

Lenovo

IdeaCentre D400 Series

Hardware Maintenance Manual

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About this manual



This manual contains service and reference information for Lenovo IdeaCentre A 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://consumersupport.lenovo.com>.

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.

Veillez 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。

Using eSupport

For Key Commodities (Examples - hard disk drive, system board, microprocessor, LCD, and memory)

- eSupport can be used to view the list of key commodities built in a particular machine serial.
- eSupport can be accessed at the following Web site:
<http://consumersupport.lenovo.com>
- To view the key commodities:
 1. Click **Parts information**.
 2. Under Parts information, click **Parts lookup**.
 3. Under Parts lookup, type the model type and serial number; then click **Continue**.

The key commodities are returned in the eSupport record under Parts shipped with your system.

For the remaining FRUs (the complete list of FRUs at the MT Model level)

- eSupport can be used to view the complete list of FRUs for a machine type and model.
- To view the complete list of FRUs for a machine type:
 1. Point your browser to <http://consumersupport.lenovo.com>.
 2. Type the machine type (Example: 8129) in the Use Quick Path field; then click **Go**.
 3. Under Browse by product, click **Continue**.
 4. Under Important information, click **Parts information**.
 5. In the Refine results field, select Service parts; then click the entry for your machine type.

The list of service parts by description, with applicable machine type model and FRU part number is displayed.

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 A 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

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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 Lenovo IdeaCentre Q500 Series

This section lists the physical specifications.

Environment

Air temperature:

Operating: 10° to 35°C (50° to 95°F)

Transit: -40° to -60°C (-40° to 140°F)

Humidity:

Operating: 20% to 80% (non-condensing)

Transit: 20% to 90% (non-condensing)

Electrical input

Input voltage: 100 ~ 127 V or 200 ~ 240V

Input frequency: 47Hz to 63Hz

General checkout

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Attention

The drives in the home center 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 the home center to boot up in quiet mode (no beep, no memory count, no error codes, and checkpoint code display) when no errors are detected by POST.
- 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 home center and all external devices.
2. Check all cables and power cords.
3. Power-on all external devices.
4. Power-on the home center.
 - Inspect the LED indicators on the front panel, which can indicate the malfunction. See the User Guide for information about the LED indicators.
 - Look for displayed error codes. Refer to “POST error codes”.
 - Look for readable instructions or a main menu on the display.
 - If you did not receive the correct response, proceed to step [5](#).
 - If you do receive the correct response, proceed to step [7](#).

5. Look at the following conditions and follow the instructions:
 - If an error code is displayed during POST, go to “POST error codes”
 - If the home center hangs and no error is displayed, continue to step 7.
6. Inspect internal components and cables
 - a. Power off the home center and all external devices.
 - b. Unplug all cables and power cord.
 - c. Place the home center on a flat, stable surface.
 - d. Remove the cover. Refer to “Removing the cover”.
 - e. Verify that components are properly seated.
 - f. Verify that all cable connectors inside the system are firmly and correctly attached to their appropriate connectors.
 - g. Replace the cover.
 - h. Power on the home center.
7. If you cannot continue, replace the last device tested.

Checkout procedure

The checkout procedure is the sequence of tasks that you should follow to diagnose a problem in the home center.

Before performing the checkout procedure for diagnosing hardware problems, review the following information:

- Read the safety information. Go to “Safety information”.
- The diagnostic program provides the primary methods of testing the major components on the home center, such as the hard disk drives, fan, memory module, processor and system temperature, voltage, and hard disk drive backplane. If you are not sure whether a problem is caused by the hardware or by the software, you can use the diagnostic program to confirm that the hardware is working correctly.

Diagnostic process

You can run the diagnostic program to determine a problem with the home center.

Note












































Run the diagnostic program from the USB flash device.

To run the diagnostic program, perform the following steps:

1. Power-off the home center and all external devices.
2. Plug the bootable USB flash device to any USB connector on the rear of the home center.
3. Press the Power button to turn on the home center. The HDD access indicator blinks blue.
4. After 3 seconds, press and release the recovery/reset button with the paper clip end. The system status indicator blinks red.
5. After the HDD 1 status indicator lights purple, scan the serial number.
6. When the HDD 3 status indicator lights purple, scan the employee number. The diagnostic process will now start in the following sequence:
 - a. Onboard flash check
 - b. HDD disk account check
 - c. DIMM size check (1024 or 2048 MB)
 - d. Fan speed check
 - e. System board voltage
 - f. Backplane temperature

- g. PQAF system test
- h. PQAF memory test
- i. PQAF HDD test
- j. Read serial number from DMI data
- k. Pass

During the diagnostic process, the result of the test displays on the HDD status indicators. The indicator(s) blinks blue when the system has passed each diagnostic test and blinks red when an error condition occurs.

Test items	HDD status indicators (pass)				HDD status indicators (fail)			
	HDD 1	HDD 2	HDD 3	HDD 4	HDD 1	HDD 2	HDD 3	HDD 4
Onboard flash check								
HDD disk account check								
DIMM size check (1024 or 2048 MB)								
Fan speed check								
CPU temperature check								
System board voltage								
Backplane temperature								
PQAF system test								
PQAF memory test								
PQAF HDD test								
Read serial number from DMI data								
Pass								

7. After the diagnostic routine is completed, the HDD status indicator lights purple indicating the system passed all diagnostic tests.
8. A copy of the test result will be saved as a log file and stored in the Results folder. The name of the log file is based on the last 8 bytes of the serial number (i.e. 00000181.LOG).

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

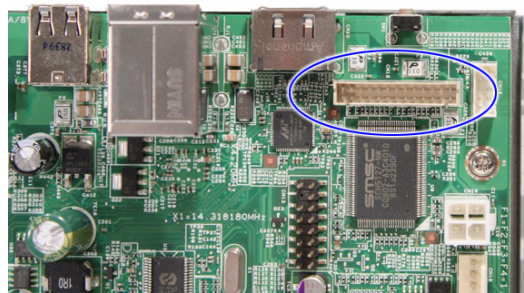
5

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

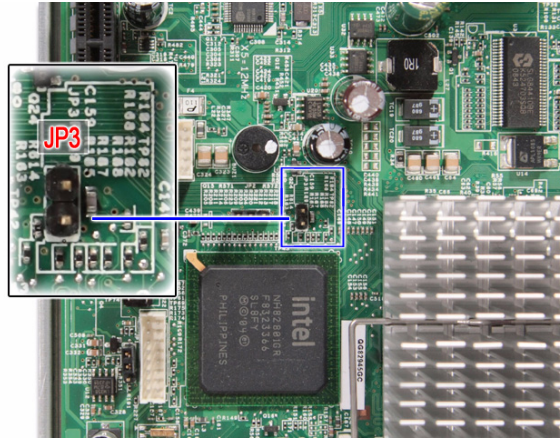
Starting the Setup Utility program

To start the Setup Utility program, do the following:

1. Power off the home center and all external devices.
2. Unplug all cables and power cord.
3. Place the system unit on a flat, stable surface.
4. Remove the cover. Refer to “Removing the cover”.
5. Connect the debug board cable to the debug board connector on the system board.



6. Locate the JP3 Debug/User mode jumper on the system board.



7. Close the jumper to enable system for debug mode.
8. Connect the power cable to the rear panel.
9. Connect a USB keyboard to the debug board.
10. Connect a monitor to the debug board.
11. Restart the home center.
12. Turn on the monitor.
13. During POST, press **F2**.
If you fail to press **F2** before POST is completed, you need to restart the server.
The Setup Main menu will be displayed showing the Setup's menu bar. Use the left and right arrow keys to move between selections on the menu bar.

Using device

All USB controllers

The All USB controllers option in the Setup Utility program allows you to enable or disable the onboard USB controller. The default is set to Enabled.

To enable all USB controllers:

1. Start the Setup Utility program. See "Starting the Setup Utility program".
2. From the Setup Utility program menu, select **Advanced > Advanced Chipset Control > Integrated Device Control Sub-Menu**.
3. Select **All USB controllers**.
4. Select **Enabled**, then press **Enter**.
5. Return to the Setup Utility program menu and press **F10** to save configuration changes and exit setup.

Serial ATA

Enables or disables the onboard SATA ports. The default is set to Enabled.

To enable the onboard SATA ports:

1. Start the Setup Utility program. See “Starting the Setup Utility program”.
2. From the Setup Utility program menu, select **Advanced > Advanced Chipset Control**.
3. Select **Serial ATA**.
4. Select **Enabled**, then press **Enter**.
5. Return to the Setup Utility program menu and press **F10** to save configuration changes and exit setup.

Note

If you do not want to save the settings, select Exit Discarding Changes from the Exit menu.

Selecting a startup device

If the home center does not start up (boot) from the hard disk, use the procedure below to startup the device.

Selecting or changing the startup device sequence

To view or permanently change the configured startup device sequence:

1. Start the Setup Utility program. See “Starting the Setup Utility program”.
2. From the Setup Utility program menu, select **Boot**.
3. Set the drive priority during system boot-up.
4. Return to the Setup Utility program menu and press **F10** to save configuration changes and exit setup.

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 **Exit Saving Changes** 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• Switch connector• System Board Power Supply connectors	Reseat connectors
Check the power cord for continuity	Power Cord
Check the power-on switch for continuity.	Power-on Switch

BIOS crisis recovery

When the home center's BIOS fails or image crashes, the system status indicator blinks blue and purple. You can use the bootable USB flash device to recover the system BIOS.

To recover a damaged BIOS:

1. Power-off the home center and all external devices.
2. Plug the bootable USB flash device to any USB connector on the rear of the home center.
3. Press the power button.
4. System BIOS recovery is initiated. The system status indicator blinks blue and purple.

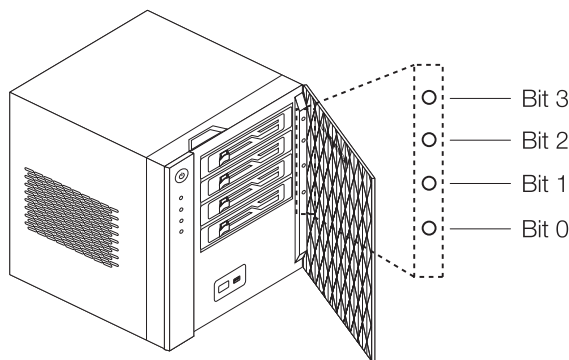
POST error codes

Each time you power-on the home center, it performs a series of tests that check the operation of the home center 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
- Verifies that the boot drive is working





If the POST detects a problem with a hardware component, the HDD status LED indicators on the front panel will blink a series of codes.



The following table describes the POST error codes and suggested actions to correct the detected problem.

Operating condition	Error code				Description/Action
	Bit 0	Bit 1	Bit 2	Bit 3	
During system boot					<p>SATA controller failed</p> <ol style="list-style-type: none">1. Reseat the following components:<ul style="list-style-type: none">- Hard disk drive- Cable from the hard disk drive backplane to the system board2. Replace the following components one at a time, in the order shown, restarting the home center each time:<ul style="list-style-type: none">- Hard disk drive- Cable from the hard disk drive backplane to the system board- Hard disk drive backplane- System board

Operating condition	Error code				Description/Action
	Bit 0	Bit 1	Bit 2	Bit 3	
					USB controller failed 1. Make sure that the correct drivers are installed and they are at the latest level. 2. Remove and reinstall the driver. Before you remove any drivers, make sure that none of your USB devices are connected to the home center. 3. Make sure the front USB port cable is installed correctly.
					LAN controller failed 1. Make sure that the correct drivers are installed and they are at the latest level. 2. Make sure that the Ethernet cable is installed correctly. 3. Check the network LED on the front panel of the home center. The network LED indicates whether there is a problem with the connector or cable. See the User Guide for information about the network LED. 4. Check the LAN activity LED on the rear panel. See the User Guide for information about the LAN activity LED.
					Fan failed 1. Make sure the connector on the fan is not damaged. 2. Make sure the fan connector on the hard disk drive backplane is not damaged. 3. Make sure the fan is properly installed. See "Removing the fan". 4. Replace the fan.
					Memory failed 1. Make sure the DIMM is installed correctly. See "Replacing the memory module". 2. Reseat the DIMM. 3. Replace the DIMM.
					Boot device not found 1. Replace the following components one at a time, in the order shown, restarting the home center each time: <ul style="list-style-type: none"> - Hard disk drive - Cable from the hard disk drive backplane to the system board - Hard disk drive backplane

Operating condition	Error code				Description/Action
	Bit 0	Bit 1	Bit 2	Bit 3	
After system boot					<p>Hard disk drive failed</p> <ol style="list-style-type: none">1. Reseat the following components:<ul style="list-style-type: none">- Hard disk drive- Cable from the hard disk drive backplane to the system board2. Replace the following components one at a time, in the order shown, restarting the home center each time:<ul style="list-style-type: none">- Hard disk drive- Cable from the hard disk drive backplane to the system board- Hard disk drive backplane- System board

Undetermined problems

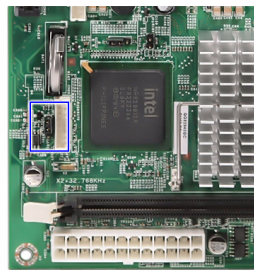
If the diagnostic tests did not diagnose the failure or if the home center is inoperative, use the information in this section.

If you suspect that a software problem is causing failures, see the User Guide.

Damaged data in CMOS memory can cause undetermined problems. To reset the CMOS data, use the CMOS jumper to clear the CMOS memory.

To reset the CMOS data:

1. Power off the home center and all external devices.
2. Unplug all cables and power cord.
3. Place the home center on a flat, stable surface.
4. Remove the cover. Refer to "Removing the cover".
5. Locate the JP1 CMOS jumper on the system board.



6. Move the jumper cap from pins 1-2 (normal) to pins 2-3 (clear CMOS).
7. Keep the jumper cap on pins 2-3 for 5 to 10 seconds, then move it back to pins 1-2.
8. Replace the cover.
9. Plug in the power cord.
10. Turn on the home center.

Check the LED indicators on the front panel, which can indicate the malfunction. See the User Guide for information about the LED indicators.

If the LEDs indicate that the home center is not working correctly, complete the following steps.

1. Power-off the home center.
2. Remove or disconnect the following components (if installed) one at a time.
 - a. Any external devices
 - b. Any adapters
 - c. Hard disk drives
 - d. Memory module
 - e. Fan module

3. Power-on the home center 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.

Replacing hardware

7

Attention



Do not remove the 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

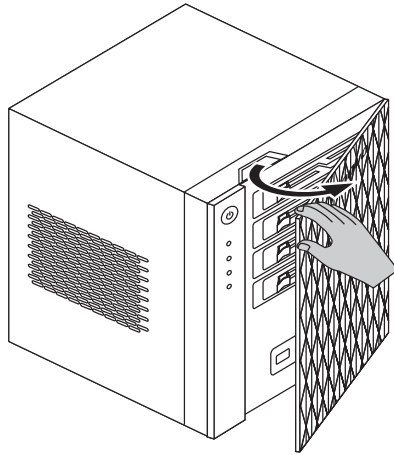
Before proceeding with the disassembly procedure, make sure that you do the following:

1. Power-off the home center and all external devices.
2. Unplug all cables and power cords.
3. Place the home center on a flat, stable surface.

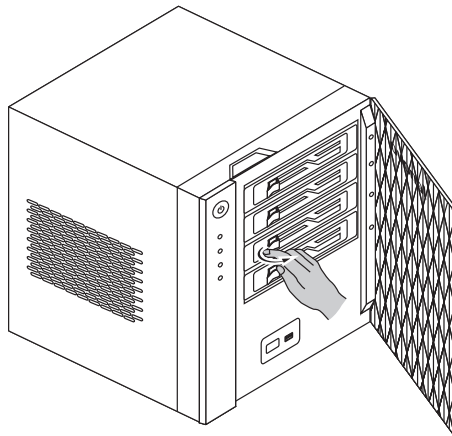
Replacing the hard disk drive

To replace the hard disk drive

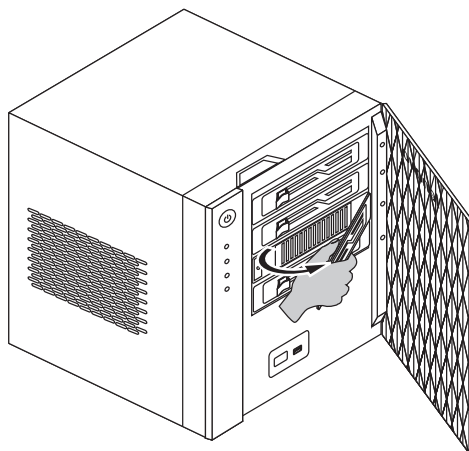
1. Open the door of the home center.



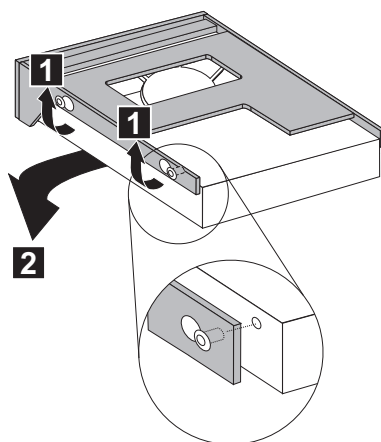
2. Remove the HDD carrier by pressing the HDD carrier latch.



3. Pull the lever and slide the HDD carrier from the chassis.

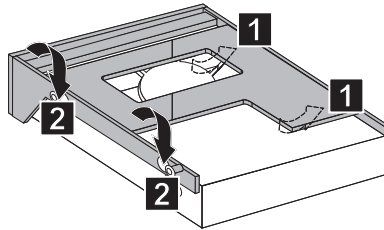


4. Remove the HDD from the carrier.
 - (1) Gently pry open the left side rail.
 - (2) Remove the drive from the carrier.

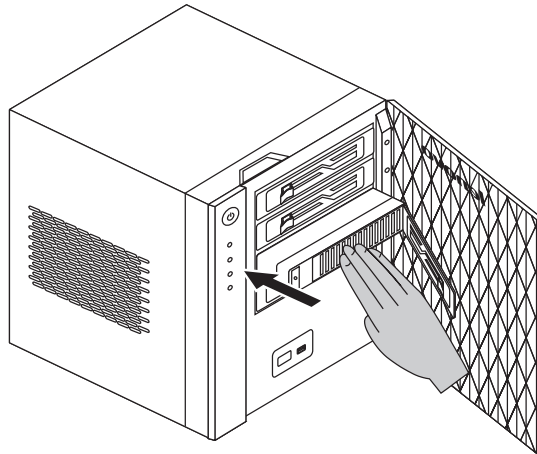


5. Install the new HDD into the carrier.

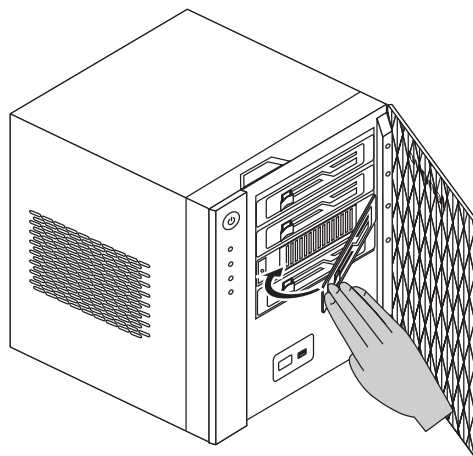
- (1) Insert the new drive into the right side of the carrier, aligning the pins with the HDD's mounting holes.
- (2) Slightly bend the left side rail and insert the pins into the HDD's mounting holes.



- (3) With the lever still extended, slide the carrier all the way into the drive bay. Do not push the lever until it begins to close by itself.



- (4) Use the lever to push the carrier until it docks into place, then close the lever.



Removing the cover

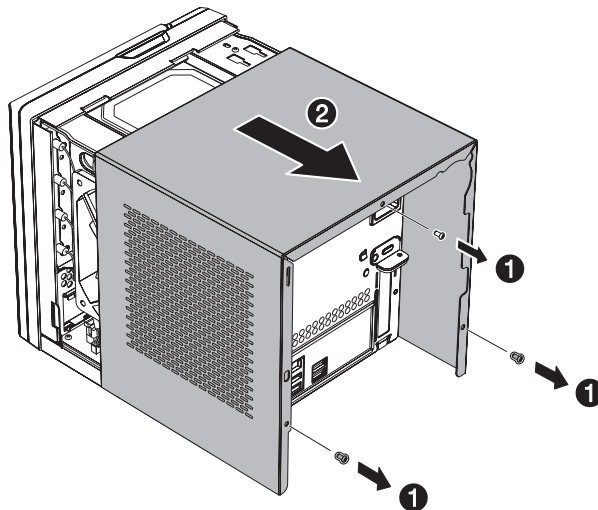
Attention



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

To remove the cover

1. Read the safety information in the User Guide document.
2. Unplug all power cords from electrical outlets.
3. Disconnect all cables attached to the home center. This includes power cords, input/output (I/O) cables, and any other cables that are connected to the home center.
4. Remove the cover.
 - (1) Remove the three screws located on the rear panel.
 - (2) Slide the cover toward the rear of the server, then lift the cover off the home center.

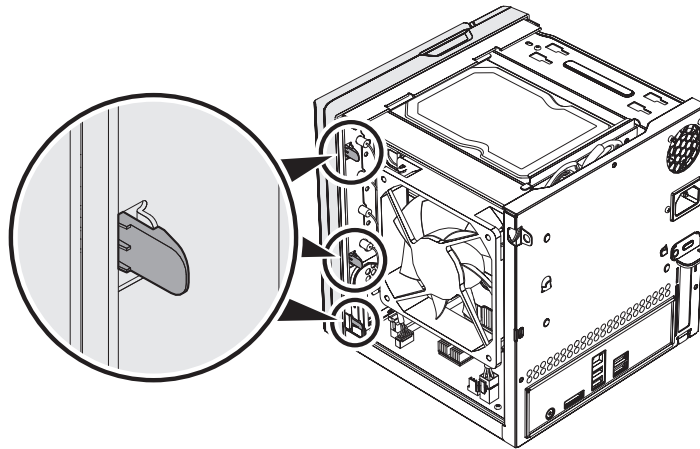


5. Set the cover aside.

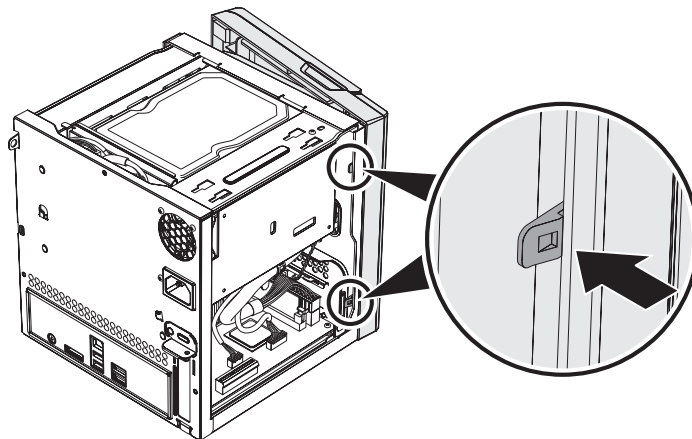
Replacing the front bezel

To replace the front bezel

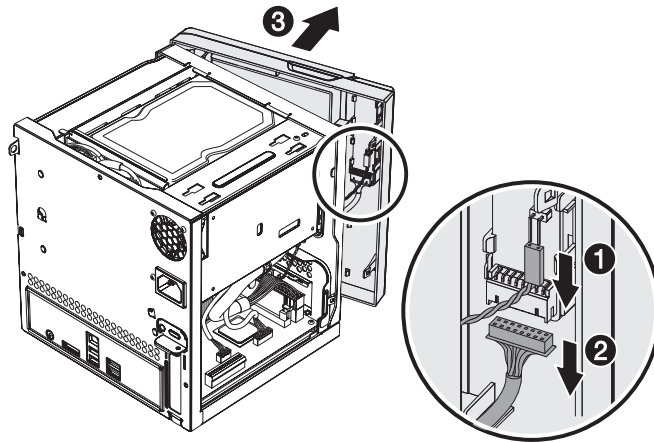
1. Remove the cover. Refer to “Removing the cover”.
2. Slightly press the right-side retention tabs and gently push in to release the bezel from the home center, as shown.



3. Do the same on the other side.



4. Disconnect the switch cable (1) and the I/O LED cable (2) from the front panel LED board.
5. Remove the bezel and set it aside (3).



6. Reconnect the switch and I/O LED cables to the front panel LED board on the new front bezel.
7. Align the bezel tabs with the notches on the front of the home center, then snap the bezel in place.
8. Refer to “Completing the installation”.

Removing the fan

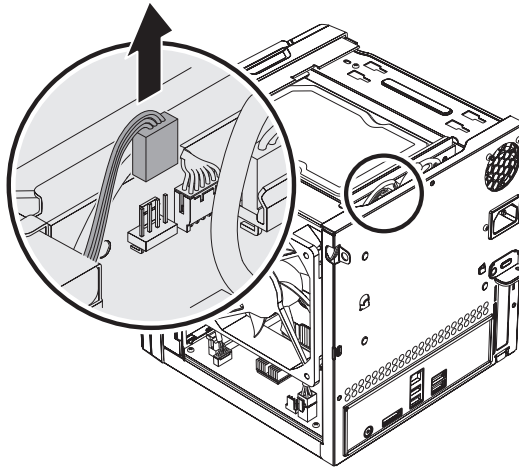
Attention



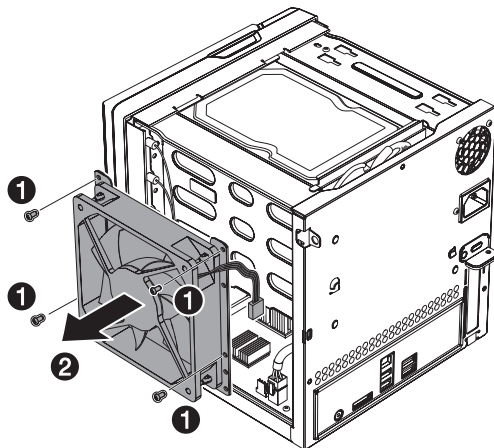
Do not remove the cover or attempt any repair before reading the “Important safety information” in the Safety and Warranty Guide that was included with your computer or in the Hardware Maintenance Manual (HMM) for the home center. To obtain copies of the Safety and Warranty Guide or HMM, go to the Support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

To replace the fan

1. Remove the cover. Refer to “Removing the cover”.
2. Disconnect the fan cable attached to the hard disk drive backplane.



3. Remove the four screws (1) that secure the fan to the home center chassis.
4. Remove the fan (2) from the home center.

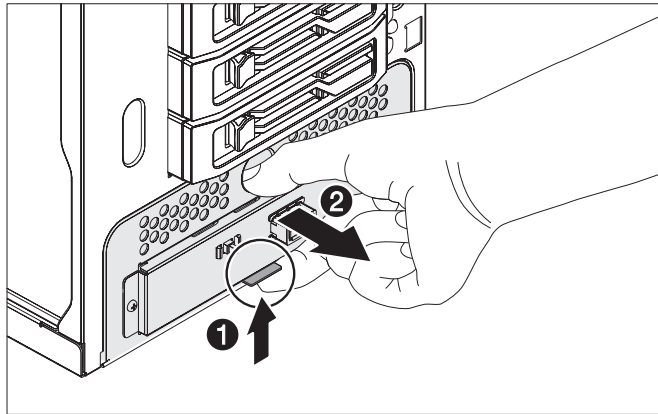


5. Align the four screw holes on the new fan to the four mounting holes on the home center chassis.
6. Secure the new fan with four screws.
7. Reconnect the fan cable to the hard disk drive backplane.
8. Refer to "Completing the installation".

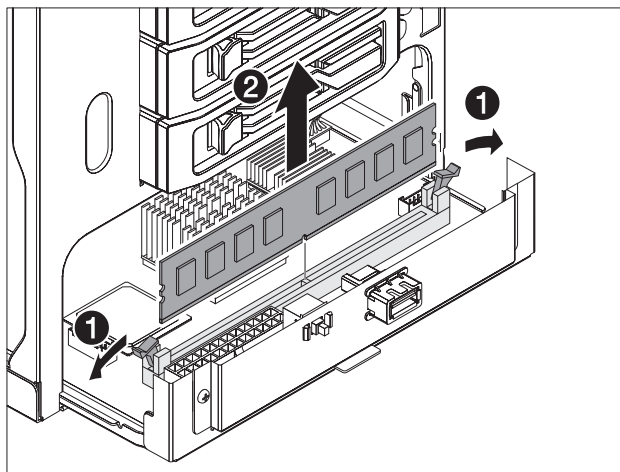
Replacing the memory module

To replace the memory module

1. Remove the cover. Refer to “Removing the cover”.
2. Remove the front bezel. Refer to “Replacing the front bezel”.
3. Slide the system board tray out of the home center chassis.
 - (1) Insert your thumb into the thumb hole, then press in the tab to release the system board tray.
 - (2) Pull the tray out until you can gain access to the memory connector.



4. Remove the memory module.
 - (1) Open the retaining clips on both sides of the memory connector to release the memory module.
 - (2) Lift the memory module from the connector.

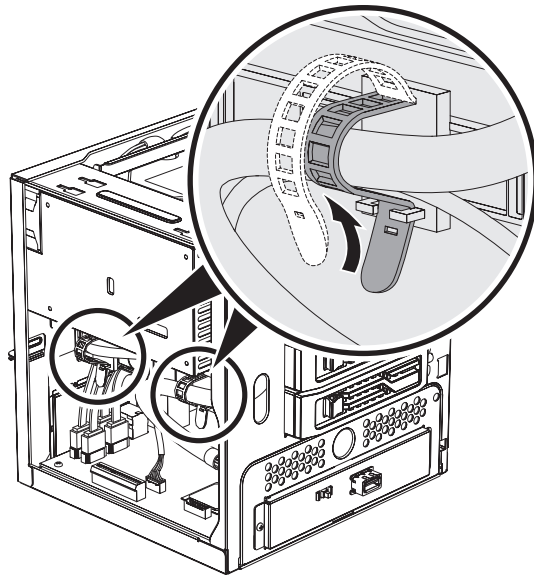


5. Install the new memory module.
 - (1) Align then insert the new memory module into the connector.
 - (2) Push down on the top edge of the memory module. Make sure the retaining clips latches lock the memory module in place.
6. Slide the system board tray into the chassis.
7. Replace the front bezel. Refer to step 7 of the “Replacing the front bezel”.
8. Refer to “Completing the installation”.

Replacing the power supply

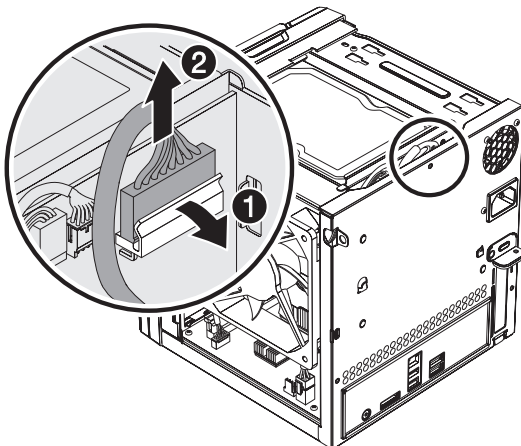
To replace the power supply

1. Remove the cover. Refer to “Removing the cover”.
2. Remove the front bezel. Refer to “Replacing the front bezel”.
3. Untie the cable ties, as shown.

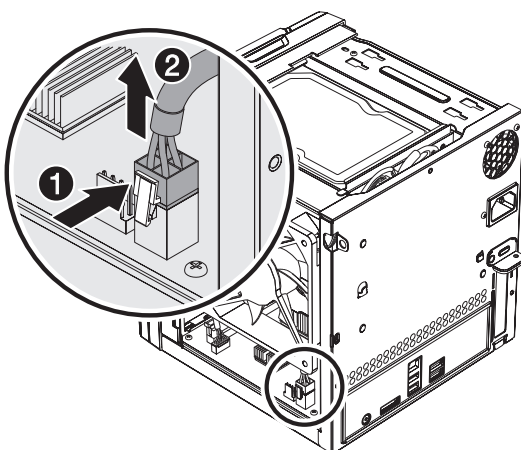


4. Disconnect the power cables.

- (1) Pry the retaining clip out (1) and detach the 8-pin power cable (2).

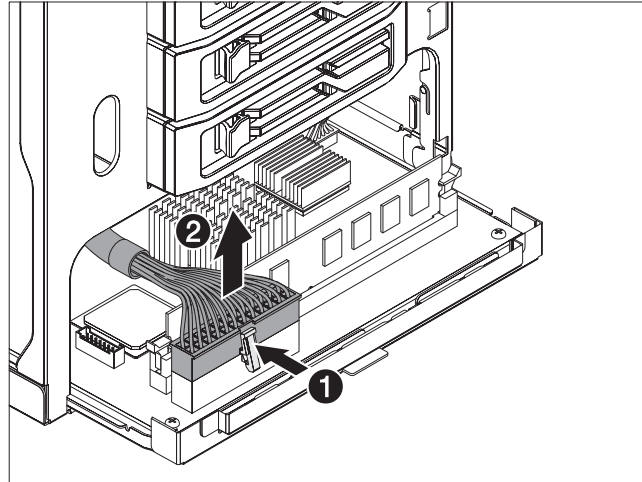


- (2) Press down on the small tab on the 4-pin power cable (1) and pull the cable out (2).

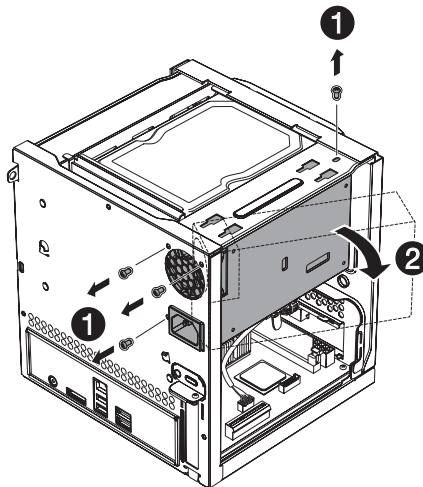


- (3) Slide the system board tray out of the chassis. Refer to step 3 of the “Replacing the memory module”.

- (4) Press down on the tab on the 24-pin power cable (1) and pull the cable out (2).



5. Remove the four screws on the power supply (1).
6. Slide the power supply module out of the bay (2), as shown.

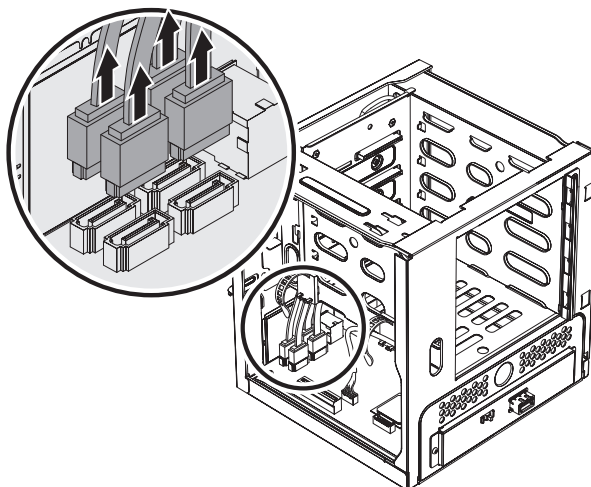


7. Slide the new power supply module into the bay.
8. Secure the new power supply to the home center with four screws.
9. Reconnect the three power cables to the hard disk drive backplane and the system board.
10. Slide the system board tray into the chassis.
11. Replace the front bezel. Refer to step 7 of the “Replacing the front bezel”.
12. Refer to “Completing the installation”.

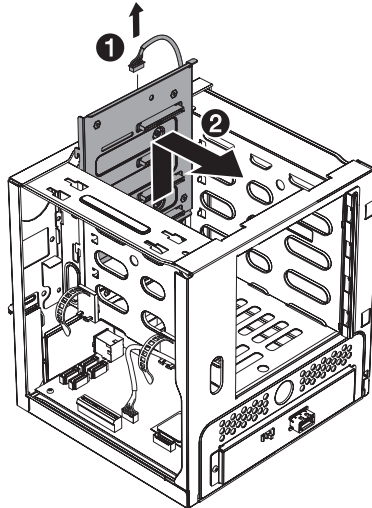
Replacing the system board

To replace the system board

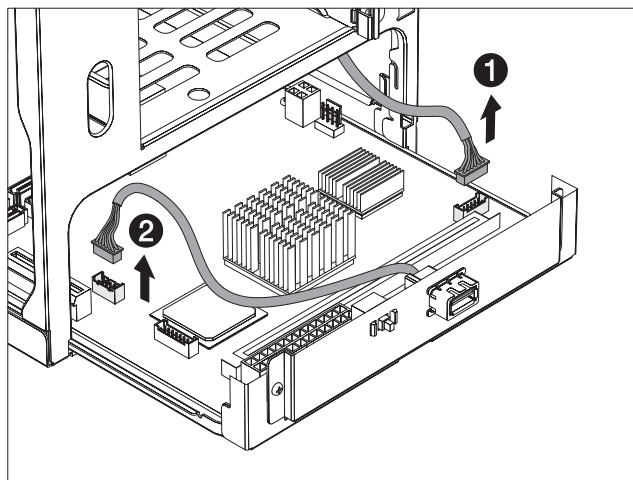
1. Remove the cover. Refer to “Removing the cover”.
2. Remove the front bezel. Refer to “Replacing the front bezel”.
3. Remove the fan. Refer to “Removing the fan”.
4. Remove the memory module. Refer to “Replacing the memory module”.
5. Remove the power supply. Refer to “Replacing the power supply”.
6. Remove the backplane bracket.
 - (1) Detach the four SATA cables from the system board.



- (2) Disconnect the backplane LED cable from the hard disk drive backplane (1), then pull the backplane bracket out of the chassis (2).

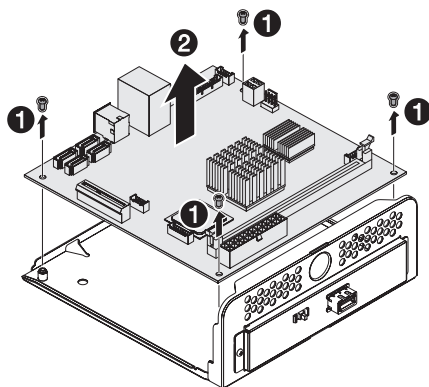


7. Pull the system board tray out until you gain access to the HDD status LED and front USB port cables.
8. Disconnect the HDD status LED cable and the front USB port cable from the system board, then slide the tray out of the chassis.



9. Remove the system board.

- (1) Remove the four screws that secure the system board to the system board tray.
- (2) Lift the system board off the tray.

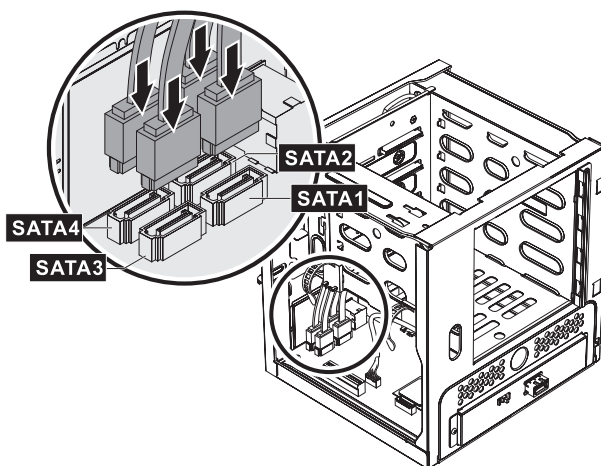


10. Install the new system board.

- (1) Place the new system board into the tray, aligning the screw holes on the system board with the mounting holes on the system board tray.
- (2) Secure the system board to the tray with four screws.

11. Install the backplane bracket.

- (1) Feed the four SATA cables into the chassis openings.
- (2) Reconnect the four SATA cables to their corresponding connectors on the system board.



- (3) Insert the backplane bracket into the chassis.
- (4) Connect all cables to the hard disk drive backplane.

12. Connect all components, boards, and cables to the system board.

13. Refer to "Completing the installation".

Replacing the power cord

To replace the power cord

1. Power-off the home center and all external devices.
2. Disconnect the failing power cord from the home center and connect the new power cord to the same connector.
3. Refer to “Completing the installation”.

Completing the installation

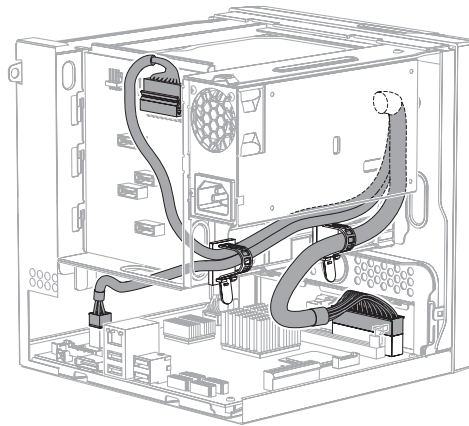
After replacing the parts, you need to install the cover and reconnect cables, including wired internet and power cords.

1. Ensure that all components have been reassembled correctly and that no tools or loose screws are left inside the home center.
2. Make sure that all cables are routed correctly before replacing the cover.

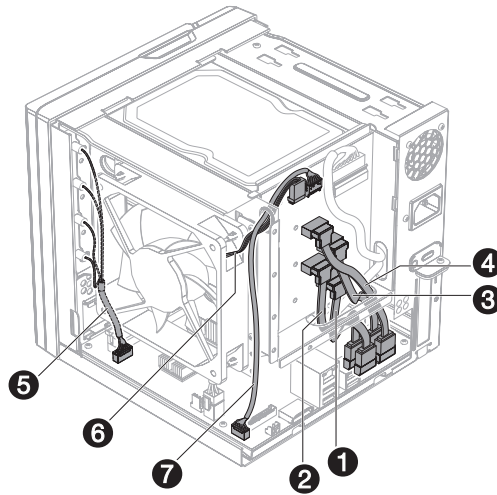
Attention

Keep cables clear of the hinges, sides of the computer chassis, and system bay.

Power cables

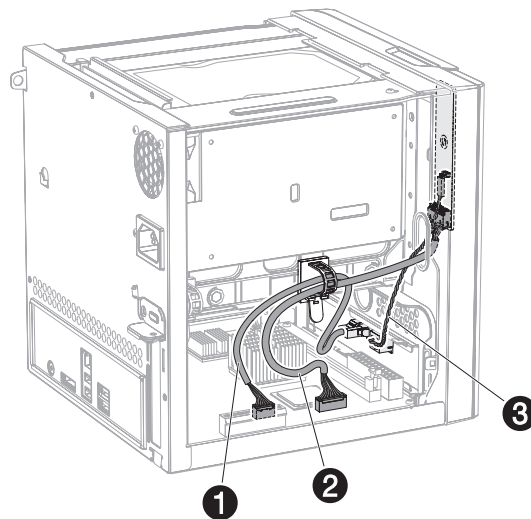


SATA, fan and LED cables



No.	Cable	No.	Cable
1	SATA 1 cable	5	HDD status LED cable
2	SATA 2 cable	6	Fan cable
3	SATA 3 cable	7	Backplane LED cable
4	SATA 4 cable		

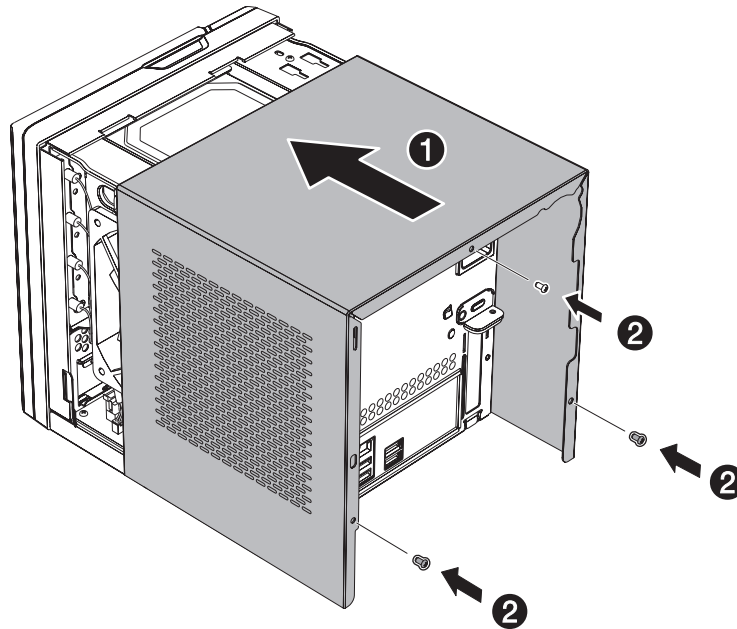
I/O LED, USB, and switch cables



No.	Cable
1	Front USB port cable
2	I/O LED cable
3	Switch cable

3. Replace the cover.

- (1) Position the cover on the home center chassis so that the tabs on the cover align with the slots on the chassis, then slide the cover toward the front of the chassis until it is fully closed.
- (2) Install and tighten the three screws on the cover.



4. Reconnect the external cables and power cords into the home center.

Note



In most areas of the world, Lenovo requires the return of the defective CRU. Information about this will come with the CRU or will come a few days after the CRU arrives.

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, USB keyboard or mouse, 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 allow you to enable and disable features that turn on the home center automatically.

- **After Power Failure:** You can specify in BIOS to enable or disable the home center to resume from previous power state after a power failure occurs.
- **On LAN Wake Up:** The home center includes a Lights Out client software that allows the LAN adapter card to wake the home center. See the User Guide for more information.

Statement



Thanks for using Lenovo products.

Carefully read all documents shipped with your computer before you install and use the product for the first time for better use of it. If you fail to operate the product according to instructions and requirements in all the manuals included with your computer, or operate the product inappropriately for reasons such as misunderstanding, Lenovo will not be responsible for any loss caused except those arising from the installation and operations carried out by Lenovo professional service staff.

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The software interface and hardware configuration involved in all the manuals included with your computer depends on the actual configuration of the computer you purchase.

Welcome to contact us for any inconsistency between the product and all the manuals included with your computer. For the latest information or any questions or comments, contact or visit Lenovo website:

Service website: <http://consumersupport.lenovo.com>

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