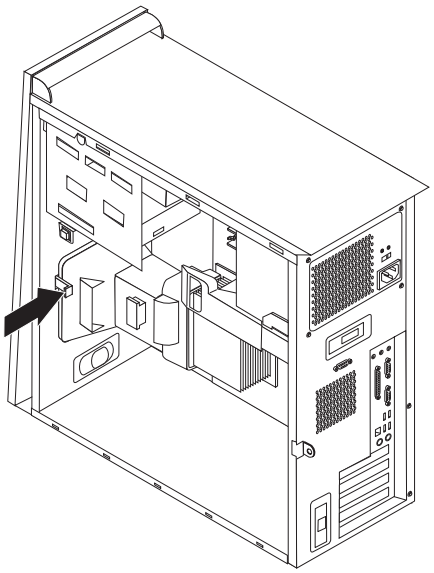
Do not open your computer or attempt any repair before reading the "Important safety information" in the *Quick Reference* that was included with your computer or in the *Hardware Maintenance Manual* (HMM) for the computer. To obtain copies of the *Quick Reference* or *HMM*, go to http://www.ibm.com/pc/support/.

1. Remove the computer cover. See "Removing the cover" on page 5.
2. Lay the computer on its side to make it easier to access the system board.
3. Carefully note the location of all cable connections on the system board. It will be necessary to reconnect them correctly after you install the new system board assembly. See "Identifying parts on the system board" on page 4 to locate the cables.

Important

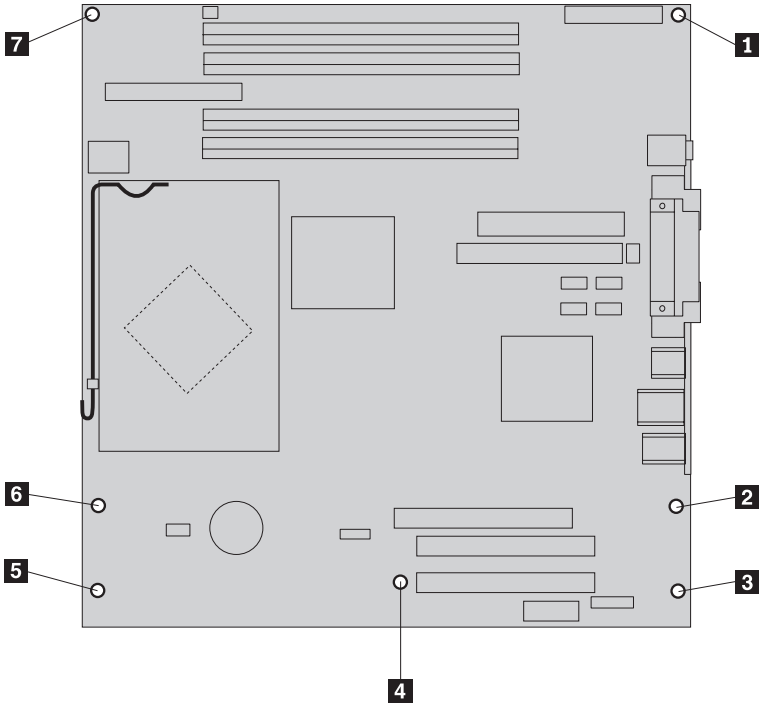
Note the cable routing. It is important to route the cables the same way after you install the new system board.

4. Disconnect all cables connected to the system board.
5. Remove the air baffle by pressing on the tab and pulling the air baffle up.



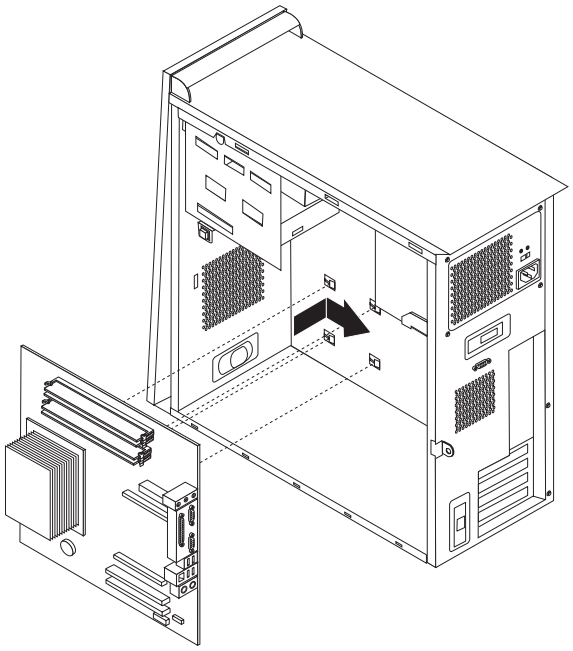
6. Remove any PCI adapter cards. See "Replacing a PCI adapter" on page 20.

7. Remove the screws 1 through 7.



8. Slide the system board toward the front of the computer to disengage it from the mounting tabs and lift it out.
9. Place the defective system board next to the new system board on a clean, flat surface.
10. Remove all memory modules from the defective system board, and install them in the same connector on the new system board. See "Replacing a memory module" on page 19. Return here after installing the memory modules.
11. Remove the heat sink and microprocessor from the defective system board, and install it on the new system board. Perform steps 5 on page 14 through step 14 on page 18. Return here after installing the microprocessor.

12. Install the new system board assembly into the computer chassis by aligning the four slots in the metal plate on the bottom of the system board with the tabs in the chassis.



Important

Make sure to correctly align the metal plate on the bottom of the system board with the tabs in the chassis. Otherwise, the system board might be damaged when you install the screws.

13. Align the seven screw holes, and install the screws.
14. Reinstall all adapter cards. See "Replacing a PCI adapter" on page 20.
15. Route the fan cable through the notch on the side of the air baffle. Then, reinstall the air baffle by aligning the tabs with the holes in the chassis, and press the air baffle down until it is secure.
16. Reconnect all cables that were disconnected from the system board. Make sure all cables are routed correctly. See "Identifying parts on the system board" on page 4 for cable locations.
17. Go to "Completing the parts replacement" on page 31.

Replacing the microprocessor

Attention:

Do not open your computer or attempt any repair before reading the "Important safety information" in the *Quick Reference* that was included with your computer or in the *Hardware Maintenance Manual* (HMM) for the computer. To obtain copies of the *Quick Reference* or *HMM*, go to http://www.ibm.com/pc/support/.

Important

Leave your computer turned off for at least one hour before removing the microprocessor to allow the thermal interface between the microprocessor and the heat sink time to cool down.

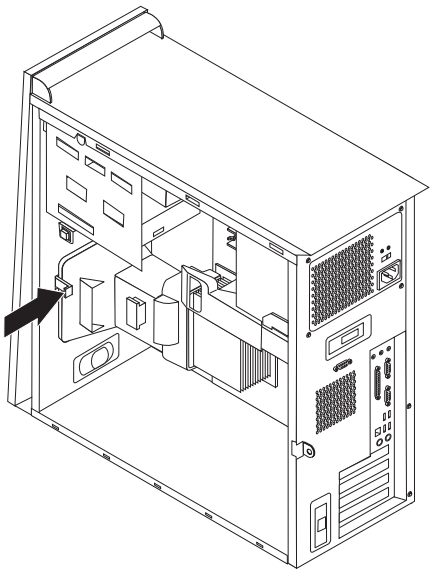
Important

When you receive a new microprocessor, you will also receive a new heat sink and vacuum pen. You must use the new heat sink with the new microprocessor. If you use the old heat sink with the new microprocessor, your computer might overheat causing intermittent problems.

Important

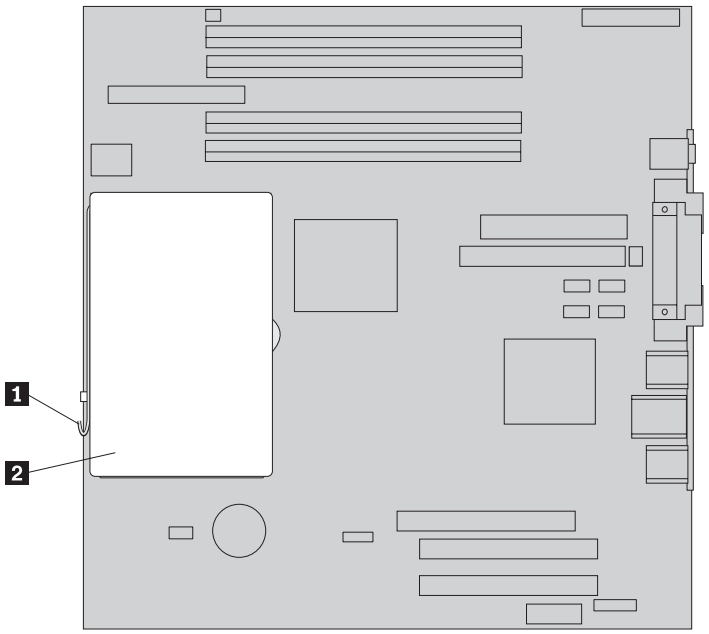
Avoid handling the microprocessor with your hands, and avoid contact with the microprocessor contacts. Use the vacuum pen provided to remove and install the microprocessor. If you must touch the microprocessor, touch only the sides.

1. Remove the computer cover. See "Removing the cover" on page 5.
2. Lay the computer on its side.
3. Remove the air baffle by pressing on the tab and pulling the air baffle up.



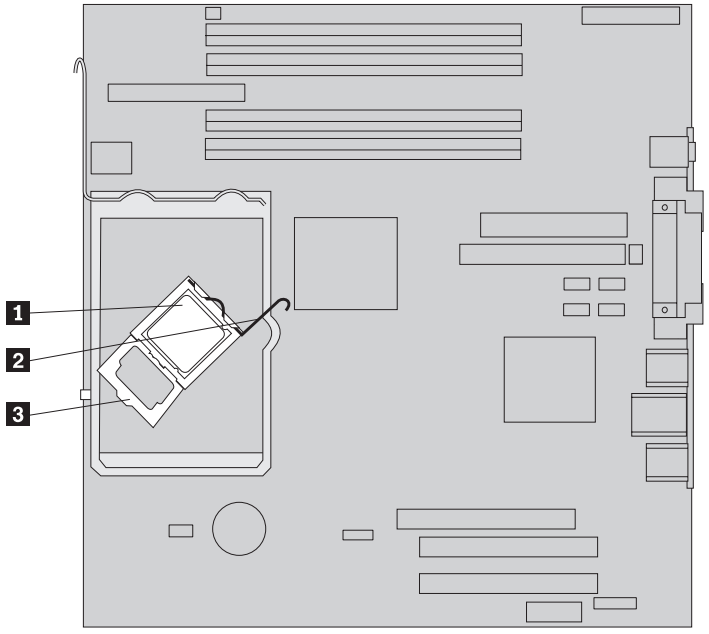
4. Disconnect the fan cable from the system board. Note the cable connector location on the system board.

5. Pivot lever **1** securing the heat sink until it is fully in the up position. Remove the heat sink **2** from the system board by carefully lifting it up and off the system board.



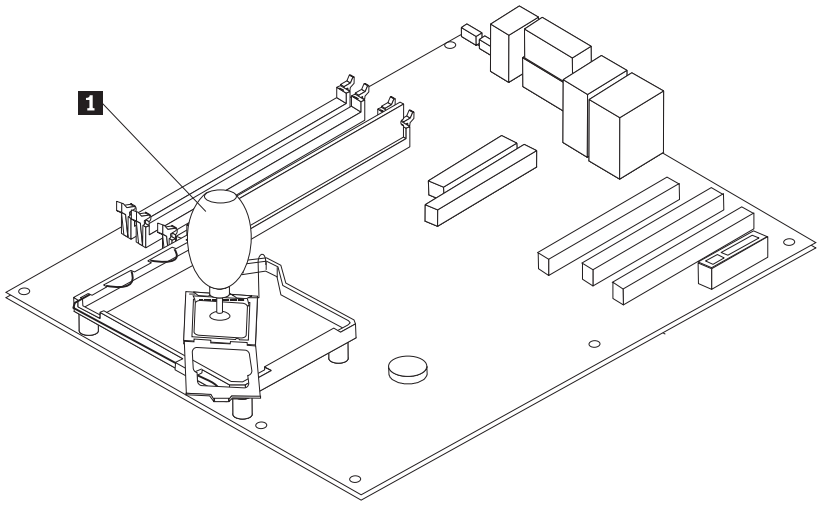
Note: If you are replacing a defective system board you must reinstall the same heat sink. Carefully place the heat sink on its side on a clean, flat surface so the thermal material on the bottom of the heat sink does not touch the surface and become contaminated.

6. Release the locking lever **2** that secures the microprocessor **1**, then pivot the microprocessor retainer **3** until it is fully open.



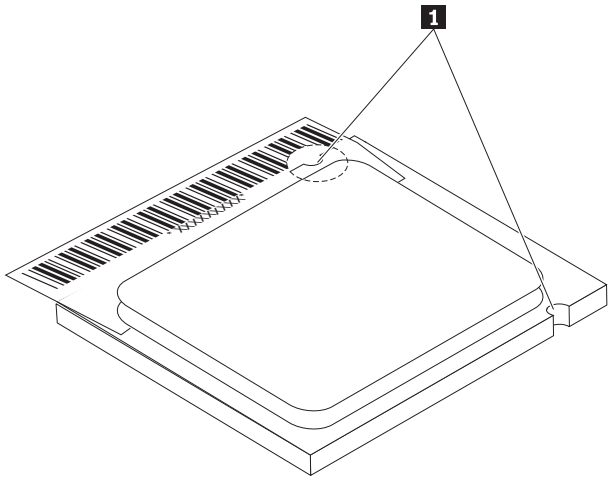
7. Using the vacuum pen **1**, remove the microprocessor from the system board socket by lifting it straight up and out of the socket.

> **Important**
> Do not touch the gold contacts on the bottom of the microprocessor. If you must touch the microprocessor, touch only the sides.



Notes:

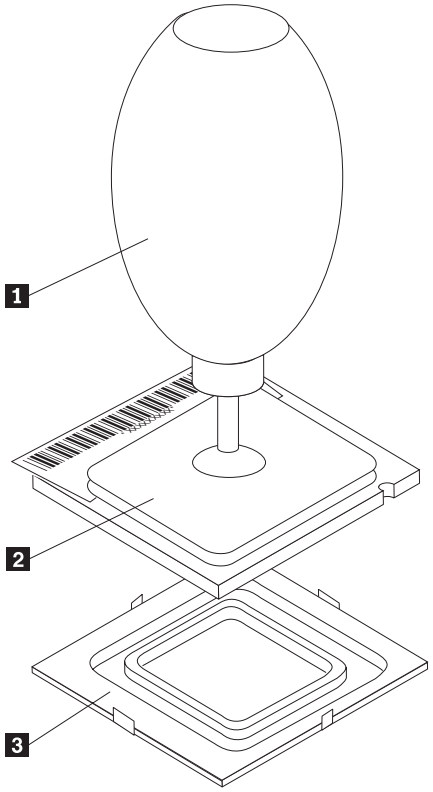
a. Take notice of the orientation of the notches **1** on the microprocessor. This is important when reinstalling the microprocessor on the system board.



b. Do not drop anything onto the microprocessor socket while it is exposed. The socket pins must be kept as clean as possible.

8. Make sure that the microprocessor retainer is fully open.

9. Loosen the protective cover **3** that protects the gold contacts on the microprocessor **2** but do not remove it. Use the vacuum pen **1** to pick up the microprocessor then completely remove the cover.

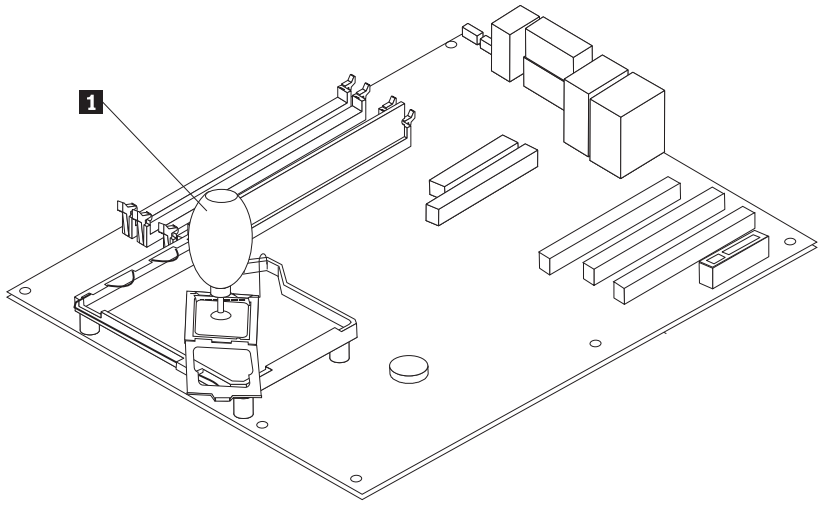


10. Position the microprocessor so that the notches on the microprocessor are aligned with the tabs in the microprocessor socket.

Important

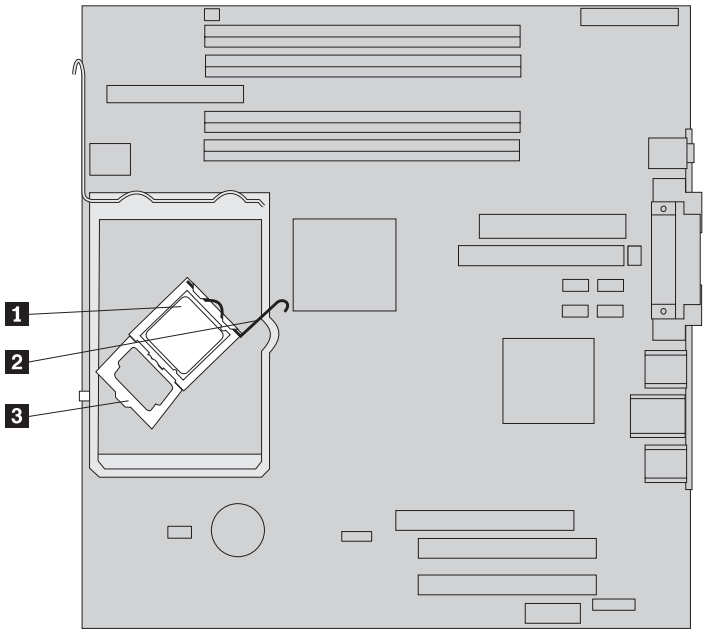
To avoid damaging the microprocessor contacts, do not tilt the microprocessor when installing it into the socket.

11. Using the vacuum pen **1**, lower the microprocessor straight down into the microprocessor socket.



Note: Install the black protective cover that was removed from the new microprocessor onto the defective microprocessor after the installation is complete.

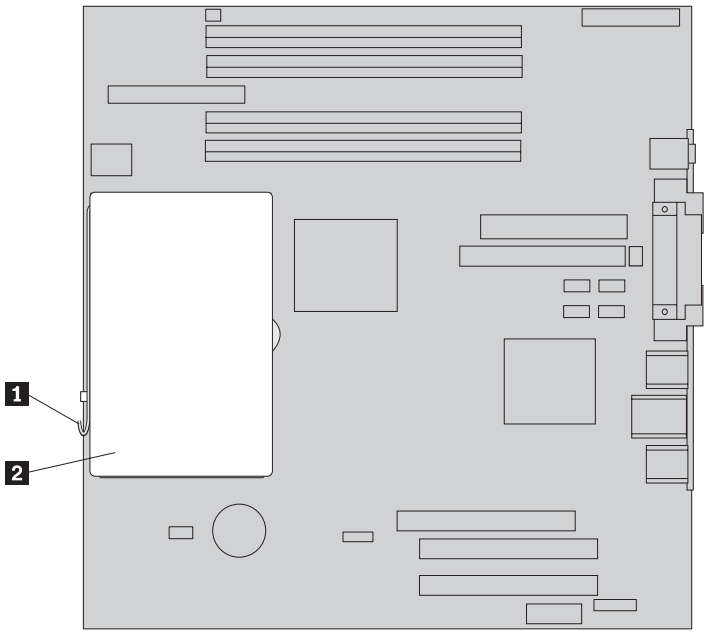
12. Pivot the retaining plate **3** to the closed position and pivot the locking lever **2** to secure the microprocessor **1** in place. Make sure the locking lever is engaged with the retainer tab when securing the microprocessor.



Note: If you are replacing the system board, there will be a black protective cover on the retainer to protect the microprocessor socket. As you close the microprocessor retainer, remove the cover. Place the black protective cover on the microprocessor retainer of the defective system board.

13. Slide the heat sink **2** into position over the microprocessor. Lower the lever **1** to secure the heat sink.

    Note: If you are replacing a defective system board, use the heat sink that was removed earlier.



14. If you are replacing the system board, continue at step 12 on page 12. If you are replacing only the microprocessor, continue at the next step.
15. Route the fan cable through the notch on the side of the air baffle. Then, install the air baffle by aligning the tabs to the holes in the chassis.
16. Reconnect the fan cable to the system board.
17. Go to "Completing the parts replacement" on page 31.

Replacing a memory module

Attention:

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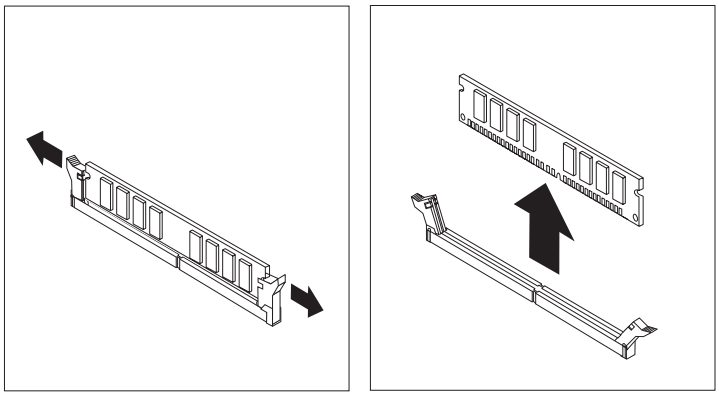
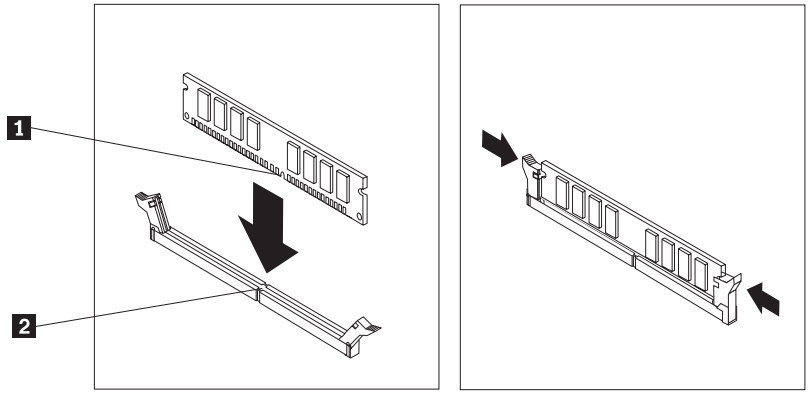
1. Remove the computer cover. See "Removing the cover" on page 5.
2. Locate the memory connectors. See "Locating components" on page 1.
3. Open the retaining clips, and lift the memory module out of its connector.



4. Ensure that the notch on the new memory module **1** aligns correctly with the connector key **2** on the system board. Push the memory module straight down into the connector until the retaining clips close.



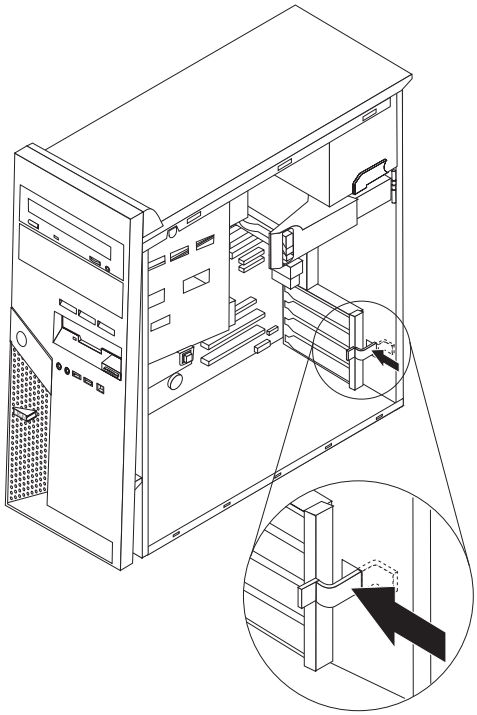
5. Go to "Completing the parts replacement" on page 31.

Replacing a PCI adapter

Attention:

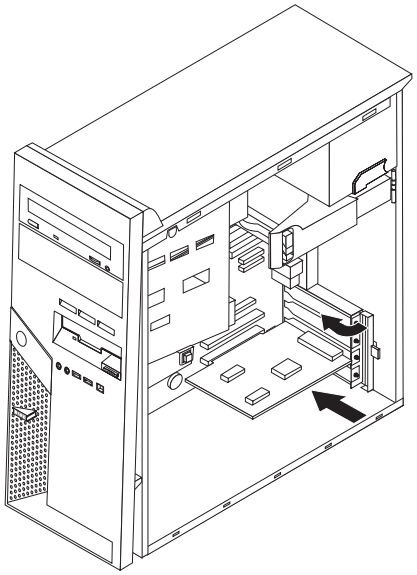
Do not open your computer or attempt any repair before reading the "Important safety information" in the *Quick Reference* that was included with your computer or in the *Hardware Maintenance Manual* (HMM) for the computer. To obtain copies of the *Quick Reference* or *HMM*, go to http://www.ibm.com/pc/support/.

1. Remove the computer cover. See "Removing the cover" on page 5.
2. Push the blue adapter latch as indicated and pivot it to the open position.



3. Remove the adapter by pulling it straight out of the adapter connector.
4. Install the new adapter into the same adapter connector. Ensure the adapter is fully seated into the adapter connector.

5. Pivot the blue adapter latch to the closed position to secure the adapters.



6. Go to “Completing the parts replacement” on page 31.

Replacing a hard disk drive

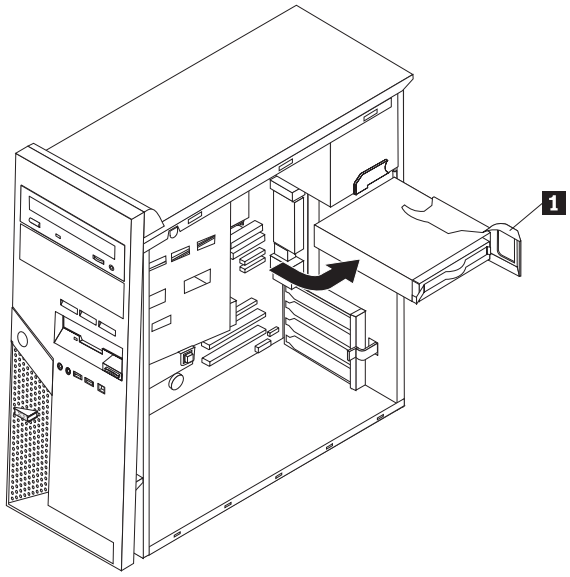
Attention:

Do not open your computer or attempt any repair before reading the "Important safety information" in the *Quick Reference* that was included with your computer or in the *Hardware Maintenance Manual* (HMM) for the computer. To obtain copies of the *Quick Reference* or *HMM*, go to the World Wide Web at http://www.ibm.com/pc/support/.

Important

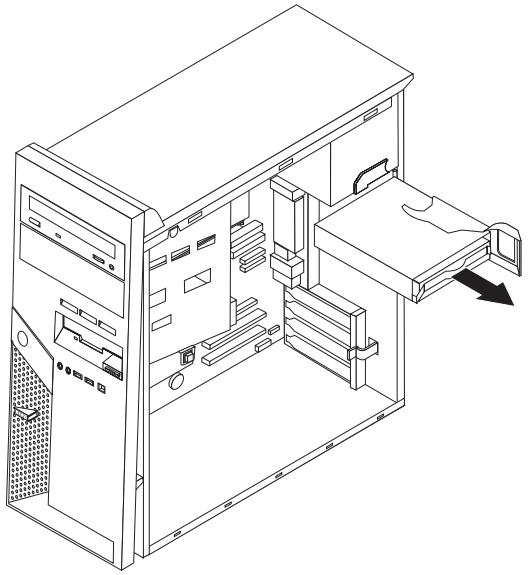
When you receive a new hard disk drive, you will also receive a *Product Recovery CD*. The *Product Recovery CD* will enable you to restore the contents of the hard disk drive to the same state as when the computer was originally shipped from the factory. For more information on recovering factory-installed software, refer to "Recovering software" in the *Quick Reference*.

1. Remove the computer cover. See "Removing the cover" on page 5.
2. Pull the blue release lever **1** and pivot the drive bay until it is in the position shown.

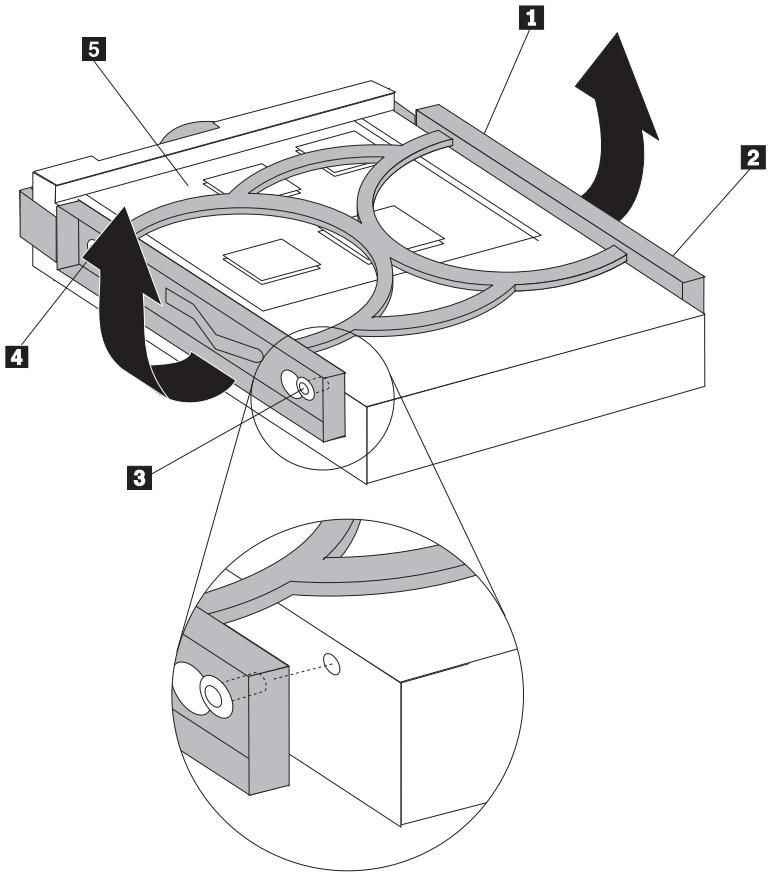


3. Disconnect the signal and power cables from the hard disk drive.

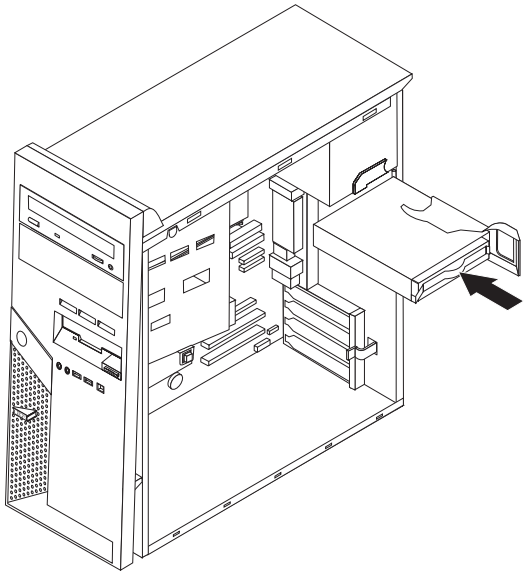
4. Slide the hard disk drive out of the hard drive bay by pulling the blue handle.



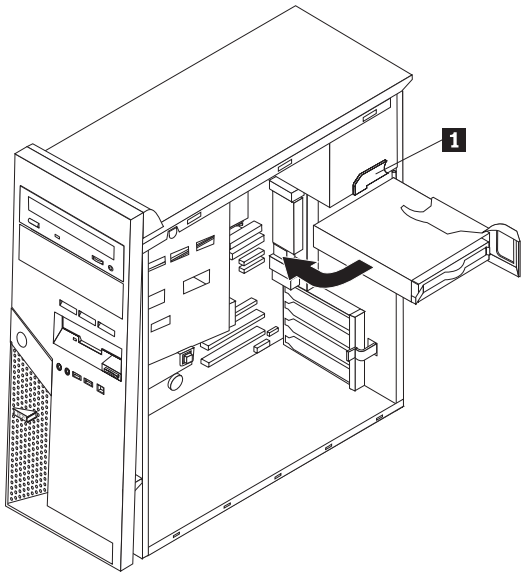
5. Remove the defective hard disk drive from the blue bracket by flexing the bracket.
6. To install the new hard disk drive into the blue bracket, flex the bracket and align the pins **1** through **4** on the bracket with the holes in the hard disk drive. Do not touch the circuit board **5** on the bottom of the hard disk drive.



7. Insert the new hard disk drive into the hard drive bay with the circuit board side facing downward.



8. Connect the power and signal cables to the new hard disk drive. See "Identifying parts on the system board" on page 4.
9. Press the blue tab **1** to pivot the drive into the computer. Route the cables so that the hard disk drive bay can be pivoted all the way into position.



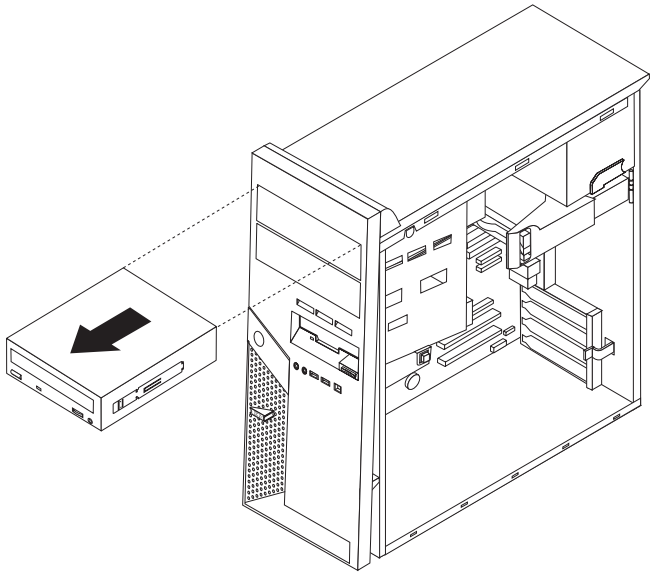
10. Go to "Completing the parts replacement" on page 31.

Replacing an optical drive

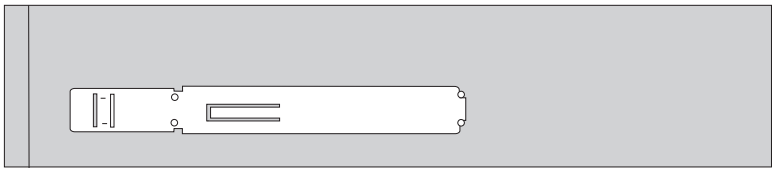
Attention:

Do not open your computer or attempt any repair before reading the "Important safety information" in the *Quick Reference* that was included with your computer or in the *Hardware Maintenance Manual* (HMM) for the computer. To obtain copies of the *Quick Reference* or *HMM*, go to http://www.ibm.com/pc/support/.

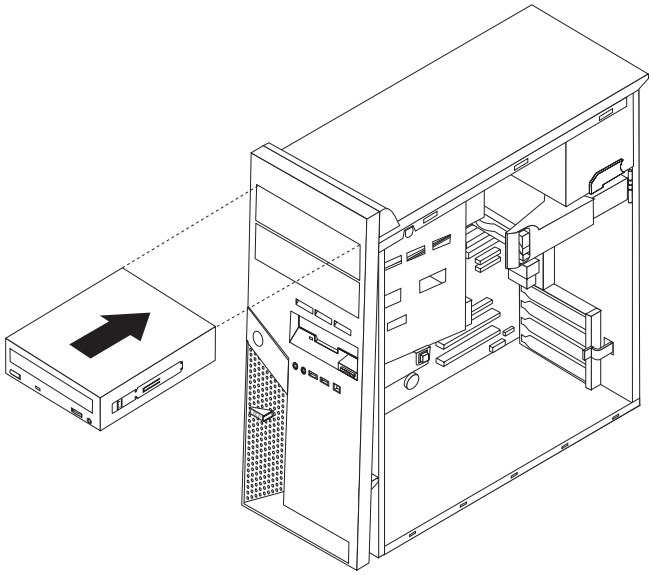
1. Remove the computer cover. See "Removing the cover" on page 5.
2. Disconnect the signal and power cables from the rear of the failing drive.
3. Release the drive by pressing on the blue retainer lever at the side of the drive and sliding it outward from the front of the computer.



4. Remove the retainer bracket from the failing drive and install it on the new drive.



5. Install the optical drive into the bay until it snaps into position.



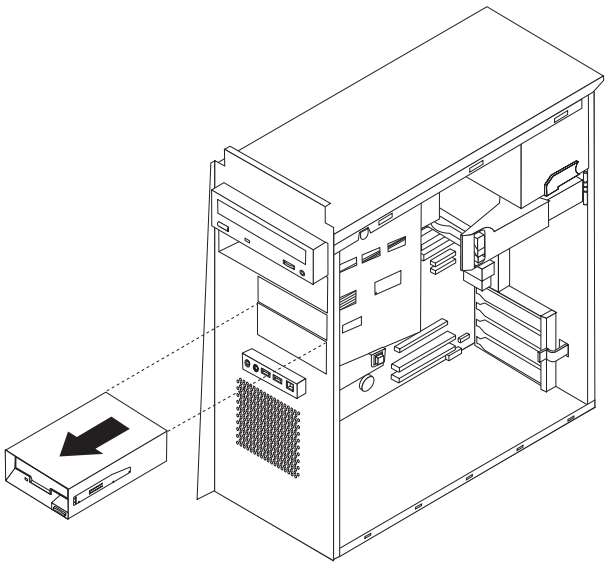
6. Connect the signal and power cables to the drive.
7. Go to “Completing the parts replacement” on page 31.

Replacing the diskette drive

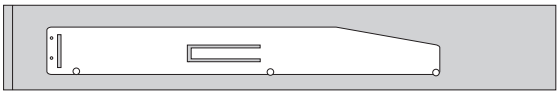
Attention:

Do not open your computer or attempt any repair before reading the "Important safety information" in the *Quick Reference* that was included with your computer or in the *Hardware Maintenance Manual* (HMM) for the computer. To obtain copies of the *Quick Reference* or *HMM*, go to http://www.ibm.com/pc/support/.

1. Remove the computer cover. See "Removing the cover" on page 5.
2. Remove the front bezel. See "Removing and replacing the front bezel" on page 6.
3. Disconnect the signal and power cables from the rear of the diskette drive.
4. Release the drive by pressing on the blue retainer lever at the side of the drive and sliding it outward from the front of the computer.



5. Remove the retainer bracket from the failing drive and install it on the new drive.



6. Install the diskette drive into the bay until it snaps into position.
7. Connect the signal and power cables to the drive.
8. To install the new bezel, align the tabs on the bottom of the bezel with the corresponding holes in the chassis. Pivot the bezel until it snaps into position at the top of the chassis.
9. Go to "Completing the parts replacement" on page 31.

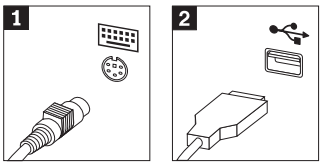
Replacing the keyboard

Attention:

Do not open your computer or attempt any repair before reading the "Important safety information" in the *Quick Reference* that was included with your computer or in the *Hardware Maintenance Manual* (HMM) for the computer. To obtain copies of the *Quick Reference* or *HMM*, go to http://www.ibm.com/pc/support.

1. Remove any media (diskettes, CDs, or tapes) from the drives, shut down the computer, and turn off all attached devices.
2. Unplug all power cords from electrical outlets.
3. Locate the keyboard connector. See "Locating connectors on the rear of the computer" on page 3 and "Locating connectors on the front of the computer" on page 2.

   Your keyboard might be connected to the standard keyboard connector **1** at the rear of the computer or to a USB connector **2** at either the front or rear of the computer. Locate the connector for the keyboard.



4. Disconnect the failing keyboard cable from the computer and connect the new keyboard cable to the same connector.
5. Go to "Completing the parts replacement" on page 31.

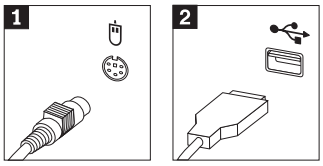
Replacing the mouse

Attention:

Do not open your computer or attempt any repair before reading the "Important safety information" in the *Quick Reference* that was included with your computer or in the *Hardware Maintenance Manual* (HMM) for the computer. To obtain copies of the *Quick Reference* or *HMM*, go to http://www.ibm.com/pc/support/.

1. Remove any media (diskettes, CDs, or tapes) from the drives, shut down the computer, and turn off all attached devices.
2. Unplug all power cords from electrical outlets.
3. Locate the mouse connector. See "Locating connectors on the rear of the computer" on page 3 and "Locating connectors on the front of the computer" on page 2.

   Your mouse might be connected to the standard mouse connector **1** at the rear of the computer or to a USB connector **2** at either the front or rear of the computer. Locate the connector for the mouse.



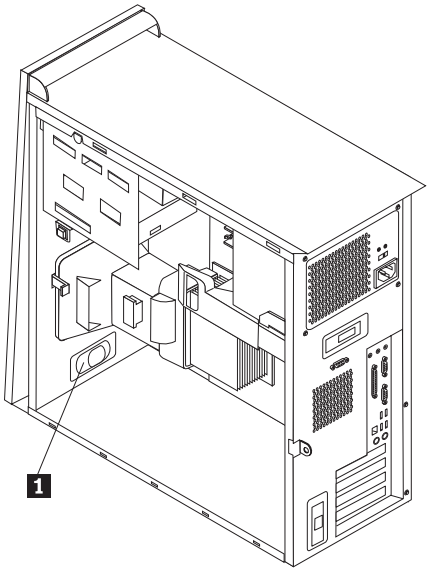
4. Disconnect the failing mouse cable from the computer and connect the new mouse cable to the same connector.
5. Go to "Completing the parts replacement" on page 31.

Replacing the internal speaker

Attention:

Do not open your computer or attempt any repair before reading the "Important safety information" in the *Quick Reference* that was included with your computer or in the *Hardware Maintenance Manual* (HMM) for the computer. To obtain copies of the *Quick Reference* or *HMM*, go to http://www.ibm.com/pc/support/.

1. Remove the computer cover. See "Removing the cover" on page 5.
2. To locate the internal speaker, see "Locating components" on page 1.
3. Disconnect the speaker cable from the system board. See "Identifying parts on the system board" on page 4.
4. Slide the speaker **1** downward to release it from the tabs that secure it.



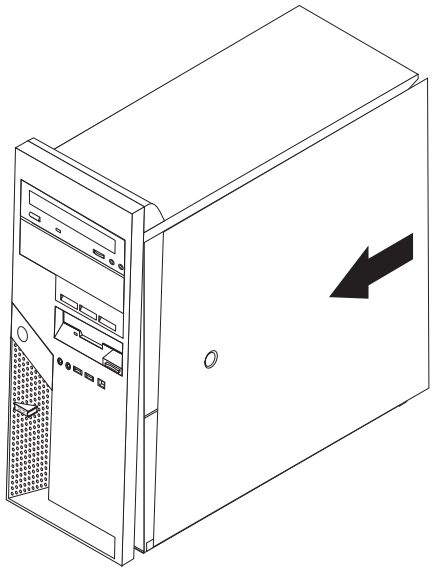
5. Position the new speaker and slide it upward so that it is held in position by the metal tabs.
6. Connect the speaker cable to the system board. See "Identifying parts on the system board" on page 4.
7. Go to "Completing the parts replacement" on page 31.

Completing the parts replacement

After replacing a failed part, you need to install any other removed parts, install the computer cover, and reconnect any cables, including telephone lines and power cords. Also, depending on the part that was replaced, you might need to confirm the updated information in the Setup Utility program. See "Starting the Setup Utility" in your *Quick Reference*.

To complete the installation:

1. Ensure that all components have been reassembled correctly and that no tools or loose screws are left inside your computer. See "Locating components" on page 1 for the location of the various components.
2. Clear any cables that might impede the replacement of the computer cover.
3. Position the computer cover on the chassis so that the rail guides on the bottom of the computer cover engage the rails. Then, push the computer cover closed until it latches.



4. Reconnect the external cables. Plug the power cord into the computer then into a properly grounded power receptacle. See “Locating connectors on the front of the computer” on page 2 and “Locating connectors on the rear of the computer” on page 3.
5. If you are replacing the system board, you must update (flash) the BIOS, see “Updating (flashing) BIOS from a diskette.”
6. To update your configuration, see ″Starting the Setup Utility″ in the *Quick Reference* that was included with your computer.

Updating (flashing) BIOS from a diskette

Important

Start the IBM Setup Utility program to view your system information. See “Starting the IBM Setup Utility” in your Quick Reference. If the serial number and the machine type/model listed on the Main menu do not match what is printed on the label of your computer, you must update (flash) the BIOS to change the serial number and the machine type/model.

To update (flash) the BIOS from a diskette, do the following:

1. Insert a system program update (flash) diskette into the diskette drive (drive A) in your computer. System program updates are available at http://www.ibm.com/pc/support on the World Wide Web.
2. Turn on the computer. If it is on already, you must turn it off and back on again. The update begins.
3. When you are prompted to select a language, press the number on your keyboard which corresponds to the language then press Enter.
4. When prompted to change the serial number, press Y.
5. Type in the seven character serial number of your computer then press Enter.
6. When prompted to change the machine type/model, press Y.
7. Type in the seven character machine type/model of your computer then press Enter.
8. Follow the instructions on the screen to complete the update.

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