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About this manual



This manual contains service and reference information for Lenovo IdeaCentre H computers listed on the cover. It is intended only for trained servicers who are familiar with Lenovo computer products.

Before servicing a Lenovo product, be sure to read the Safety Information.

This manual includes a complete FRU part number listing for each machine type and model listed on the cover. If you have internet access, FRU part numbers are also available at: <http://www.lenovo.com/support>.

The description of the TV card in this manual is only used for the machines which have the TV card. It is invalid for those machines which do not have TV card.

Important Safety Information

Be sure to read all caution and danger statements in this book before performing any of the instructions.

Veuillez lire toutes les consignes de type DANGER et ATTENTION du présent document avant d'exécuter les instructions.

Lesen Sie unbedingt alle Hinweise vom Typ "ACHTUNG" oder "VORSICHT" in dieser Dokumentation, bevor Sie irgendwelche Vorgänge durchführen

Leggere le istruzioni introdotte da ATTENZIONE e PERICOLO presenti nel manuale prima di eseguire una qualsiasi delle istruzioni

Certifique-se de ler todas as instruções de cuidado e perigo neste manual antes de executar qualquer uma das instruções

Es importante que lea todas las declaraciones de precaución y de peligro de este manual antes de seguir las instrucciones.

执行任何说明之前，请确保已阅读本书中的所有警告和危险声明。

Important information about replacing RoHS compliant FRUs

RoHS, The Restriction of Hazardous Substances in Electrical and Electronic Equipment Directive (2002/95/EC) is a European Union legal requirement affecting the global electronics industry. RoHS requirements must be implemented on Lenovo products placed on the market after June 2006. Products on the market before June 2006 are not required to have RoHS compliant parts.

So, if the parts are not compliant originally, replacement parts can also be noncompliant, but in all cases, if the parts are compliant, the replacement parts must also be compliant.

Lenovo plans to transition to RoHS compliance well before the implementation date and expects its suppliers to be ready to support Lenovo's requirements and schedule. Products sold in 2005, will contain some RoHS compliant FRUs. The following statement pertains to these products and any product Lenovo produces containing RoHS compliant parts.

RoHS compliant Lenovo IdeaCentre H parts have unique FRU part numbers. Before or after June, 2006, failed RoHS compliant parts must always be replaced using RoHS compliant FRUs, so only the FRUs identified as compliant in the system HMM or direct substitutions for those FRUs can be used.

Products marketed before June 2006		Products marketed after June 2006	
Current or original part	Replacement FRU	Current or original part	Replacement FRU
Non-RoHS	Can be Non-RoHS	Must be RoHS	Must be RoHS
Non-RoHS	Can be RoHS		
Non-RoHS	Can sub to RoHS		
RoHS	Must be RoHS		

Note: A direct substitution is a part with a different FRU part number that is automatically shipped by the distribution center at the time of order.

Related Web URLs are:

- Lenovo information for Suppliers website:
<http://www-03.ibm.com/procurement/proweb.nsf/ContentDocsByTitle/United+States~Information+for+suppliers>
- RoHS Directive:
http://europa.eu.int/eur-lex/pri/en/oj/dat/2003/l_037/l_03720030213en00190023.pdf
- California Senate Bills 20, 50:
<http://www.ciwmb.ca.gov/HHW/Events/AnnualConf/2004/presentation/MPaparian.pdf>

Safety information

2

This chapter contains the safety information that you need to be familiar with before servicing a computer.

General safety

Follow these rules to ensure general safety:

- Observe good housekeeping in the area of the machines during and after maintenance.
- When lifting any heavy object:
 1. Ensure you can stand safely without slipping.
 2. Distribute the weight of the object equally between your feet.
 3. Use a slow lifting force. Never move suddenly or twist when you attempt to lift.
 4. Lift by standing or by pushing up with your leg muscles; this action removes the strain from the muscles in your back. *Do not attempt to lift any objects that weigh more than 16 kg (35 lb) or objects that you think are too heavy for you.*
- Do not perform any action that causes hazards to the customer, or that makes the equipment unsafe.
- Before you start the machine, ensure that other service representatives and the customer's personnel are not in a hazardous position.
- Place removed covers and other parts in a safe place, away from all personnel, while you are servicing the machine.
- Keep your tool case away from walk areas so that other people will not trip over it.
- Do not wear loose clothing that can be trapped in the moving parts of a machine. Ensure that your sleeves are fastened or rolled up above your elbows. If your hair is long, fasten it.
- Insert the ends of your necktie or scarf inside clothing or fasten it with a nonconductive clip, approximately 8 centimeters (3 inches) from the end.
- Do not wear jewelry, chains, metal-frame eyeglasses, or metal fasteners for your clothing.

Remember: Metal objects are good electrical conductors.

- Wear safety glasses when you are: hammering, drilling soldering, cutting wire, attaching springs, using solvents, or working in any other conditions that might be hazardous to your eyes.
- After service, reinstall all safety shields, guards, labels, and ground wires. Replace any safety device that is worn or defective.
- Reinstall all covers correctly before returning the machine to the customer.

Electrical safety



CAUTION:

Electrical current from power, telephone, and communication cables can be hazardous. To avoid personal injury or equipment damage, disconnect the attached power cords, telecommunication systems, networks, and modems before you open the server/workstation covers, unless instructed otherwise in the installation and configuration procedures.

Observe the following rules when working on electrical equipment.

Important: Use only approved tools and test equipment. Some hand tools have handles covered with a soft material that does not insulate you when working with live electrical currents.

Many customers have, near their equipment, rubber floor mats that contain small conductive fibers to decrease electrostatic discharges. Do not use this type of mat to protect yourself from electrical shock.

- Find the room emergency power-off (EPO) switch, disconnecting switch, or electrical outlet. If an electrical accident occurs, you can then operate the switch or unplug the power cord quickly.
- Do not work alone under hazardous conditions or near equipment that has hazardous voltages.
- Disconnect all power before:
 - Performing a mechanical inspection
 - Working near power supplies
 - Removing or installing main units
- Before you start to work on the machine, unplug the power cord. If you cannot unplug it, ask the customer to power-off the wall box that supplies power to the machine and to lock the wall box in the off position.

- If you need to work on a machine that has exposed electrical circuits, observe the following precautions:
 - Ensure that another person, familiar with the power-off controls, is near you.
Remember: Another person must be there to switch off the power, if necessary.
 - Use only one hand when working with powered-on electrical equipment; keep the other hand in your pocket or behind your back.
Remember: There must be a complete circuit to cause electrical shock. By observing the above rule, you may prevent a current from passing through your body.
 - When using testers, set the controls correctly and use the approved probe leads and accessories for that tester.
 - Stand on suitable rubber mats (obtained locally, if necessary) to insulate you from grounds such as metal floor strips and machine frames.
Observe the special safety precautions when you work with very high voltages; these instructions are in the safety sections of maintenance information. Use extreme care when measuring high voltages.
- Regularly inspect and maintain your electrical hand tools for safe operational condition.
- Do not use worn or broken tools and testers.
- *Never assume* that power has been disconnected from a circuit. First, check that it has been powered-off.
- Always look carefully for possible hazards in your work area. Examples of these hazards are moist floors, nongrounded power extension cables, power surges, and missing safety grounds.
- Do not touch live electrical circuits with the reflective surface of a plastic dental mirror. The surface is conductive; such touching can cause personal injury and machine damage.
- Do not service the following parts with the power on when they are removed from their normal operating places in a machine:
 - Power supply units
 - Pumps
 - Blowers and fans
 - Motor generatorsand similar units. (This practice ensures correct grounding of the units.)
- If an electrical accident occurs:
 - Use caution; do not become a victim yourself.
 - Switch off power.
 - Send another person to get medical aid.

Safety inspection guide

The intent of this inspection guide is to assist you in identifying potentially unsafe conditions on these products. Each machine, as it was designed and built, had required safety items installed to protect users and service personnel from injury. This guide addresses only those items. However, good judgment should be used to identify potential safety hazards due to attachment of features or options not covered by this inspection guide.

If any unsafe conditions are present, you must determine how serious the apparent hazard could be and whether you can continue without first correcting the problem.

Consider these conditions and the safety hazards they present:

- Electrical hazards, especially primary power (primary voltage on the frame can cause serious or fatal electrical shock).
- Explosive hazards, such as a damaged CRT face or bulging capacitor
- Mechanical hazards, such as loose or missing hardware

The guide consists of a series of steps presented in a checklist. Begin the checks with the power off, and the power cord disconnected.

Checklist:

1. Check exterior covers for damage (loose, broken, or sharp edges).
2. Power-off the computer. Disconnect the power cord.
3. Check the power cord for:
 - a. A third-wire ground connector in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and frame ground.
 - b. The power cord should be the appropriate type as specified in the parts listings.
 - c. Insulation must not be frayed or worn.
4. Remove the cover.
5. Check for any obvious alterations. Use good judgment as to the safety of any alterations.
6. Check inside the unit for any obvious unsafe conditions, such as metal filings, contamination, water or other liquids, or signs of fire or smoke damage.
7. Check for worn, frayed, or pinched cables.
8. Check that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

Handling electrostatic discharge-sensitive devices

Any computer part containing transistors or integrated circuits (ICs) should be considered sensitive to electrostatic discharge (ESD). ESD damage can occur when there is a difference in charge between objects. Protect against ESD damage by equalizing the charge so that the machine, the part, the work mat, and the person handling the part are all at the same charge.

Notes:

1. Use product-specific ESD procedures when they exceed the requirements noted here.
2. Make sure that the ESD protective devices you use have been certified (ISO 9000) as fully effective.

When handling ESD-sensitive parts:

- Keep the parts in protective packages until they are inserted into the product.
- Avoid contact with other people.
- Wear a grounded wrist strap against your skin to eliminate static on your body.
- Prevent the part from touching your clothing. Most clothing is insulative and retains a charge even when you are wearing a wrist strap.
- Use the black side of a grounded work mat to provide a static-free work surface. The mat is especially useful when handling ESD-sensitive devices.
- Select a grounding system, such as those listed below, to provide protection that meets the specific service requirement.

Note: The use of a grounding system is desirable but not required to protect against ESD damage.

- Attach the ESD ground clip to any frame ground, ground braid, or green-wire ground.
- Use an ESD common ground or reference point when working on a double-insulated or battery-operated system. You can use coax or connector-outside shells on these systems.
- Use the round ground-prong of the ac plug on ac-operated computers.

Grounding requirements

Electrical grounding of the computer is required for operator safety and correct system function. Proper grounding of the electrical outlet can be verified by a certified electrician.

Safety notices

The caution and danger safety notices in this section are provided in the the language of English.



DANGER

Electrical current from power, telephone and communication cables is hazardous.

To avoid a shock hazard:

- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- Connect all power cords to a properly wired and grounded electrical outlet.
- Connect to properly wired outlets any equipment that will be attached to this product.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.

To Connect	To Disconnect
1. Turn everything OFF. 2. First, attach all cables to devices. 3. Attach signal cables to connectors. 4. Attach power cords to outlet. 5. Turn device ON.	1. Turn everything OFF. 2. First, remove power cords from outlet. 3. Remove signal cables from connectors. 4. Remove all cables from devices.

**CAUTION:**

When replacing the lithium battery, use only Part Number 33F8354 or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:

- Throw or immerse into water
- Heat to more than 100°C (212°F)
- Repair or disassemble

Dispose of the battery as required by local ordinances or regulations.

**CAUTION:**

When laser products (such as CD-ROMs, DVD-ROM drives, fiber optic devices, or transmitters) are installed, note the following:

- 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 controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.

**DANGER:**

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following:

Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.



≥ 18 kg (37 lbs)



≥ 32 kg (70.5 lbs)



≥ 55 kg (121.2 lbs)

CAUTION:

Use safe practices when lifting.



CAUTION:

The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.



CAUTION:

Do not place any object weighing more than 82 kg (180 lbs.) on top of rack-mounted devices.



General information

3

This chapter provides general information that applies to all machine types supported by this publication.

Specifications

This section lists the physical specifications for your computer.

Type IdeaCentre H3

This section lists the physical specifications.

Environment

Air temperature:

Operating: 10° to 35°C

Transit: -40° to 55°C

Humidity:

Operating: 35% to 80%

Transit: 20% to 93% (40°C)

Altitude: 86KPa to 106KPa

Electrical input

Input voltage: 90-264V

Input frequency: 50/60Hz (Adaptive Voltage Positioning)

Input voltage: 90-137V/180-264V

Input frequency: 50/60Hz(With Voltage-selection Switch)

Input voltage: 180-264V

Input frequency:50/60Hz

General Checkout

4

Attention

The drives in the computer you are servicing might have been rearranged or the drive startup sequence changed. Be extremely careful during write operations such as copying, saving, or formatting. Data or programs can be overwritten if you select an incorrect drive.

General error messages appear if a problem or conflict is found by an application program, the operating system, or both. For an explanation of these messages, refer to the information supplied with that software package.

Notes

- The default is for this computer to boot up in quiet mode (no beep, no memory count and checkpoint code display) when no errors are detected by POST.
- To enable beep, memory count, and checkpoint code display when a successful POST occurs, do the following:
 1. Start the Setup Utility program. See ["Starting the Setup Utility program"](#).
 2. Select **Start Options**.
 3. Set **Power-On Self-Test to Enhanced**.
- Before replacing any FRUs, ensure that the latest level of BIOS is installed on the system. A down-level BIOS might cause false errors and unnecessary replacement of the system board.

Use the following procedure to help determine the cause of the problem:

1. Power-off the computer and all external devices.
2. Check all cables and power cords.
3. Set all display controls to the middle position.
4. Power-on all external devices.

5. Power-on the computer.
 - Look for displayed error codes
 - Listen for beep codes
 - Look for readable instructions or a main menu on the display.If you did not receive the correct response, proceed to step 6.
If you do receive the correct response, proceed to step 7.
6. Look at the following conditions and follow the instructions:
 - If you hear beep codes during POST, go to [“Beep symptoms”](#).
 - If the computer displays a POST error, go to [“POST error codes”](#).
 - If the computer hangs and no error is displayed, continue at step 7.
7. If you cannot continue, replace the last device tested.

Problem determination tips

Due to the variety of hardware and software combinations that can be encountered, use the following information to assist you in problem determination. If possible, have this information available when requesting assistance from Service Support and Engineering functions.

- Machine type and model
- Processor or hard disk upgrades
- Failure symptom
 - Do diagnostics indicate a failure?
 - What, when, where, single, or multiple systems?
 - Is the failure repeatable?
 - Has this configuration ever worked?
 - If it has been working, what changes were made prior to it failing?
 - Is this the original reported failure?
- Diagnostics version
 - Type and version level
- Hardware configuration
 - Print (print screen) configuration currently in use
 - BIOS level
- Operating system software
 - Type and version level

Note: To eliminate confusion, identical systems are considered identical only if they:

1. Are the exact machine type and models
2. Have the same BIOS level
3. Have the same adapters/attachments in the same locations
4. Have the same address jumpers/terminators/cabling
5. Have the same software versions and levels
6. Have the same configuration options set in the system
7. Have the same setup for the operation system control files

Comparing the configuration and software set-up between “working and non-working” systems will often lead to problem resolution.

Using the Setup Utility

5

The Setup Utility program is used to view and change the configuration settings of your computer, regardless of which operating system you are using. However, the operating-system settings might override any similar settings in the Setup Utility program.

Starting the Setup Utility program

To start the Setup Utility program, do the following:

1. If your computer is already on when you start this procedure, shut down the operating system and turn off the computer.
2. Press and hold the F1 key then turn on the computer. When you hear multiple beeps, release the F1 key.

Notes:

- a. If you are using a USB keyboard and the Setup Utility program does not display using this method, repeatedly press and release the F1 key rather than leaving it pressed when turning on the computer.
- b. If a user password or an administrator password has been set, the Setup Utility program menu is not displayed until you type your password. For more information, see “Using passwords.”

The Setup Utility might start automatically when POST detects that hardware has been removed or new hardware has been installed in your computer.

Viewing and changing settings

The Setup Utility program menu lists items that identify system configuration topics. To view or change settings, see “Starting the Setup Utility program.”

When working with the Setup Utility program menu, you must use the

keyboard. The keys used to perform various tasks are displayed on the right side of each screen.

Using passwords

By using the Setup Utility program, you can set passwords to prevent unauthorized persons from gaining access to your computer and data. See “Starting the Setup Utility program.” The following types of passwords are available:

- Supervisor Password
- User Password

You do not have to set any passwords to use your computer. However, if you decide to set any passwords, read the following sections.

Password considerations

A password can be any combination of up to sixteen characters (a-z and 0-9) and symbols. For security reasons, it is a good idea to use a strong password that cannot be easily compromised. We suggest the passwords should adhere to the following rules:

- Must have at least seven characters in length
- Contain at least one alphabetic character, one numeric character, and one symbol
- Contain at least one of the following symbols: “,” “.”
- Setup Utility program and hard disk drive passwords are not case sensitive
- Not be your name or your user name
- Not be a common word or a common name
- Be significantly different from your previous password

Supervisor password

When a Supervisor Password is set, it deters unauthorized persons from changing configuration settings. If you are responsible for maintaining the settings of several computers, you might want to set a Supervisor Password.

After you set a Supervisor Password, a password prompt is displayed each time you try to access the Setup Utility program.

If both the supervisor and user passwords are set, you can type either

password. However, to change any configuration settings, you must use your supervisor password.

Setting, changing, and deleting a Supervisor password

To set, change, or delete a password, do the following:

Note: A password can be any combination of up to ten characters (A- Z, a-z, and 0-9). For more information, see "Password considerations" on page 17.

1. Start the Setup Utility program (see "Starting the Setup Utility program" on page 16).
2. From the Setup Utility program menu, select **Set Administrator Password** and press Enter.
3. The password dialog box will be displayed. Type the new password, and press Enter.
4. when prompted to confirm the password, type the password again. If you type the password correctly, the password will be installed.

To delete a previously set supervisor password, do the following :

Note: When prompted for a password, you must type your supervisor password.

1. From the Setup Utility program menu, select **Set Administrator Password** and press Enter.
2. when you type the supervisor password. a message will display that Enter Password to confirm current password, Press the current password , if password is correct. next message will display that **Enter New Password**. Press Enter and a message will display that indicates the password has been disabled. After that, the user password will be disabled too if a user password has been installed.
3. Press any key to continue.

User Password

When a User Password is set, you cannot start the Setup Utility program until a valid password is typed from the keyboard.

You can set a user password after you set the supervisor password.

Setting, changing, and deleting a user password

To set, change, or delete a user password, do the following:

Note: A password can be any combination of up to ten characters(A-Z, a-z, and 0-9).

1. Start the Setup Utility program (See "Starting the Setup Utility program".)
2. From the Setup Utility program menu, select **Set Power-On Password** and press Enter.
3. The password dialog box will be displayed. Type the new password, and press Enter.
4. when prompted to confirm the password, type the password again. If you type the password correctly, the password will be installed.

To delete a previously set user password, do the following :

Note: When prompted for a password, you must type your supervisor password.

1. From the Setup Utility program menu, select **Set Power-On Password** and press **Enter**.
2. when you type the user password. a message will display that Enter Password to confirm current password, Press the current password , if password is correct. next message will display that **Enter New Password**. Press Enter and a message will display that indicates the password has been disabled.
3. Press any key to continue.

Using Device

Device is used to enable or disable user access to the following device:

USB Functions

When this feature is set to **Disable**, the device of USB is disabled and will not be displayed in the system configuration.

To set Device, do the following:

1. Start the Setup Utility program (see "Starting the Setup Utility program" on page 16).
2. From the Setup Utility program menu, select **Devices**.
3. Select **USB Setup**.
4. Select **USB Functions**.
5. Select **Disable** or **Enable** and press Enter.
6. Return to the Setup Utility program menu and select **Exit** and then **Save changes and Exit**.

Note: If you do not want to save the settings, select **Discard Changes and Exit** or **Discard Changes**. You can set others such as **Legacy USB Support**, **Onboard Audio Controller**, **Onboard Ethernet**

Controller, Lan boot Agent and so on. See the information displayed on the right side of the screen.

Selecting a startup device

If your computer does not start up (boot) from a device such as the CD-ROM, diskette, or hard disk as expected, use one of the following procedures to select a startup device.

Selecting a temporary startup device

Use this procedure to startup from any boot device.

Note: Not all CDs, hard disks, and diskettes are bootable.

1. Turn off your computer.
2. Press and hold the F12 key then turn on the computer. When the Startup Device Menu appears, release the F12 key.

Note: If you are using a USB keyboard and the Startup Device Menu does not display using this method, repeatedly press and release the F12 key rather than leaving it pressed when turning on the computer.

3. Select the desired startup device from the Startup Device Menu and press Enter to begin.

Note: Selecting a startup device from the Startup Device menu does not permanently change the startup sequence.

Selecting or changing the startup device sequence

To view or permanently change the configured startup device sequence, do the following:

1. Start the Setup Utility program (see “Starting the Setup Utility program” on page 16).
2. Select **Startup**.
3. Select Primary Boot Sequence for the 1st Boot Device, the 2nd Boot Device, the 3rd Boot Device and the 4th Boot Device.
4. Press ESC to return the **Startup** and then **Save changes and Exit**.

If you have changed these settings and want to return to the default settings, select **Load Optimal Defaults** on the Setup Utility menu.

Exiting from the Setup Utility program

When you finish viewing or changing settings, press Esc to return to the Setup Utility program menu (you might have to press Esc several times). If you want to save the new settings, select **Save changes and Exit** before you exit. Otherwise, your changes will not be saved.

Symptom-to-FRU Index

6

The Symptom-to-FRU index lists error symptoms and possible causes. The most likely cause is listed first. Always begin with Chapter 4, "General Checkout," on page 13. This index can also be used to help you decide which FRUs to have available when servicing a computer. If you are unable to correct the problem using this index, go to "Undetermined problems" on page 27.

Notes

- If you have both an error message and an incorrect audio response diagnose the error message first.
- If you cannot run the diagnostic tests or you get a diagnostic error code when running a test but did receive a POST error message diagnose the POST error message first.
- If you did not receive any error message look for a description of your error symptoms in the first part of this index.

Power Supply Problems

If you suspect a power problem, use the following procedures.

Check/Verify	FRU/Action
Check the following for proper installation. <ul style="list-style-type: none">• Power Cord• On/Off Switch connector• On/Off Switch Power Supply connector• System Board Power Supply connectors• Microprocessor(s) connection	Reseat connectors
Check the power cord for continuity.	Power Cord
Check the power-on switch for continuity.	Power-on Switch

Beep symptoms

Beep symptoms are tones or a series of tones separated by pauses (intervals without sound) during POST.

The following tables describes beep symptoms.

Beep Symptom	FRU/Action
3 beeps Base memory read/write test error	

POST error codes

Each time you power-on the system, it performs a series of tests that check the operation of the system and some options. This series of tests is called the *Power-On Self-Test*, or *POST*. POST does the following operations.

- Checks some basic system-board operations
- Checks the memory operation
- Starts the video operation
- Verifies that the boot drive is working

If the POST detects a problem, an error message appears on the screen. A single problem can cause several error messages to appear. When you correct the cause of the first error message, the other error messages probably will not appear on the screen the next time you turn on the system.

POST Error Message	Description/Action
CPU FAN Failure	Detect CPU fan status.
Setup data integrity check failure	Checksum of CMOS is incorrect. The computer loads the default configuration settings. This error might indicate that CMOS has become corrupt due to a weak CMOS battery.

Undetermined problems

If this computer has a parallel ATA hard disk drive, make sure that the hard disk drive is jumpered as a master and the optical drive is jumpered as a slave.

1. Power-off the computer.
2. Remove or disconnect the following components (if installed) one at a time.
 - a. External devices (modem, printer, or mouse)
 - b. Any adapters
 - c. Memory modules
 - d. Extended video memory
 - e. External Cache
 - f. External Cache RAM
 - g. Hard disk drive
 - h. Diskette drive
3. Power-on the computer to re-test the system.
4. Repeat steps 1 through 3 until you find the failing device or adapter.

If all devices and adapters have been removed, and the problem continues, replace the system board.

Locations

7

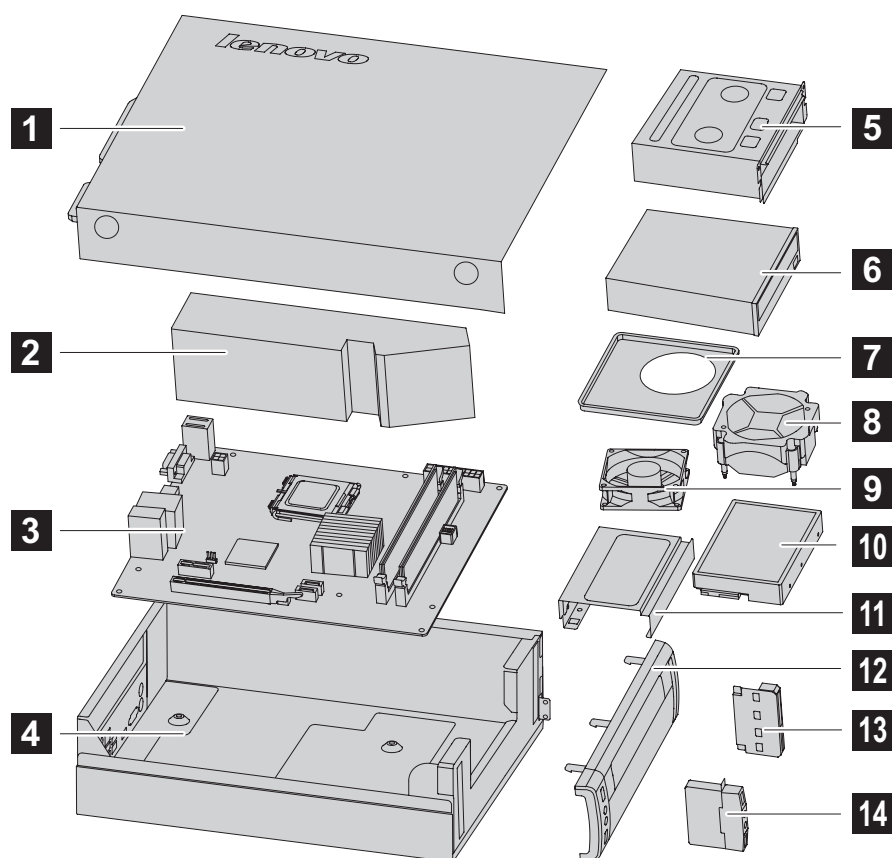
This chapter provides illustrations to help locate the various connectors, controls and components of the computer. To remove the computer cover, refer to "Removing the computer cover".

Locating components and connectors

The following illustrations will help you to locate the various components and connectors in your computer.

Internal components

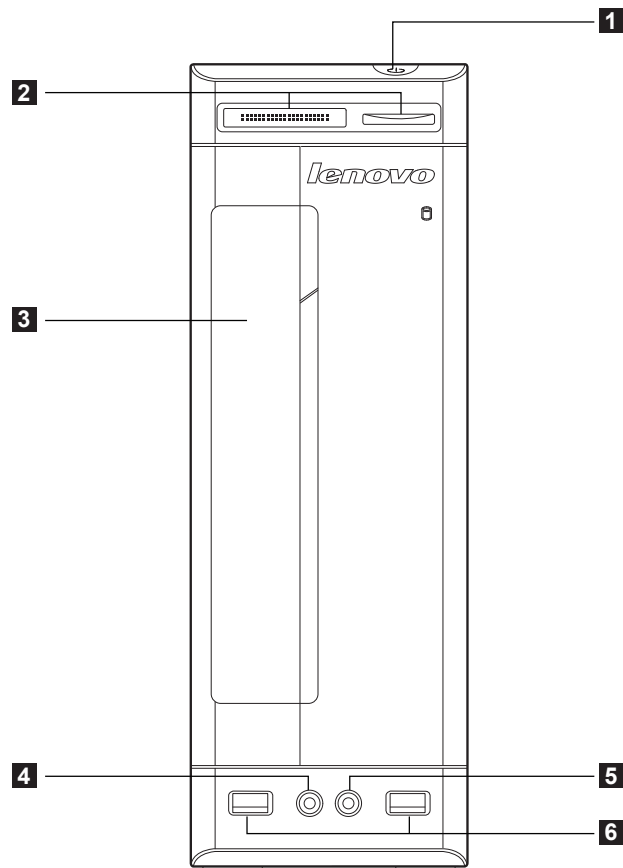
The following illustration shows the components inside your computer.



- 1** Computer cover
- 2** Power supply
- 3** Motherboard
- 4** Chassis
- 5** Optical disk drive bay
- 6** Optical disk drive
- 7** Vent
- 8** Heatsink
- 9** Fan
- 10** Hard disk drive
- 11** Hard disk drive bay
- 12** Front bezel
- 13** Card reader (Selected models)
- 14** Audio & USB connectors

Front view

The following illustrations show the location of connectors on the front of the computer.

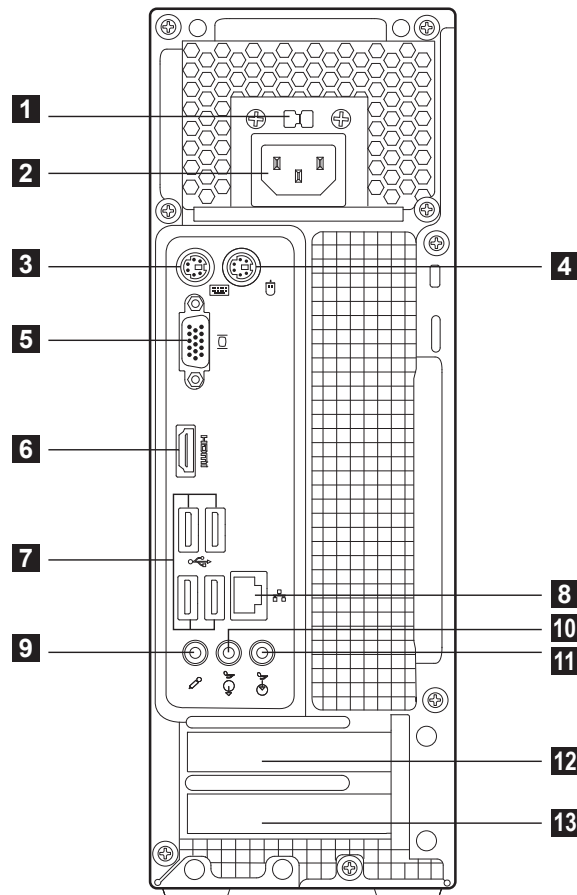


- 1** Power switch
- 2** Card reader modules (Selected models)
- 3** Optical drive
- 4** Headphone connector
- 5** Microphone connector
- 6** USB ports (2)

Rear view

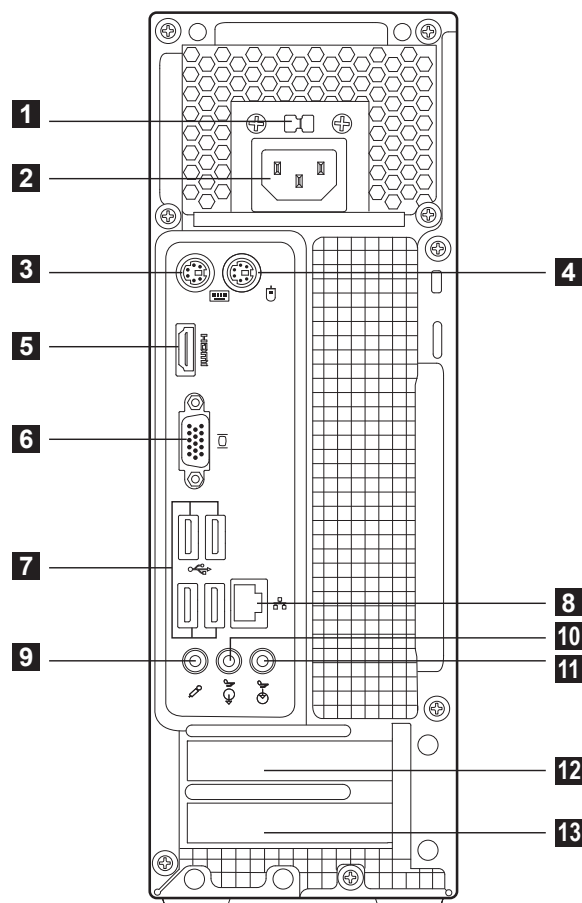
The following illustration shows the location of connectors on the rear of the computer.

(If the rear view configuration in this chapter is different from your actual computer, the rear view configuration of your actual computer should be taken as final and binding)



- 1** Voltage selection switch (Some models are equipped with this switch)
- 2** Power connector
- 3** PS/2 keyboard connector
- 4** PS/2 mouse connector
- 5** On-board VGA connector

- 6** HDMI connector
- 7** USB connectors (4)
- 8** Ethernet connector
- 9** Microphone connector
- 10** Audio line-out connector
- 11** Audio line-in connector
- 12** PCI Express x1 adapter connector
- 13** PCI Express x16 graphics adapter connector



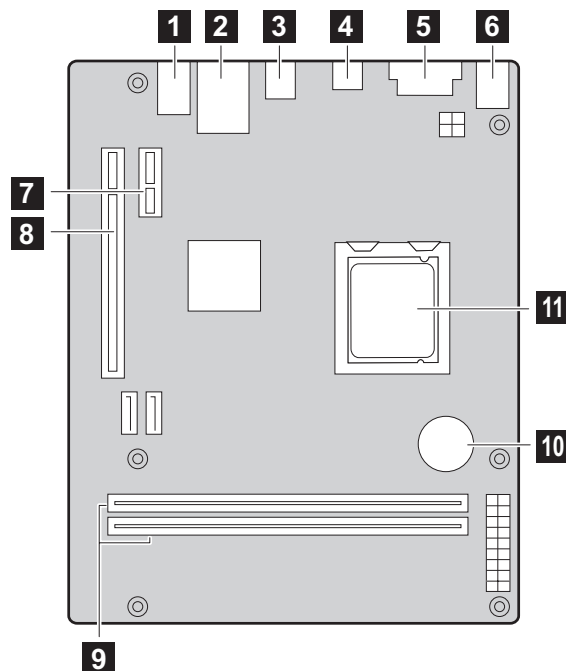
- 1** Voltage selection switch (Some models are equipped with this switch)
- 2** Power connector
- 3** PS/2 keyboard connector
- 4** PS/2 mouse connector
- 5** HDMI connector
- 6** On-board VGA connector
- 7** USB connectors (4)
- 8** Ethernet connector

- 9** Microphone connector
- 10** Audio line-out connector
- 11** Audio line-in connector
- 12** PCI Express x1 adapter connector
- 13** PCI Express x16 graphics adapter connector

Identifying parts on the system board

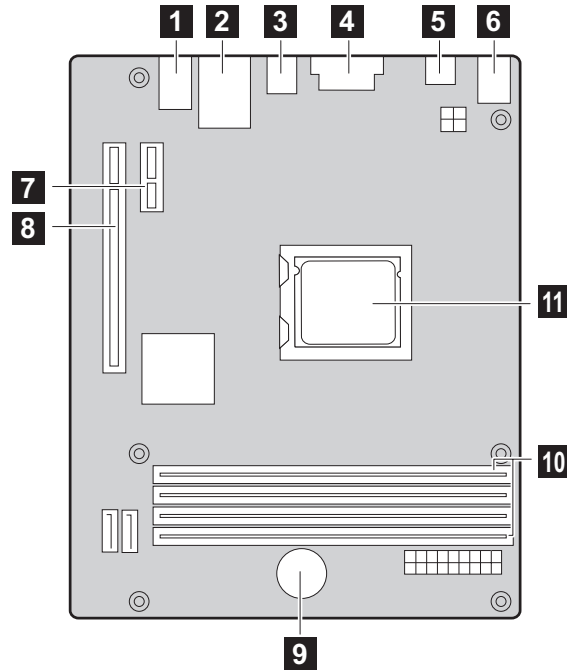
The system board (sometimes called the planar or motherboard) is the main circuit board in your computer. It provides basic computer functions and supports a variety of devices that are factory-installed or that you can install later.

The following illustrations show the locations of parts on the system board.

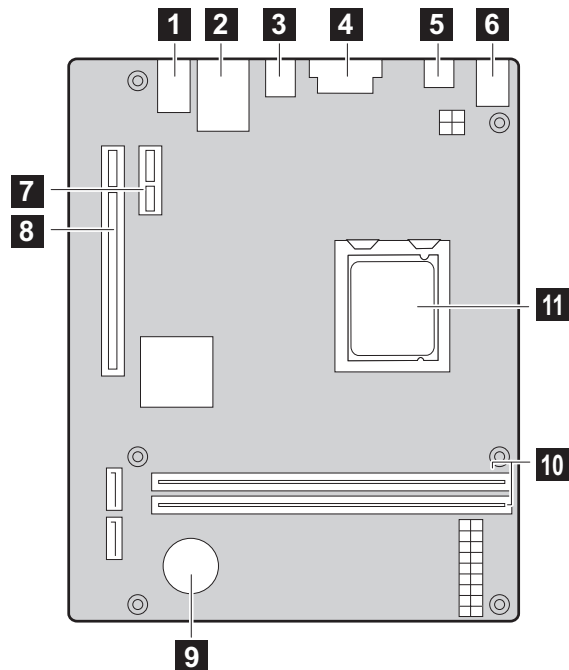


- 1** Rear audio connectors
- 2** Ethernet and USB connectors
- 3** USB connectors
- 4** HDMI port
- 5** On-board VGA connector
- 6** PS/2 mouse and keyboard connectors
- 7** PCI Express x 1 adapter connector

- 8** PCI Express x 16 graphics adapter connector
- 9** Memory connectors
- 10** Battery
- 11** Microprocessor



- 1** Rear audio connectors
- 2** Ethernet and USB connectors
- 3** USB connectors
- 4** On-board VGA connector
- 5** HDMI port
- 6** PS/2 mouse and keyboard connectors
- 7** PCI Express x 1 adapter connector
- 8** PCI Express x 16 graphics adapter connector
- 9** Battery
- 10** Memory connectors
- 11** Microprocessor



- 1** Rear audio connectors
- 2** Ethernet and USB connectors
- 3** USB connectors
- 4** On-board VGA connector
- 5** HDMI port
- 6** PS/2 mouse and keyboard connectors
- 7** PCI Express x 1 adapter connector
- 8** PCI Express x 16 graphics adapter connector
- 9** Battery
- 10** Memory connectors
- 11** Microprocessor

Replacing hardware

8

Attention



Do not remove the computer cover or attempt any repair before reading the “Important safety information” in the *Safety and Warranty Guide* that was included with your computer or in the *Hardware Maintenance Manual* (HMM) for the computer. To obtain copies of the *Safety and Warranty Guide* or HMM, go to the Support Web site at <http://consumersupport.lenovo.com>

Note



Use only parts provided by Lenovo.

General information

Pre-disassembly instructions

Before proceeding with the disassembly procedure, make sure that you do the following:

1. Turn off the power to the system and all peripherals.
2. Unplug all power and signal cables from the computer.
3. Place the system on a flat, stable surface.

Removing the computer cover

Attention



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

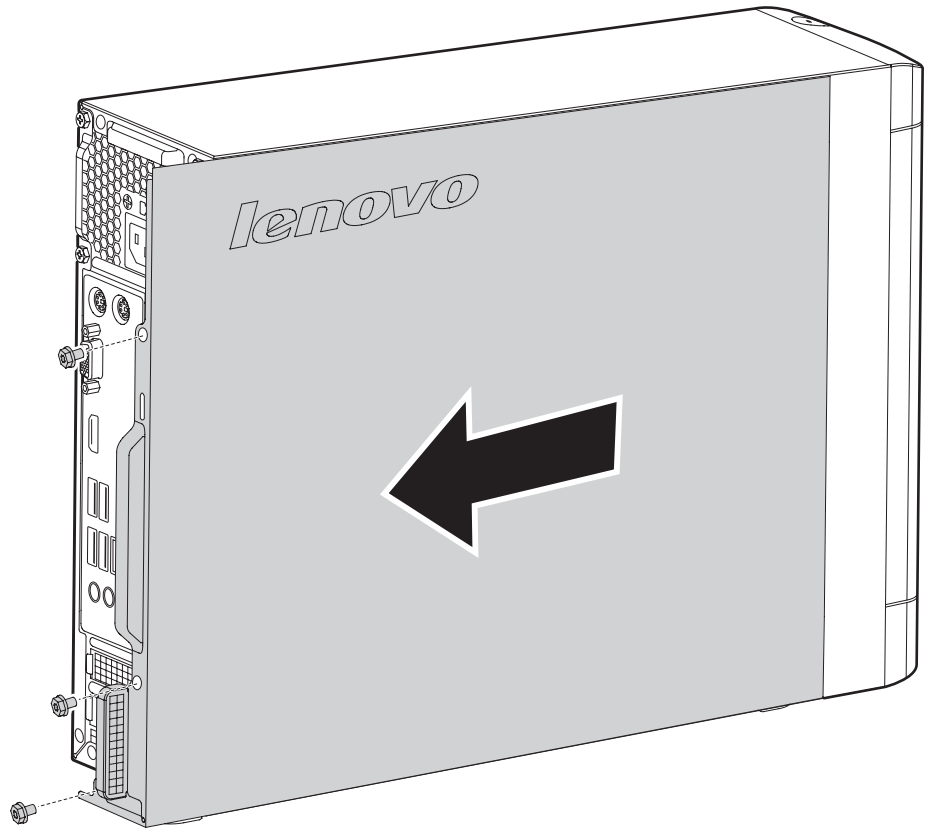
To remove the computer cover:

1. Remove any media (diskettes, CDs, or memory cards) from the drives, shut down your operating system, turn off all attached devices, and the computer.
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. Refer to "Locating connectors on the rear of the computer".
4. Remove the 3 screws that secure the computer cover at the rear of the chassis.
5. Slide the computer cover to the rear of the chassis to remove.

Note



For this procedure, it helps to lay the computer flat.



Removing the front bezel

To remove the front bezel:

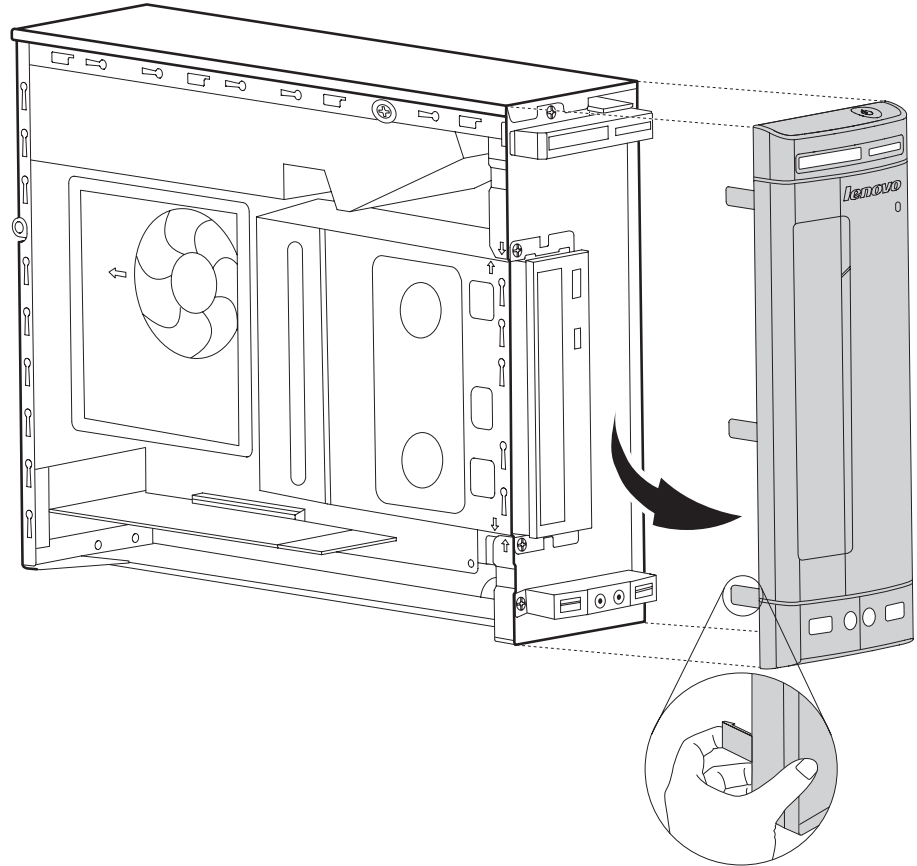
1. Remove the computer cover. Refer to "Removing the computer cover".

Note



For this procedure, it helps to lay the computer on its side.

2. Remove the front bezel by releasing the three plastic tabs inside the chassis and push the bezel outward as shown.



3. To reinstall the bezel, align the plastic tabs on the bottom of the bezel with the corresponding holes in the chassis, and then snap it into position at the bottom and top of the chassis.
4. Install back the computer cover.

Replacing the optical drive

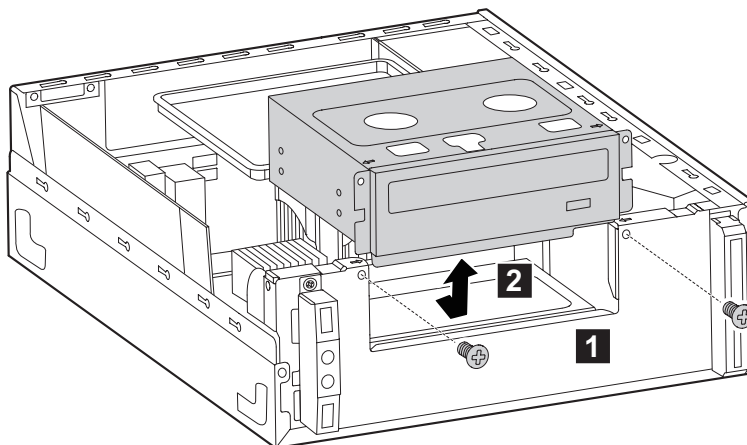
Attention



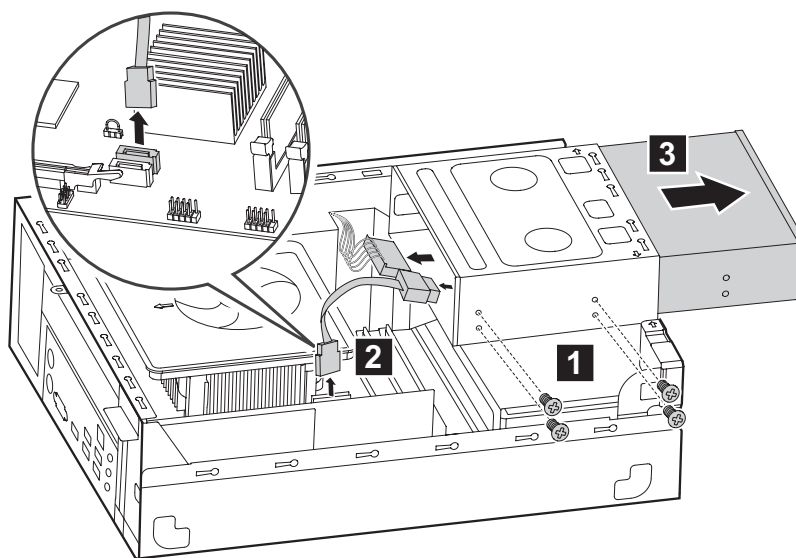
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To replace the optical drive

1. Remove the computer cover. Refer to “Removing the computer cover”.
2. Remove the front bezel. Refer to “Removing the front bezel”.
3. Remove the 2 screws that secure the optical disk bay to the chassis. **1**
4. Slide out then lift up the optical disk drive bay. **2**



5. Disconnect the data and power cables from the rear of the optical drive.
6. Remove the 4 screws that secure the optical drive to the optical disk bay and push the optical drive straight out of the front of the disk bay.



7. Slide the new optical drive into the bay from the front, screw it back to the disk bay.
8. Connect the data and power cables to the drive.
9. Slide in then push the optical disk drive bay back in, and then screw it back to the chassis.
10. Install back the front bezel and computer cover.

Replacing a memory module

Attention



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To replace a memory module:

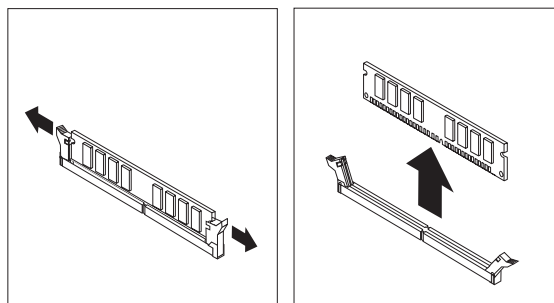
1. Remove the computer cover. Refer to “Removing the computer cover”.

Note

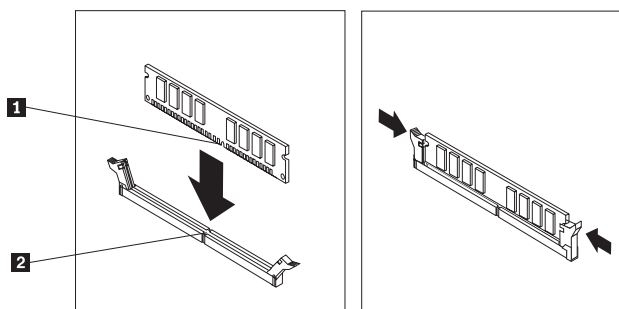


For this procedure, it helps to lay the computer on its side.

2. Remove the front bezel. Refer to “Removing the front bezel”.
3. Remove the optical disk drive bay. Refer to “Replacing an optical drive”.
4. Locate the memory module connectors. Refer to “Locating components”.
5. Remove the memory module being replaced by opening the retaining clips as shown.



6. Position the new memory module over the memory connector. Make sure the notch **1** on the memory 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.



7. Install the optical disk drive bay.
8. Install back the front bezel and computer cover.

Replacing the hard disk drive

Attention

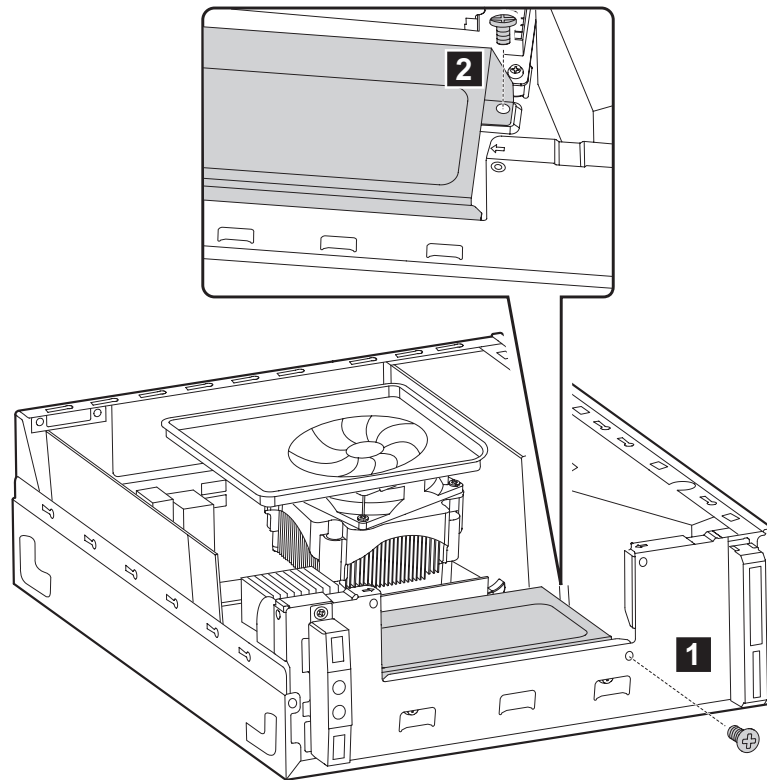


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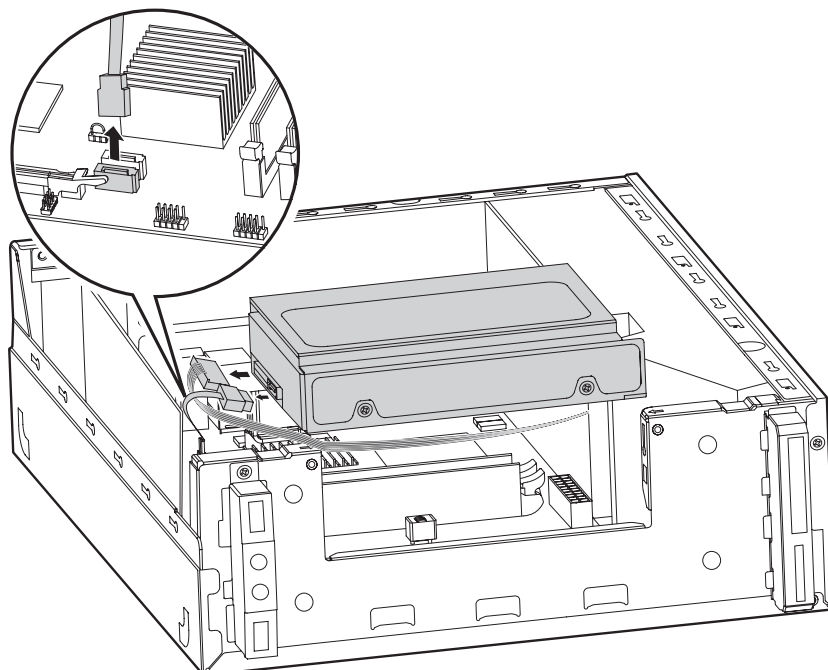
To replace the hard disk drive

1. Remove the computer cover. Refer to "Removing the computer cover".
2. Remove the front bezel. Refer to "Removing the front bezel".
3. Remove the optical disk bay. Refer to "Replacing the optical drive".

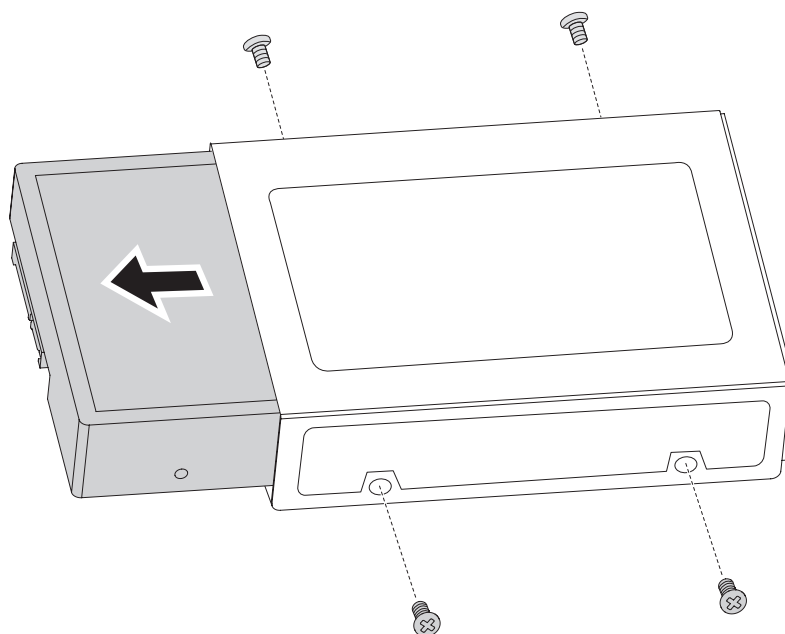
4. Remove the 2 screws that secure the hard disk bay to the chassis.



5. Slide out and then lift up the hard disk drive bay, disconnect the data and power cables from the hard disk drive.



6. Remove the 4 screws that secure the hard disk drive to the hard disk drive bay.
7. Slide the hard disk drive out of the bay.



8. Install the new hard disk drive.
 - (1) Insert the new hard disk drive into the drive bay.
 - (2) Screw back the 4 screws on the drive bay.
9. Connect the data and power cables back to the new hard disk drive.
10. Align then slide in the hard disk drive bay, screw back the 2 screws to chassis.
11. Install the optical drive disk bay.
12. Install back the front bezel and computer cover.

Replacing the system fan

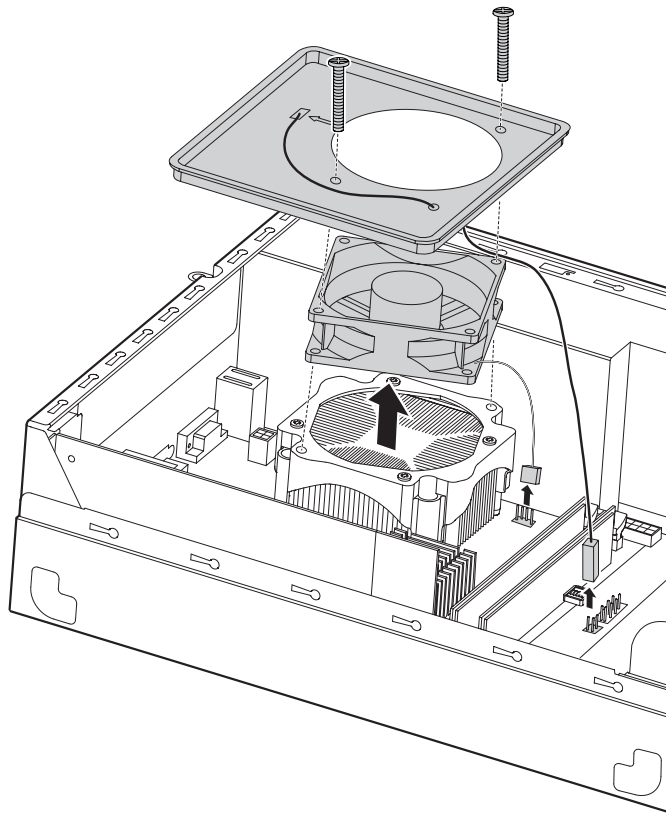
Attention



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To replace the system fan:

1. Remove the computer cover. Refer to "Removing the computer cover".
2. Remove the front bezel. Refer to "Removing the front bezel".
3. Remove the optical disk drive. Refer to "Replacing the optical disk drive".
4. Remove the 2 screws that secure the vent and system fan to the heatsink.
5. Disconnect the power cable from the motherboard.
6. Lift up the system fan.



7. Connect the new fan power cable to the motherboard, align and then screw back the new system fan.
8. Screw back the optical disk drive bay to the chassis.
9. Install back the front bezel and computer cover.

Replacing the heat sink

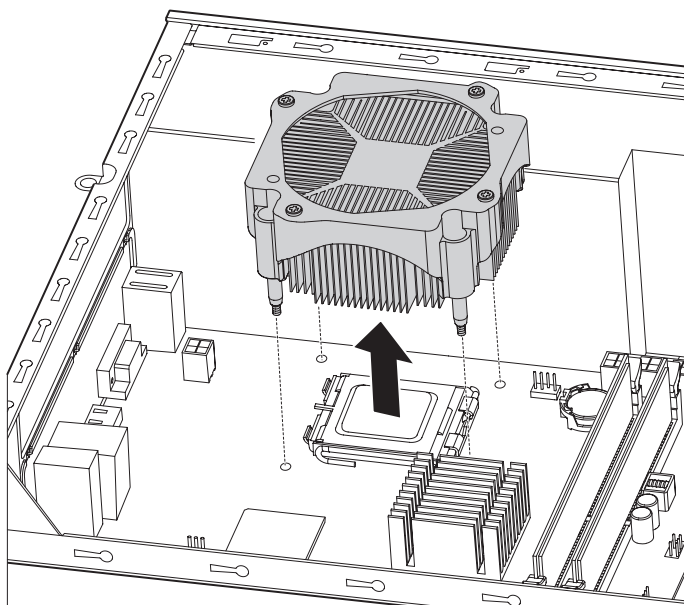
Attention



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To replace the heatsink:

1. Remove the computer cover. Refer to "Removing the computer cover".
2. Remove the front bezel. Refer to "Removing the front bezel".
3. Remove the optical disk drive. Refer to "Replacing the optical disk drive".
4. Remove the system fan. Refer to "Replacing the system fan".
5. Remove the 4 screws that secure the heatsink to the motherboard.
6. Lift up the heatsink.



7. Align then screw in the new heatsink.
8. Install back the system fan back.
9. Screw back the optical disk drive bay to the chassis.
10. Install back the front bezel and computer cover.

Replacing the CPU

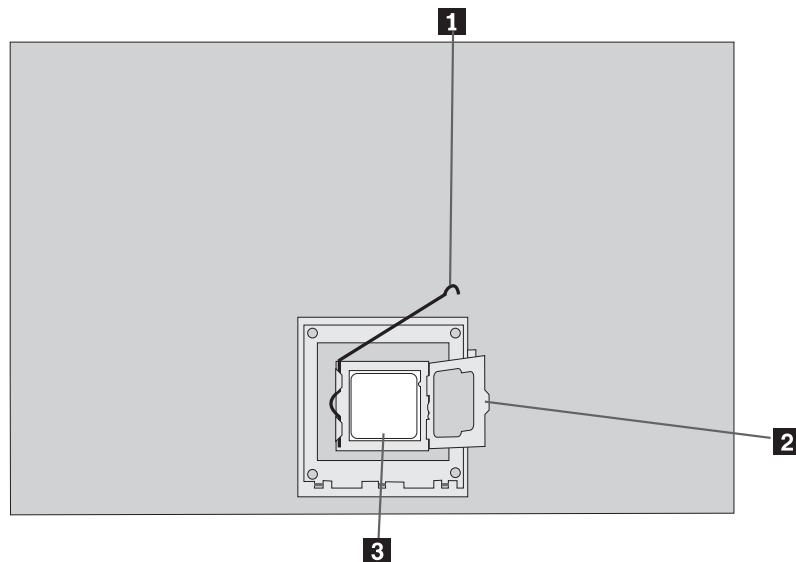
Attention



Do not remove the computer cover or attempt any repair before reading the "Important safety information" in the *Safety and Warranty Guide* that was included with your computer or in the *Hardware Maintenance Manual* (HMM) for the computer. To obtain copies of the *Safety and Warranty Guide* or *HMM*, go to the Support Web site at <http://consumersupport.lenovo.com>

To replace an CPU

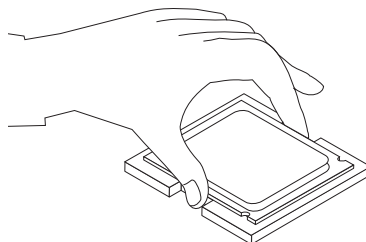
1. Remove the computer cover. Refer to "Removing the computer cover".
2. Remove the front bezel. Refer to "Removing the front bezel".
3. Remove the optical disk drive. Refer to "Replacing the optical disk drive".
4. Remove the system fan. Refer to "Replacing the system fan".
5. Remove the heatsink. Refer to "Replacing the heatsink".
6. To remove the microprocessor **3** from the system board, press then slide the small handle out to spring it up. **1** and open the retainer **2**.



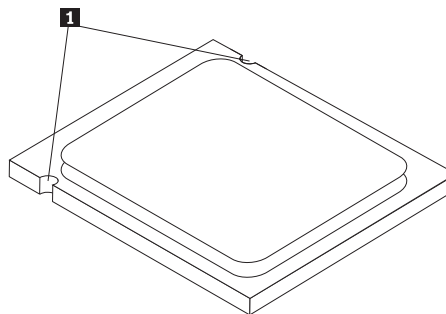
Important

Do not touch the gold contacts on the bottom of the microprocessor. When handling the microprocessor, touch only the sides.

7. Lift the microprocessor straight up and out of the socket.

**Note**

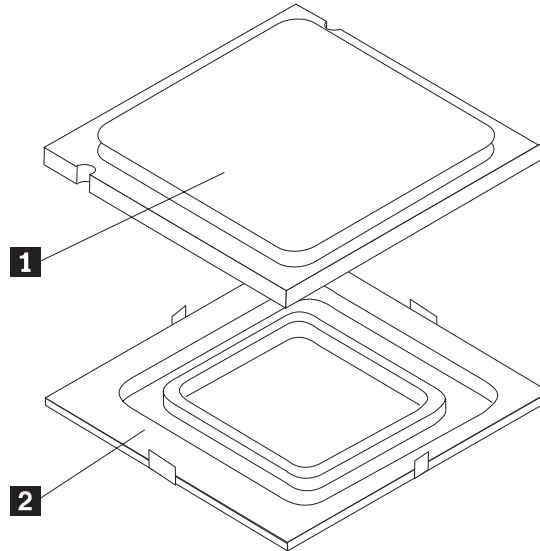
- a. Note the orientation of the notches **1** on the microprocessor. This is important when reinstalling the microprocessor on the new system board.



- 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. Holding the microprocessor with your fingers, remove the protective cover **2** that protects the gold contacts on the new microprocessor **1**.

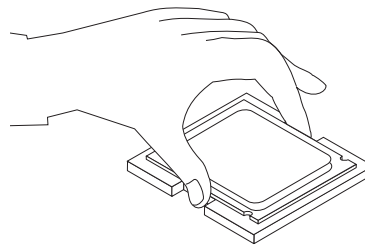


10. Holding the microprocessor with your fingers, position the microprocessor so that the notches on the microprocessor are aligned with the tabs in the microprocessor socket.

Important

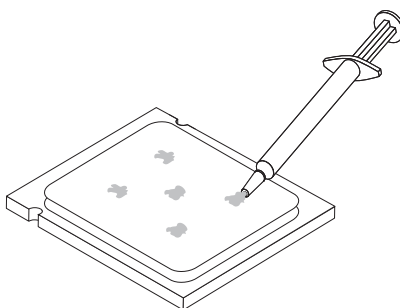
To avoid damaging the microprocessor contacts, do not tilt the microprocessor when installing it into the socket.

11. Lower the microprocessor straight down into the system board socket of the system board.



12. To secure the microprocessor in the socket, close the microprocessor retainer and lock it into position with the small handle.

13. Use the thermal grease syringe to place five drops of grease on the top of the microprocessor. Each drop of grease should be 0.03ml (3 tick marks on the grease syringe).

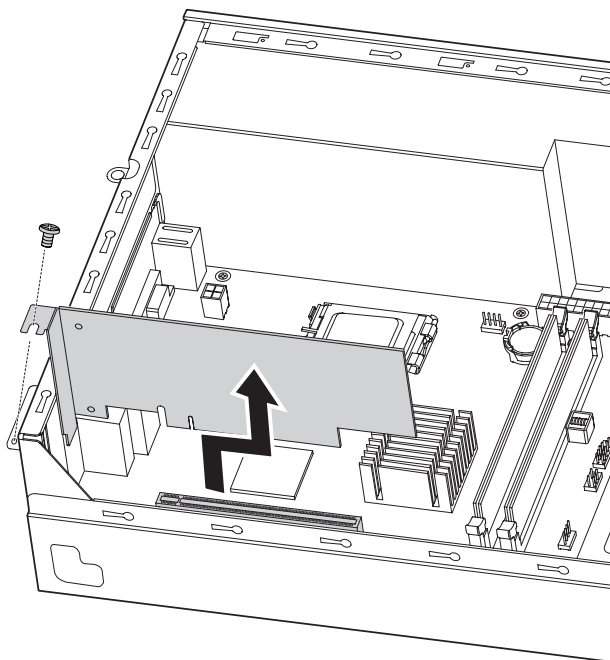


14. Install all the relative parts back.
15. Reattach all the cables back to the motherboard.
16. Install the front bezel and computer cover.

Replacing the graphic card

To replace the graphic card:

1. Remove the computer cover. Refer to “Removing the computer cover”.
2. Remove the screw that secures the graphic card to the chassis.
3. Lift up then slide the graphic card out of chassis.

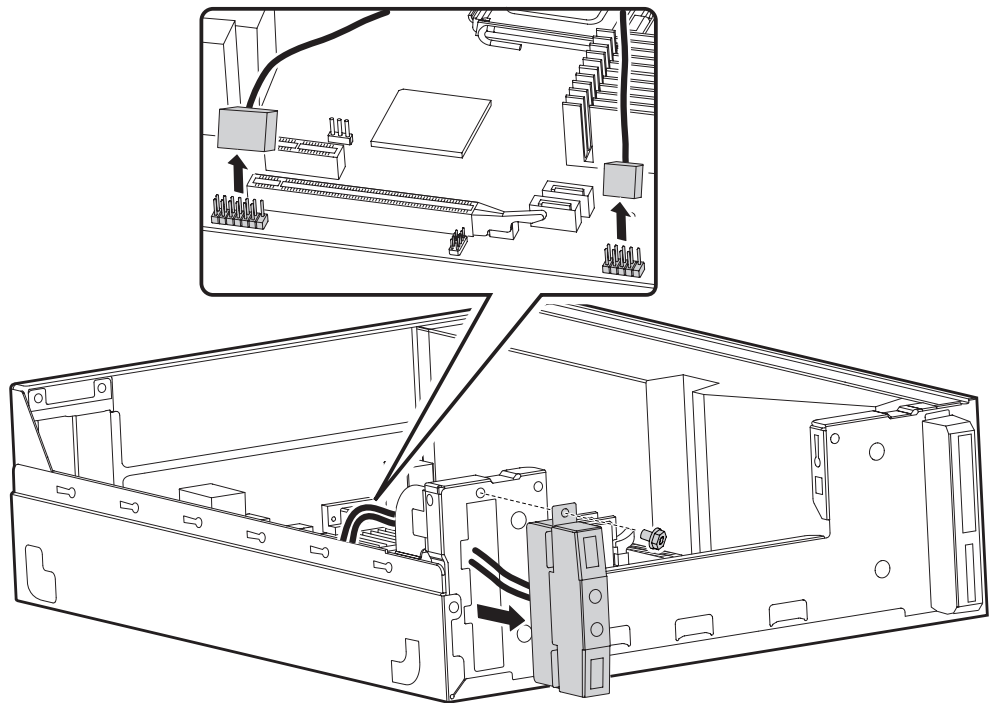


4. Align then insert the new graphic card and screw it in.
5. Install the computer cover.

Replacing the audio & USB connectors

To replace the audio & USB connectors:

1. Remove the computer cover. Refer to “Removing the computer cover”.
2. Remove the front bezel. Refer to “Removing the front bezel”.
3. Remove the graphic card. Refer to “Replacing the graphic card”.
4. Remove the screw that secures the audio & USB connectors to the chassis.
5. Remove the data cables from the motherboard.
6. Slide the audio & USB connectors out of chassis.



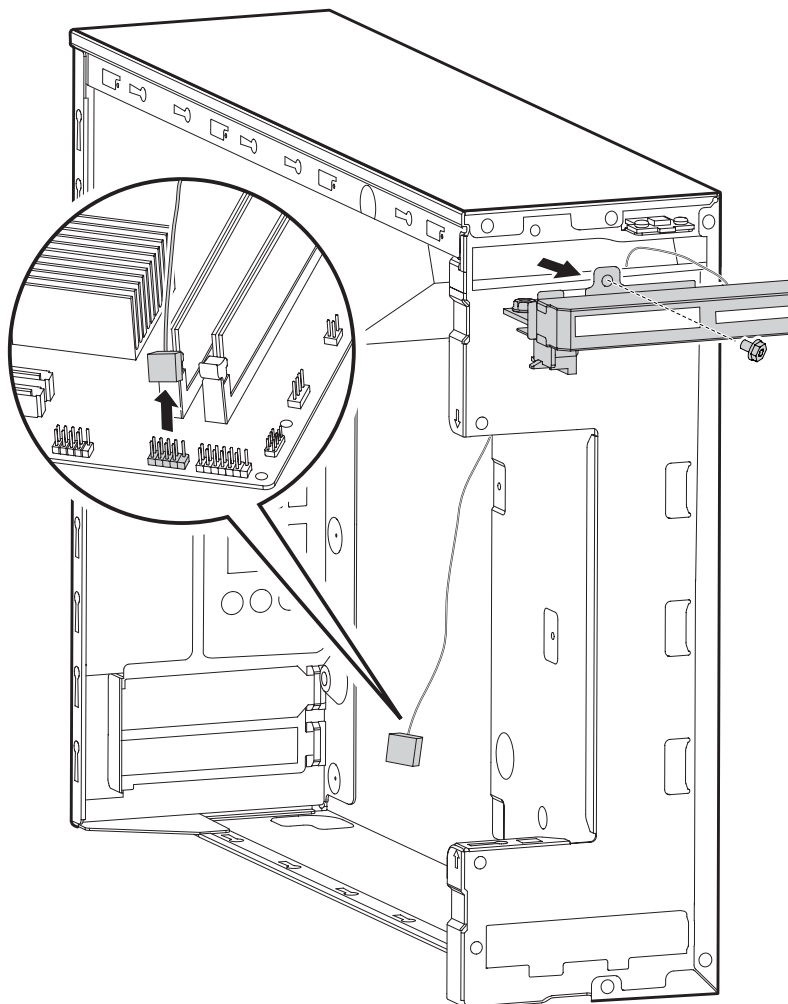
7. Align then insert the new audio & USB connectors and screw it in.
8. Reconnect the data cables to the motherboard.
9. Install the graphic card back.
10. Install the front bezel and computer cover.

Replacing the card reader module

To replace the card reader module:

1. Remove the computer cover. Refer to “Removing the computer cover”.
2. Remove the front bezel. Refer to “Removing the front bezel”.
3. Remove the screw that secures the card reader module to the chassis.

4. Remove the data cable from the motherboard.
5. Slide the card reader module out of chassis.



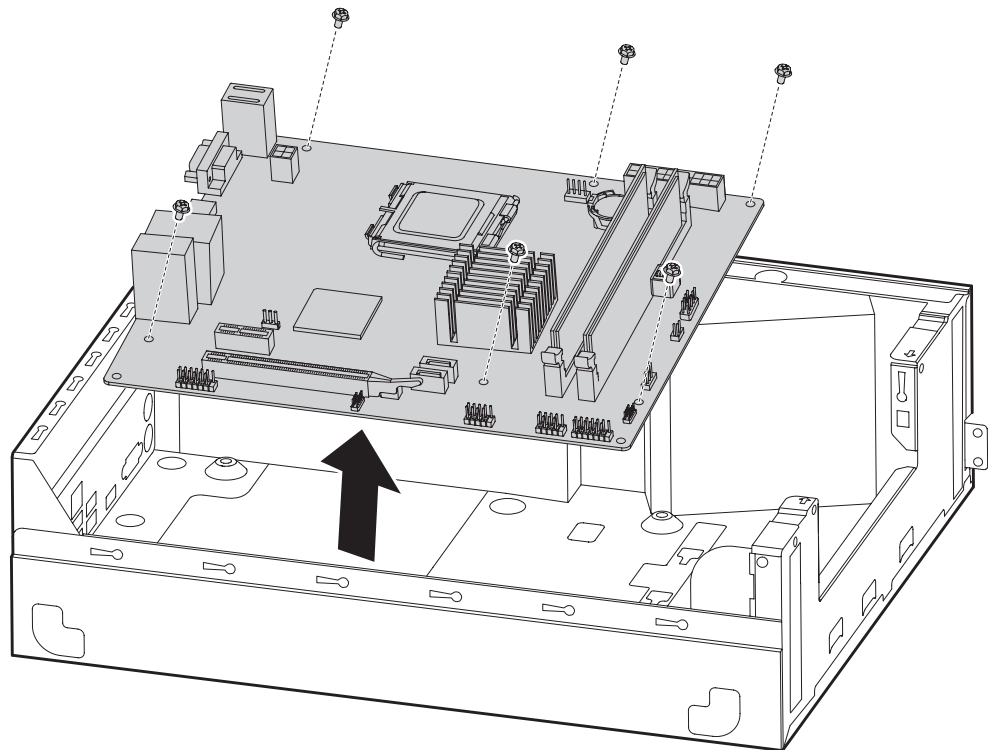
6. Align then insert the new card reader module and screw it in.
7. Reconnect the data cable to the motherboard.
8. Install the front bezel and computer cover.

Replacing the motherboard

To replace the motherboard:

1. Remove the computer cover. Refer to “Removing the computer cover”.
2. Remove the front bezel. Refer to “Removing the front bezel”.
3. Remove the optical disk drive. Refer to “Replacing the optical disk drive”.
4. Remove the memory module. Refer to “Replacing a memory module”.
5. Replacing the hard disk drive. Refer to “Replacing the hard disk drive”.

6. Remove the system fan. Refer to “Replacing the system fan”.
7. Remove the heatsink. Refer to “Replacing the heatsink”.
8. Remove the graphic card. Refer to “Replacing the graphic card”.
9. Remove the CPU. Refer to “Replacing the CPU”.
10. Remove the 6 screws that secure the motherboard to the chassis.
11. Remove all the cables from the motherboard.
12. Slide then lift the motherboard out of chassis.



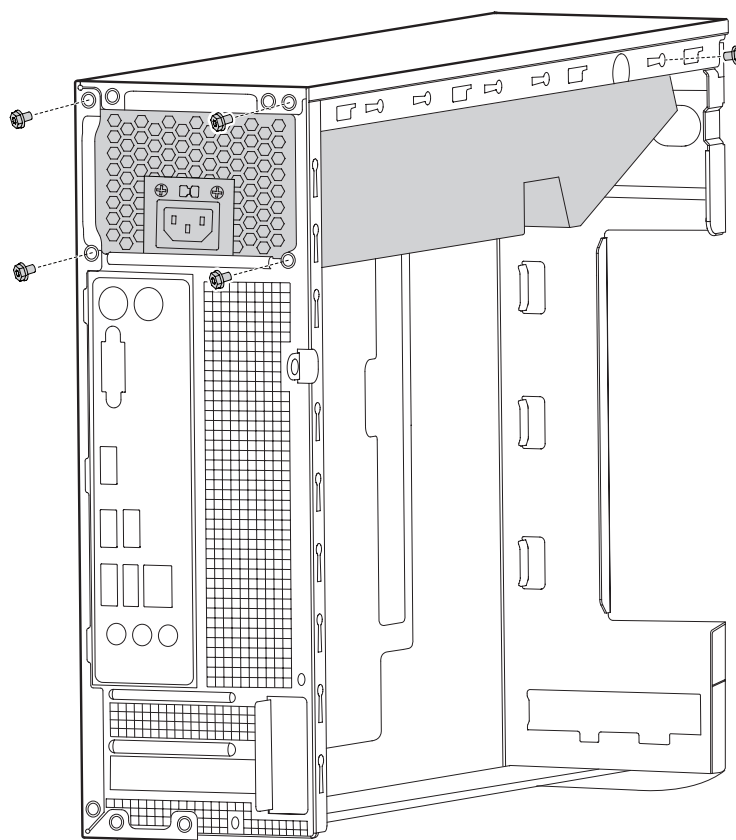
13. Align then insert the new motherboard and screw it in.
14. Reconnect all the cables to the new motherboard.
15. Install all the relative parts back.
16. Install the front bezel and side cover.

Replacing the Power supply

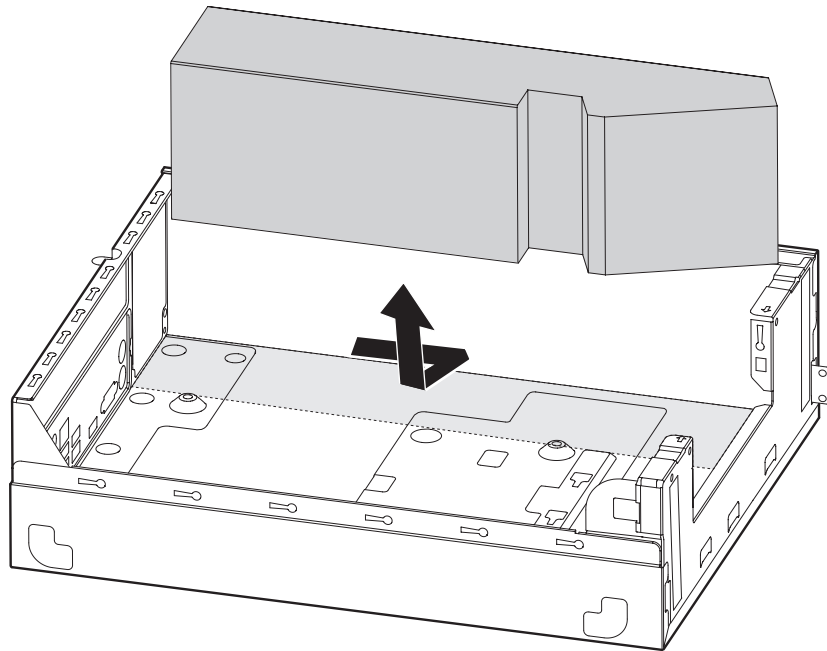
To replace the Power supply:

1. Remove the computer cover. Refer to “Removing the computer cover”.
2. Remove the front bezel. Refer to “Removing the front bezel”.
3. Remove the optical disk drive. Refer to “Replacing the optical disk drive”.
4. Remove the hard disk drive. Refer to “Replacing the hard disk drive”.

5. Remove the system fan. Refer to “Replacing the system fan”.
6. Remove the heatsink. Refer to “Replacing the heatsink”.
7. Remove the memory module. Refer to “Replacing a memory module”.
8. Remove the graphic card. Refer to “Replacing the graphic card”.
9. Remove the CPU. Refer to “Replacing the CPU”.
10. Remove the motherboard. Refer to “Replacing the motherboard”.
11. Remove the 5 screws that secure the Power supply to the chassis.



12. Slide then lift the Power supply out of chassis.



13. Align then insert the new Power supply and screw it in.
14. Install all the relative parts back and reattach all the cables back.
15. Install back the front bezel and computer cover.

Replacing the keyboard

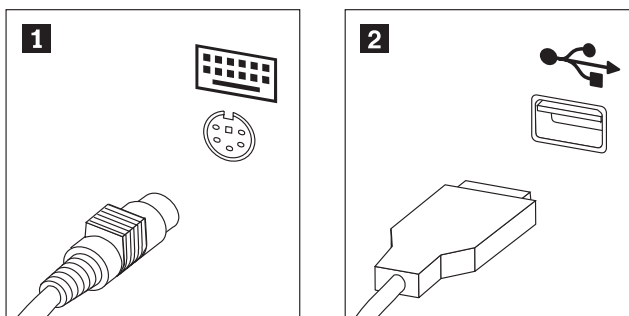
To replace the keyboard:

1. Remove any media (diskettes, CDs, or memory cards) from the drives, shut down your operating system, and turn off all attached devices and the computer.
2. Unplug all power cords from electrical outlets.
3. Locate the connector for the keyboard. Refer to "Locating connectors on the rear of the computer" and "Locating connectors on the front of the computer".

Note



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.



4. Disconnect the failing keyboard cable from the computer and connect the new keyboard cable to the same connector.

Replacing the mouse

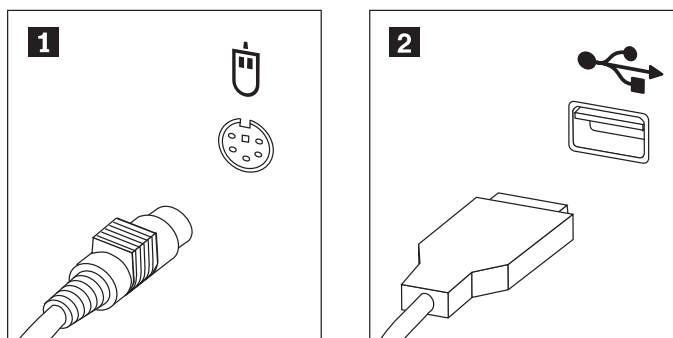
To replace the mouse:

1. Remove any media (diskettes, CDs, or memory cards) from the drives, shut down your operating system, and turn off all attached devices and the computer.
2. Unplug all power cords from electrical outlets.
3. Locate the connector for the mouse. Refer to "Locating connectors on the front of the computer" and "Locating connectors on the rear of the computer".

Note



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.



4. Disconnect the failing mouse cable from the computer.
5. Connect the new mouse cable to the connector.

Additional Service Information



This chapter provides additional information that the service representative might find helpful.

Power management

Power management reduces the power consumption of certain components of the computer such as the system power supply, processor, hard disk drives, and some monitors.

Automatic configuration and power interface (ACPI) BIOS

Being an ACPI BIOS system, the operating system is allowed to control the power management features of the computer and the setting for Advanced Power Management (APM) BIOS mode is ignored. Not all operating systems support ACPI BIOS mode.

Automatic Power-On features

The Automatic Power-On features within the Power Management menu allow you to enable and disable features that turn on the computer automatically.

- **Wake Up on LAN:** This feature allows PCI or PCI-E LAN that support this capability to wake the system.
- **Wake Up Alarm:** You can specify a date and time at which the computer will be turned on automatically. This can be either a single event or a daily event.

Statement



Thanks for using Lenovo products.

Carefully read all of the documents shipped with your computer before you install and use the product for the first time. Lenovo will not assume responsibility for damage that results from failure to operate the product according to instructions and requirements described in the manuals included with your computer. Lenovo will not assume responsibility for any loss caused except that caused by the installation or operations carried out by Lenovo professional service staff.

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All of the manuals included with your computer are provided to help you use Lenovo products appropriately, but do not provide any description of the software/hardware configuration for the product. For the configuration of the product, refer to related contract (if any), product packing list for the product or retailer.

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The software and hardware configuration included with your computer depends on the actual configuration of the computer and may differ from other similar models.

Customers are welcome to contact us for any inconsistency between the product and the manuals included with your computer. For the latest information or any questions or comments, please visit consumer support website at:

<http://consumersupport.lenovo.com>

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