Lenovo

ThinkCentre. ®

ThinkCentre M700
Hardware Maintenance Manual

think

Machine Types: 10GS, 10GT, 10KN, and 10KQ

Note: Before using this information and the product it supports, be sure to read and understand the Chapter 1 "Read this first: Important safety information" on page 1 and Appendix F "Notices" on page 149.

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About this manual

This manual provides service and reference information for Lenovo® computers listed on the front cover.

Use this manual along with the advanced diagnostic tests to troubleshoot problems.

Important: This manual is intended only for trained service technicians who are familiar with Lenovo computers. Use this manual along with the advanced diagnostic tests to troubleshoot problems effectively. Before servicing a Lenovo computer, be sure to read and understand Chapter 1 "Read this first: Important safety information" on page 1.

Chapter 1. Read this first: Important safety information

This chapter contains the safety information that you must be familiar with.

Power cords and power adapters

Use only the power cords and power adapters supplied by the product manufacturer. Do not use the ac power cord for other devices.

The power cords shall be safety approved. For Germany, it shall be H05VV-F, 3G, 0.75 mm^2, or better. For other countries, the suitable types shall be used accordingly.

Never wrap a power cord around a power adapter or other object. Doing so can stress the cord in ways that can cause the cord to fray, crack, or crimp. This can present a safety hazard.

Always route power cords so that they will not be walked on, tripped over, or pinched by objects.

Protect power cord and power adapters from liquids. For instance, do not leave your power cord or power adapter near sinks, tubs, toilets, or on floors that are cleaned with liquid cleansers. Liquids can cause a short circuit, particularly if the power cord or power adapter has been stressed by misuse. Liquids also can cause gradual corrosion of power cord terminals and/or the connector terminals on a power adapter, which can eventually result in overheating.

Ensure that all power cord connectors are securely and completely plugged into receptacles.

Do not use any power adapter that shows corrosion at the ac input pins or shows signs of overheating (such as deformed plastic) at the ac input or anywhere on the power adapter.

Do not use any power cords where the electrical contacts on either end show signs of corrosion or overheating or where the power cord appears to have been damaged in any way.

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.

    Attention:

    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.

CAUTION:
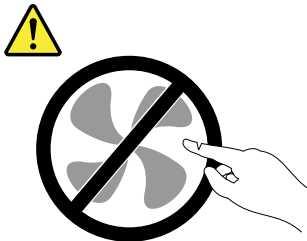
Hazardous moving parts. Keep fingers and other body parts away.

CAUTION:

Before you open the computer cover, turn off the computer and wait several minutes until the computer is cool.

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 computer 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 Field Replaceable Units (FRUs)
- Before you start to work on the machine, unplug the power cord. If you cannot unplug it, power off the wall box that supplies power to the machine and 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 a tester, 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 generators

  and 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. To protect against ESD damage, equalize the charge between objects. Then, 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 while handling the part.

- 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 (multi-lingual translations)

The caution and danger safety notices in this section are provided in the following languages:

- English
- Arabic
- Brazilian/Portuguese
- Chinese (simplified)
- Chinese (traditional)
- French
- German
- Hebrew
- Italian
- Korean
- Spanish

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 tables when installing, moving, or opening covers on this product or attached devices.**

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

CAUTION:
When replacing the lithium battery, use only Part Number 45C1566 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.
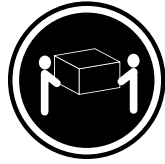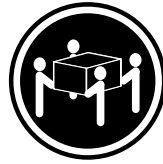
≥18 kg (37 lb)   ≥32 kg (70.5 lb)   ≥55 kg (121.2 lb)

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.

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خــــطر

التيـار الكـهربـي المـوجـود بمصـدر الطـاقـة أو أجـهـزة التليفـون أو أسـلاك الإتـصالات يشـكل خـطورة.

لـتفادي مخـاطـر الصـدمـات الكـهربـائـية:

لا تحـاول توصيـل أو فصل أي أسـلاك أو القـيام بعمـليات تـركيب أو صيـانـة أوإعـادة توصيـف لـهذا المنتج أثـناء وجـود عاصـفـة كـهربـائـية.

يجب تـوصيـل كل أسـلاك الكـهربـاء فـي مخـارج كـهربـاء ذات تـوصيـلات أسـلاك وتـوصيـلات أرضـية صحيـحة
يجـب تـوصيـل أي جـهـاز سـيتم الحـاقـه بـهذا المنتج فـي مخـارج كـهربـاء ذات تـوصيـلات أسـلاك صحيحة.

وإن أمـكن يـجب اسـتخدام يـد واحـدة فـقط فـي تـوصيـل أو فصل أسـلاك الإشـارة.

لا تحـاول تشغـيل أي جـهـاز إذا كـان هنـاك أثـر لحـرق أو مـياه أو تـلف بالمكـونـات
يجب فصل أسـلاك الكـهربـاء وأنـظمة الاتصـالات وشبـكات الاتصـال وأجـهـزة المـودم الملحـقة قـبل فـتح أغطيـة الجهاز، مـالـم يـتم طـلب خـلاف ذلك فـي التعليـمات الخـاصـة بالتـركيب والتـوصـيـف.
قم بتوصيل وفصل الأسـلاك كمـا هو موضـح في الجـدول التالي وذلك عند القيام بعمليات التركيب أو النقل أو فتح أغطيـة هذا المنتج أو الأجهـزة الملحقة.

<table>
<tr><td>للفصل:</td><td>للتوصيل:</td></tr>
<tr><td>قم بإيقاف كل شيء.</td><td>قم بإيقاف كل شيء.</td></tr>
<tr><td>أولا، قم بفصل كل أسلاك الكهرباء من المخرج.</td><td>أولا، قم بتوصيل كل الأسلاك بالأجهزة.</td></tr>
<tr><td>قم بفصل أسلاك الإشارة من الموصلات.</td><td>قم بتوصيل أسلاك الإشارة في لموصلات.</td></tr>
<tr><td>قم بفصل كل الأسلاك من الأجهزة.</td><td>قم بتوصيل أسلاك الكهرباء في المخارج.</td></tr>
<tr><td></td><td>قم بتشغيل الجهاز .</td></tr>
</table>

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تنبيـــه :
عند استبدال البطارية الليثيوم، استخدم فقط رقم الجزء الخاص Part Number 45C1566
أو نوع أخر يكون على نفس مستوى الكفاءة يحدده لك المصنع.
اذا كان النظام الخاص معه يستخدم معه بطارية ليثيوم قم باستبدالها بنفس النوع الذي تم صناعته من خلال نفس المصنع. تحتوي البطارية على مادة الليثيوم ويمكن أن تنفجرفي حالة عدم استخدامها أو التعامل معها بطريقة صحيحة أو عند التخلص منها بطريقة خطأ.

لا تقم بــ:
• القاء البطارية أو غمرها في الماء
• تسخينها أعلى من ١٠٠ درجة مئوية°و(٢١٢ ° فهرنهيت)
• بتصليحها أو فكها

تخلص من البطارية طبقا للقانون أو النظام المحلي .

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≥18 kg (37 lb)   ≥32 kg (70.5 lb)   ≥55 kg (121.2 lb)

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PERIGO

A corrente elétrica proveniente de cabos de alimentação, de telefone e de comunicações é perigosa.

Para evitar risco de choque elétrico:

- Não conecte nem desconecte nenhum cabo ou execute instalação, manutenção ou reconfiguração deste produto durante uma tempestade com raios.
- Conecte todos os cabos de alimentação a tomadas elétricas corretamente instaladas e aterradas.
- Todo equipamento que for conectado a este produto deve ser conectado a tomadas corretamente instaladas.
- Quando possível, utilize apenas uma das mãos para conectar ou desconectar cabos de sinal.
- Nunca ligue nenhum equipamento quando houver evidência de fogo, água ou danos estruturais.
- Antes de abrir tampas de dispositivos, desconecte cabos de alimentação, sistemas de telecomunicação, redes e modems conectados, a menos que especificado de maneira diferente nos procedimentos de instalação e configuração.
- Conecte e desconecte os cabos conforme descrito na tabela apresentada a seguir ao instalar, mover ou abrir tampas deste produto ou de dispositivos conectados.

Para Conectar:	Para Desconectar:
1. DESLIGUE Tudo.	1. DESLIGUE Tudo.
2. Primeiramente, conecte todos os cabos aos dispositivos.	2. Primeiramente, remova os cabos de alimentação das tomadas.
3. Conecte os cabos de sinal aos conectores.	3. Remova os cabos de sinal dos conectores.
4. Conecte os cabos de alimentação às tomadas.	4. Remova todos os cabos dos dispositivos.
5. LIGUE os dispositivos.	

CUIDADO:

Ao substituir a bateria de lítio, utilize apenas uma bateria com Número de Peça 45C1566 ou um tipo de bateria equivalente recomendado pelo Se o seu sistema possui um módulo com uma bateria de lítio, substitua-o apenas por um módulo do mesmo tipo e do mesmo fabricante. A bateria contém lítio e pode explodir se não for utilizada, manuseada ou descartada de maneira correta.

Não:
- Jogue ou coloque na água
- Aqueça a mais de 100°C (212°F)
- Conserte nem desmonte

Descarte a bateria conforme requerido pelas leis ou regulamentos locais.

PRECAUCIÓN:

Quando produtos a laser (como unidades de CD-ROMs, unidades de DVD-ROM, dispositivos de fibra ótica ou transmissores) estiverem instalados, observe o seguinte:

- Não remova as tampas. A remoção das tampas de um produto a laser pode resultar em exposição prejudicial à radiação de laser. Não existem peças que podem ser consertadas no interior do dispositivo.

- A utilização de controles ou ajustes ou a execução de procedimentos diferentes dos especificados aqui pode resultar em exposição prejudicial à radiação.

PERIGO

Alguns produtos a laser contêm diodo de laser integrado da Classe 3A ou da Classe 3B. Observe o seguinte:

Radiação a laser quando aberto. Não olhe diretamente para o feixe a olho nu ou com instrumentos ópticos e evite exposição direta ao feixe.
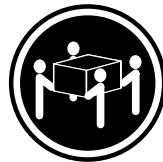
≥18 kg (37 lb)   ≥32 kg (70.5 lb)   ≥55 kg (121.2 lb)

CUIDADO:

Utilize procedimentos de segurança para levantar equipamentos.

CUIDADO:

O botão de controle de alimentação do dispositivo e o botão para ligar/desligar da fonte de alimentação não desligam a corrente elétrica fornecida ao dispositivo. O dispositivo também pode ter mais de um cabo de alimentação. Para remover toda a corrente elétrica do dispositivo, assegure que todos os cabos de alimentação estejam desconectados da fonte de alimentação.
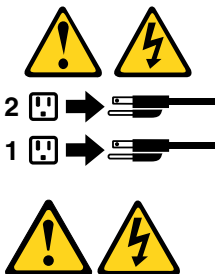
危险

电源、电话和通信电缆中的电流是危险的。

为避免电击危险：

- 请勿在雷电期间连接或断开任何电缆的连接，
  或者对本产品进行安装、维护或重新配置。

- 将所有电源线连接到正确连线和妥善接地的电源插座。

- 将所有要连接到该产品的设备连接到正确连线的插座。

- 如果可能，请仅使用一只手来连接或断开信号电缆的连接。

- 切勿在有火、水、结构损坏迹象的情况下开启任何设备。

- 在打开设备外盖之前请断开已连接的电源线、远程通信系统、
  网络和调制解调器，除非在安装和配置过程中另有说明。

- 当安装、移动或打开该产品或连接设备的外盖时，
  请按照下表所述来连接或断开电缆的连接。

要连接	要断开连接
1. 切断所有电源。	1. 切断所有电源。
2. 首先将所有电缆连接到设备。	2. 首先从插座上拔出电源线。
3. 将信号电缆连接到接口。	3. 从接口上拔出信号电缆。
4. 将电源线连接到插座。	4. 从设备上拔出所有电缆。
5. 开启设备。	

警告：
更换锂电池时，请仅使用部件号为 45C1566 的电池或制造商推荐的同类电池。如果您的系统
有包含锂电池的模块，请仅使用同一制造商生产的相同模块类型来替换该模块。该电池中含有
锂，如果使用、操作或处理不当，可能会发生爆炸。

切勿：

- 投入或浸入水中

- 加热到 100℃（212℉）以上

- 维修或拆卸

请按照当地法令或条例的要求处理电池。

警告：
安装激光产品（例如 CD-ROM、DVD-ROM 驱动器、光纤设备或发射设备）时，
请注意以下声明：

- 请勿卸下外盖。卸下激光产品的外盖可能导致遭受激光辐射的危险。该设
  备内没有可维修的部件。

- 如果不按照此处指定的过程进行控制、调整或操作，则有可能导致遭受辐
  射的危险。

危险

某些激光产品包含嵌入式 3A 类或 3B 类激光二极管。请注意以下声明：

打开后有激光辐射。请勿注视光束，请勿直接用光学仪器查看，并请避免直接暴露在光束中。
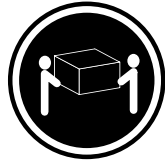
≥18 千克（37 磅）　　≥32 千克（70.5 磅）　　≥55 千克（121.2 磅）

警告：
抬起时请采取安全措施。

警告：
设备上的电源控制按钮和电源上的电源开关不会切断供给该设备的电流。该设备还可能有多条电源线。要切断该设备的所有电流，请确保所有电源线都与电源断开连接。

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1

危险
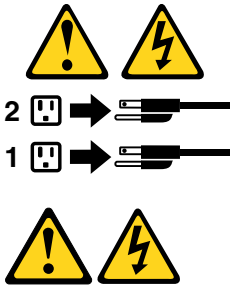
電源、電話及通訊纜線上的電流都具有危險性。
若要避免觸電危險：
- 請勿在雷雨期間，連接或拔除纜線、執行安裝、維護或重新配置本產品。
- 將所有電源線連接到正確配線及接地的電源插座。
- 任何與本產品連接的設備都必須連接到配線妥當的電源插座。
- 請盡可能用單手連接或拔除信號線。
- 發生火災、水災或結構損害時，絕對不要開啟任何設備。
- 除非在安裝及配置程序中另有指示，否則在開啟裝置機蓋之前，請拔掉連接的電源線、電信系統、網路及數據機。
- 安裝、移動或開啟本產品或附屬裝置的機蓋時，請遵循下列說明連接及拔掉纜線。

連線	切斷連線
1.關閉所有開關。	1.關閉所有開關。
2.首先，連接所有接線到裝置。	2.首先，拔掉插座上的電源線。
3.連接信號線到接頭。	3.拔掉接頭上的信號線。
4.連接電源線到插座。	4.拔掉裝置上所有接線。
5.開啟裝置。	

警告：
更換鋰電池時，請僅使用產品編號 **45C1566** 或製造商所建議的同類型電池。
如果您的系統中含有鋰電池模組，請僅使用同一家製造商所生產的相同模組進行更換。
如果未以正確方式使用、處理或棄置含鋰的電池，會有爆炸的危險。
請勿：

- 沾溼或浸入水中
- 置於 **100°C (212°F)** 以上的高溫環境
- 修理或拆開
請按照各地區有關廢棄電池的法令和規定處理舊電池。

警告：
- 請勿移除機蓋。移除雷射產品的機蓋，可能會導致暴露在危險的雷射輻射中。裝置內部並無可自行維修的零件。
- 利用或執行非本文中所指定的控制、調整及執行程序，可能會導致危險的輻射外洩。

危險

部分雷射產品含有內嵌式 **Class 3A** 或 **Class 3B** 雷射二極體。請注意下列事項：
在開啟光碟機時，會發生雷射輻射。請勿直視光束或用光學儀器直接檢視，並避免直接暴露在光束中。

≥ 18 公斤（37 磅）　　≥ 32 公斤（70.5 磅）　　≥ 55 公斤（121.2 磅）

警告：
搬運時請注意安全。

警告：
裝置上的電源控制按鈕及電源供應器上的電源開關，無法關閉裝置所產生的電流。
該裝置可能有多條電源線。若要除去裝置流出的所有電流，請確認已切斷所有電源線的電源。

2
1
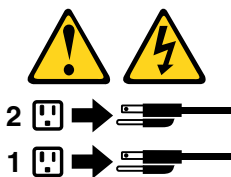
DANGER

Le courant électrique provenant de l'alimentation, du téléphone et des câbles de transmission peut présenter un danger.

Pour éviter tout risque de choc électrique :

- Ne manipulez aucun câble et n'effectuez aucune opération d'installation, d'entretien ou de reconfiguration de ce produit au cours d'un orage.
- Branchez tous les cordons d'alimentation sur un socle de prise de courant correctement câblé et mis à la terre.
- Branchez sur des socles de prise de courant correctement câblés tout équipement connecté à ce produit.
- Lorsque cela est possible, n'utilisez qu'une seule main pour connecter ou déconnecter les câbles d'interface.
- Ne mettez jamais un équipement sous tension en cas d'incendie ou d'inondation, ou en présence de dommages matériels.
- Avant de retirer les carters de l'unité, mettez celle-ci hors tension et déconnectez ses cordons d'alimentation, ainsi que les câbles qui la relient aux réseaux, aux systèmes de télécommunication et aux modems (sauf instruction contraire mentionnée dans les procédures d'installation et de configuration).
- Lorsque vous installez, que vous déplacez, ou que vous manipulez le présent produit ou des périphériques qui lui sont raccordés, reportez-vous aux instructions ci-dessous pour connecter et déconnecter les différents cordons.

Connexion	Déconnexion
1. Mettez les unités HORS TENSION.	1. Mettez les unités HORS TENSION.
2. Commencez par brancher tous les cordons sur les unités.	2. Débranchez les cordons d'alimentation des prises.
3. Branchez les câbles d'interface sur des connecteurs.	3. Débranchez les câbles d'interface des connecteurs.
4. Branchez les cordons d'alimentation sur des prises.	4. Débranchez tous les câbles des unités.
5. Mettez les unités SOUS TENSION.	

ATTENTION:

Remplacer la pile au lithium usagée par une pile de référence identique exclusivement, (référence 45C1566), ou suivre les instructions du fabricant qui en définit les équivalences. Si votre système est doté d'un module contenant une pile au lithium, vous devez le remplacer uniquement par un module identique, produit par le même fabricant. La pile contient du lithium et peut exploser en cas de mauvaise utilisation, de mauvaise manipulation ou de mise au rebut inappropriée.

Ne pas :

- **la jeter à l'eau,**
- **l'exposer à des températures supérieures à 100°C,**
- **chercher à la réparer ou à la démonter.**

Ne pas mettre la pile à la poubelle. Pour la mise au rebut, se reporter à la réglementation en vigueur.

ATTENTION:

Si des produits à laser (tels que des unités de CD-ROM, de DVD-ROM, des unités à fibres optiques, ou des émetteurs) sont installés, prenez connaissance des informations suivantes :

- **Ne retirez pas le carter. En ouvrant l'unité de CD-ROM ou de DVD-ROM, vous vous exposez au rayonnement dangereux du laser. Aucune pièce de l'unité n'est réparable.**
- **Pour éviter tout risque d'exposition au rayon laser, respectez les consignes de réglage et d'utilisation des commandes, ainsi que les procédures décrites dans le présent manuel.**

DANGER

Certains produits à laser contiennent une diode à laser intégrée de classe 3A ou 3B. Prenez connaissance des informations suivantes:

Rayonnement laser lorsque le carter est ouvert. Evitez toute expositiondirecte au rayon laser. Evitez de regarder fixement le faisceau ou del'observer à l'aide d'instruments optiques.
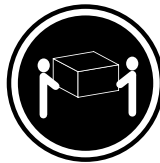
≥18 kg (37 lb)   ≥32 kg (70.5 lb)   ≥55 kg (121.2 lb)

ATTENTION:

Soulevez la machine avec précaution.

ATTENTION:

L'interrupteur de contrôle d'alimentation de l'unité et l'interrupteur dubloc d'alimentation ne coupent pas le courant électrique alimentantl'unité. En outre, le système peut être équipé de plusieurs cordonsd'alimentation. Pour mettre l'unité hors tension, vous devez déconnectertous les cordons de la source d'alimentation.
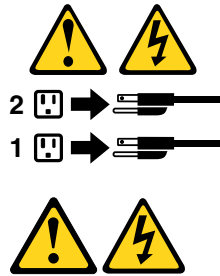
VORSICHT

An Netz-, Telefon- und Datenleitungen können gefährliche Spannungen anliegen.

Aus Sicherheitsgründen:

• **Bei Gewitter an diesem Gerät keine Kabel anschließen oder lösen. Ferner keine Installations-, Wartungs- oder Rekonfigurationsarbeiten durchführen.**

• **Gerät nur an eine Schutzkontaktsteckdose mit ordnungsgemäß geerdetem Schutzkontakt anschließen.**

• **Alle angeschlossenen Geräte ebenfalls an Schutzkontaktsteckdosen mit ordnungsgemäß geerdetem Schutzkontakt anschließen.**

• **Die Signalkabel nach Möglichkeit einhändig anschließen oder lösen, um einen Stromschlag durch Berühren von Oberflächen mit unterschiedlichem elektrischem Potenzial zu vermeiden.**

• **Geräte niemals einschalten, wenn Hinweise auf Feuer, Wasser oder Gebäudeschäden vorliegen.**

• **Die Verbindung zu den angeschlossenen Netzkabeln, Telekommunikationssystemen, Netzwerken und Modems ist vor dem Öffnen des Gehäuses zu unterbrechen, sofern in den Installations- und Konfigurationsprozeduren keine anders lautenden Anweisungen enthalten sind.**

• **Zum Installieren, Transportieren und Öffnen der Abdeckungen des Computers oder der angeschlossenen Einheiten die Kabel gemäß der folgenden Tabelle anschließen und abziehen.**

Zum Anschließen der Kabel gehen Sie wie folgt vor	Zum Abziehen der Kabel gehen Sie wie folgt vor
1. Schalten Sie alle Einheiten AUS.	1. Schalten Sie alle Einheiten AUS.
2. Schließen Sie erst alle Kabel an die Einheiten an.	2. Ziehen Sie zuerst alle Netzkabel aus den Netzsteckdosen.
3. Schließen Sie die Signalkabel an die Buchsen an.	3. Ziehen Sie die Signalkabel aus den Buchsen.
4. Schließen Sie die Netzkabel an die Steckdose an.	4. Ziehen Sie alle Kabel von den Einheiten ab.
5. Schalten Sie die Einheit EIN.	

CAUTION:

Eine verbrauchte Lithiumbatterie nur durch eine Batterie mit der Teilenummer 45C1566 oder eine gleichwertige, vom Hersteller empfohlene Batterie ersetzen. Enthält das System ein Modul mit einer Lithiumbatterie, dieses nur durch ein Modul desselben Typs und von demselben Hersteller ersetzen. Die Batterie enthält Lithium und kann bei unsachgemäßer Verwendung, Handhabung oder Entsorgung explodieren.

Die Batterie nicht:

• mit Wasser in Berührung bringen.

- über 100 C erhitzen.
- reparieren oder zerlegen.

Die örtlichen Bestimmungen für die Entsorgung von Sondermüll beachten.

ACHTUNG:

Bei der Installation von Lasergeräten (wie CD-ROM-Laufwerken, DVD- aufwerken, Einheiten mit Lichtwellenleitertechnik oder Sendern) Folgendes beachten:

- **Die Abdeckungen nicht entfernen. Durch Entfernen der Abdeckungen des Lasergeräts können gefährliche Laserstrahlungen freigesetzt werden. Das Gerät enthält keine zu wartenden Teile.**
- **Werden Steuerelemente, Einstellungen oder Durchführungen von Prozeduren anders als hier angegeben verwendet, kann gefährliche Laserstrahlung auftreten.**

VORSICHT

Einige Lasergeräte enthalten eine Laserdiode der Klasse 3A oder 3B. Beachten Sie Folgendes:

Laserstrahlung bei geöffneter Verkleidung. Nicht in den Strahl blicken. Keine Lupen oder Spiegel verwenden. Strahlungsbereich meiden.
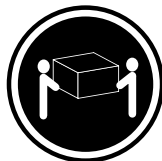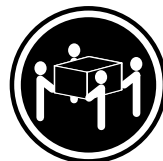
≥18 kg   ≥32 kg   ≥55 kg

ACHTUNG:

Arbeitsschutzrichtlinien beim Anheben der Maschine beachten.

ACHTUNG:

Mit dem Netzschalter an der Einheit und am Netzteil wird die Stromversorgung für die Einheit nicht unterbrochen. Die Einheit kann auch mit mehreren Netzkabeln ausgestattet sein. Um die Stromversorgung für die Einheit vollständig zu unterbrechen, müssen alle zum Gerät führenden Netzkabel vom Netz getrennt werden.
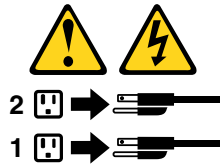
סכנה

זרם חשמלי המועבר בכבלי חשמל, טלפון ותקשורת הוא מסוכן.

כדי להימנע מסכנת התחשמלות:

- אל תחברו או תנתקו כבלים, ואל תבצעו פעולת התקנה, תחזוקה או שינוי תצורה במוצר זה במהלך סופת ברקים.

- חברו את כל כבלי החשמל לשקע חשמל מחווט ומוארק כהלכה.

- חברו כל ציוד שיחובר למוצר זה לשקעי חשמל מחווטים כהלכה.

- במידת האפשר, השתמשו ביד אחת בלבד לחיבור או לניתוק של כבלי אותות.

- לעולם אל תפעילו ציוד כלשהו כאשר יש עדות לנזק מבני או לנזק כתוצאה מאש או ממים.

- נתקו את כבלי החשמל, מערכות התקשורת, התקני הרשת והמודמים המחוברים לפני פתיחת כיסויי ההתקן, אלא אם הליכי ההתקנה וקביעת התצורה מורים אחרת.

- בעת התקנה, העברה או פתיחת כיסויים במוצר זה או בהתקנים המחוברים, חברו ונתקו את הכבלים כמתואר בטבלה שלהלן.

כדי לנתק	כדי לחבר
1. כבו הכל.	1. כבו הכל.
2. ראשית, נתקו את כבלי החשמל מהשקעים.	2. ראשית, חברו את כל הכבלים להתקנים.
3. נתקו את כבלי האותות מהמחברים.	3. חברו את כבלי האותות למחברים.
4. הסירו את כל הכבלים מההתקנים.	4. חברו את כבלי החשמל לשקעים.
	5. הפעילו את ההתקן.

זהירות:

בעת החלפת סוללת הליתיום, השתמשו רק בסוללה בעלת מק"ט 45C1566 או בסוג תואם שהומלץ על ידי היצרן. אם המערכת כוללת מודול המכיל סוללת ליתיום, החליפו אותו רק במודול מאותו סוג ומתוצרת אותו יצרן. הסוללה מכילה ליתיום, ועלולה להתפוצץ אם לא משתמשים ומטפלים בה או משליכים אותה כיאות.

לעולם:

- אל תטבלו במים

- אל תחממו לטמפרטורה הגבוהה מ-100^OC (212^OF)

- אל תתקנו או תפרקו

השליכו את הסוללה כנדרש לפי התקנות והחוקים המקומיים.

זהירות:
בעת התקנת מוצרי לייזר (כגון כונני תקליטורים ו-DVD, התקני סיב אופטי או משדרים), שימו לב לאזהרות הבאות:

- אל תסירו את הכיסויים. הסרת הכיסויים של מוצר הלייזר עלולה לגרום לחשיפה לקרינת לייזר מסוכנת. אין חלקים ברי טיפול בתוך ההתקן.
- שינויים, שימוש בבקרות או ביצוע הליכים אחרים מאלה המתוארים כאן, עלולים לגרום לחשיפה לקרינה מסוכנת.

סכנה

מוצרי לייזר מסוימים מכילים דיודת לייזר מסוג Class 3A או Class 3B. שימו לב לאזהרה הבאה:

כאשר הוא פתוח, המוצר פולט קרינת לייזר. אל תביטו ישירות בקרן, אל תביטו ישירות בעזרת ציוד אופטי, והימענו מחשיפה לקרן.

55 ≥ ק"ג(121.2 ליב')

32 ≥ ק"ג (70.5 ליב')
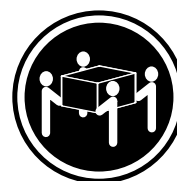
18 ≥ ק"ג (37 ליב')

זהירות:
השתמשו בהליכים הנאותים בעת הרמת הציוד.

זהירות:
לחצן ההפעלה של ההתקן ומתג ההפעלה של ספק החשמל אינם מפסיקים את זרם החשמל המסופק להתקן. בנוסף, ההתקן עשוי לכלול יותר מכבל חשמל אחד. כדי לסלק את כל הזרם החשמלי מההתקן, ודאו שכל כבלי החשמל מנותקים ממקור החשמל.
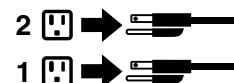
PERICOLO

La corrente elettrica proveniente dai cavi di alimentazione, del telefono e di comunicazione può essere pericolosa.

Per evitare il rischio di scosse elettriche:

- **Non collegare o scollegare qualsiasi cavo oppure effettuare l'installazione, la manutenzione o la riconfigurazione del prodotto durante un temporale.**

- **Collegare tutti i fili elettrici a una presa di alimentazione correttamente cablata e dotata di messa a terra.**

- **Collegare alle prese elettriche appropriate tutte le apparecchiature che verranno utilizzate per questo prodotto.**

- **Se possibile, utilizzare solo una mano per collegare o scollegare i cavi di segnale.**

- **Non accendere assolutamente apparecchiature in presenza di incendi, perdite d'acqua o danno strutturale.**

- **Scollegare i cavi di alimentazione, i sistemi di telecomunicazione, le reti e il modem prima di aprire i coperchi del dispositivo, salvo istruzioni contrarie relative alle procedure di installazione e configurazione.**

- **Collegare e scollegare i cavi come descritto nella seguente tabella quando vengono effettuate operazioni di installazione, spostamento o apertura dei coperchi di questo prodotto o delle unità collegate.**

Per collegarsi	Per scollegarsi
1. SPEGNERE le apparecchiature.	1. SPEGNERE le apparecchiature.
2. Innanzitutto, collegare tutti i cavi alle unità.	2. Innanzitutto, rimuovere i cavi di alimentazione dalla presa.
3. Collegare i cavi di segnale ai connettori.	3. Rimuovere i cavi di segnale dai connettori.
4. Collegare i cavi di alimentazione alla presa.	4. Rimuovere tutti i cavi dalle unità.
5. Accendere l'unità.	

ATTENZIONE:

Quando si sostituisce la batteria al litio, utilizzare solo il Numero parte 45C1566 o un tipo di batteria equivalente consigliato dal produttore. Se sul sistema è presente un modulo che contiene una batteria al litio, sostituirlo solo con un tipo di modulo dello stesso tipo della stessa casa di produzione. La batteria contiene litio e può esplodere se usata, maneggiata o smaltita in modo non corretto.

Non:

- **Gettare o immergere la batteria nell'acqua**

- **Riscaldarla ad una temperatura superiore ai 100 gradi C (212 gradi F)**

- **Smontarla, ricaricarla o tentare di ripararla**

Le batterie usate vanno smaltite in accordo alla normativa in vigore (DPR 915/82 e successive disposizioni e disposizioni locali).

ATTENZIONE:

Quando vengono installati prodotti laser (quali CD-ROM, unità DVD-ROM, unità a fibre ottiche o trasmittenti), tener presente quanto segue:

* Non rimuovere gli sportelli. L'apertura di un'unità laser può determinare l'esposizione a radiazioni laser pericolose. All'interno dell'unità non vi sono parti su cui effettuare l'assistenza tecnica.
* L'utilizzo di controlli, regolazioni o l'esecuzione di procedure non descritti nel presente manuale possono provocare l'esposizione a radiazioni pericolose.

PERICOLO

Alcune unità laser contengono un diodo laser di Classe 3A o Classe 3B. Tener presente quanto segue:

Aprendo l'unità vengono emesse radiazioni laser. Non fissare il fascio, non guardarlo direttamente con strumenti ottici ed evitare l'esposizione al fascio.
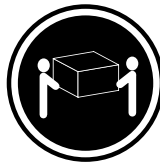
≥18 kg   ≥32 kg   ≥55 kg

ATTENZIONE:

Prestare attenzione nel sollevare l'apparecchiatura.

ATTENZIONE:

Il pulsante di controllo dell'alimentazione presente sull'unità e l'interruttore dell'alimentatore non disattivano l'alimentazione corrente fornita all'unità. E' possibile che l'unità disponga di più cavi di alimentazione. Per disattivare l'alimentazione dall'unità, accertarsi che tutti i cavi di alimentazione siano scollegati dalla fonte di alimentazione.

위험

전원, 전화, 통신 케이블의 전류는 위험합니다.

감전의 위험을 피하려면 다음과 같이 하십시오.

- 번개가 치는 날에는 케이블을 연결 또는 분리하거나 본 제품을 설치, 보수, 재구성하지 마십시오.

- 모든 전원 코드는 올바르게 접지된 전기 콘센트에 연결하십시오.

- 본 제품에 연결될 장치는 올바르게 배선된 콘센트에 연결하십시오.

- 신호 케이블을 연결 또는 분리할 때 가능하면 한 손만을 사용하십시오.

- 불 또는 물로 인한 손상이나 구조적인 손상이 있을 경우 장치의 전원을 절대 켜지 마십시오.

- 설치 및 구성 과정에 별도의 지시 사항이 없는 경우, 장치의 덮개를 열기 전에 연결된 전원 코드, 원격 통신 시스템,
  네트워크, 모뎀을 분리하십시오.

- 본 제품이나 연결된 장치를 설치, 이동하거나 덮개를 열 때 다음 표와 같은 순서로 케이블을 연결하거나
  분리하십시오.

연결할 때:	분리할 때:
1. 모든 장치의 전원을 끄십시오. 2. 먼저 모든 케이블을 장치에 연결하십시오. 3. 커넥터에 신호 케이블을 연결하십시오. 4. 콘센트에 전원 코드를 연결하십시오. 5. 장치의 전원을 켜십시오.	1. 모든 장치의 전원을 끄십시오. 2. 먼저 콘센트에서 전원 코드를 분리하십시오. 3. 커넥터에서 신호 케이블을 분리하십시오. 4. 장치에서 모든 케이블을 분리하십시오.

주의:
배터리를 교환할 때는 Part Number 45C1566 또는 제조업체에서 지정한 동일한 종류의 제품을 사용하십시오.
사용자의 시스템이 리튬 배터리를 포함하는 모듈일 경우, 동일한 제조업체에서 동일한 모듈 유형으로 생산된 제품으로
교체하십시오. 배터리에는 리튬이 함유되어 있어 잘못 사용, 취급 또는 폐기할 경우 폭발의 위험이 있습니다.

사고를 방지하려면 다음 사항을 준수하십시오.

- 배터리를 물 속에 던지거나 침수시키지 마십시오.

- 100℃(212°F) 이상 가열하지 마십시오.

- 수리하거나 분해하지 마십시오.

배터리를 폐기할 때는 법령 또는 회사의 안전 수칙에 따라 폐기하십시오.

주의:
CD-ROM, DVD-ROM 장치, 광섬유 장치 또는 송신 장치와 같은 레이저 제품을 설치할 때,
다음과 같은 취급 주의사항을 참고하십시오.

- 덮개를 열지 마십시오. 덮개를 열면 레이저 복사 에너지에 노출될 위험이 있습니다. 장치 내부에는
  사용자가 조정하거나 수리할 수 있는 부품이 없습니다.

- 규정된 것 이외의 절차 수행, 제어 조정 등의 행위로 인해 해로운 레이저 복사에 노출될 수 있습니다.

위험

일부 장비에는 임베디드 클래스 3A 또는 클래스 3B 레이저 다이오드가 있습니다. 다음 주의사항에 유의하십시오.

드라이브가 열리면 레이저 복사 에너지가 방출됩니다. 광선이 눈에 직접 쏘이지 않도록 하십시오. 나안 또는 광학 기구를 착용한 상태에서 광선을 직접 바라보지 않도록 하십시오.
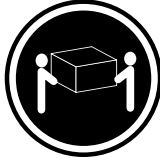
| ≥18 kg (37 lbs) | ≥32 kg (70.5 lbs) | ≥55 kg (121.2 lbs) |
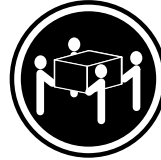
주의:
제품을 들어 올릴 때
안전 규제를 따르십시오.

주의:
장치의 전원 제어 버튼 및 전원 공급 장치의 전원 스위치를 사용하여 장치에 공급되는 전기를 차단하지 마십시오.
장치는 둘 이상의 코드를 가지고 있을 수 있습니다. 장치에서 모든 전원을 차단하려면 콘센트에서 코드가 모두
분리되어 있는지 확인하십시오.
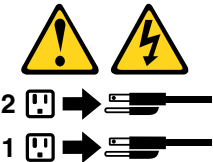
PELIGRO

La corriente eléctrica procedente de cables de alimentación, teléfonos y cables de comunicación puede ser peligrosa.

Para evitar el riesgo de descarga eléctrica:

- **No conecte ni desconecte los cables ni realice ninguna tarea de instalación, mantenimiento o reconfiguración de este producto durante una tormenta eléctrica.**
- **Conecte todos los cables de alimentación a tomas de corriente debidamente cableadas y conectadas a tierra.**
- **Cualquier equipo que se conecte a este producto también debe conectarse a tomas de corriente debidamente cableadas.**
- **Siempre que sea posible, utilice una sola mano para conectar o desconectar los cables de señal.**

- **No encienda nunca un equipo cuando hay señales de fuego, agua o daños estructurales.**

- **Desconecte los cables de alimentación, los sistemas de telecomunicaciones, las redes y los módems conectados antes de abrir las cubiertas de los dispositivos, a menos que se indique lo contrario en los procedimientos de instalación y configuración.**

- **Conecte y desconecte los cables, como se describe en la tabla siguiente, cuando instale, mueva o abra las cubiertas de este producto o de los dispositivos conectados.**

Para conectar	Para desconectar
1. APÁGUELO todo.	1. APÁGUELO todo.
2. En primer lugar, conecte todos los cables a los dispositivos.	2. En primer lugar, desenchufe los cables de alimentación de las tomas de corriente.
3. Conecte los cables de señal a los conectores.	3. Desconecte los cables de señal de los conectores.
4. Enchufe los cables de alimentación a las tomas de corriente.	4. Desconecte todos los cables de los dispositivos.
5. Encienda el dispositivo.	

PRECAUCIÓN:

Cuando sustituya una batería de litio, utilice solamente una batería número de pieza 45C1566 u otra de tipo equivalente recomendada por el fabricante. Si su sistema dispone de un módulo que contiene una batería de litio, reemplácelo sólo con el mismo tipo de módulo, del mismo fabricante. La batería contiene litio y puede explotar si no se utiliza, manipula o desecha correctamente.

No debe:

- **Arrojarla al agua o sumergirla en ella**

- **Exponerla a temperaturas superiores a 100°C (212°F)**

- **Repararla o desmontarla**

Deshágase de la batería según especifiquen las leyes o normas locales.

PRECAUCIÓN:

Cuando haya productos láser (como unidades de CD-ROM, unidades de DVD, dispositivos de fibra óptica o transmisores) instalados, tenga en cuenta lo siguiente:

- **No quite las cubiertas. Si quita las cubiertas del producto láser, podría quedar expuesto a radiación láser peligrosa. Dentro del dispositivo no existe ninguna pieza que requiera servicio técnico.**

- **Si usa controles o ajustes o realiza procedimientos que no sean los especificados aquí, podría exponerse a radiaciones peligrosas.**

PELIGRO

Algunos productos láser tienen incorporado un diodo láser de clase 3A o clase 3B. Tenga en cuenta lo siguiente:

Cuando se abre, queda expuesto a radiación láser. No mire directamente al rayo láser, ni siquiera con instrumentos ópticos, y evite exponerse directamente al rayo láser.
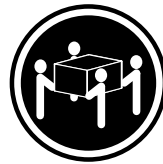
≥18 kg   ≥32 kg   ≥55 kg

PRECAUCIÓN:

Adopte procedimientos seguros al levantar el equipo.

PRECAUCIÓN:

El botón de control de alimentación del dispositivo y el interruptor de alimentación de la fuente de alimentación no desconectan la corriente eléctrica suministrada al dispositivo. Además, el dispositivo podría tener más de un cable de alimentación. Para suprimir toda la corriente eléctrica del dispositivo, asegúrese de que todos los cables de alimentación estén desconectados de la toma de corriente.

2
1

Chapter 2. Product overview

This chapter provides information about the following topics:

Hardware locations

This section provides information about the locations of your computer hardware.

Note: The computer hardware might look slightly different from the illustrations.

Front view
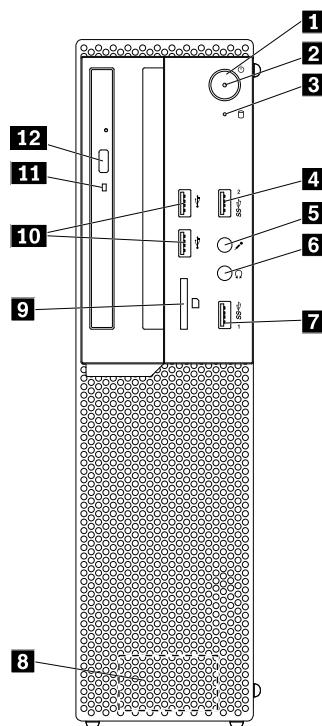
Figure 1. Front view

1 Power button	**2** Power indicator
3 Storage drive activity indicator	**4** USB 3.0 connector
5 Microphone connector	**6** Headphone connector
7 USB 3.0 connector	**8** Internal speaker (some models)

9 Card reader slot (some models)	10 USB 2.0 connectors (2) (some models)
11 Optical drive activity indicator	12 Optical drive eject/close button

- **Card reader slot**

  Used to hold a card-shaped storage medium so that the card reader can read the data on the storage medium.

- **Headphone connector**

  Used to connect headphones to your computer.

- **Internal speaker**

  Used to listen to the sounds from your computer without using a headset or headphones.

- **Microphone connector**

  Used to connect a microphone to your computer. You can use the microphone to record sounds or use speech-recognition software.

- **Optical drive activity indicator**

  When the optical drive activity indicator is on, the optical drive is in use.

- **Optical drive eject/close button**

  Used to eject the tray of the optical drive from the drive. After you insert a disc into the tray, press the eject/close button to close the tray.

- **Power button**

  Used to turn on your computer. You also can use the power button to turn off your computer only when you cannot use any Microsoft® Windows® shutdown procedure to turn off your computer.

- **Power indicator**

  When the power indicator is on, the computer is on.

- **Storage drive activity indicator**

  When the storage drive activity indicator is on, the storage drive is in use.

- **USB 2.0 connector**

  Used to connect a device that requires a USB 2.0 connection, such as a keyboard, a mouse, a scanner, a printer, or a personal digital assistant (PDA).

- **USB 3.0 connector**

  Used to connect a device that requires a USB 2.0 or USB 3.0 connection, such as a keyboard, a mouse, a scanner, a printer, or a PDA.

Rear view
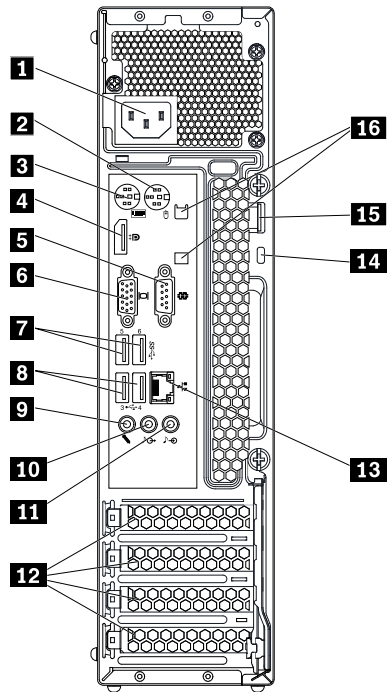
Figure 2. Rear view

1 Power cord connector	**2** PS/2 mouse connector
3 PS/2 keyboard connector	**4** DisplayPort®-out connector
5 Serial connector	**6** VGA-out connector
7 USB 3.0 connectors (2)	**8** USB 2.0 connectors (2)
9 Microphone connector	**10** Audio line-out connector
11 Audio line-in connector	**12** PCI Express card area (different cards provide different connectors)
13 Ethernet connector	**14** Security-lock slot
15 Padlock loop	**16** Cable lock slots (2)

Note: A discrete graphics card, network interface card, or audio card might be installed in the Peripheral Component Interconnect (PCI) Express card area. If such a card is installed, ensure that you use the connectors on the card instead of the corresponding connectors on the computer.

- **Audio line-in connector**

  Used to receive audio signals from an external audio device, such as a stereo system. When you attach an external audio device, a cable is connected between the audio line-out connector of the device and the audio line-in connector of the computer.

- **Audio line-out connector**

  Used to send audio signals from the computer to external devices, such as powered stereo speakers, headphones, or multimedia keyboards. To attach a stereo system or other external recording device, a cable is connected between the audio line-in connector of the device and the audio line-out connector of the computer.

  Note: If your computer has both an audio line-out connector and a headset connector or headphone connector, always use the headset connector or headphone connector for earphones, headphones, or a headset. However, a headphone connector does not support the microphone of a headset.

- **Cable-lock slots (2)**

  Used to secure a cable lock. For more information, see "Attaching a cable lock" on page 60.

- **DisplayPort-out connector**

  Used to send audio and video signals from your computer to another audio or video device, such as a high-performance monitor.

- **Ethernet connector**

  Used to connect an Ethernet cable for a local area network (LAN).

  Note: To operate the computer within Federal Communications Commission (FCC) Class B limits, use a Category 5e or better Ethernet cable.

- **Microphone connector**

  Used to connect a microphone to your computer when you want to record sound or if you use speech-recognition software.

- **Padlock loop**

  Used to secure a padlock. For more information, see "Locking the computer cover" on page 58.

- **PCI Express card area (different cards provide different connectors)**

  To improve the operating performance of your computer, you can connect PCI Express cards into this area. Depending on your computer model, the connectors in this area might vary.

- **Power cord connector**

  Used to connect the power cord to your computer for power supply.

- **PS/2 keyboard connector**

  Used to connect a keyboard that uses a Personal System/2 (PS/2) keyboard connector.

- **PS/2 mouse connector**

  Used to connect a mouse, a trackball, or other pointing devices that use a PS/2 mouse connector.

- **Serial connector**

  Used to connect an external modem, a serial printer, or other devices that use a serial connector.

- **Security-lock slot**

  Used to secure a Kensington-style cable lock. For more information, see "Attaching a Kensington-style cable lock" on page 59.

- **USB 2.0 connector**

  Used to connect a device that requires a USB 2.0 connection, such as a keyboard, a mouse, a scanner, a printer, or a personal digital assistant (PDA).

- **USB 3.0 connector**

  Used to connect a device that requires a USB 2.0 or USB 3.0 connection, such as a keyboard, a mouse, a scanner, a printer, or a PDA.

- **VGA-out connector**

  Used to send video signals from your computer to another video device, such as a monitor.

Computer components

Note: Depending on your computer model, some of the following components might not be available.
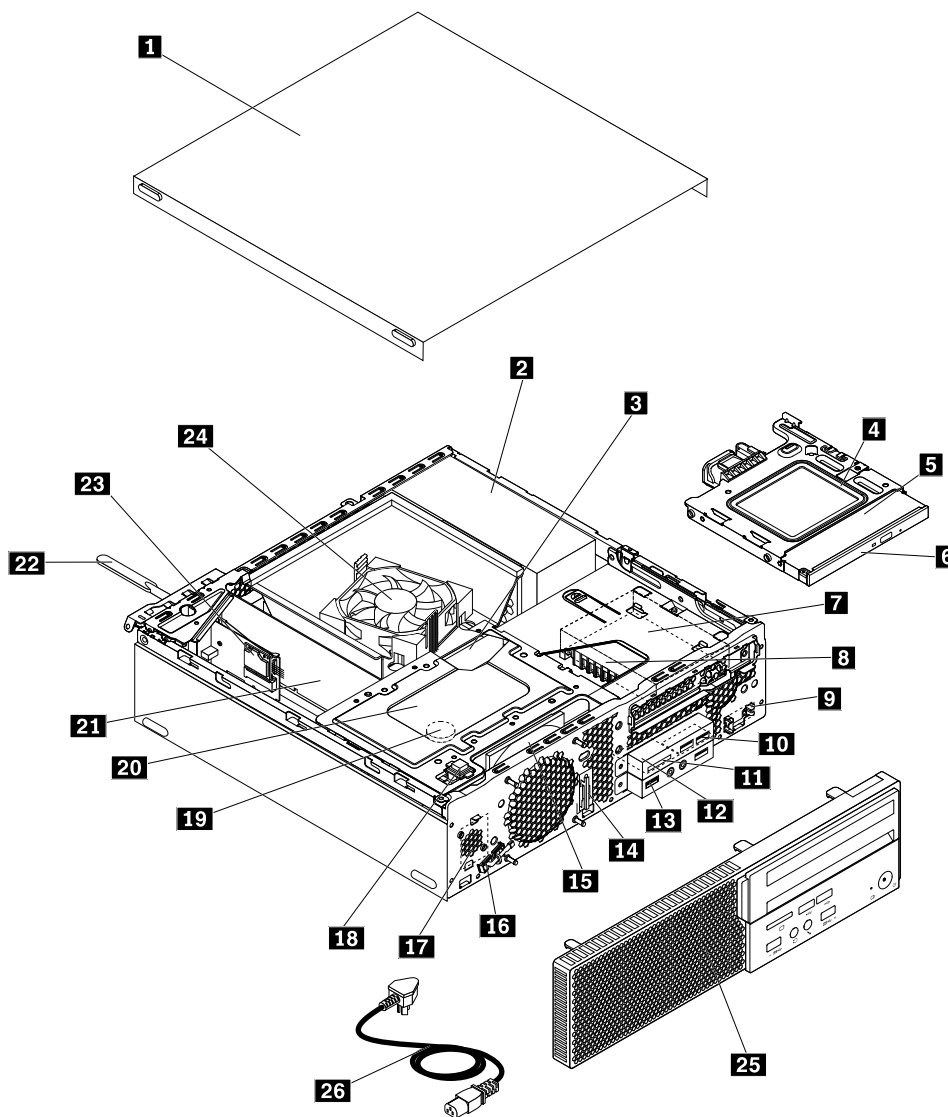
Figure 3. Computer components

1 Computer cover	**2** Power supply assembly
3 Memory module	**4** Optical drive bracket
5 Optical drive	**6** Optical drive bezel
7 Secondary storage drive (a 2.5-inch storage drive)	**8** Secondary storage drive bracket
9 Power button board	**10** USB 2.0 assembly
11 Card reader	**12** Card reader and USB 2.0 assembly bracket
13 Front audio and USB 3.0 assembly	**14** Front Wi-Fi antenna
15 System fan	**16** Thermal sensor
17 Internal speaker	**18** Cover presence switch (also called intrusion switch)

19 Coin-cell battery	20 Primary storage drive bracket and primary storage drive (a 2.5-inch or 3.5-inch storage drive)
21 PCI Express card	22 Rear Wi-Fi antenna
23 Wi-Fi card	24 Heat sink and fan assembly (with the microprocessor underneath)
25 Front bezel	26 Power cord

Major FRUs and CRUs

Note: Depending on your computer model, some of the following components might not be available.
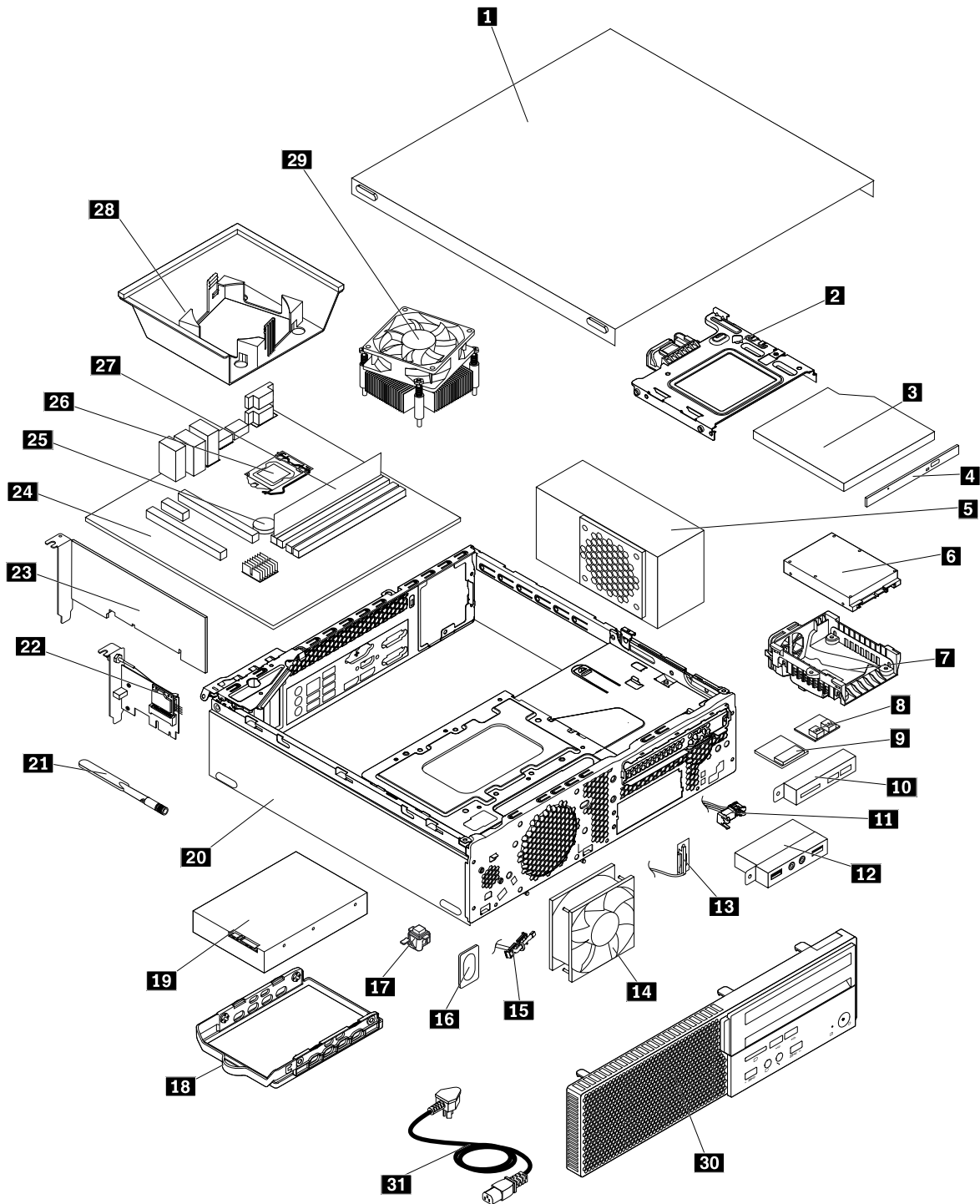
Figure 4. Major FRUs and CRUs

The following table lists the major FRUs shown in the illustration above and identifies which FRUs are also self-service CRUs or optional-service CRUs.

Notes:

- Self-service CRUs: These CRUs unplug or are secured by no more than two screws. Examples of these types of CRUs include the keyboard, the mouse, any USB device, and the power cord. Other self-service CRUs depending on product design might include memory modules, adapter cards, hard disk drives, and optical drives.
- Optional-service CRUs: These CRUs are isolated parts within the computer and are concealed by an access panel that is typically secured by more than two screws. Once the access panel is removed, the specific CRU is visible.

Number	FRU description	Self-service CRU	Optional-service CRU
1	Computer cover	Yes	No
2	Optical drive bracket	Yes	No
3	Optical drive	Yes	No
4	Optical drive bezel	Yes	No
5	Power supply assembly	No	Yes
6	Secondary storage drive (a 2.5-inch storage drive)	Yes	No
7	Secondary storage drive bracket	Yes	No
8	USB 2.0 assembly	No	No
9	Card reader	No	No
10	Card reader and USB 2.0 assembly bracket	No	No
11	Power button board	No	No
12	Front audio and USB 3.0 assembly	No	No
13	Front Wi-Fi antenna	No	No
14	System fan	No	No
15	Thermal sensor	No	No
16	Internal speaker	No	No
17	Cover presence switch (also called intrusion switch)	No	No
18	Primary storage drive bracket	Yes	No
19	Primary storage drive (a 2.5-inch or 3.5-inch storage drive)	Yes	No
20	Chassis	No	No
21	Rear Wi-Fi antenna	No	No
22	Wi-Fi card	No	No
23	PCI Express card	Yes	No
24	System board	No	No
25	Coin-cell battery	Yes	No
26	Microprocessor	No	No
27	Memory module	Yes	No
28	Heat sink fan duct	No	No
29	Heat sink and fan assembly	No	Yes
30	Front bezel	Yes	No
31	Power cord	Yes	No

For detailed FRU information, such as the FRU part numbers and supported computer models, go to:
http:/www.lenovo.com/serviceparts-lookup

Parts on the system board

Note: For the parts that are displayed on the following figure but not introduced in the following table, see "Front view" on page 27 and "Rear view" on page 29.
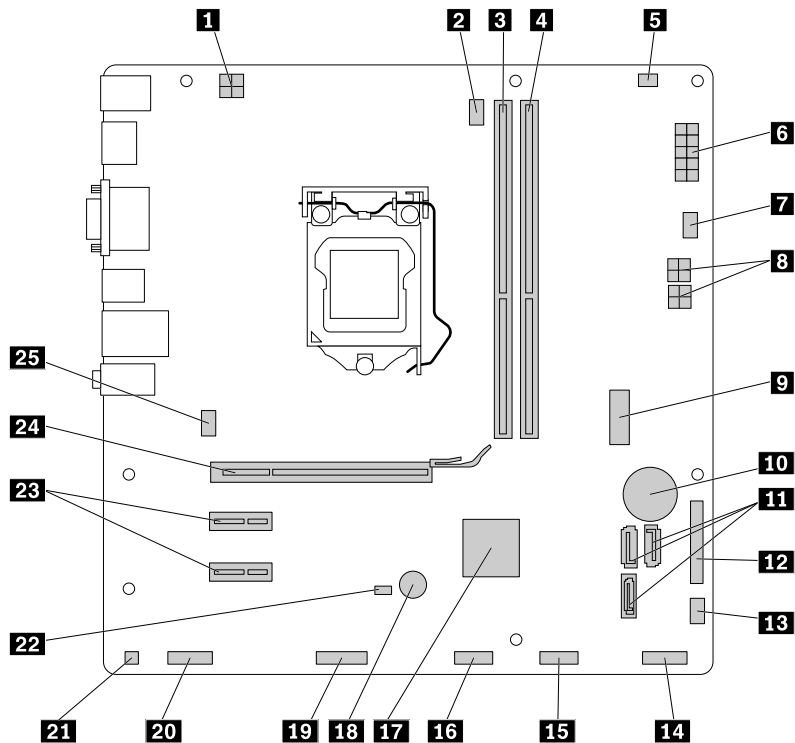
Figure 5. Parts on the system board

1 4-pin power connector	**2** Microprocessor fan connector
3 Memory slot (DIMM1)	**4** Memory slot (DIMM2)
5 Thermal sensor connector	**6** 10-pin power connector
7 Auxiliary fan connector 2 (for connecting the fan on the secondary storage drive bracket)	**8** SATA power connectors (2)
9 Front USB 3.0 connector	**10** Coin-cell battery
11 SATA 3.0 connectors (3)	**12** Parallel connector
13 Auxiliary fan connector 1	**14** Power button board connector
15 Card reader connector	**16** Front USB 2.0 connector
17 PCH	**18** Buzzer
19 Serial (COM2) connector	**20** Front audio connector
21 Internal speaker connector	**22** Cover presence switch connector (Intrusion switch connector)
23 PCI Express x1 card slot (2)	**24** PCI Express x16 graphics card slot
25 System fan connector	

Machine type and model label

The machine type and model label identifies your computer. When you contact Lenovo for help, the machine type and model information helps support technicians to identify your computer and provide faster service.

The machine type and model label is attached on the side of your computer as shown.

MT-M XXXX-XXXXXX
S/N   XXXXXXXX
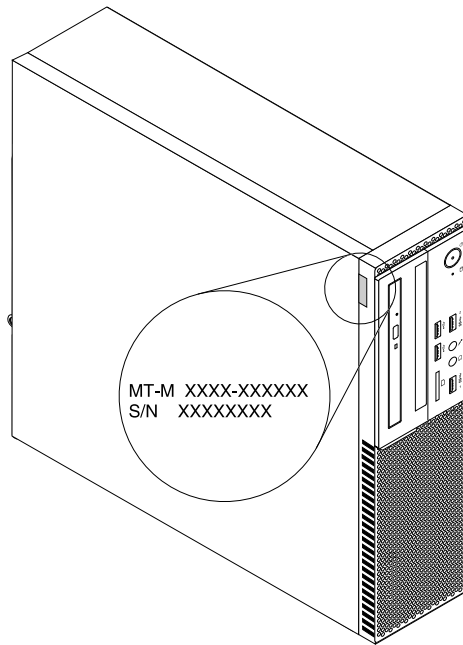
Figure 6. Machine type and model label

Features

The computer features introduced in this section apply to various models.

Information about your computer

- To view basic information (such as microprocessor and memory information) about your computer, do the following:
    1. Click the Start button to open the Start menu.
    2. Depending on your Windows version, do one of the following:
        - For Windows 7: Right-click **Computer**, and then click **Properties**.
        - For Windows 10: Click **Settings** ➙ **System** ➙ **About**.
- To view detailed information about the devices (such as the optical drive and network adapters) on your computer, do the following:
    1. Depending on your Windows version, do one of the following:
        - For Windows 7: Click the Start button to open the Start menu. Right-click **Computer**, and then click **Properties**.
        - For Windows 10: Right-click the Start button to open the Start context menu.
    2. Click **Device Manager**. Type the administrator password or provide confirmation if prompted.

Preinstalled operating system

Your computer is preinstalled with Windows 7 or Windows 10 operating system. Additional operating systems might be identified by Lenovo as compatible with your computer. To determine if an operating system has been certified or tested for compatibility, check the Web site of the operating system provider.

Power supply

- 180-watt automatic voltage-sensing power supply
- 210-watt automatic voltage-sensing power supply

Storage drives

Your computer supports up to two storage drives.

To view the amount of storage drive space, do the following:

1. Depending on your Windows version, do one of the following:

    - For Windows 7: Click the Start button to open the Start menu. Right-click **Computer**, and then click **Manage**.
    - For Windows 10: Right-click the Start button to open the Start context menu.

2. Click **Disk Management**.

Video features

- The integrated graphics card supports the following display connectors on your computer:
    - DisplayPort-out connector
    - VGA-out connector
- The discrete graphics card, which is available on some models, provides enhanced display capability and experience.

Audio features

- The integrated audio card supports the following audio connectors and devices on your computer:
    - Audio line-in connector
    - Audio line-out connector
    - Headphone connector
    - Internal speaker (available on some models)
    - Microphone connector
- The discrete audio card, which is available on some models, provides enhanced audio capability and experience.

Input/Output (I/O) features

- Audio connectors (audio line-in connector, audio line-out connector, headphone connector, and microphone connector)
- Card reader slot (available on some models)
- Display connectors (DisplayPort-out connector and VGA-out connector)
- Ethernet connector
- PS/2 keyboard connector (available on some models)
- PS/2 mouse connector (available on some models)
- Serial connector

- USB connector

Expansion

- Card reader (available on some models)
- Memory slot
- Optical drive
- PCI Express x1 card slot
- PCI Express x16 graphics card slot
- Storage drive bay

Network features

- Ethernet LAN

  - The integrated network interface card supports the Ethernet connector on your computer.

  - The discrete network interface card, which is available on some models, provides an additional Ethernet connector.

- Wireless LAN (available on some models)
- Bluetooth (available on some models)

Security features

For more information, see Chapter 5 "Security" on page 57.

System management features

- Ability to store power-on self-test (POST) hardware test results
- Desktop Management Interface (DMI)

  Desktop Management Interface provides a common path for users to access information about all aspects of a computer. The information includes processor type, installation date, connected printers and other peripherals, power sources, maintenance history, and so on.

- ErP LPS compliance mode

  The energy-related products directive (ErP) lowest power state (LPS) compliance mode reduces the consumption of electricity when your computer is in sleep or off mode. For more information, see "Enabling or disabling ErP LPS compliance mode" on page 64.

- Intel® Standard Manageability

  Intel Standard Manageability is hardware- and firmware-based technology that makes computers easier and less expensive for businesses to monitor, maintain, update, upgrade, and repair.

- Intel Active Management Technology (AMT) (available on some models)

  Intel Active Management Technology is hardware- and firmware-based technology that makes computers easier and less expensive for businesses to monitor, maintain, update, upgrade, and repair.

- Preboot Execution Environment (PXE)

  Preboot Execution Environment enables computers to start through a network interface independent of data storage drives (such as hard disk drives) or installed operating systems.

- System Management (SM) Basic Input/Output System (BIOS) and SM software

  The SMBIOS specification defines data structures and access methods that can be used to read management data stored in the BIOS of a computer.

- Wake on LAN

  Wake on LAN is an Ethernet computer networking standard that allows a computer to be turned on or woken up by a network message. The message usually is sent by a program running on another computer on the same LAN.

- Wake on Ring

  Wake on Ring, sometimes referred to as Wake on Modem, is a specification that allows supported computers and devices to resume from sleep or hibernation mode.

- Windows Management Instrumentation (WMI)

  Windows Management Instrumentation is a set of extensions to the Windows Driver Model. It provides an operating system interface through which instrumented components provide information and notification.

Specifications

This section lists the physical specifications for your computer.

Dimensions

    Width: 92.8 mm (3.7 inches)

    Height: 342.8 mm (13.5 inches)

    Depth: 363.7 mm (14.3 inches)

Weight (without the package)

    Maximum configuration as shipped: 5.6 kg (12.3 lb)

Environment

- Air temperature:

      Operating: From 10°C (50°F) to 35°C (95°F)

      Storage in original shipping package: From -40°C (-40°F) to 60°C (140°F)

      Storage without package: From -10°C (14°F) to 60°C (140°F)

- Humidity:

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

      Storage: 20%–90% (non-condensing)

- Altitude:

      Operating: From -15.2 m (-50 ft) to 3048 m (10 000 ft)

      Storage: From -15.2 m (-50 ft) to 10 668 m (35 000 ft)

Electrical input

    Input voltage: From 100 V ac to 240 V ac

    Input frequency: 50/60 Hz

Programs

This section provides information about the programs on your computer.

Accessing a program on your computer

Note: For Windows 7, depending on your computer model, some of the Lenovo programs might be ready to be installed, so you need to install them manually. Then, you can access and use these programs.

To access a program on your computer, do one of the following:

- From Windows Search:
    1. Depending on your Windows version, do one of the following:
        – For Windows 7: Click the Start button to open the Start menu, and then type the program name into the search box.
        – For Windows 10: Type the program name into the search box next to the Start button.
    2. In the search results, click the name of the desired program to launch the program.
- From the Start menu or Control Panel:
    1. Click the Start button to open the Start menu. Then, click the name of the desired program to launch the program.
    2. If the program name is not displayed, click **All Programs** for Windows 7 or **All apps** for Windows 10 to display the program list. From the list or a folder in the list, click the name of the desired program to launch the program.
    3. If the program name is not displayed on the Start menu, access the program from Control Panel.
        a. Depending on your Windows version, do one of the following:
            – For Windows 7: Click **Control Panel** on the Start menu.
            – For Windows 10: Right-click the Start button to open the Start context menu, and then click **Control Panel**.
        b. View Control Panel using Large icons or Small icons, and then click the name of the desired program to launch the program.

Installing a program that is ready to be installed

To install a program that is ready to be installed, do the following:
1. Open the Lenovo ThinkVantage® Tools program. See "Accessing a program on your computer" on page 41.
2. View the program icons using Tiles.
3. Follow the instructions under greyed-out icons to locate the icon for the desired program. Then, double-click the icon to install the program.

An introduction to Lenovo programs

This section provides information about the major Lenovo programs available on your operating system.

Note: Depending on your computer model, some of the following programs might not be available.

- For Windows 7 only:
    – **Create Recovery Media**

    The Create Recovery Media program enables you to restore only the C drive or the entire storage drive to the factory-default settings.
    – **Fingerprint Manager Pro or ThinkVantage Fingerprint Software**

    The Fingerprint Manager Pro or ThinkVantage Fingerprint Software program enables you to use a fingerprint reader. The integrated fingerprint reader provided on some keyboards enables you to enroll your fingerprint and associate it with your power-on password, hard disk password, and Windows password. As a result, fingerprint authentication can replace passwords and enable simple and secure user access.
    – **Lenovo PowerENGAGE**

    The Lenovo PowerENGAGE program enables you to register your computer with Lenovo.

– **Password Manager**

The Password Manager program automatically captures and fills in authentication information for Windows programs and Web sites.

– **Rescue and Recovery®**

The Rescue and Recovery program is a one-button recovery and restore solution. It includes a set of self-recovery tools to help you diagnose computer problems, get help, and recover from system crashes, even if you cannot start the Windows operating system.

– **System Update**

The System Update program provides regular access to the system updates for your computer, such as device driver updates, software updates, and BIOS updates. The program gathers information from the Lenovo Help Center about new updates for your computer, then sorts and displays the updates for download and installation. You have complete control of which updates to download and install.

- For Windows 10 only:

  – **Lenovo Companion**

  Your computer's best features and capabilities should be easy to access and understand. With Lenovo Companion, they are. Use Lenovo Companion to do the following:

  – Optimize your computer's performance, monitor your computer's health, and manage updates.

  – Access your user guide, check warranty status, and view accessories customized for your computer.

  – Read how-to articles, explore Lenovo forums, and stay up-to-date on technology news with articles and blogs from trusted sources.

  Lenovo Companion is filled with exclusive Lenovo content to help you learn more about what you can do with your computer.

  – **Lenovo ID**

  The Lenovo ID program enables you to create your Lenovo ID and access all supported Lenovo programs and web portals with single sign-on.

- For Windows 7 and Windows 10:

  – **Lenovo Bluetooth Lock**

  The Lenovo Bluetooth Lock program enables you to use a Bluetooth device (such as your smartphone) as a proximity-based unit for locking or unlocking your computer automatically. By detecting the distance between your computer and the predefined Bluetooth device that you are carrying, the Lenovo Bluetooth Lock program automatically locks your computer when you walk away and unlocks your computer when you come back. This is a simple way to protect your computer against unauthorized access in case that you forget to lock your computer.

  – **Lenovo Device Experience or Lenovo PC Experience**

  The Lenovo Device Experience or Lenovo PC Experience program helps you work more easily and securely. The program provides easy access to Lenovo ThinkVantage Tools or Lenovo Tools, important settings and information about your computer, the Lenovo Support Web site, and so on.

  – **Lenovo Solution Center**

  The Lenovo Solution Center program enables you to troubleshoot and resolve computer problems. It combines diagnostic tests, system information collection, security status, and support information, along with hints and tips for maximum system performance.

  – **Power Manager**

  The Power Manager program provides convenient, flexible, and complete power management for your computer. It enables you to adjust your computer power settings to achieve the best balance between performance and power saving.

Chapter 3. Using your computer

This chapter contains the following topics:

- "Registering your computer" on page 45
- "Setting the computer volume" on page 45
- "Adding an icon to the Windows notification area" on page 45
- "Using a disc" on page 45
- "Connecting to a network" on page 47

Registering your computer

When you register your computer with Lenovo, you enter required information into a Lenovo database. The information enables Lenovo to contact you when there is a recall or other severe problem and provide quicker service when you call Lenovo for help. In addition, some locations offer extended privileges and services to registered users.

To register your computer with Lenovo, ensure that your computer is connected to the Internet. Then, go to http://www.lenovo.com/register and follow the instructions on the screen.

Setting the computer volume

To set the computer volume, do the following:

1. Click the volume icon in the Windows notification area on the taskbar.

   Note: If the volume icon is not displayed in the Windows notification area, add the icon to the notification area. See "Adding an icon to the Windows notification area" on page 45.

2. Follow the instructions on the screen to adjust the volume. Click the speaker icon to mute the audio.

Adding an icon to the Windows notification area

To add an icon to the Windows notification area, do the following:

1. Click the arrow next to the notification area to view hidden icons. Then, click the desired icon and drag it to the notification area.
2. If the icon is not displayed, turn on the icon.
   a. Click the Start button to open the Start menu.
   b. Depending on your Windows version, do one of the following:
      - For Windows 7: Click **Control Panel**. View Control Panel using Large icons or Small icons, and then click **Notification Area Icons** ➙ **Turn system icons on or off**.
      - For Windows 10: Click **Settings** ➙ **System** ➙ **Notifications & actions** ➙ **Turn system icons on or off**.
   c. Turn on the desired icon.
3. If the icon is still not displayed in the Windows notification area, repeat step 1.

Using a disc

This section provides information about using a disc and the optical drive.

Guidelines about using the optical drive

When using the optical drive, follow these guidelines:

- Do not place the computer in a location where the drive is exposed to any of the following conditions:
    - High temperature
    - High humidity
    - Excessive dust
    - Excessive vibration or sudden shock
    - An inclined surface
    - Direct sunlight
- Do not insert any object other than a disc into the drive.
- Do not insert damaged discs into the drive. Warped, scratched, or dirty discs can damage the drive.
- Before moving the computer, remove the disc from the drive.

Handling and storing a disc

When handling and storing a disc, follow these guidelines:

- Hold the disc by its edges. Do not touch the surface of the side that is not labeled.
- To remove dust or fingerprints, wipe the disc with a clean, soft cloth from the center to the outside. Wiping the disc in a circular direction might cause loss of data.
- Do not write or stick paper on the disc.
- Do not scratch or mark the disc.
- Do not place or store the disc in direct sunlight.
- Do not use benzene, thinners, or other cleaners to clean the disc.
- Do not drop or bend the disc.

Playing and removing a disc

To play a disc, do the following:
1. With the computer on, press the eject/close button on the front of the optical drive. The tray slides out of the drive.
2. Insert a disc into the tray. Some optical drive has a snap hub in the center of the tray. If your drive has a snap hub, support the tray with one hand and then push center of the disc until it snaps into place.
3. Press the eject/close button again or gently push the tray forward to close the tray. The disc player program starts automatically. For more information, refer to the help system of the disc player program.

To remove a disc from the optical drive, do the following:
1. With the computer on, press the eject/close button on the front of the optical drive. The tray slides out of the drive.
2. Carefully remove the disc from the tray.
3. Press the eject/close button again or gently push the tray forward to close the tray.

Note: If the tray does not slide out of the drive when you press the eject/close button, turn off your computer. Then, insert a straightened paper clip into the emergency-eject hole adjacent to the eject/close button. Use the emergency eject only in an emergency.

Recording a disc

If your optical drive supports recording, you can record a disc.

Recording a disc using Windows tools

To record a disc using Windows tools, do one of the following:

- Burn a disc using the AutoPlay window.
    1. Ensure that the disc is played automatically.
        a. Click the Start button to open the Start menu.
        b. Depending on your Windows version, do one of the following:
            – For Windows 7: Click **Control Panel**. View Control Panel using Large icons or Small icons, and then click **AutoPlay**.
            – For Windows 10: Click **Settings ➙ Devices ➙ AutoPlay**.
        c. Select or turn on **Use AutoPlay for all media and devices**.
    2. Insert a recordable disc into the optical drive that supports recording. The AutoPlay window opens.
    3. Follow the instructions on the screen.
- Burn a disc using Windows Media® Player.
    1. Insert a recordable disc into the optical drive that supports recording.
    2. Open Windows Media Player. See "Accessing a program on your computer" on page 41.
    3. Follow the instructions on the screen.
- Burn a disc from an ISO file.
    1. Insert a recordable disc into the optical drive that supports recording.
    2. Double-click the ISO file.
    3. Follow the instructions on the screen.

Recording a disc using preinstalled programs

To record a disc using preinstalled programs, do the following:

1. Insert a recordable disc into the optical drive that supports recording.
2. Open the PowerDVD Create, PowerProducer, or Power2Go program. See "Accessing a program on your computer" on page 41.
3. Follow the instructions on the screen.

Connecting to a network

This section provides information about connecting to a network. If you cannot connect your computer to a network, see "Networking problems" on page 73.

Connecting to an Ethernet LAN

You can connect your computer to an Ethernet LAN by connecting an Ethernet cable to the Ethernet connector.

DANGER

> **To avoid the risk of electrical shock, do not connect the telephone cable to the Ethernet connector.**

Connecting to a wireless LAN

You can connect your computer to a wireless LAN without the use of an Ethernet cable but by means of radio waves only.

Note: The wireless LAN feature is supported only on some models.

To establish a wireless-LAN connection, do the following:

1. Ensure that a wireless LAN is available and the wireless LAN feature on your computer is working.
2. Click the wireless-network-connection-status icon in the Windows notification area to display available wireless networks.

   Note: If the wireless-network-connection-status icon is not displayed in the Windows notification area, add the icon to the notification area. See "Adding an icon to the Windows notification area" on page 45.
3. Click a wireless LAN, and then click **Connect** to connect your computer to it. Provide required information if needed.

Connecting to a Bluetooth-enabled device

Bluetooth is a short-range wireless communications technology. Use Bluetooth to establish a wireless connection between your computer and another Bluetooth-enabled device within a distance of about 10 m (32.8 ft).

Note: The Bluetooth feature is supported only on some models.

To connect to a Bluetooth-enabled device, do the following:

1. Ensure that the Bluetooth feature on your computer is working and the Bluetooth-enabled device is located within a distance of about 10 m (32.8 ft) from your computer.
2. Click the Bluetooth icon in the Windows notification area on the taskbar. Then, click **Add a Device** and follow the instructions on the screen.

   Note: If the Bluetooth icon is not displayed in the Windows notification area, add the icon to the notification area. See "Adding an icon to the Windows notification area" on page 45.

Chapter 4. You and your computer

This chapter contains the following topics:

Arranging your workspace

Arrange your workspace to suit your needs and the kind of work you do. This section provides information about the factors that affect the way you arrange your workspace.

Glare and lighting

Position the monitor to minimize glare and reflections from overhead lights, windows, and other light sources. Reflected light from shiny surfaces can cause annoying reflections on your screen. When possible, place the monitor at right angles to windows and other light sources. If necessary, reduce overhead lighting by turning off lights or using lower wattage bulbs. If you install the monitor near a window, use curtains or blinds to block the sunlight. You can adjust the brightness and contrast controls on the monitor as the room lighting changes throughout the day.

Where it is impossible to avoid reflections or to adjust the lighting, an antiglare filter placed over the screen might be helpful. However, these filters might affect the clarity of the image on the screen; try them only after you have exhausted other methods of reducing glare.

Air circulation

Your computer produces heat. The computer has a fan that pulls in fresh air and forces out hot air through the air vents. Blocking the air vents can cause overheating, which might result in a malfunction or damage. Position the computer so that nothing blocks the air vents; usually, 51 mm (2 inches) of air space is sufficient. Ensure that the vented air is not blowing on people.

Electrical outlet locations and cable lengths

The following factors might determine the final placement of your computer:

- Locations of electrical outlets
- Length of power cords or power adapters
- Length of the cables that are connected to other devices

For more information about power cords or power adapters, see "Power cords and power adapters" on page 1.

Comfort

Although no single working position is ideal for everyone, here are a few guidelines to help you find a position that suits you best. The following figure sets an example for your reference.
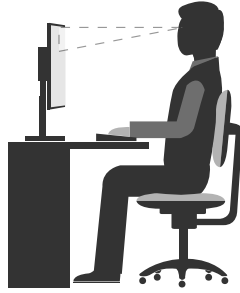
- Screen position: Keep the screen at a comfortable viewing distance, usually 51-61 cm (20-24 inches). Then, adjust the screen so that the top of the screen is at or slightly below eye level and you can view it without twisting your body.
- Chair position: Use a chair that gives you good back support and seat height adjustment. Use chair adjustments to best suit your desired posture.
- Head position: Keep your head and neck in a comfortable and neutral (vertical or upright) position.
- Arm and hand positions: Keep your forearms, wrists, and hands in a relaxed and neutral (horizontal) position. Type with a soft touch without pounding the keys.
- Leg position: Keep your thighs parallel to the floor and your feet flat on the floor or on a footrest.

Make minor modifications in your working posture to deter the onset of discomfort caused by long periods of working in the same position. Frequent, short breaks from your work also help to prevent minor discomfort associated with your working posture.

Accessibility information

Lenovo is committed to providing users who have hearing, vision, and mobility limitations with greater access to information and technology. This section provides information about the ways these users can get the most out of their computer experience. You also can get the most up-to-date accessibility information from the following Web site:
http://www.lenovo.com/accessibility

Keyboard shortcuts

The following table contains keyboard shortcuts that can help make your computer easier to use.

Note: Depending on your keyboard, some of the following keyboard shortcuts might not be available.

Keyboard shortcut	Function
Windows logo key + U	Open Ease of Access Center
Right Shift for eight seconds	Turn on or turn off Filter Keys
Shift five times	Turn on or turn off Sticky Keys
Num Lock for five seconds	Turn on or turn off Toggle Keys
Left Alt+Left Shift+Num Lock	Turn on or turn off Mouse Keys
Left Alt+Left Shift+PrtScn (or PrtSc)	Turn on or turn off High Contrast

For more information, go to http://windows.microsoft.com/, and then perform a search using any of the following keywords: `keyboard shortcuts`, `key combinations`, `shortcut keys`.

Ease of Access Center

Ease of Access Center on the Windows operating system enables users to configure their computers to suit their physical and cognitive needs.

To use Ease of Access Center, do the following:
1. Click the Start button to open the Start menu.
2. Depending on your Windows version, do one of the following:
    - For Windows 7: Click **Control Panel**. View Control Panel using Large icons or Small icons, and then click **Ease of Access Center**.
    - For Windows 10: Click **Settings** ➙ **Ease of Access**.
3. Choose the appropriate tool by following the instructions on the screen.

Ease of Access Center mainly includes the following tools:
- Magnifier

  Magnifier is a useful utility that enlarges the entire screen or part of the screen so that you can see the items better.
- Narrator

  Narrator is a screen reader that reads aloud what is displayed on the screen and describes events such as error messages.
- On-Screen Keyboard

  If you prefer to type or enter data into your computer using a mouse, joystick, or other pointing device instead of a physical keyboard, you can use On-Screen Keyboard. On-Screen Keyboard displays a visual keyboard with all the standard keys.
- High Contrast

  High Contrast is a feature that heightens the color contrast of some text and images on your screen. As a result, those items are more distinct and easier to identify.
- Personalized keyboard

  Adjust keyboard settings to make your keyboard easier to use. For example, you can use your keyboard to control the pointer and type certain key combinations easier.
- Personalized mouse

  Adjust mouse settings to make your mouse easier to use. For example, you can change the pointer appearance and make it easier to manage windows with the mouse.

Speech Recognition

Speech Recognition enables you to control your computer by voice.

Using only your voice, you can start programs, open menus, click objects on the screen, dictate text into documents, and write and send e-mails. Everything you do with the keyboard and mouse can be done with only your voice.

To use Speech Recognition, do the following:
1. Depending on your Windows version, do one of the following:
    - For Windows 7: Click the Start button to open the Start menu.
    - For Windows 10: Right-click the Start button to open the Start context menu.
2. Click **Control Panel**. View Control Panel using Large icons or Small icons, and then click **Speech Recognition**.

3. Follow the instructions on the screen.

Screen-reader technologies

Screen-reader technologies are primarily focused on software program interfaces, help information systems, and various online documents. For additional information about screen readers, see the following:

- Using PDFs with screen readers:
  http://www.adobe.com/accessibility.html?promoid=DJGVE
- Using the JAWS screen reader:
  http://www.freedomscientific.com/jaws-hq.asp
- Using the NVDA screen reader:
  http://www.nvaccess.org/

Screen resolution

You can make the text and images on your screen easier to read by adjusting the screen resolution of your computer.

To adjust the screen resolution, do the following:

1. Right-click a blank area on the desktop.
2. Depending on your Windows version, do one of the following:
   - For Windows 7: Click **Screen resolution**.
   - For Windows 10: Click **Display settings**. On the **Display** tab, click **Advanced display settings**.
3. Follow the instructions on the screen.

Note: Setting the resolution too low might prevent some items from fitting on the screen.

Customizable item size

You can make the items on your screen easier to read by changing the item size.

- To change the item size temporarily, use the Magnifier tool in Ease of Access Center. See "Ease of Access Center" on page 51.
- To change the item size permanently, do the following:
  - Change the size of all the items on your screen.
    1. Right-click a blank area on the desktop.
    2. Depending on your Windows version, do one of the following:
       - For Windows 7: Click **Screen resolution** ➔ **Make text and other items larger or smaller**.
       - For Windows 10: Click **Display settings**.
    3. Change the item size by following the instructions on the screen.
    4. Click **Apply**. This change will take effect the next time you log in to the operating system.
  - Change the size of the items on a Web page.

    Press and hold Ctrl, and then press the plus-sign key (+) to enlarge or the minus-sign key (-) to reduce the text size.
  - Change the size of the items on the desktop or a window.

    Note: This function might not work on some windows.

    If your mouse has a wheel, press and hold Ctrl, and then scroll the wheel to change the item size.

Industry-standard connectors

Your computer provides industry-standard connectors that enable you to connect assistive devices.

For more information about the location and function of the connectors, see "Hardware locations" on page 27.

TTY/TDD conversion modem

Your computer supports the use of a text telephone (TTY) or the telecommunications device for the deaf (TDD) conversion modem. The modem must be connected between your computer and a TTY/TDD telephone. Then, you can type a message on your computer and send it to the telephone.

Documentation in accessible formats

Lenovo provides electronic documentation in accessible formats, such as properly tagged PDF files or HyperText Markup Language (HTML) files. Lenovo electronic documentation is developed to ensure that visually impaired users can read the documentation through a screen reader. Each image in the documentation also includes adequate alternative text so that visually impaired users can understand the image when they use a screen reader.

Cleaning your computer

CAUTION:
Remove any media from the drives and turn off all connected devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.

It is a good practice to clean your computer periodically to protect the surfaces and ensure trouble-free operation. Use only mild cleaning solutions and a damp cloth to clean the painted surfaces of the computer.

Dust buildup compounds problems associated with glare, so remember to clean the screen periodically. Wipe the screen surface gently with a soft, dry cloth, or blow on the screen to remove grit and other loose particles. Depending on the type of the screen, moisten a soft, lint-free cloth with an LCD cleaner or liquid glass cleaner and then wipe the screen surface.

Maintenance

With appropriate care and maintenance, your computer will serve you reliably. This section provides information about maintaining your computer so that it can keep working in top order.

Basic maintenance tips

Here are some basic points about keeping your computer functioning properly:

- Keep your computer in a clean, dry environment. Ensure that the computer rests on a flat, steady surface.
- Do not cover any of air vents. These air vents provide airflow to keep your computer from overheating.
- Keep food and drinks away from all parts of your computer. Food particles and spills might make the keyboard and mouse stick and unusable.
- Do not get the power switches or other controls wet. Moisture can damage these parts and cause an electrical hazard.
- Always disconnect a power cord by grasping the plug instead of the cord.

Good maintenance practices

By performing a few good maintenance practices, you can maintain good computer performance, protect your data, and be prepared in case of a computer failure.

• Keep your computer software, device drivers, and operating system up-to-date. See "Keeping your computer current" on page 54.

• Empty your recycle bin on a regular basis.

• Clean out your Inbox, Sent Items, and Deleted Items folders in your e-mail application on a regular basis.

• Clean up files and free up storage drive space and memory space occasionally to prevent performance problems. See "Performance problems" on page 75.

• Keep a log book. Entries might include major software or hardware changes, device-driver updates, intermittent problems and what you did to resolve them, and other issues you might have experienced. The cause of a problem might be change in hardware, change in software, or any other actions that might have taken place. A log book can help you or a Lenovo technician determine the cause of a problem.

• Back up your data on the storage drive regularly. You can restore the storage drive from a backup.

  To back up your data, do one of the following:

  – For Windows 7: Open the Rescue and Recovery program. See "Accessing a program on your computer" on page 41. For more information about backing up your data, refer to the help system of the program.

  – For Windows 10: Right-click the Start button to open the Start context menu, and then click **Control Panel**. View Control Panel using Large icons or Small icons, and then click **File History**. Follow the instructions on the screen.

• Create a recovery medium as early as possible. You can use the recovery medium to recover your operating system even if Windows fails to start up.

  To create a recovery medium, do one of the following:

  – For Windows 7: Open the Create Recovery Media program. See "Accessing a program on your computer" on page 41. For more information about creating a recovery medium, refer to the help system of the program.

  – For Windows 10: Right-click the Start button to open the Start context menu, and then click **Control Panel**. View Control Panel using Large icons or Small icons, and then click **Recovery**. Follow the instructions on the screen.

• For Windows 7, create a rescue medium as early as possible. You can use the rescue medium to recover from failures that prevent you from gaining access to the Rescue and Recovery workspace on your storage drive.

  To create a rescue medium, open the Rescue and Recovery program. See "Accessing a program on your computer" on page 41. For more information about creating a rescue medium, refer to the help system of the program.

Keeping your computer current

In most cases, it is a good practice to have the most up-to-date operating system update patches, software programs, and device drivers. This section provides information about how to get the latest updates for your computer.

Getting the latest device drivers
Attention: Reinstalling device drivers will change the current configuration of your computer.

To get the latest device drivers for your computer, do one of the following:

• Download the device drivers that are preinstalled on your computer. Go to http://www.lenovo.com/drivers.

- Use the Lenovo program or Windows Update. See "Getting the latest system updates" on page 55.

  Note: The device drivers provided by Windows Update might not be tested by Lenovo. It is recommended that you get device drivers from Lenovo.

Getting the latest system updates

To get the latest system updates for your computer, ensure that your computer is connected to the Internet and do one of the following:

- Use one of the following Lenovo programs to get the system updates, such as device driver updates, software updates, and BIOS updates:

  – For Windows 7: Use the System Update program.

  – For Windows 10: Use the Lenovo Companion program.

  To open the System Update or Lenovo Companion program, see "Accessing a program on your computer" on page 41. For more information about using the program, refer to the help system of the program.

- Use Windows Update to get the system updates, such as security fixes, new versions of Windows components, and device driver updates.

    1. Click the Start button to open the Start menu.

    2. Depending on your Windows version, do one of the following:

        – For Windows 7: Click **Control Panel**. View Control Panel using Large icons or Small icons, and then click **Windows Update**.

        – For Windows 10: Click **Settings** ➙ **Update & security** ➙ **Windows Update**.

    3. Follow the instructions on the screen.

Moving your computer

Before moving your computer, take the following precautions:

1. Back up your data on the storage drive. See "Good maintenance practices" on page 54.
2. Remove any media from the drives and turn off all connected devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
3. If you saved the original shipping cartons and packing materials, use them to pack the units. If you are using different cartons, cushion the units to avoid damage.

Moving your computer to another country or region

When you move your computer to another country or region, you must take local electrical standards into consideration. If the local electrical outlet style is different from the type you are currently using, contact the Lenovo Customer Support Center to purchase either an electrical plug adapter or a new power cord. For a list of Lenovo Support phone numbers, go to http://www.lenovo.com/support/phone. If you cannot find the support telephone number for your country or region, contact your Lenovo reseller.

Chapter 5. Security

This chapter contains the following topics:

- "Locking your computer" on page 57
- "Viewing and changing security settings in the Setup Utility program" on page 60
- "Preventing unauthorized access to your computer" on page 61
- "Using fingerprint authentication" on page 61
- "Using the cover presence switch" on page 61
- "Using and understanding firewalls" on page 62
- "Protecting data against viruses" on page 62
- "Computrace Agent software embedded in firmware" on page 62
- "Trusted Platform Module (TPM)" on page 62

Locking your computer

This section provides information about locking your computer with the locking devices to keep your computer safe.

Locking the computer cover

Locking the computer cover helps prevent unauthorized people from gaining access to the inside of your computer. Your computer comes with a padlock loop so that the computer cover cannot be removed when a padlock is installed.
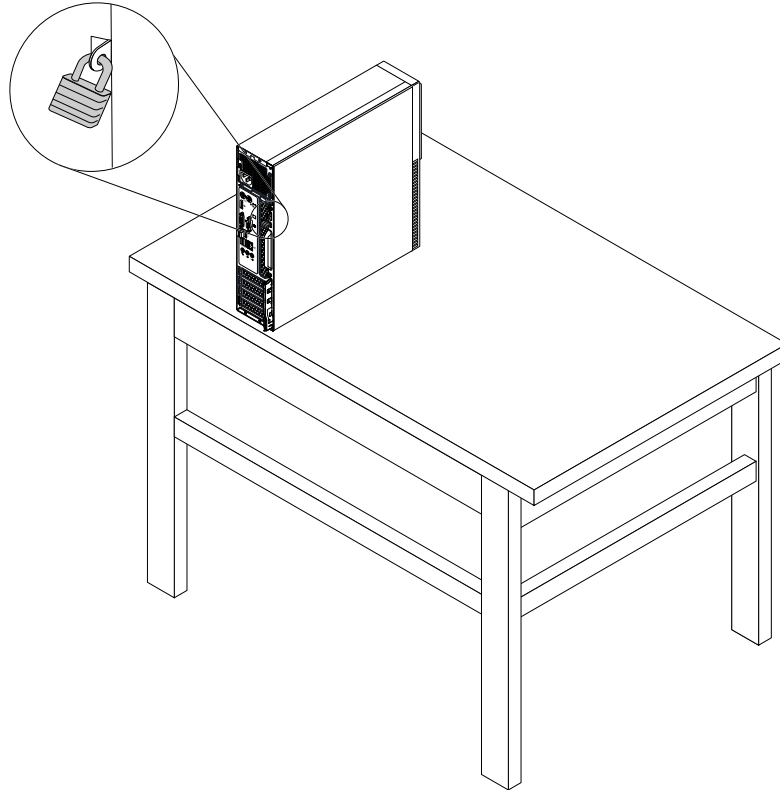
Figure 7. Installing a padlock

Attaching a Kensington-style cable lock

You can use a Kensington-style cable lock to secure your computer to a desk, table, or other non-permanent fixture. The cable lock connects to the security-lock slot at the rear of your computer. Depending on the type selected, the cable lock can be operated with a key or combination. The cable lock also locks the buttons used to open the computer cover. This is the same type of lock used with many notebook computers. You can order such a cable lock directly from Lenovo by searching for *Kensington* at: http://www.lenovo.com/support
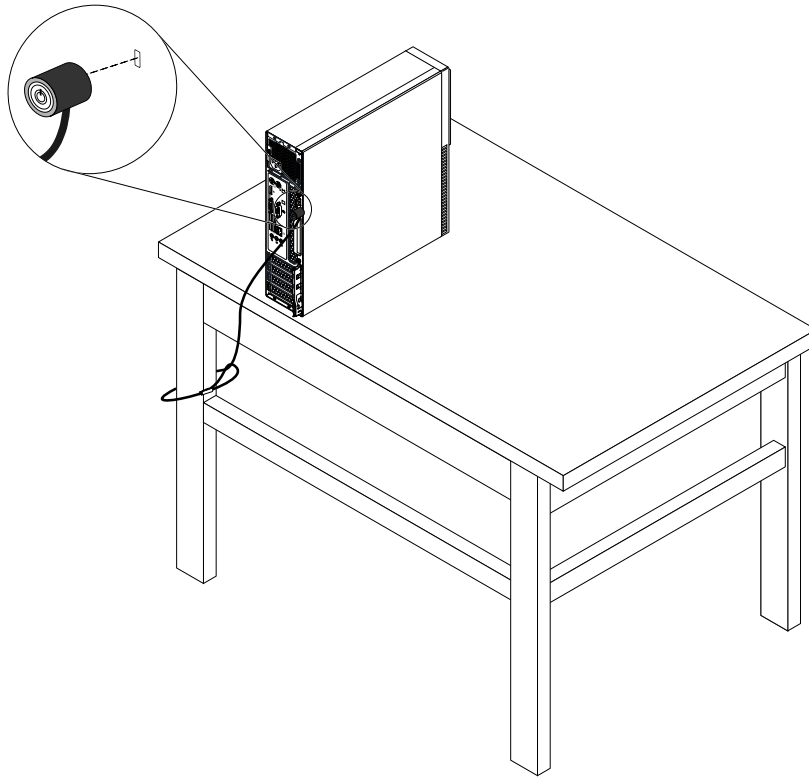
Figure 8. Kensington-style cable lock

Attaching a cable lock

A cable lock can be used to secure devices, such as the keyboard and the mouse, by locking the device cables to your computer. The cable lock connects to the cable-lock slots on the rear of your computer.

To install a cable lock, do the following:

1. Insert the clip **1** into the cable-lock slot **4**.

2. Pull the cables you want to lock through the dents in the cable lock.

3. Press the clip **2** into the cable-lock slot **3** until it snaps into position.
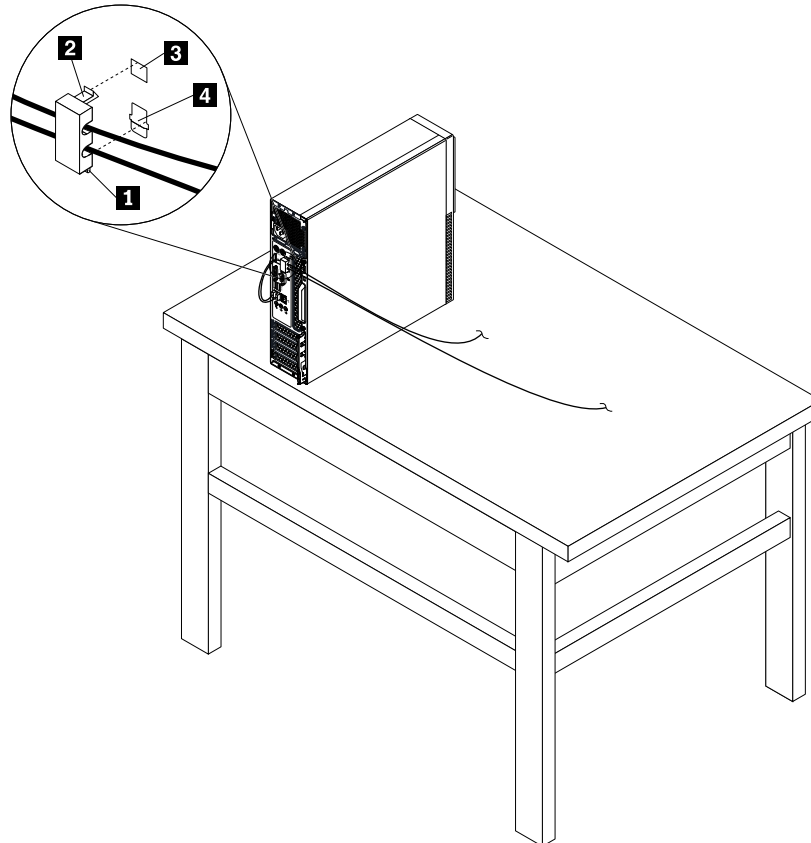
Figure 9. Installing a cable lock

Viewing and changing security settings in the Setup Utility program

To view and change security settings in the Setup Utility program, do the following:

1. Start the Setup Utility program. See "Starting the Setup Utility program" on page 63.

2. Select **Security**.

3. Follow the instructions on the right side of the screen to view and change security settings. You can refer to "Using the Setup Utility program" on page 63 to get basic information about some major security settings.

4. Exit the Setup Utility program. See "Exiting the Setup Utility program" on page 66.

Preventing unauthorized access to your computer

You can use BIOS passwords and Windows accounts to prevent unauthorized access to your computer and data.

- To use BIOS passwords, see "Using BIOS passwords" on page 65.
- To use Windows accounts, do the following:

    1. Click the Start button to open the Start menu.
    2. Depending on your Windows version, do one of the following:

        – For Windows 7: Click **Control Panel** ➙ **User Accounts**.
        – For Windows 10: Click **Settings** ➙ **Accounts**.

    3. Follow the instructions on the screen.

Using fingerprint authentication

If your keyboard has a fingerprint reader, you can use fingerprint authentication to replace passwords for simple and secure user access. To use fingerprint authentication, first enroll your fingerprints and associate them with your passwords (such as the power-on password, hard disk password, and Windows password). Use the fingerprint reader and the fingerprint program to complete this procedure.

To use fingerprint authentication, do one of the following:

- For Windows 7: Use the Fingerprint Manager Pro or ThinkVantage Fingerprint Software program provided by Lenovo. To open the program, see "Accessing a program on your computer" on page 41. For more information about using the program, refer to the help system of the program.
- For Windows 10: Use the fingerprint tool provided by Windows. Click the Start button to open the Start menu, and then click **Settings** ➙ **Accounts** ➙ **Sign-in options**. Follow the instructions on the screen.

To use the fingerprint reader, refer to the documentation shipped with the fingerprint keyboard or located on the Lenovo Support Web site at http://www.lenovo.com/support/keyboards.

Using the cover presence switch

The cover presence switch prevents your computer from logging in to the operating system when the computer cover is not properly installed or closed.

To enable the cover-presence-switch connector on the system board, do the following:

1. Start the Setup Utility program. See "Starting the Setup Utility program" on page 63.
2. Select **Security** ➙ **Chassis Intrusion Detection** and press Enter.
3. Select **Enabled** and press Enter.
4. Exit the Setup Utility program. See "Exiting the Setup Utility program" on page 66.

When the cover-presence-switch connector on the system board is enabled, if the cover presence switch detects that the computer cover is not correctly installed or closed, an error message will be displayed when you turn on the computer. To bypass the error message and log in to the operating system, do the following:

1. Properly install or close your computer cover. See Chapter 9 "Installing or replacing hardware" on page 87.
2. Start and then exit the Setup Utility program. See "Starting the Setup Utility program" on page 63 and "Exiting the Setup Utility program" on page 66.

Using and understanding firewalls

A firewall can be hardware, software, or a combination of both depending on the level of security required. Firewalls work on a set of rules to determine which inbound and outbound connections are authorized. If your computer is preinstalled with a firewall program, it helps protect against computer Internet security threats, unauthorized access, intrusions, and Internet attacks. It also protects your privacy. For more information about how to use the firewall program, refer to the help system of your firewall program.

To use Windows Firewall, do the following

1. Depending on your Windows version, do one of the following:

   - For Windows 7: Click the Start button to open the Start menu.

   - For Windows 10: Right-click the Start button to open the Start context menu.

2. Click **Control Panel**. View Control Panel using Large icons or Small icons, and then click **Windows Firewall**.

3. Follow the instructions on the screen.

Protecting data against viruses

Your computer is preinstalled with an antivirus program to help you guard against, detect, and eliminate viruses.

Lenovo provides a full version of antivirus software on your computer with a free 30-day subscription. After 30 days, you must renew the license to continue receiving the antivirus software updates.

Note: Virus definition files must be kept up-to-date to guard against new viruses.

For more information about how to use your antivirus software, refer to the help system of your antivirus software.

Computrace Agent software embedded in firmware

The Computrace Agent software is an IT asset management and computer theft recovery solution. The software detects if changes have been made on the computer, such as hardware, software, or the computer call-in location. You might have to purchase a subscription to activate the Computrace Agent software.

Trusted Platform Module (TPM)

TPM is a secure cryptoprocessor that can store cryptographic keys that protect information stored in your computer.

Chapter 6. Advanced configuration

This chapter contains the following topics:

- "Using the Setup Utility program" on page 63
- "Updating the BIOS" on page 67

Using the Setup Utility program

The Setup Utility program is used to view and change the configuration settings of your computer. This section provides information about only the major configuration settings available in the program.

Note: 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. Turn on or restart your computer.
2. Before Windows starts up, repeatedly press and release the F1 key until the Setup Utility program opens. If a BIOS password has been set, the Setup Utility program will not open until you enter the correct password. For more information, see "Using BIOS passwords" on page 65.

   Note: For some keyboards, you might need to press Fn+F1 to open the Setup Utility program.

To view and change the configuration settings, follow the instructions on the right side of the screen. The keys used to perform various tasks are displayed at the bottom of the screen.

Enabling or disabling a device

This section provides information about how to enable or disable user access to hardware devices (such as USB connectors or storage drives).

To enable or disable a device, do the following:

1. Start the Setup Utility program. See "Starting the Setup Utility program" on page 63.
2. Select **Devices**.
3. Select the device you want to enable or disable and press Enter.
4. Select the desired setting and press Enter.
5. Exit the Setup Utility program. See "Exiting the Setup Utility program" on page 66.

Enabling or disabling the Automatic Power On features

If you enable the Automatic Power On features, your computer will start up automatically.

To enable or disable the Automatic Power On features, do the following:

1. Start the Setup Utility program. See "Starting the Setup Utility program" on page 63.
2. Select **Power** ➙ **Automatic Power On** and press Enter.
3. Select the feature you want to enable or disable and press Enter.
4. Select the desired setting and press Enter.
5. Exit the Setup Utility program. See "Exiting the Setup Utility program" on page 66.

Enabling or disabling ErP LPS compliance mode

Lenovo computers meet the eco-design requirements of the ErP Lot 3 regulation. For more information, go to:
http://www.lenovo.com/ecodeclaration

You can enable ErP LPS compliance mode in the Setup Utility program to reduce the consumption of electricity when your computer is off or in sleep mode.

To enable or disable ErP LPS compliance mode, do the following:

1. Start the Setup Utility program. See "Starting the Setup Utility program" on page 63.
2. Select **Power → Enhanced Power Saving Mode** and press Enter.
3. Depending on whether you select **Enabled** or **Disabled**, do one of the following:
   - If you select **Enabled**, press Enter. Then, disable the Wake on LAN feature. See "Enabling or disabling the Automatic Power On features" on page 63.
   - If you select **Disabled**, press Enter. Then, go to the next step.
4. Exit the Setup Utility program. See "Exiting the Setup Utility program" on page 66.

When ErP LPS compliance mode is enabled, you can wake up your computer by doing one of the following:

- Press the power button.
- Enable the Wake Up on Alarm feature to make your computer wake up at a set time. See "Enabling or disabling the Automatic Power On features" on page 63.
- Enable the After Power Loss feature to make your computer wake up when the power supply resumes after a sudden loss of electricity.
   1. Start the Setup Utility program. See "Starting the Setup Utility program" on page 63.
   2. Select **Power → After Power Loss** and press Enter.
   3. Select **Power On** and press Enter.
   4. Exit the Setup Utility program. See "Exiting the Setup Utility program" on page 66.

Enabling or disabling the Configuration Change Detection feature

If you enable the Configuration Change Detection feature, when the POST detects the configuration changes of some hardware devices (such as storage drives or memory modules), an error message will be displayed when you turn on the computer.

To enable or disable the Configuration Change Detection feature, do the following:

1. Start the Setup Utility program. See "Starting the Setup Utility program" on page 63.
2. Select **Security → Configuration Change Detection** and press Enter.
3. Select the desired setting and press Enter.
4. Exit the Setup Utility program. See "Exiting the Setup Utility program" on page 66.

To bypass the error message and log in to the operating system, do one of the following:

- Press the F2 key.

   Note: For some keyboards, you might need to press Fn+F2 to bypass the error message.

- Start and then exit the Setup Utility program. See "Starting the Setup Utility program" on page 63 and "Exiting the Setup Utility program" on page 66.

Using BIOS passwords

By using the Setup Utility program, you can set passwords to prevent unauthorized access to your computer and data.

You do not have to set any passwords to use your computer. However, using passwords improves computer security. If you decide to set any passwords, read the following topics.

Setup Utility program password types

The following types of passwords are available:

- Power-on password
  When a power-on password is set, you are prompted to enter a valid password each time the computer is turned on. The computer cannot be used until the valid password is entered.

- Administrator password
  Setting an administrator password deters unauthorized users from changing configuration settings. If you are responsible for maintaining the configuration settings of several computers, you might want to set an administrator password.

  When an administrator password is set, you are prompted to enter a valid password each time you try to access the Setup Utility program. The Setup Utility program cannot be accessed until a valid password is entered.

  If both the power-on password and administrator password are set, you can enter either password. However, you must use your administrator password to change any configuration settings.

- Hard disk password
  Setting a hard disk password prevents unauthorized access to the data on the storage drive. When a hard disk password is set, you are prompted to enter a valid password each time you try to access the storage drive.

  Notes:

  – After you set a hard disk password, your data on the storage drive is protected even if the storage drive is removed from one computer and installed in another.

  – If the hard disk password is forgotten, there is no way to reset the password or recover data from the storage drive.

Password considerations

A password can be any combination of up to 64 alphabetic and numeric characters. For security reasons, it is recommended to use a strong password that cannot be easily compromised.

Note: The Setup Utility program passwords are not case sensitive.

To set a strong password, consider the following guidelines:

- Have at least eight characters in length

- Contain at least one alphabetic character and one numeric character

- Not be your name or your user name

- Not be a common word or a common name

- Be significantly different from your previous passwords

Setting, changing, and deleting a password

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

1. Start the Setup Utility program. See "Starting the Setup Utility program" on page 63.
2. Select **Security**.

3. Depending on the password type, select **Set Power-On Password**, **Set Administrator Password**, or **Hard Disk Password** and press Enter.

4. Follow the instructions on the right side of the screen to set, change, or delete a password.

   Note: A password can be any combination of up to 64 alphabetic and numeric characters. For more information, see "Password considerations" on page 65.

5. Exit the Setup Utility program. See "Exiting the Setup Utility program" on page 66.

Selecting a startup device

If your computer does not start up from a device as expected, you can choose to change the startup device sequence permanently or select a temporary startup device.

Changing the startup device sequence permanently

To change the startup device sequence permanently, do the following:

1. Depending on the type of the storage device, do one of the following:

   - If the storage device is internal, go to step 2.
   - If the storage device is a disc, ensure that your computer is on or turn on the computer. Then, insert the disc into the optical drive.
   - If the storage device is an external device other than a disc, connect the storage device to the computer.

2. Start the Setup Utility program. See "Starting the Setup Utility program" on page 63.

3. Select **Startup**.

4. Follow the instructions on the right side of the screen to change the startup device sequence.

5. Exit the Setup Utility program. See "Exiting the Setup Utility program" on page 66.

Selecting a temporary startup device

Note: Not all discs and storage drives are bootable.

To select a temporary startup device, do the following:

1. Depending on the type of the storage device, do one of the following:

   - If the storage device is internal, go to step 2.
   - If the storage device is a disc, ensure that your computer is on or turn on the computer. Then, insert the disc into the optical drive.
   - If the storage device is an external device other than a disc, connect the storage device to the computer.

2. Turn on or restart the computer. Before Windows starts up, repeatedly press and release the F12 key until Startup Device Menu is displayed.

   Note: For some keyboards, you might need to press Fn+F12 to display Startup Device Menu.

3. Select the desired storage device and press Enter. The computer will start up from the device you select.

If you want to select a permanent startup device, select **Enter Setup** on Startup Device Menu and press Enter to start the Setup Utility program. For more information about how to select a permanent startup device, see "Changing the startup device sequence permanently" on page 66.

Exiting the Setup Utility program

To exit the Setup Utility program, do one of the following:

- If you want to save the new settings, press the F10 key. Then, select **Yes** in the window displayed and press Enter.

  Note: For some keyboards, you might need to press Fn+F10 to exit the Setup Utility program.

- If you do not want to save the new settings, select **Exit → Discard Changes and Exit** and press Enter. Then, select **Yes** in the window displayed and press Enter.

Updating the BIOS

When you install a new program, hardware device, or device driver, you might be informed to update the BIOS. You can update the BIOS from your operating system or a flash update disc (supported only on some models).

To update the BIOS, do the following:

1. Go to http://www.lenovo.com/drivers.
2. Download the flash BIOS update driver for the operating system version or the ISO image version (used to create a flash update disc). Then, download the installation instructions for the flash BIOS update driver you download.
3. Print the installation instructions you download and follow the instructions to update the BIOS.

Note: If you want to update the BIOS from a flash update disc, the installation instructions might not provide the information about how to record the update disc. See "Recording a disc" on page 47.

Chapter 7. Troubleshooting, diagnostics, and recovery

This chapter provides solutions to resolve your computer problems. Follow the steps in the basic procedure for resolving computer problems, which helps you make good use of the troubleshooting, diagnostics, and recovery information.

- "Basic procedure for resolving computer problems" on page 69
- "Troubleshooting" on page 69
- "Diagnostics" on page 77
- "Recovery information" on page 78

Basic procedure for resolving computer problems

It is recommended that you use the following procedure to resolve computer problems you are experiencing:

1. Ensure that:
   a. The cables for all connected devices are connected correctly and securely.
   b. All connected devices that require ac power are connected to properly grounded, functioning electrical outlets.
   c. All connected devices are enabled in the BIOS settings of your computer. See "Enabling or disabling a device" on page 63.

   If these actions do not resolve your problem, continue with the next step.

2. Use an antivirus program to see if your computer has been infected by a virus. If the program detects a virus, remove the virus. If the antivirus program does not resolve your problem, continue with the next step.

3. Go to "Troubleshooting" on page 69 and follow the instructions for the type of problem you are experiencing. If these troubleshooting instructions do not resolve your problem, continue with the next step.

4. Run the diagnostic program. See "Diagnostics" on page 77. If the diagnostic program does not resolve your problem, continue with the next step.

5. Recover your operating system. See "Recovery information" on page 78.

6. If none of these actions solve your problem, contact the Lenovo Customer Support Center. For a list of Lenovo Support phone numbers, go to http://www.lenovo.com/support/phone. For more information about help, service, and technical assistance, see Chapter 10 "Getting information, help, and service" on page 131.

Troubleshooting

Attention: Do not open your computer or attempt any repair before reading and understanding the Chapter 1 "Read this first: Important safety information" on page 1.

Use the troubleshooting information to find solutions to problems that have definite symptoms.

Startup problems

This section provides solutions to startup-related problems.

The computer does not start up when you press the power button

Solutions: Ensure that:

- The power cord is correctly connected to the rear of the computer and to a working electrical outlet.

- If your computer has a secondary power switch on the rear of the computer, ensure that it is switched on.
- The power indicator on the front of the computer is on.
- The computer voltage matches the voltage available at the electrical outlet for your country or region.

The operating system fails to start up

Solution: Ensure that the startup sequence includes the device where the operating system resides. Usually, the operating system is on the storage drive. For more information, see "Changing the startup device sequence permanently" on page 66.

The computer beeps multiple times before the operating system starts up

Solution: Ensure that no keys are stuck.

Audio problems

This section provides solutions to audio-related problems.

No audio in Windows

Solutions:

- If you are using powered external speakers that have an On/Off control, ensure that:
  - The On/Off control is set to the **On** position.
  - The speaker power cable is connected to a properly grounded, functional ac electrical outlet.
- If your external speakers have a volume control, ensure that the volume is not set too low.
- Click the volume icon in the Windows notification area on the taskbar. Ensure that the mute speakers settings are not selected and none of the volume settings is set too low.

  Note: If the volume icon is not displayed in the Windows notification area, add the icon to the notification area. See "Adding an icon to the Windows notification area" on page 45.
- Some models have a front audio panel you can use to adjust volume. If you have a front audio panel, ensure that the volume is not set too low.
- Ensure that your external speakers (and headphones, if used) are connected to the correct audio connector on the computer. Most speaker cables are color-coded to match the connector.

  Note: When external-speaker or headphone cables are connected to the audio connector, the internal speaker, if present, is disabled. In most cases, if an audio adapter is installed in one of the expansion slots, the audio function built into the system board is disabled. Therefore, you must use the audio connectors on the audio adapter.
- Ensure that the program you are running is designed for use in the Microsoft Windows operating system. If the program is designed to run in DOS, the program does not use the Windows sound feature. The program must be configured to use SoundBlaster Pro or SoundBlaster emulation.
- Ensure that the audio device drivers are correctly installed.

Sound comes only from one external speaker

Solutions:

- Ensure that the speaker cable is inserted completely into the connector on the computer.
- Ensure that the cable that connects the left speaker to the right speaker is securely connected.
- Click the volume icon in the Windows notification area on the taskbar. Then, click the speaker icon on top of the volume control. Click the **Levels** tab and ensure that the Balance settings are set correctly .

Note: If the volume icon is not displayed in the Windows notification area, add the icon to the notification area. See "Adding an icon to the Windows notification area" on page 45.

CD problems

This section provides solutions to CD-related problems.

A CD or DVD does not work

Solutions:

- If you have multiple CD or DVD drives installed (or a combination of CD and DVD drives), try inserting the disc into the other drive. In some cases, only one of the drives is connected to the audio subsystem.
- Ensure that the disc is inserted correctly, with its label up.
- Ensure that the disc you are using is clean. To remove dust or fingerprints, wipe the disc clean with a soft cloth from the center to the outside. Wiping a disc in a circular motion might cause loss of data.
- Ensure that the disc you are using is not scratched or damaged. Try inserting another disc that you know is good. If you cannot read from a known-good disc, you might have a problem with your optical drive or the cabling to your optical drive. Ensure that the power cable and signal cable are securely connected to the drive.

Unable to use a bootable recovery medium, such as the Product Recovery CD, to start your computer

Solution: Ensure that the CD or DVD drive is in the startup sequence before the storage drive. Refer to "Selecting a temporary startup device" on page 66 for information on viewing and changing the startup sequence. Note that on some models the startup sequence is permanently set and cannot be changed.

DVD problems

This section provides solutions to DVD-related problems.

Black screen instead of DVD video

Solutions:

- Restart the DVD player program.
- Try a lower screen resolution or color depth.
- Close any open files, and then restart the computer.

DVD movie does not play

Solutions:

- Ensure that the disc surface is clean and not scratched.
- Check the disc or package for regional coding. You might need to purchase a disc with coding for the region where you are using your computer.

No audio or intermittent audio while playing a DVD movie

Solutions:

- Check the volume control settings on your computer and on your speakers.
- Ensure that the disc surface is clean and not scratched.
- Check all cable connections to and from the speakers.
- Use the DVD menu for the video to select a different audio track.

Playback is slow or choppy

Solutions:

- Disable any background programs, such as AntiVirus or Desktop Themes.
- Ensure that video resolution is set to less than 1152 x 864 pixels.

Invalid disc or no disc found message

Solutions:

- Ensure that a DVD disc is in the drive with the shiny side of the disc facing down.
- Ensure that video resolution is set to less than 1152 x 864 pixels.
- On computers that have a CD-ROM or CD-RW drive in addition to a DVD-ROM drive, ensure that the DVD disc is in the drive labeled "DVD".

Intermittent problems

Some problems occur only occasionally and are difficult to repeat.

Solutions:

- Ensure that all cables and cords are securely connected to the computer and connected devices.
- Ensure that when the computer is on, the fan grill is not blocked (there is air flow around the grill), and the fans are working. If airflow is blocked or the fans are not working, the computer might overheat.
- If Small Computer System Interface (SCSI) devices are installed, ensure that the last external device in each SCSI chain is terminated correctly. For more information, see your SCSI documentation.

Storage drive problems

Select your symptom from the following list:

- "Some or all storage drives missing from the Setup Utility program" on page 72
- ""No Operating System Found" message or the system not starting up from the correct storage drive" on page 72

Some or all storage drives missing from the Setup Utility program

Symptom: Some or all storage drives missing from the Setup Utility program

Solutions:

- Ensure that all storage drive signal cables and power cables are connected correctly.
- Ensure that your computer is configured correctly to support the storage drives.
  - If your computer is installed with five SATA storage drives, ensure that the SATA storage drive enablement module (one to five storage drives) is installed.
  - If your computer is installed with SAS storage drives, ensure that the SAS storage drive enablement module (one to five storage drives) or the LSI MegaRAID SAS adapter is installed.

"No Operating System Found" message or the system not starting up from the correct storage drive

Symptom: "No Operating System Found" message or the system not starting up from the correct storage drive

Solutions:

- Ensure that all storage drive signal cables and power cables are connected correctly.

- Ensure that the storage drive your computer starts up from is listed as the first startup device in the Setup Utility program. Refer to "Changing the startup device sequence permanently" on page 66.

Note: In rare cases, the storage drive with the operating system might get corrupted or damaged. In such cases, you might need to replace the storage drive. Refer to Chapter 9 "Installing or replacing hardware" on page 87.

Networking problems

This section provides solutions to networking-related problems.

Ethernet LAN problems

My computer cannot be connected to an Ethernet LAN

Solutions:

- Connect the cable from the Ethernet connector to the RJ45 connector of the hub.
- Enable the Ethernet LAN feature in the Setup Utility program. See "Starting the Setup Utility program" on page 63. Then, follow the instructions on the screen.
- Enable the Ethernet LAN adapter.

    1. Depending on your Windows version, do one of the following:

        – For Windows 7: Click the Start button to open the Start menu.

        – For Windows 10: Right-click the Start button to open the Start context menu.

    2. Click **Control Panel**. View Control Panel using Large icons or Small icons, and then click **Network and Sharing Center** ➙ **Change adapter settings**.

    3. Right-click the Ethernet LAN adapter icon and click **Enable**.

- Update or reinstall the Ethernet LAN driver. See "Keeping your computer current" on page 54.
- Install all networking software that is necessary for your network environment. Check with your LAN administrator for the necessary networking software.
- Set the same duplex for the switch port and the adapter. If you configured the adapter for full duplex, ensure that the switch port is also configured for full duplex. Setting the wrong duplex mode might degrade performance, cause data loss, or result in lost connections.

My computer is a Gigabit Ethernet model and I use a speed of 1000 Mbps, but the connection fails or errors occur

Solution: Connect the network cable to the Ethernet connector using Category 5 wiring and a 100 BASE-T hub/switch (not 100 BASE-X).

My computer is a Gigabit Ethernet model, but it cannot be connected to the network at 1000 Mbps, but at only 100 Mbps

Solutions:

- Try another cable.
- Set the link partner to auto-negotiate.
- Set the switch to be 802.3ab-compliant (gigabit over copper).

The Wake On LAN feature does not work

Solution: Enable the Wake On LAN (WOL) feature in the Setup Utility program. See "Starting the Setup Utility program" on page 63. Then, follow the instructions on the screen.

Wireless LAN problem

Note: The wireless LAN feature is supported only on some models.

The wireless LAN feature does not work

Solutions:

- Enable the wireless LAN feature in the Setup Utility program. See "Starting the Setup Utility program" on page 63. Then, follow the instructions on the screen.
- For Windows 10, enable the wireless LAN feature in Windows Settings. Click the Start button to open the Start menu, and then click **Settings** ➙ **Network & Internet** ➙ **Wi-Fi**. Turn on the Wi-Fi feature.
- Enable the wireless LAN adapter.
    1. Depending on your Windows version, do one of the following:
        – For Windows 7: Click the Start button to open the Start menu.
        – For Windows 10: Right-click the Start button to open the Start context menu.
    2. Click **Control Panel**. View Control Panel using Large icons or Small icons, and then click **Network and Sharing Center** ➙ **Change adapter settings**.
    3. Right-click the wireless LAN adapter icon and click **Enable**.
- Update or reinstall the wireless LAN driver. See "Keeping your computer current" on page 54.

Bluetooth problems

Note: The Bluetooth feature is supported only on some models.

The Bluetooth feature does not work

Solutions:

- Enable the Bluetooth feature in the Setup Utility program. See "Starting the Setup Utility program" on page 63. Then, follow the instructions on the screen.
- Turn on the Bluetooth radios.
    1. Depending on your Windows version, do one of the following:
        – For Windows 7: Click the Start button to open the Start menu. Right-click **Computer**, and then click **Properties**.
        – For Windows 10: Right-click the Start button to open the Start context menu.
    2. Click **Device Manager**. Type the administrator password or provide confirmation if prompted.
    3. Right-click the Bluetooth radios under **Bluetooth Radios** and click **Enable**.
- Enable the Bluetooth adapter.
    1. Depending on your Windows version, do one of the following:
        – For Windows 7: Click the Start button to open the Start menu.
        – For Windows 10: Right-click the Start button to open the Start context menu.
    2. Click **Control Panel**. View Control Panel using Large icons or Small icons, and then click **Network and Sharing Center** ➙ **Change adapter settings**.
    3. Right-click the Bluetooth adapter icon and click **Enable**.
- Update or reinstall the Bluetooth driver. See "Keeping your computer current" on page 54.

Sound does not come from the Bluetooth headset or headphones

Solution: Set the Bluetooth headset or headphones as the default device.
1. Exit the application that uses the sound device (for example, Windows Media Player).
2. Right-click the volume icon in the Windows notification area on the taskbar.

Note: If the volume icon is not displayed in the Windows notification area, add the icon to the notification area. See "Adding an icon to the Windows notification area" on page 45.

3. Click **Playback devices**.
4. If you are using the Headset profile, select **Bluetooth Hands-free Audio**, and then click **Set Default**. If you are using the AV profile, select **Stereo Audio**, and then click **Set Default**.
5. Click **OK**.

Performance problems

This section provides solutions to performance-related problems of your computer.

Excessive number of fragmented files

Solution: Use the Windows disk defragmentation or disk optimization feature to clean up the files.

Note: Depending on the volume of the storage drives and amount of data stored on the storage drives, the disk-defragmentation process might take up to several hours.

1. Close any open programs and windows.
2. Click the Start button to open the Start menu.
3. Depending on your Windows version, do one of the following:

   - For Windows 7: Click **Computer**.
   - For Windows 10: Click **File Explorer → This PC**.

4. Right-click your C drive and then click **Properties**.
5. Click the **Tools** tab.
6. Depending on your Windows version, do one of the following:

   - For Windows 7: Click **Defragment now**.
   - For Windows 10: Click **Optimize**. Select the desired drive, and then click **Optimize**.

7. Follow the instructions on the screen.

Insufficient free storage drive space

Solutions: Free up storage drive space.

- Clean out your Inbox, Sent Items, and Deleted Items folders from your e-mail application.
- Clean up your C drive.

   1. Click the Start button to open the Start menu.
   2. Depending on your Windows version, do one of the following:

      – For Windows 7: Click **Computer**.
      – For Windows 10: Click **File Explorer → This PC**.

   3. Right-click your C drive and then click **Properties**.
   4. Check the amount of free space, and then click **Disk Cleanup**.
   5. A list of unnecessary file categories is displayed. Select each file category you want to delete, and then click **OK**.

- Turn some Windows features off or remove some unnecessary programs.

   1. Depending on your Windows version, do one of the following:

      – For Windows 7: Click the Start button to open the Start menu.
      – For Windows 10: Right-click the Start button to open the Start context menu.

2. Click **Control Panel**. View Control Panel using Large icons or Small icons, and then click **Programs and Features**.

3. Do one of the following:

   – To turn some Windows features off, click **Turn Windows features on or off**. Follow the instructions on the screen.

   – To remove some unnecessary programs, select the program you want to remove, and then click **Uninstall/Change** or **Uninstall**.

Insufficient free memory space

Solutions:

• Right-click a blank area on the taskbar and open Task Manager. Then, end some tasks you are not performing.

• Install additional memory modules. See Chapter 9 "Installing or replacing hardware" on page 87. To purchase memory modules, go to
http://www.lenovo.com.

Serial connector cannot be accessed

Solutions:

• Connect the serial cable to the serial connector on the computer and to the serial device. If the serial device has its own power cord, connect the power cord to a grounded electrical outlet.

• Turn on the serial device and keep the device online.

• Install any application programs supplied with the serial device. Refer to the documentation that comes with the serial device for more information.

• If you added one serial-connector adapter, install the adapter correctly.

USB device problems

This section provides solutions to USB device-related problems.

My USB device cannot be accessed

Solutions:

• Connect the USB cable from the USB connector to the USB device. If the USB device has its own power cord, connect the power cord to a grounded electrical outlet.

• Turn on the USB device and keep the device online.

• Install any device drivers or application programs supplied with the USB device. Refer to the documentation that comes with the USB device for more information.

• Detach and reconnect the USB connector to reset the USB device.

I cannot install the Windows 7 operating system using an external USB device

Solution: Go to http://www.lenovo.com/support to download and install USB drivers.

Software and driver problems

This section provides solutions to software- and driver-related problems.

For some programs, dates cannot be sorted in correct order

Solution: Some programs developed before the year 2000 use only the last two digits of a year to sort dates, assuming the first two digits are 19. Consequently, dates cannot be sorted in correct order nowadays.

Check with your software manufacturer to see if any updates are available. Many software manufacturers make updates available from the World Wide Web.

Some application programs do not work as expected

Solutions:

1. Check whether the problem is caused by an application program.
   a. Ensure that the software is compatible with your computer. Refer to the information supplied with the software for more information.
   b. Verify that other software works correctly on your computer.
   c. Verify that the software you are using works on another computer.
2. If the problem is caused by an application program:
   - Refer to the printed documentation that comes with the program or the help system of the program.
   - Update the program. See "Keeping your computer current" on page 54.
   - Uninstall the program and then reinstall it. To download a program that is preinstalled on your computer, go to http://www.lenovo.com/support and follow the instructions on the screen.

A device does not work normally due to device driver problems

Solution: Update the device driver. See "Keeping your computer current" on page 54.

Diagnostics

Note: If you are using a Windows operating system other than Windows 7 or Windows 10, go to http://www.lenovo.com/diags for the diagnostics information for your computer.

The diagnostic program is used to test hardware components of your computer. The diagnostic program also can report operating-system-controlled settings that interfere with the correct operation of your computer.

Lenovo Solution Center

The Lenovo Solution Center program is the diagnostic program preinstalled on your computer. The program enables you to troubleshoot and resolve computer problems. It combines diagnostic tests, system information collection, security status, and support information, along with hints and tips for maximum system performance.

To open the Lenovo Solution Center program, see "Accessing a program on your computer" on page 41. For more information about using the program, refer to the help system of the program.

If you are unable to isolate and repair the problem yourself after running Lenovo Solution Center, save and print the log files created by the program. You might need the log files when you speak to a Lenovo technical support representative.

UEFI diagnostic program

The UEFI diagnostic program enables you to test hardware devices (such as memory modules or storage drives) and provides the following tools:

- System information
- Recover bad sectors tool
- Generate configuration file
- Execute from configuration file

To use the UEFI diagnostic program, do the following:

1. Turn on or restart your computer.

2. Before Windows starts, repeatedly press and release the F10 key until the UEFI diagnostic program opens.

   Note: If a BIOS password has been set, the Setup Utility program will not open until you enter the correct password. For more information, see "Using BIOS passwords" on page 65.

3. Follow the instructions on the screen to use the diagnostic program.

Recovery information

This section provides instructions about how to recover your operating system.

Note: If a device does not work normally after recovering the operating system, update the device driver. See "Keeping your computer current" on page 54.

Recovery information for Windows 7

To recover your Windows 7 operating system, use the following solutions:

- Use Windows recovery solutions.

  – Use System Restore to restore system files and settings to an earlier point.

    1. Click the Start button to open the Start menu.

    2. Click **Control Panel**. View Control Panel using Large icons or Small icons, and then click **Recovery** ➙ **Open System Restore**.

    3. Follow the instructions on the screen.

  – Use the Windows recovery environment by doing one of the following:

    – After several consecutive failed boot attempts, the Windows recovery environment might start automatically. Follow the instructions on the screen to choose the appropriate recovery solution.

    – Turn on or restart your computer. Then, repeatedly press and release the F8 key until the Advanced Boot Options window opens. Select **Repair Your Computer**, press Enter, and follow the instructions on the screen to choose the appropriate recovery solution.

      Note: For some keyboards, you might need to press Fn+F8 to open the Advanced Boot Options window.

- Use the Rescue and Recovery program to restore the storage drive from a backup, or restore the C drive to the factory-default settings.

  Notes:

  – Depending on your computer model, the Rescue and Recovery program might not be available unless you installed it manually earlier.

  – If you use the Rescue and Recovery program to restore the storage drive from a backup, ensure that you backed up your data earlier with the program.

  To use the Rescue and Recovery program, do one of the following:

  – Open the Rescue and Recovery program. See "Accessing a program on your computer" on page 41. For more information about using the program, refer to the help system of the program.

  – Open the Rescue and Recovery workspace.

    1. Turn off your computer. Press and hold the Enter key and then turn on the computer. Release the Enter key when Startup Interrupt Menu is displayed. Then, press F11 to open the Rescue and Recovery workspace.

2. If the Rescue and Recovery workspace fails to open, use the rescue medium you created earlier to resolve the problem. Select the rescue medium as the startup device. See "Selecting a temporary startup device" on page 66. When the rescue medium starts, the Rescue and Recovery workspace opens. Follow the instructions on the screen.

- Use the recovery medium you created earlier with the Create Recovery Media program to restore only the C drive or the entire storage drive to the factory-default settings.

    Note: To create a recovery medium, see "Good maintenance practices" on page 54.

    1. Select the recovery medium as the startup device. See "Selecting a temporary startup device" on page 66.
    2. Follow the instructions on the screen to choose the appropriate recovery solution.

- Use the recovery disc set provided by Lenovo to restore the entire storage drive to the factory-default settings.

    – If your computer comes with the recovery disc set, follow the instructions shipped with the disc set.

    – If your computer does not come with the recovery disc set, contact the Lenovo Customer Support Center to order a recovery disc set. See "Calling for service" on page 132.

Recovery information for Windows 10

To recover your Windows 10 operating system, use the following solutions:

- Use Windows recovery solutions.

    – Use recovery solutions in Windows Settings.

        1. Click the Start button to open the Start menu.
        2. Click **Settings** ➙ **Update & security** ➙ **Recovery**.
        3. Choose the appropriate recovery solution by following the instructions on the screen.

    – Use System Restore to restore system files and settings to an earlier point.

        1. Right-click the Start button to open the Start context menu.
        2. Click **Control Panel**. View Control Panel using Large icons or Small icons, and then click **Recovery** ➙ **Open System Restore**.
        3. Follow the instructions on the screen.

    – Use the File History tool to restore your files from a backup.

        Note: If you use the File History tool to restore your files from a backup, ensure that you backed up your data earlier with the tool.

        1. Right-click the Start button to open the Start context menu.
        2. Click **Control Panel**. View Control Panel using Large icons or Small icons, and then click **File History** ➙ **Restore personal files**.
        3. Follow the instructions on the screen.

    – Use the Windows recovery environment by doing one of the following:

        – After several consecutive failed boot attempts, the Windows recovery environment might start automatically. Follow the instructions on the screen to choose the appropriate recovery solution.

        – Select the recovery medium you created earlier with the Windows tool as the startup device. See "Selecting a temporary startup device" on page 66. Then, follow the instructions on the screen to choose the appropriate recovery solution.

            Note: To create a recovery medium, see "Good maintenance practices" on page 54.

- Use the recovery USB key provided by Lenovo to restore the entire storage drive to the factory-default settings.
    - If your computer comes with the recovery USB key, follow the instructions shipped with the USB key.
    - If your computer does not come with the recovery USB key, contact the Lenovo Customer Support Center to order a recovery USB key. See "Calling for service" on page 132.

Chapter 8. Service checkout and symptom-to-FRU index

This chapter provides information about general service checkout and symptom-to-FRU index.

Service checkout

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.

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, go to step 6.

   If you *do* receive the correct response, go to step 7.
6. Look at the following conditions and follow the instructions:

   - If you hear beep codes during POST, go to "Beep symptoms" on page 83.

   - If the computer displays a POST error, go to "POST error codes" on page 83.

   - If the computer hangs and no error is displayed, go to step 7.
7. Run the Diagnostic programs. See "Diagnostics" on page 77.

   - If you receive an error, replace the part that the diagnostic program calls out.

   - If the test stops and 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 drive 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

Notes: 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 Diagnostic Diskettes (version)
7. Have the same configuration options set in the system
8. Have the same setup for the operating system control files

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

Symptom-to-FRU index

The Symptom-to-FRU index lists error symptoms and possible causes. The most likely cause is listed first. Always begin with "Service checkout" on page 81. 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 86.

Notes:

- The Symptom-to-FRU index is not specific to any machine type and are applicable to all Lenovo computers.
- 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 get a diagnostic error code when running a test, first diagnose the POST error message you receive.
- If you did not receive any error message, look for a description of your error symptoms in the first part of this index.

Hard disk drive boot error

A hard disk drive boot error can have the following causes.

Error	FRU/Action
The start-up drive is not in the boot sequence in configuration.	Check the configuration and ensure the start-up drive is in the boot sequence.
No operating system installed on the boot drive.	Install an operating system on the boot drive.

Error	FRU/Action
The boot sector on the startup drive is corrupted.	The drive must be formatted. Do the following: 1. Attempt to back up the data on the failing hard disk drive. 2. Using the operating system programs, format the hard disk drive.
The drive is defective.	Replace the hard disk drive.

Power supply problems

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

Check/Verify	FRU/Action
Check the following for proper installation. • 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 table describes the beep symptoms.

Beep symptom	FRU/Action
2 short beeps CMOS setting error	Common error code, see the detail failure information in "POST error codes" on page 83.
3 short and 1 long beeps DRAM memory error	Perform the following actions in order. 1. Make sure the memory module(s) are properly seated in the connector(s). 2. Replace the memory module(s). 3. Replace the system board.

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 be displayed next time you turn on the system.

Error code	POST error message	Description/Action
0135	Fan failure	The system might be overheating. Press F10 to exit. **Note:** If the problem is caused by the microprocessor fan, press F10 will not solve the problem.
0211	Keyboard not found	When there is no keyboard detected, the error message will be displayed.
0164	Memory size decreased	Press F10 to exit.
1762	Configuration change has occurred	This error message is displayed when a hard disk drive or optical drive change has been made. Press F10 to exit.
1820	More than one external fingerprint reader are attached. Power off and remove all but the reader that you set up within your main operating system.	If more than one external fingerprint reader are connected to a computer, this error message will be displayed. Remove all of the fingerprint keyboards except the one compatible with the fingerprint application on your computer.
1962	No operating system found. Press any key to repeat boot sequence.	This error occurs only after the POST is completed. Press any key to repeat boot sequence.

Miscellaneous error conditions

Message/Symptom	FRU/Action
Changing display colors	**Display/Monitor**
Computer will *not* power-off. See "Hard disk drive boot error" on page 82.	1. Power Switch 2. System Board 3. Riser card, if installed.
Computer will *not* RPL from server	1. Ensure that network is in startup sequence as first device or first device after diskette. 2. Ensure that network adapter is enabled for RPL. 3. Network adapter (Advise network administrator of new MAC address)

Message/Symptom	FRU/Action
Computer will *not* perform a Wake On LAN® (if applicable)	1. Check power supply and signal cable connections to network adapter. 2. Ensure that the operating system settings are set to enable Wake on LAN. 3. Ensure Wake On LAN feature is enabled in Setup/Configuration (see "Starting the Setup Utility program" on page 63) 4. Ensure network administrator is using correct MAC address. 5. Ensure no interrupt or I/O address conflicts. 6. Network adapter (advise network administrator of new MAC address)
Dead computer. See "Hard disk drive boot error" on page 82.	1. Power Supply 2. System Board
Diskette drive in-use light remains on or does not light when drive is active.	1. Diskette Drive 2. System Board 3. Diskette Drive Cable
Blank screen except for flashing cursor.	1. System Board 2. Primary Hard Disk Drive 3. Hard Disk Drive Cable
Incorrect memory size during POST	1. Run the Memory tests. 2. Memory Module 3. System Board
"Insert a Diskette" icon appears with a known-good diagnostics diskette in the first 3.5-inch diskette drive.	1. System Board 2. Diskette Drive Cable 3. Network Adapter
Intensity or color varies from left to right of characters and color bars	1. Display 2. Video adapter (if present) 3. System Board
No power or fan not running	1. See "Hard disk drive boot error" on page 82.
Non-system disk or disk error-type message with a known-good diagnostic diskette.	1. Diskette Drive 2. System Board 3. Diskette Drive Cable
Other display symptoms not listed above (including blank or illegible display)	1. Display 2. System Board
Power-on indicator or hard disk drive in-use light not on, but computer works correctly	1. Power switch/LED assembly 2. System Board
Printer problems	1. Printer 2. System Board

Message/Symptom	FRU/Action
Program loads from the hard disk with a known-good diagnostics diskette in the first 3.5-inch diskette drive	1. Run the Setup Utility program and check Startup sequence. 2. Diskette Drive 3. Diskette Drive Cable 4. System Board 5. Power Supply

RPL computer cannot access programs from its own hard disk.	1. If network administrator is using LCCM Hybrid RPL, check startup sequence:
	  a. **First device - network**
	  b. **Second device - hard disk**
	2. Hard disk drive

RPL computer does not RPL from server	1. Check startup sequence. 2. Check the network adapter LED status.
Serial or parallel connector device failure (system board connector)	1. External Device Self-Test OK? 2. External Device 3. Cable 4. System Board
Serial or parallel connector device failure (adapter connector)	1. External Device Self-Test OK? 2. External Device 3. Cable 4. Alternate Adapter 5. System Board
Some or all keys on the keyboard do not work	1. Keyboard 2. Keyboard Cable 3. System Board

Undetermined problems

This section provides instructions on how to find out the failing devices or adapters.

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. See "Replacing the system board" on page 127.

Chapter 9. Installing or replacing hardware

This chapter contains the following topics:

- "Handling static-sensitive devices" on page 87
- "Installing or replacing hardware" on page 87

Handling static-sensitive devices

Do not open the static-protective package containing the new part until the defective part has been removed and you are ready to install the new part. Static electricity, although harmless to you, can seriously damage computer components and parts.

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

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

Installing or replacing hardware

This section provides instructions on how to install or replace hardware for your computer. You can expand the capabilities of your computer and maintain your computer by installing or replacing hardware.

Attention: Do not open your computer or attempt any repair before reading and understanding the Chapter 1 "Read this first: Important safety information" on page 1.

Notes:

- Depending on your computer model, some of the hardware parts in this section might not be available.
- Use computer parts provided only by Lenovo.
- When installing or replacing an option, use the appropriate instructions in this section along with the instructions that come with the option.
- 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.

Installing external options

You can connect external options to your computer, such as external speakers, a printer, or a scanner. For some external options, you must install additional software in addition to making the physical connection. When installing an external option, see "Hardware locations" on page 27 to identify the required connector.

Use the instructions shipped with the option to help you make the connection and install any software or device drivers that are required for the option.

Removing the computer cover

Attention: Do not open your computer or attempt any repair before reading and understanding the Chapter 1 "Read this first: Important safety information" on page 1.

CAUTION:

Before you open the computer cover, turn off the computer and wait several minutes until the computer is cool.

To remove the computer cover, do the following:

1. Remove any media from the drives and turn off all connected devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Unlock any locking device that secures the computer cover.
3. Hold the sides of your computer and gently lay it down so that the computer cover is facing up.
4. Remove the two screws that secure the computer cover and slide the computer cover to the rear to remove it.
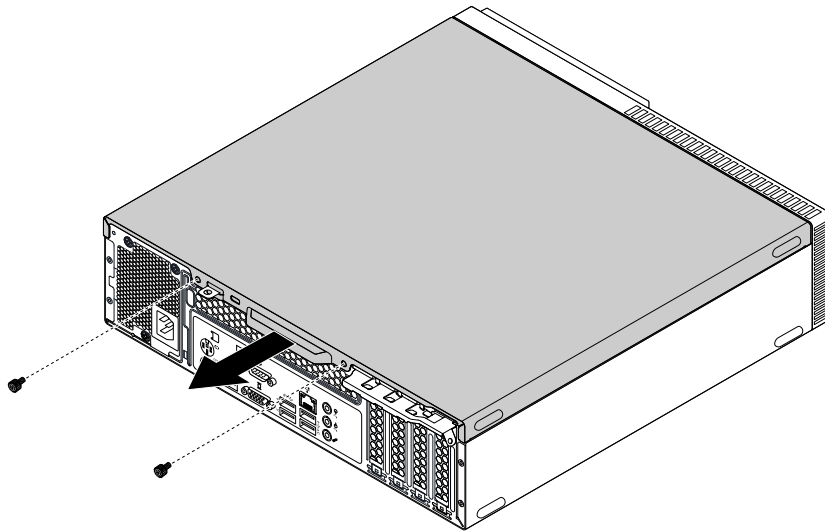
Figure 10. Removing the computer cover

Replacing the front bezel

Attention: Do not open your computer or attempt any repair before reading and understanding the Chapter 1 "Read this first: Important safety information" on page 1.

To replace the front bezel, do the following:

1. Remove any media from the drives and turn off all connected devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See "Removing the computer cover" on page 88.

3. If a dust shield has been installed, pull it outward to remove it from the front bezel.
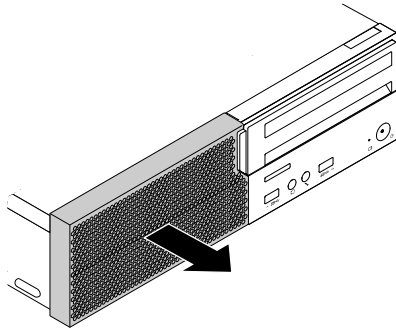
Figure 11. Removing the dust shield

4. Release the three plastic tabs on the top of the front bezel, and then pivot the front bezel downward.
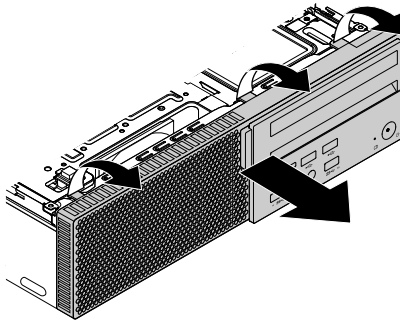
Figure 12. Removing the front bezel

5. Align the three plastic tabs on the bottom of the new front bezel with the corresponding holes in the chassis. Then, pivot the front bezel upward until it snaps into position.
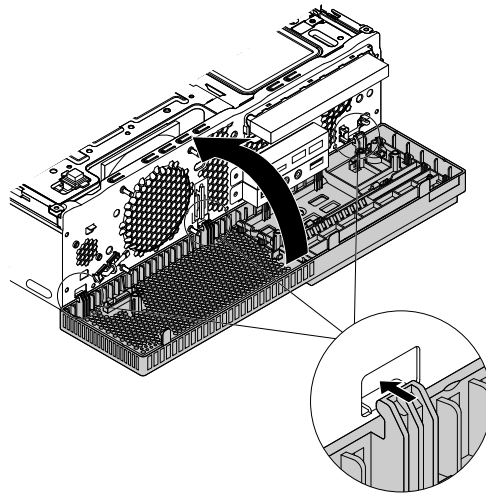
Figure 13. Installing the front bezel

6. Reinstall the dust shield if you have removed it. Align the edges of the dust shield with the edges of the front bezel. Then, press the dust shield inward until it snaps into position.
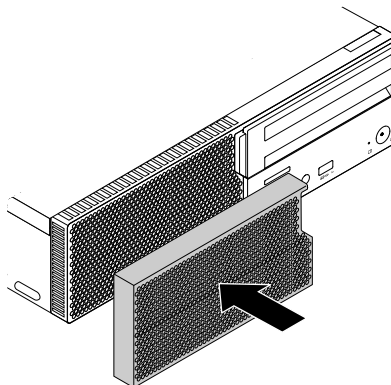
Figure 14. Installing the dust shield

What to do next:

• To work with another piece of hardware, go to the appropriate section.

• To complete the installation or replacement, go to "Completing the parts replacement" on page 129.

Replacing the optical drive

Attention: Do not open your computer or attempt any repair before reading and understanding the Chapter 1 "Read this first: Important safety information" on page 1.

To replace the optical drive, do the following:

1. Remove any media from the drives and turn off all connected devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.

2. Remove the computer cover. See "Removing the computer cover" on page 88.

3. Remove the front bezel. See "Replacing the front bezel" on page 88.

4. Locate the optical drive. See "Computer components" on page 32.

5. Disconnect the signal cable and the power cable from the rear of the optical drive.

6. Press and hold the blue release tabs **1** and **2** on the optical drive bracket as shown. Push the optical drive toward the rear of the computer to remove the optical drive with the bracket from the chassis.
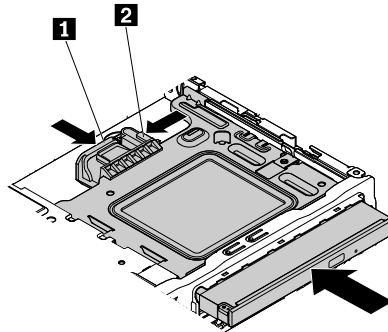
Figure 15. Removing the optical drive with the bracket

7. Flex the optical drive bracket as shown to remove the optical drive from the bracket.
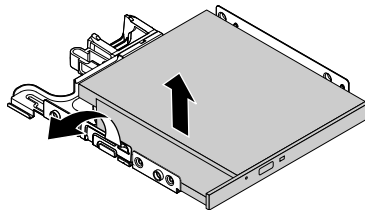
Figure 16. Removing the optical drive from the bracket

8. Insert a straightened paper clip into the emergency-eject hole **1** adjacent to the eject/close button so that the tray slides out of the optical drive. Then, remove the optical drive bezel from the optical drive as shown.
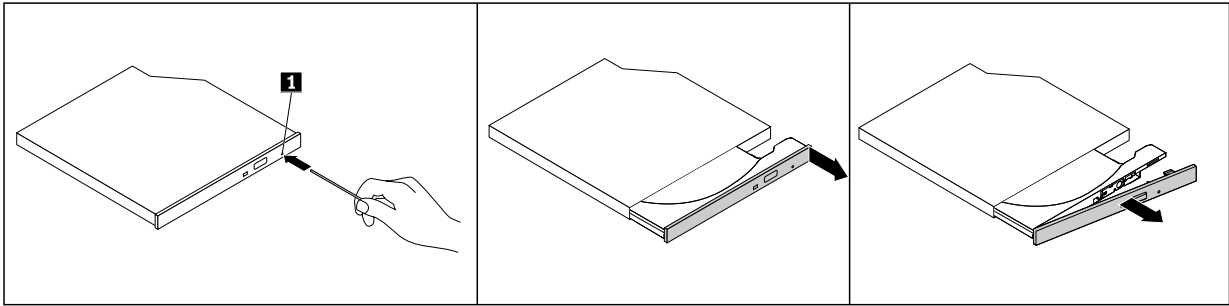
Figure 17. Removing the optical drive bezel from the optical drive

9. Insert the tab **1** on the optical drive bezel into the corresponding hole in the new optical drive. Then, insert the other three tabs **2** into the corresponding holes in the optical drive. Gently push the tray forward to close the tray.
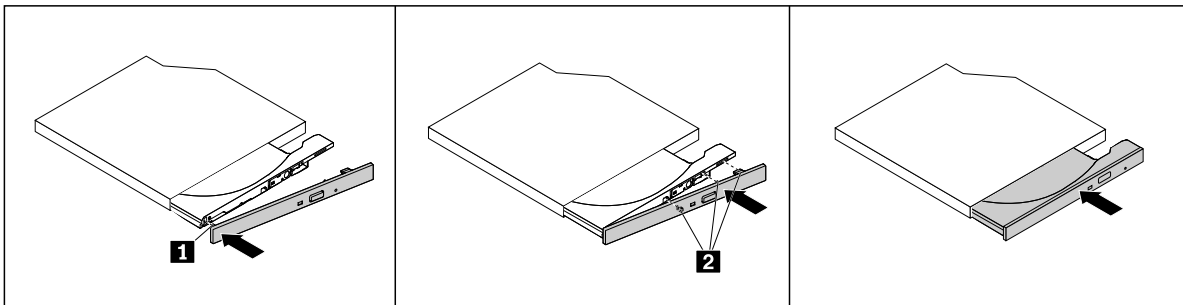
Figure 18. Installing the optical drive bezel to the optical drive

10. Flex the optical drive bracket and insert the two pins on the bracket into the corresponding holes in the optical drive. Then, pivot the optical drive downward until it snaps into position.
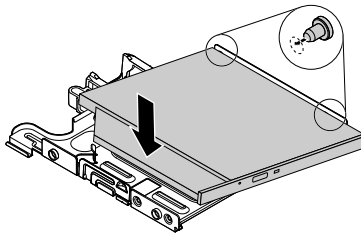
Figure 19. Installing the optical drive into the bracket

11. Align the mounting studs on the bracket with the corresponding holes in the chassis, and then install the optical drive with the bracket into the drive bay assembly. Slide the optical drive with the bracket to the front of the computer until it snaps into position.
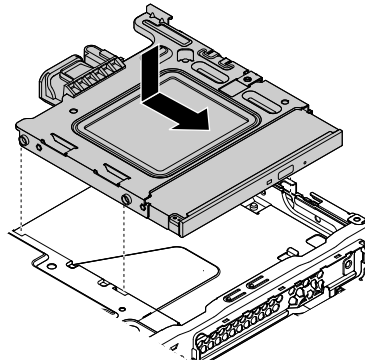
Figure 20. Installing the optical drive with the bracket

12. Connect the signal cable and the power cable to the optical drive.
13. Reinstall the front bezel. See "Replacing the front bezel" on page 88.

What to do next:

• To work with another piece of hardware, go to the appropriate section.
• To complete the installation or replacement, go to "Completing the parts replacement" on page 129.

Pivoting the drive bay assembly upward and downward

Attention: Do not open your computer or attempt any repair before reading and understanding the Chapter 1 "Read this first: Important safety information" on page 1.

To pivot the drive bay assembly upward and downward, do the following:

1. Remove any media from the drives and turn off all connected devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See "Removing the computer cover" on page 88.
3. Remove the front bezel. See "Replacing the front bezel" on page 88.
4. Remove the optical drive. See "Replacing the optical drive" on page 91.

5. Pressing the retaining clip **1** as shown, pivot the drive bay assembly upward.
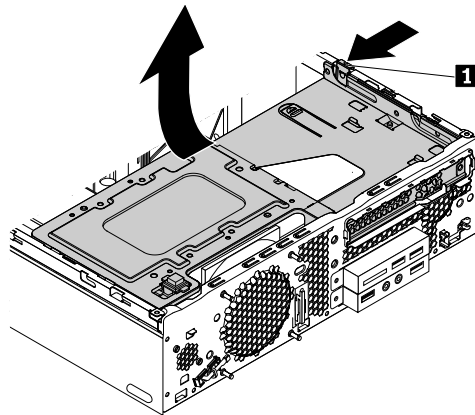
Figure 21. Pivoting the drive bay assembly upward

6. Pressing the release tab **1** on the drive bay assembly as shown, pivot the drive bay assembly downward until it snaps into position.
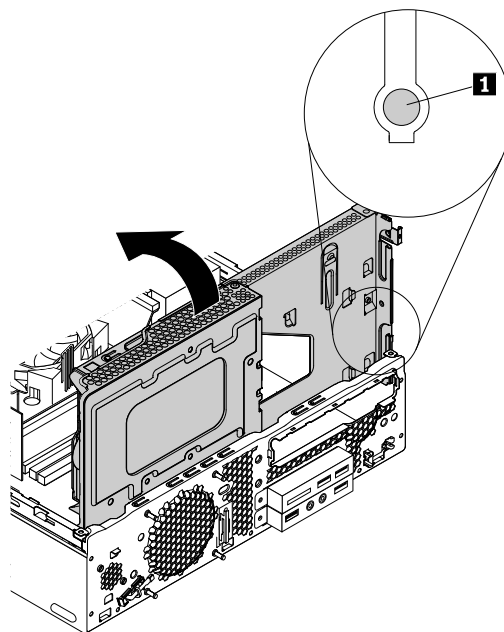
Figure 22. Pivoting the drive bay assembly downward

7. Reinstall the optical drive. See "Replacing the optical drive" on page 91.
8. Reinstall the front bezel. See "Replacing the front bezel" on page 88.

What to do next:

• To work with another piece of hardware, go to the appropriate section.
• To complete the installation or replacement, go to "Completing the parts replacement" on page 129.

Replacing the storage drive

Attention: Do not open your computer or attempt any repair before reading and understanding the Chapter 1 "Read this first: Important safety information" on page 1.

To replace the storage drive, refer to one of the following topics:

- "Replacing the 3.5-inch primary storage drive" on page 95
- "Replacing the 2.5-inch primary storage drive" on page 97
- "Replacing the 2.5-inch secondary storage drive" on page 99

Replacing the 3.5-inch primary storage drive

To replace the 3.5-inch primary storage drive, do the following:

1. Remove any media from the drives and turn off all connected devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See "Removing the computer cover" on page 88.
3. Remove the front bezel. See "Replacing the front bezel" on page 88.
4. Remove the optical drive. See "Replacing the optical drive" on page 91.
5. Pivot the drive bay assembly upward. See "Pivoting the drive bay assembly upward and downward" on page 93.
6. Locate the 3.5-inch primary storage drive. See "Computer components" on page 32.
7. Disconnect the signal cable and the power cable from the 3.5-inch storage drive.
8. Pull the storage drive bracket with the 3.5-inch storage drive out of the chassis.
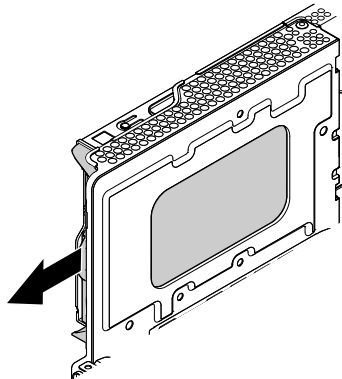
Figure 23. Removing the bracket with the 3.5-inch primary storage drive

9. Flex the storage drive bracket to remove the 3.5-inch storage drive from the bracket.
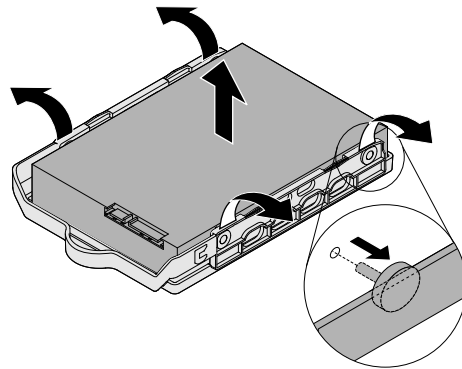
Figure 24. Removing the 3.5-inch primary storage drive from the bracket

10. Flex the storage drive bracket and insert the four pins **1** on the bracket into the corresponding holes in the new 3.5-inch storage drive.
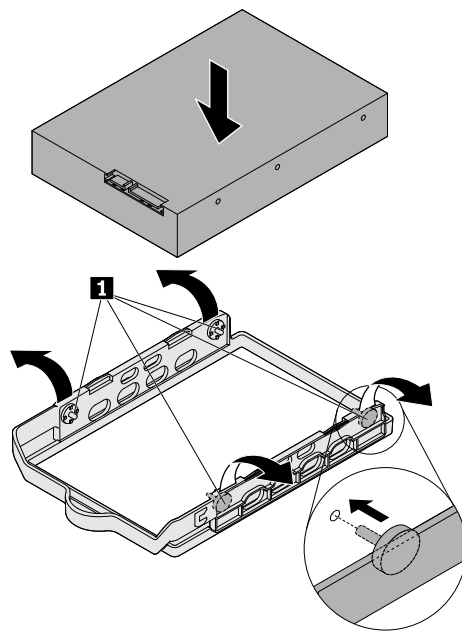

Figure 25. Installing the 3.5-inch primary storage drive into the bracket

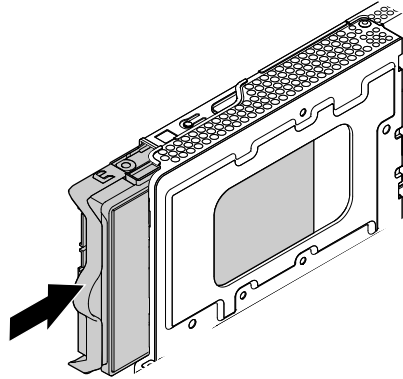11. Slide the bracket with the 3.5-inch storage drive into the storage drive bay until it snaps into position.

Figure 26. Installing the bracket with the 3.5-inch primary storage drive

12. Connect the signal cable and the power cable to the 3.5-inch storage drive.
13. Pivot the drive bay assembly downward. See "Pivoting the drive bay assembly upward and downward" on page 93.
14. Reinstall the optical drive. See "Replacing the optical drive" on page 91.
15. Reinstall the front bezel. See "Replacing the front bezel" on page 88.

What to do next:

• To work with another piece of hardware, go to the appropriate section.

• To complete the installation or replacement, go to "Completing the parts replacement" on page 129.

Replacing the 2.5-inch primary storage drive

To replace the 2.5-inch primary storage drive, do the following:

1. Remove any media from the drives and turn off all connected devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See "Removing the computer cover" on page 88.
3. Remove the front bezel. See "Replacing the front bezel" on page 88.
4. Remove the optical drive. See "Replacing the optical drive" on page 91.
5. Pivot the drive bay assembly upward. See "Pivoting the drive bay assembly upward and downward" on page 93.
6. Locate the 2.5-inch primary storage drive. See "Computer components" on page 32.
7. Disconnect the signal cable and the power cable from the 2.5-inch storage drive.
8. Remove the storage converter with the 2.5-inch storage drive. See "Replacing the 3.5-inch primary storage drive" on page 95.

9. Remove the four screws that secure the 2.5-inch storage drive to the storage converter. Then, remove the 2.5-inch storage drive from the converter as shown.
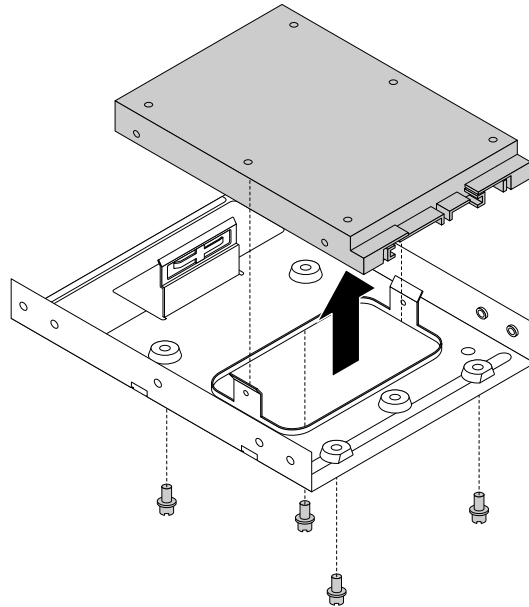

Figure 27. Removing the 2.5-inch primary storage drive from the storage converter

10. Position the new 2.5-inch storage drive into the storage converter so that the holes in the storage drive are aligned with the corresponding holes in the converter. Then, install the four screws to secure the 2.5-inch storage drive to the converter.
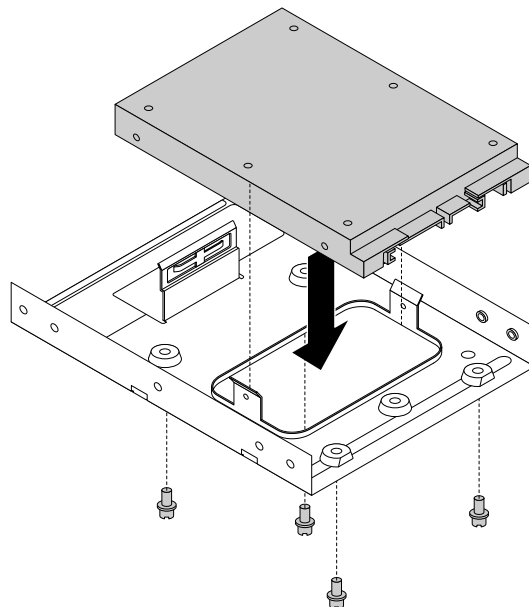
Figure 28. Installing the 2.5-inch primary storage drive into the storage converter

11. Install the storage converter with the 2.5-inch storage drive. See "Replacing the 3.5-inch primary storage drive" on page 95.

12. Connect the signal cable and the power cable to the 2.5-inch storage drive.

13. Pivot the drive bay assembly downward. See "Pivoting the drive bay assembly upward and downward" on page 93.

14. Reinstall the optical drive. See "Replacing the optical drive" on page 91.

15. Reinstall the front bezel. See "Replacing the front bezel" on page 88.

What to do next:

- To work with another piece of hardware, go to the appropriate section.

- To complete the installation or replacement, go to "Completing the parts replacement" on page 129.

Replacing the 2.5-inch secondary storage drive

To replace the 2.5-inch secondary storage drive, do the following:

1. Remove any media from the drives and turn off all connected devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.

2. Remove the computer cover. See "Removing the computer cover" on page 88.

3. Remove the front bezel. See "Replacing the front bezel" on page 88.

4. Remove the optical drive. See "Replacing the optical drive" on page 91.

5. Pivot the drive bay assembly upward. See "Pivoting the drive bay assembly upward and downward" on page 93.

6. Locate the 2.5-inch secondary storage drive. See "Computer components" on page 32.

7. Disconnect the signal cable and the power cable from the 2.5-inch storage drive.

8. Remove the screw **1** that secures the storage drive bracket. Then, slide the bracket with the 2.5-inch storage drive upward and remove it from the chassis as shown.
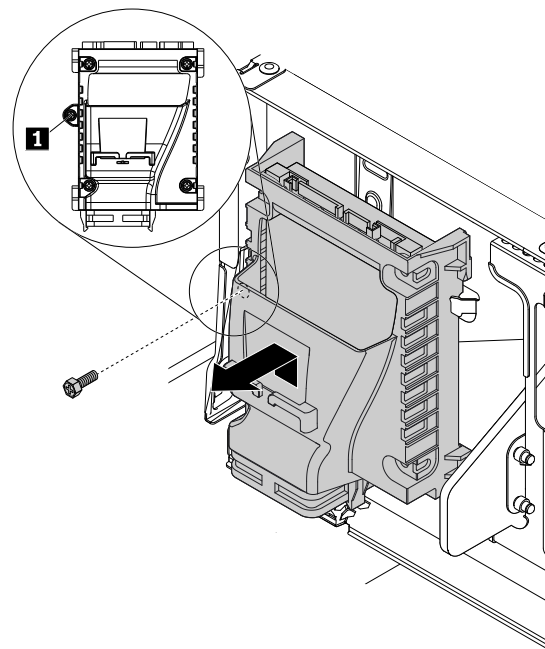

Figure 29. Removing the bracket with the 2.5-inch secondary storage drive

9. Remove the four screws **1** that secure the 2.5-inch storage drive to the bracket. Then, flex the storage drive bracket to remove the 2.5-inch storage drive.
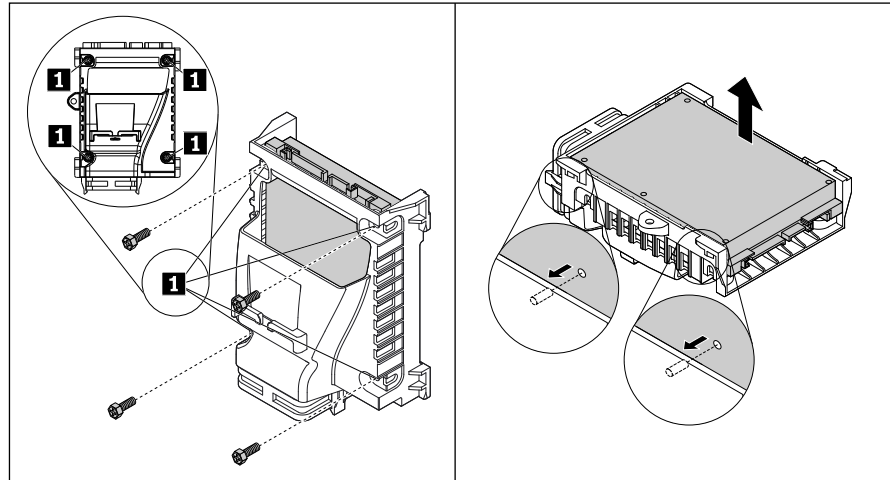

Figure 30. Removing the 2.5-inch secondary storage drive from the bracket

10. Insert the two pins on the storage drive bracket with the corresponding holes in the new 2.5-inch storage drive. Then, pivot the storage drive downward until it snaps into position. Install the fours screws **1** to secure the 2.5-inch storage drive.
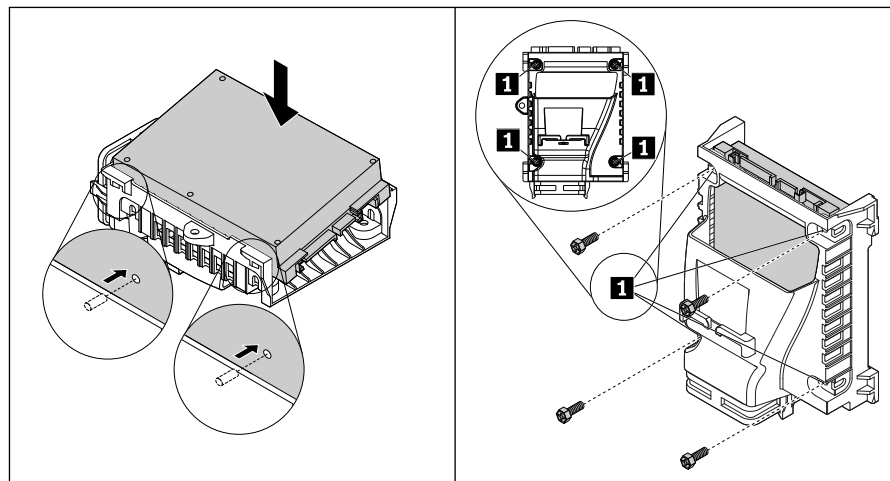

Figure 31. Installing the 2.5-inch secondary storage drive into the bracket

11. Position the bracket with the 2.5-inch storage drive in the secondary storage drive bay, and then slide it downward until the bracket is secured by the four retaining clips **1** in the storage drive bay. Install the screw **2** to secure the bracket.
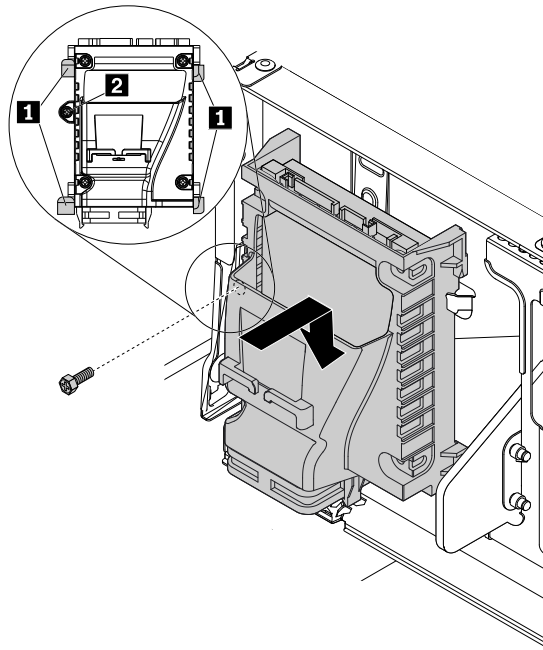
Figure 32. Installing the bracket with the 2.5-inch secondary storage drive

12. Connect the signal cable and the power cable to the 2.5-inch storage drive.
13. Pivot the drive bay assembly downward. See "Pivoting the drive bay assembly upward and downward" on page 93.
14. Reinstall the optical drive. See "Replacing the optical drive" on page 91.
15. Reinstall the front bezel. See "Replacing the front bezel" on page 88.

What to do next:

- To work with another piece of hardware, go to the appropriate section.
- To complete the installation or replacement, go to "Completing the parts replacement" on page 129.

Replacing the cover presence switch

Attention: Do not open your computer or attempt any repair before reading and understanding the Chapter 1 "Read this first: Important safety information" on page 1.

To replace the cover presence switch, do the following:

1. Remove any media from the drives and turn off all connected devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See "Removing the computer cover" on page 88.
3. Remove the front bezel. See "Replacing the front bezel" on page 88.
4. Locate the cover presence switch. See "Computer components" on page 32.
5. Disconnect the cover presence switch cable from the system board.

6. Press the clip **1** as shown and lift the cover presence switch out of the chassis.
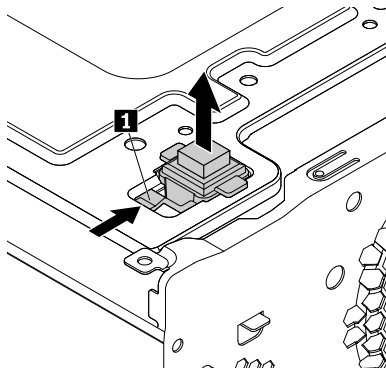

Figure 33. Removing the cover presence switch

7. Route the new cover presence switch cable through the corresponding hole in the chassis, and then connect it to the system board. See "Parts on the system board" on page 37.

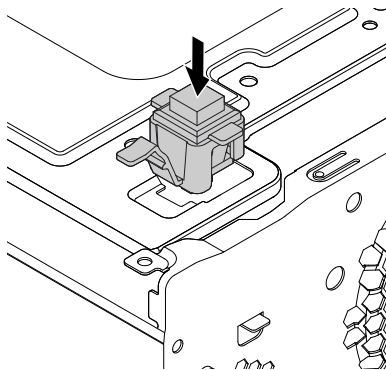8. Press the new cover presence switch into the hole until it snaps into position.

Figure 34. Installing the cover presence switch

9. Reinstall the front bezel. See "Replacing the front bezel" on page 88.

What to do next:

• To work with another piece of hardware, go to the appropriate section.

• To complete the installation or replacement, go to "Completing the parts replacement" on page 129.

Replacing the internal speaker

Attention: Do not open your computer or attempt any repair before reading and understanding the Chapter 1 "Read this first: Important safety information" on page 1.

To replace the internal speaker, do the following:

1. Remove any media from the drives and turn off all connected devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.

2. Remove the computer cover. See "Removing the computer cover" on page 88.

3. Remove the front bezel. See "Replacing the front bezel" on page 88.

4. Remove the optical drive. See "Replacing the optical drive" on page 91.

5. Pivot the drive bay assembly upward. See "Pivoting the drive bay assembly upward and downward" on page 93.

6. Locate the internal speaker. See "Computer components" on page 32.

7. Disconnect the internal speaker cable from the system board.

8. On the inside of the front panel, press the tab **1** and slide the internal speaker as shown to remove it from the chassis.
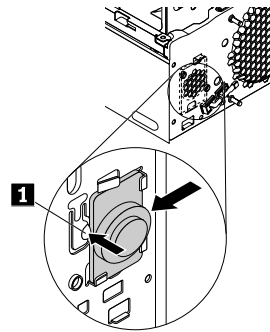

Figure 35. Removing the internal speaker

9. Align the new internal speaker with the corresponding four metal clips **1** on the inside of the front panel. Then, slide the internal speaker as shown until it snaps into position.
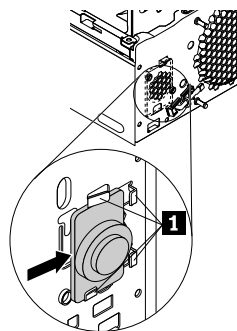
Figure 36. Installing the internal speaker

10. Connect the internal speaker cable to the system board. See "Parts on the system board" on page 37.

11. Pivot the drive bay assembly downward. See "Pivoting the drive bay assembly upward and downward" on page 93.

12. Reinstall the optical drive. See "Replacing the optical drive" on page 91.

13. Reinstall the front bezel. See "Replacing the front bezel" on page 88.

What to do next:

- To work with another piece of hardware, go to the appropriate section.

- To complete the installation or replacement, go to "Completing the parts replacement" on page 129.

Replacing the thermal sensor

Attention: Do not open your computer or attempt any repair before reading and understanding the Chapter 1 "Read this first: Important safety information" on page 1.

To replace the thermal sensor, do the following:

1. Remove any media from the drives and turn off all connected devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See "Removing the computer cover" on page 88.
3. Remove the front bezel. See "Replacing the front bezel" on page 88.
4. Remove the optical drive. See "Replacing the optical drive" on page 91.
5. Pivot the drive bay assembly upward. See "Pivoting the drive bay assembly upward and downward" on page 93.
6. Locate the thermal sensor. See "Computer components" on page 32.
7. Disconnect the thermal sensor cable from the system board.
8. On the inside of the front panel, squeeze the two retaining clips that secure the thermal sensor and push the thermal sensor out of the chassis.
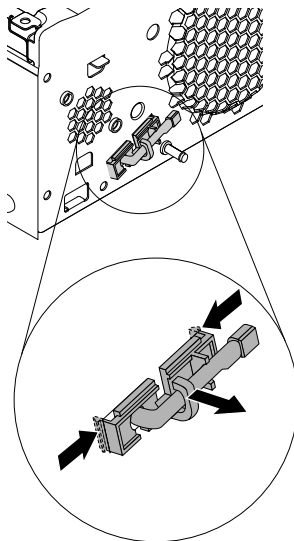

Figure 37. Removing the thermal sensor

9. Route the new thermal sensor cable through the hole **1** and insert the corresponding retaining clip on the thermal sensor into the same hole. Then, press the other retaining clip on the thermal sensor into the hole **2**.
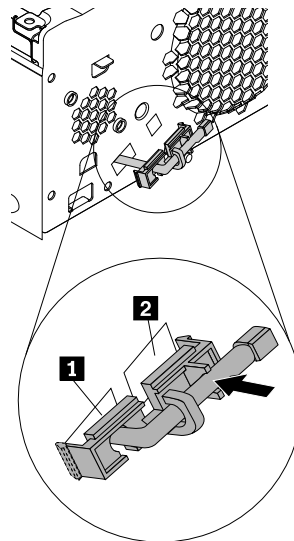

Figure 38. Installing the thermal sensor

10. Connect the thermal sensor cable to the system board. See "Parts on the system board" on page 37.

11. Pivot the drive bay assembly downward. See "Pivoting the drive bay assembly upward and downward" on page 93.

12. Reinstall the optical drive. See "Replacing the optical drive" on page 91.

13. Reinstall the front bezel. See "Replacing the front bezel" on page 88.

What to do next:

• To work with another piece of hardware, go to the appropriate section.

• To complete the installation or replacement, go to "Completing the parts replacement" on page 129.

Replacing the card reader

Attention: Do not open your computer or attempt any repair before reading and understanding the Chapter 1 "Read this first: Important safety information" on page 1.

To replace the card reader, do the following:

1. Remove any media from the drives and turn off all connected devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.

2. Remove the computer cover. See "Removing the computer cover" on page 88.

3. Remove the front bezel. See "Replacing the front bezel" on page 88.

4. Remove the optical drive. See "Replacing the optical drive" on page 91.

5. Pivot the drive bay assembly upward. See "Pivoting the drive bay assembly upward and downward" on page 93.

6. Locate the card reader. See "Computer components" on page 32.

7. Disconnect the card reader cable from the system board.

8. Remove the screw that secures the card reader and USB 2.0 assembly bracket, and then pull the bracket out to access the card reader.
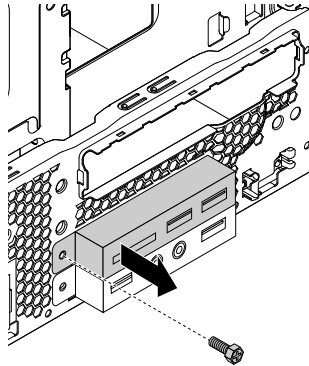

Figure 39. Removing the card reader and USB 2.0 assembly bracket

9. Remove the two screws that secure the card reader, and then remove the card reader from the card reader and USB 2.0 assembly bracket.
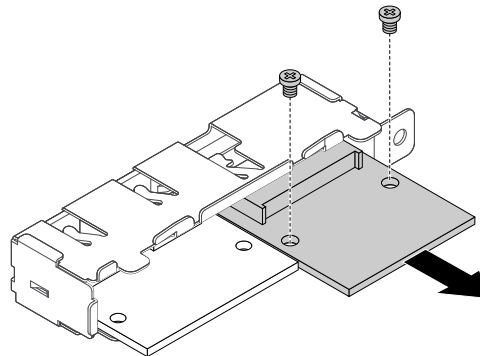

Figure 40. Removing the card reader

10. Align the two holes in the new card reader with the corresponding screw holes in the card reader and USB 2.0 assembly bracket. Then, install the two screws to secure the card reader.
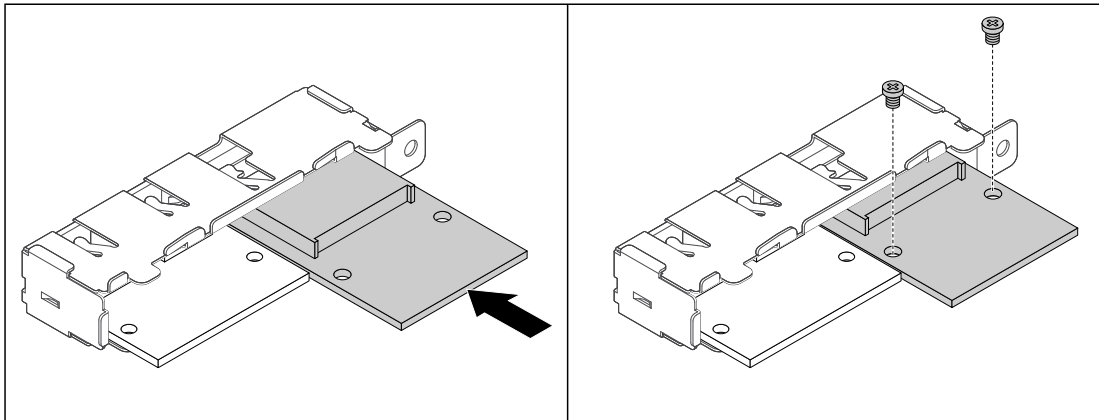

Figure 41. Installing the card reader

11. Route the card reader cable through the corresponding hole and connect it to the system board. See "Parts on the system board" on page 37.

12. Insert the metallic tabs **1** on the card reader and USB 2.0 assembly bracket into the corresponding hole in the chassis. Then, align the hole in the bracket with the corresponding screw hole in the chassis and install the screw to secure the bracket.
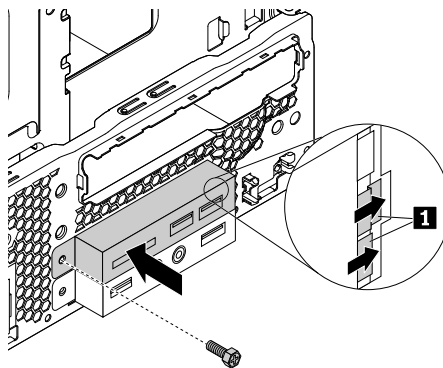

Figure 42. Installing the card reader and USB 2.0 assembly bracket

13. Pivot the drive bay assembly downward. See "Pivoting the drive bay assembly upward and downward" on page 93.

14. Reinstall the optical drive. See "Replacing the optical drive" on page 91.

15. Reinstall the front bezel. See "Replacing the front bezel" on page 88.

What to do next:

- To work with another piece of hardware, go to the appropriate section.
- To complete the installation or replacement, go to "Completing the parts replacement" on page 129.

Replacing the USB 2.0 assembly

Attention: Do not open your computer or attempt any repair before reading and understanding the Chapter 1 "Read this first: Important safety information" on page 1.

To replace the USB 2.0 assembly, do the following:

1. Remove any media from the drives and turn off all connected devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.

2. Remove the computer cover. See "Removing the computer cover" on page 88.

3. Remove the front bezel. See "Replacing the front bezel" on page 88.

4. Remove the optical drive. See "Replacing the optical drive" on page 91.

5. Pivot the drive bay assembly upward. See "Pivoting the drive bay assembly upward and downward" on page 93.

6. Locate the USB 2.0 assembly. See "Computer components" on page 32.

7. Disconnect the USB 2.0 assembly cable from the system board.

8. Remove the screw that secures the card reader and USB 2.0 assembly bracket, and then pull the bracket out to access the USB 2.0 assembly.
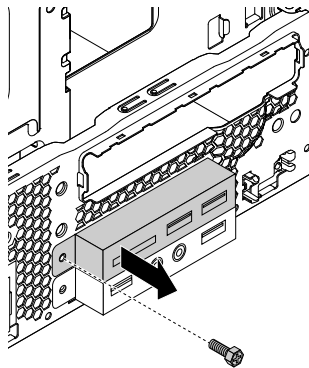

Figure 43. Removing the card reader and USB 2.0 assembly bracket

9. Remove the two screws that secure the USB 2.0 assembly, and then remove the USB 2.0 assembly from the card reader and USB 2.0 assembly bracket.
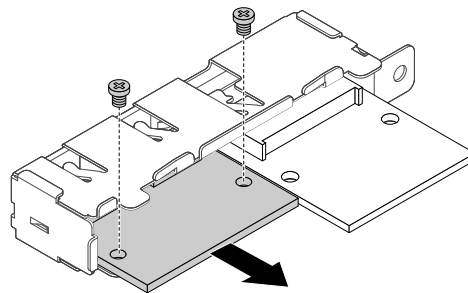

Figure 44. Removing the USB 2.0 assembly

10. Align the two holes in the new USB 2.0 assembly with the corresponding screw holes in the card reader and USB 2.0 assembly bracket. Then, install the two screws to secure the USB 2.0 assembly.
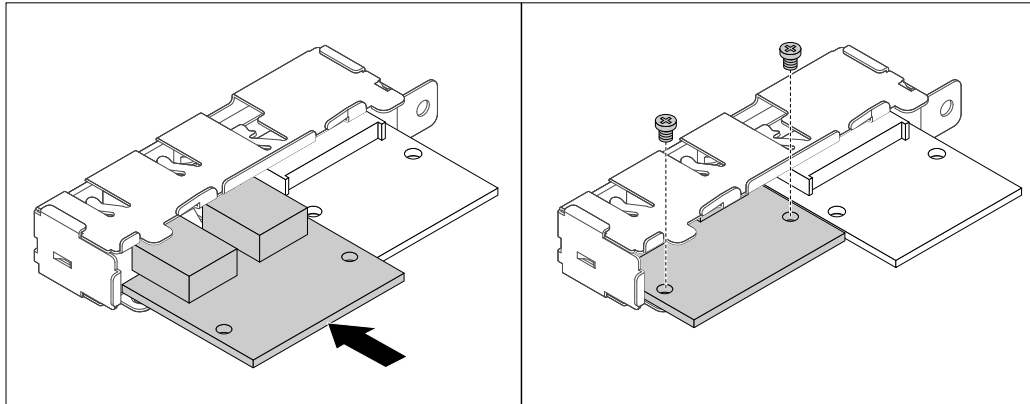

Figure 45. Installing the USB 2.0 assembly

11. Route the USB 2.0 assembly cable through the corresponding hole and connect it to the system board. See "Parts on the system board" on page 37.
12. Insert the metallic tabs **1** on the card reader and USB 2.0 assembly bracket into the corresponding hole in the chassis. Then, align the hole in the bracket with the corresponding screw hole in the chassis and install the screw to secure the bracket.
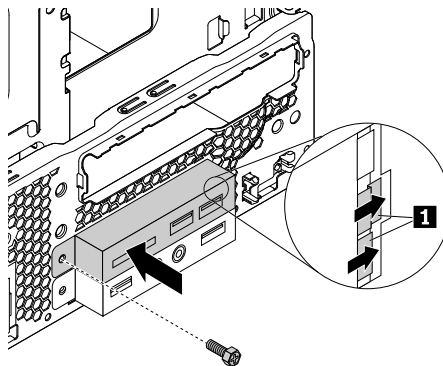

Figure 46. Installing the card reader and USB 2.0 assembly bracket

13. Pivot the drive bay assembly downward. See "Pivoting the drive bay assembly upward and downward" on page 93.
14. Reinstall the optical drive. See "Replacing the optical drive" on page 91.
15. Reinstall the front bezel. See "Replacing the front bezel" on page 88.

What to do next:

- To work with another piece of hardware, go to the appropriate section.
- To complete the installation or replacement, go to "Completing the parts replacement" on page 129.

Replacing the front audio and USB 3.0 assembly

Attention: Do not open your computer or attempt any repair before reading and understanding the Chapter 1 "Read this first: Important safety information" on page 1.

To replace the front audio and USB 3.0 assembly, do the following:

1. Remove any media from the drives and turn off all connected devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See "Removing the computer cover" on page 88.
3. Remove the front bezel. See "Replacing the front bezel" on page 88.
4. Remove the optical drive. See "Replacing the optical drive" on page 91.
5. Pivot the drive bay assembly upward. See "Pivoting the drive bay assembly upward and downward" on page 93.
6. Locate the front audio and USB 3.0 assembly. See "Computer components" on page 32.
7. Disconnect the front audio and USB 3.0 assembly cables from the system board.
8. Remove the screw that secures the front audio and USB 3.0 assembly, and then pull the assembly out of the chassis.
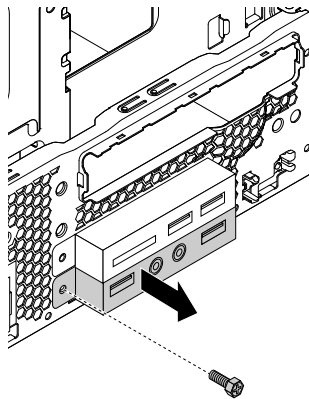

Figure 47. Removing the front audio and USB 3.0 assembly

9. Route the new front audio and USB 3.0 assembly cables through the corresponding hole and connect them to the system board. See "Parts on the system board" on page 37.

10. Insert the metallic tabs **1** on the new front audio and USB 3.0 assembly into the corresponding hole in the chassis. Then, align the hole in the front audio and USB 3.0 assembly with the corresponding screw hole in the chassis and install the screw to secure the assembly.
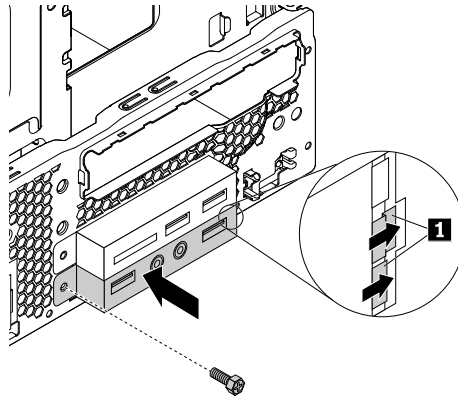

Figure 48. Installing the front audio and USB 3.0 assembly

11. Pivot the drive bay assembly downward. See "Pivoting the drive bay assembly upward and downward" on page 93.

12. Reinstall the optical drive. See "Replacing the optical drive" on page 91.

13. Reinstall the front bezel. See "Replacing the front bezel" on page 88.

What to do next:

- To work with another piece of hardware, go to the appropriate section.
- To complete the installation or replacement, go to "Completing the parts replacement" on page 129.

Replacing the power button board

Attention: Do not open your computer or attempt any repair before reading and understanding the Chapter 1 "Read this first: Important safety information" on page 1.

To replace the power button board, do the following:

1. Remove any media from the drives and turn off all connected devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.

2. Remove the computer cover. See "Removing the computer cover" on page 88.

3. Remove the front bezel. See "Replacing the front bezel" on page 88.

4. Remove the optical drive. See "Replacing the optical drive" on page 91.

5. Pivot the drive bay assembly upward. See "Pivoting the drive bay assembly upward and downward" on page 93.

6. Locate the power button board. See "Computer components" on page 32.

7. Disconnect the power button board cable from the system board.

8. Squeeze the two retaining clips that secure the power button board and push the power button board inward, and then remove it from the chassis.
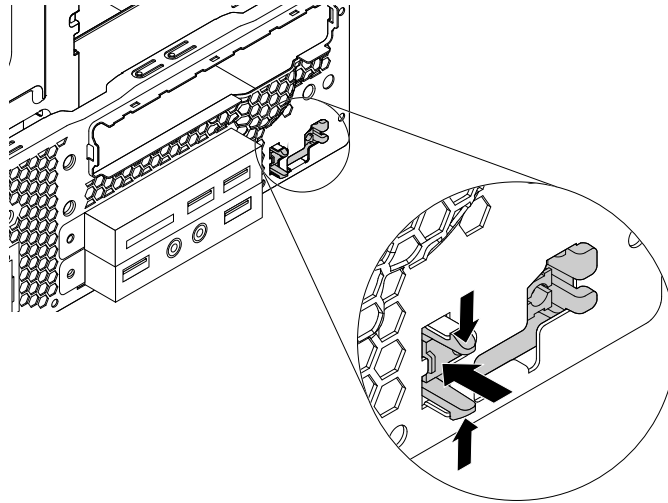

Figure 49. Removing the power button board

9. On the inside of the front panel, insert one retaining clip on the new power button board into the hole **1**. Then, press the other retaining clip into the hole **2**.
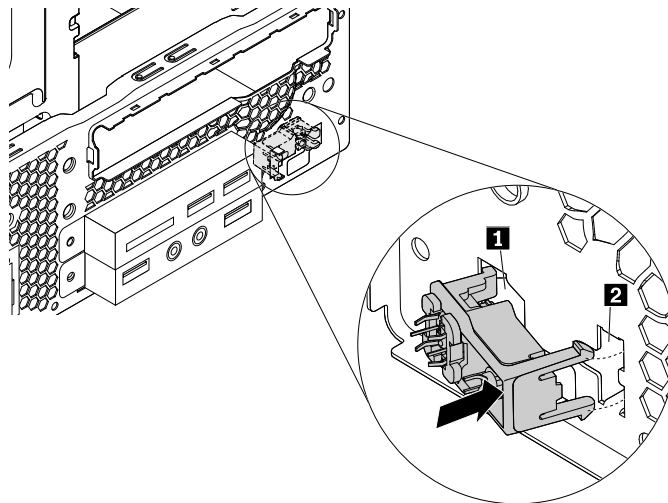
Figure 50. Installing the power button board

10. Connect the power button board cable to the system board. See "Parts on the system board" on page 37.
11. Pivot the drive bay assembly downward. See "Pivoting the drive bay assembly upward and downward" on page 93.
12. Reinstall the optical drive. See "Replacing the optical drive" on page 91.
13. Reinstall the front bezel. See "Replacing the front bezel" on page 88.

What to do next:

• To work with another piece of hardware, go to the appropriate section.

- To complete the installation or replacement, go to "Completing the parts replacement" on page 129.

Replacing the power supply assembly

Attention: Do not open your computer or attempt any repair before reading and understanding the Chapter 1 "Read this first: Important safety information" on page 1.

Although there are no moving parts in your computer after the power cord has been disconnected, the following warnings are required for your safety and proper Underwriters Laboratories (UL) certification.

CAUTION:
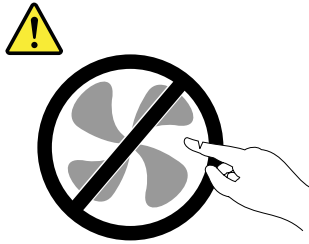
Hazardous moving parts. Keep fingers and other body parts away.

CAUTION:
Never remove the cover on a power supply or any part that has the following label attached.

Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

To replace the power supply assembly, do the following:

1. Remove any media from the drives and turn off all connected devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.

2. Remove the computer cover. See "Removing the computer cover" on page 88.

3. Remove the front bezel. See "Replacing the front bezel" on page 88.

4. Remove the optical drive. See "Replacing the optical drive" on page 91.

5. Pivot the drive bay assembly upward. See "Pivoting the drive bay assembly upward and downward" on page 93.

6. Remove the heat sink fan duct. See "Replacing the heat sink and fan assembly" on page 123.

7. Locate the power supply assembly. See "Computer components" on page 32.

8. Disconnect the power supply assembly cables from the system board.

9. Remove the three screws that secure the power supply assembly. Pressing the retaining clip **1** downward, slide the power supply assembly to the front of the computer and lift it out of the chassis.
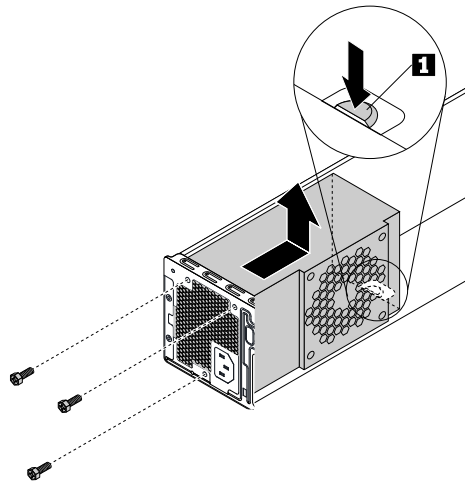

Figure 51. Removing the power supply assembly

10. Position the new power supply assembly in the chassis so that the three screw holes in the power supply assembly align with those in the chassis. Then, install the three screws to secure the power supply assembly.
11. Connect the power supply assembly cables to the system board. See "Parts on the system board" on page 37.
12. Reinstall the heat sink fan duct. See "Replacing the heat sink and fan assembly" on page 123.
13. Pivot the drive bay assembly downward. See "Pivoting the drive bay assembly upward and downward" on page 93.
14. Reinstall the optical drive. See "Replacing the optical drive" on page 91.
15. Reinstall the front bezel. See "Replacing the front bezel" on page 88.

What to do next:

• To work with another piece of hardware, go to the appropriate section.
• To complete the installation or replacement, go to "Completing the parts replacement" on page 129.

Replacing the system fan

Attention: Do not open your computer or attempt any repair before reading and understanding the Chapter 1 "Read this first: Important safety information" on page 1.

To replace the system fan, do the following:
1. Remove any media from the drives and turn off all connected devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See "Removing the computer cover" on page 88.
3. Remove the front bezel. See "Replacing the front bezel" on page 88.
4. Remove the optical drive. See "Replacing the optical drive" on page 91.
5. Pivot the drive bay assembly upward. See "Pivoting the drive bay assembly upward and downward" on page 93.

6. Locate the system fan. See "Computer components" on page 32.

7. Disconnect the system fan cable from the system board.

8. The system fan is connected to the chassis by four rubber mounts. Remove the system fan by breaking or cutting the rubber mounts and gently pulling the system fan out of the chassis.

   Note: The new system fan will have four new rubber mounts connected.
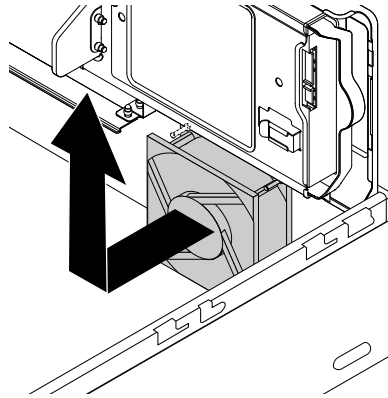

Figure 52. Removing the system fan

9. On the inside of the rear panel, push the four rubber mounts on the new system fan through the corresponding holes in the chassis. Then, on the outside of the rear panel, pull the tips of the rubber mounts until the system fan is secured in place.

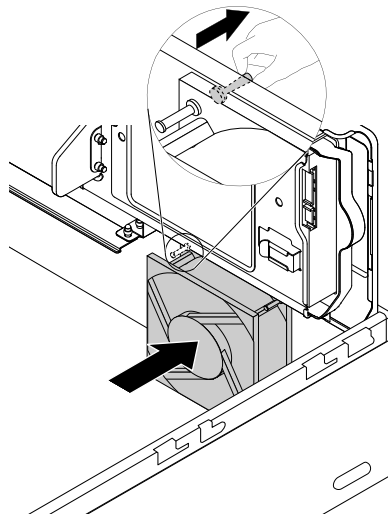*Figure 53. Installing the system fan*

10. Connect the system fan cable to the system board. See "Parts on the system board" on page 37.

11. Pivot the drive bay assembly downward. See "Pivoting the drive bay assembly upward and downward" on page 93.

12. Reinstall the optical drive. See "Replacing the optical drive" on page 91.

13. Reinstall the front bezel. See "Replacing the front bezel" on page 88.

What to do next:

- To work with another piece of hardware, go to the appropriate section.

- To complete the installation or replacement, go to "Completing the parts replacement" on page 129.

Replacing a PCI Express card

Attention: Do not open your computer or attempt any repair before reading and understanding the Chapter 1 "Read this first: Important safety information" on page 1.

To replace a PCI Express card, do the following:

1. Remove any media from the drives and turn off all connected devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.

2. Remove the computer cover. See "Removing the computer cover" on page 88.

3. Locate the PCI Express card you want to replace. The PCI Express cards are installed in the PCI Express card slots on the system board. See "Parts on the system board" on page 37.

4. Pivot the card latch outward to open the latch. Then, grasp the PCI Express card and gently pull it out of the slot.
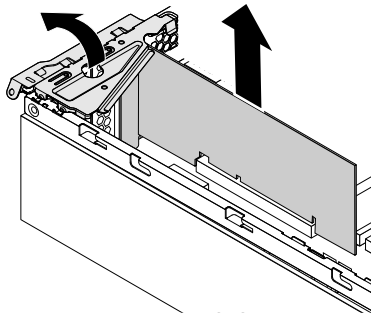
Figure 54. Removing a PCI Express card

Notes:

- The card fits tightly into the card slot. If necessary, alternate moving each side of the card a small amount until it is removed from the card slot.

- If the card is held in place by a retaining latch, press the card retaining latch **1** as shown to disengage the latch. Grasp the card and gently pull it out of the slot.
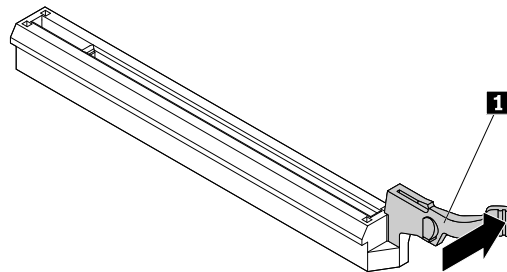
5. Insert the new PCI Express card into the appropriate PCI Express card slot on the system board. See "Parts on the system board" on page 37.

   Note: If you are installing a PCI Express x16 graphics card, ensure that the memory slot retaining clips are closed before you install the graphics card.

6. Pivot the card latch to the closed position.

What to do next:

• To work with another piece of hardware, go to the appropriate section.

• To complete the installation or replacement, go to "Completing the parts replacement" on page 129.

Replacing the Wi-Fi card

Attention: Do not open your computer or attempt any repair before reading and understanding the Chapter 1 "Read this first: Important safety information" on page 1.

To replace the Wi-Fi card, do the following:

1. Remove any media from the drives and turn off all connected devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See "Removing the computer cover" on page 88.
3. Locate the Wi-Fi card. See "Computer components" on page 32.
4. If your computer comes with a Wi-Fi card that supports the Bluetooth function, disconnect the Bluetooth cable from the Wi-Fi card adapter.

   Note: The Bluetooth cable connects the Bluetooth connector on the Wi-Fi card adapter to the system board.
5. Remove the Wi-Fi card adapter. See "Replacing a PCI Express card" on page 116.
6. Disconnect the front and rear Wi-Fi antenna cables from the Wi-Fi card, and then remove the two screws that secure the Wi-Fi card. Pull the Wi-Fi card out of the card slot.
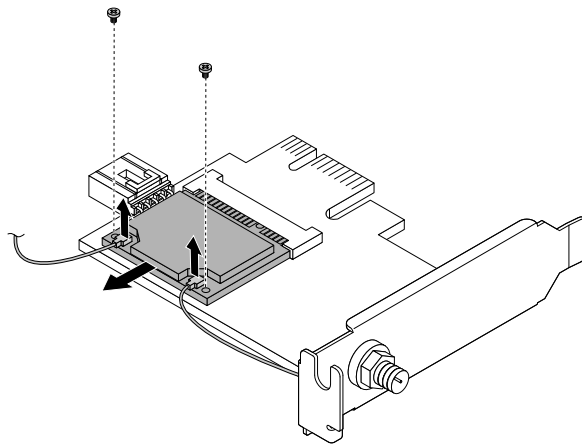

Figure 55. Removing the Wi-Fi card

7. Insert the new Wi-Fi card into the card slot on the Wi-Fi card adapter. Then, install the two screws to secure the Wi-Fi card and connect the front and rear Wi-Fi antenna cables to the Wi-Fi card.
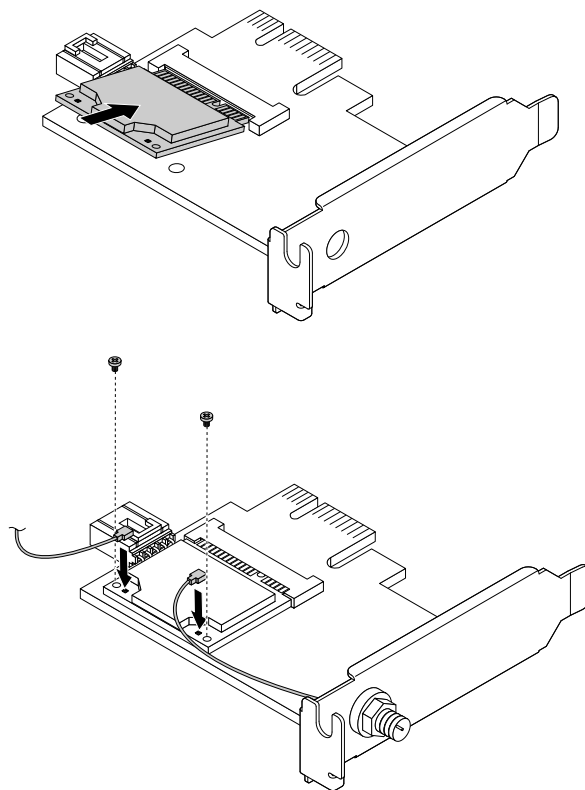

Figure 56. Installing the Wi-Fi card

8. Reinstall the Wi-Fi card adapter. See "Replacing a PCI Express card" on page 116.
9. If the Wi-Fi card supports the Bluetooth function, use a Bluetooth cable to connect the Bluetooth connector on the Wi-Fi card adapter to the system board.

What to do next:

• To work with another piece of hardware, go to the appropriate section.

• To complete the installation or replacement, go to "Completing the parts replacement" on page 129.

Replacing the Wi-Fi antennas

Attention: Do not open your computer or attempt any repair before reading and understanding the Chapter 1 "Read this first: Important safety information" on page 1.

To replace the Wi-Fi antennas, refer to the following topics:

• "Replacing the front Wi-Fi antenna" on page 118

• "Replacing the rear Wi-Fi antenna" on page 120

Replacing the front Wi-Fi antenna

To replace the front Wi-Fi antenna, do the following:

1. Remove any media from the drives and turn off all connected devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.

2. Remove the computer cover. See "Removing the computer cover" on page 88.

3. Remove the front bezel. See "Replacing the front bezel" on page 88.

4. Remove the optical drive. See "Replacing the optical drive" on page 91.

5. Pivot the drive bay assembly upward. See "Pivoting the drive bay assembly upward and downward" on page 93.

6. Locate the front Wi-Fi antenna. See "Computer components" on page 32.

7. Disconnect the front Wi-Fi antenna cable from the Wi-Fi card.

8. Peel off the front Wi-Fi antenna from the front panel, and then remove it from the chassis.
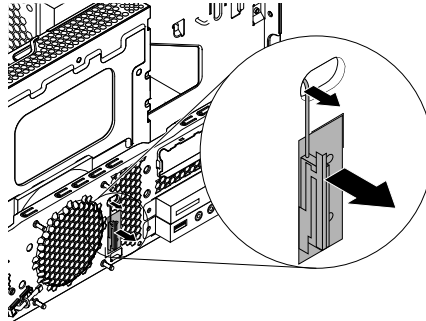
Figure 57. Removing the front Wi-Fi antenna

9. Peel off the release paper on the adhesive surface of the new front Wi-Fi antenna.

10. Route the new front Wi-Fi antenna cable through the corresponding hole, and then stick the front Wi-Fi antenna to the front panel.
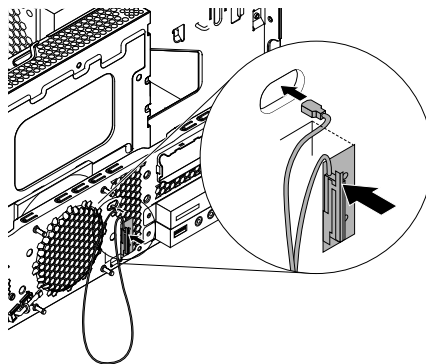
Figure 58. Installing the front Wi-Fi antenna

11. Connect the front Wi-Fi antenna cable to the Wi-Fi card.

12. Pivot the drive bay assembly downward. See "Pivoting the drive bay assembly upward and downward" on page 93.

13. Reinstall the optical drive. See "Replacing the optical drive" on page 91.

14. Reinstall the front bezel. See "Replacing the front bezel" on page 88.

What to do next:

• To work with another piece of hardware, go to the appropriate section.

• To complete the installation or replacement, go to "Completing the parts replacement" on page 129.

Replacing the rear Wi-Fi antenna

To replace the rear Wi-Fi antenna, do the following:

1. Remove any media from the drives and turn off all connected devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See "Removing the computer cover" on page 88.
3. Locate the rear Wi-Fi antenna. See "Computer components" on page 32.
4. Straighten the rear Wi-Fi antenna so that it can be more easily twisted.
5. Holding the thicker end of the rear Wi-Fi antenna, unscrew it from the rear Wi-Fi antenna cable connector.
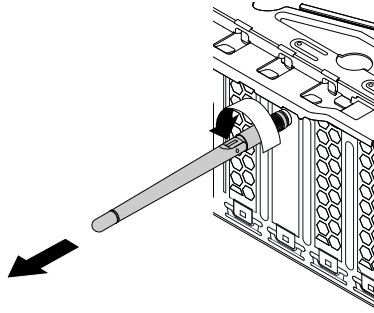
Figure 59. Removing the rear Wi-Fi antenna

6. Holding the thicker end of the new rear Wi-Fi antenna, screw it to the rear Wi-Fi antenna cable connector.
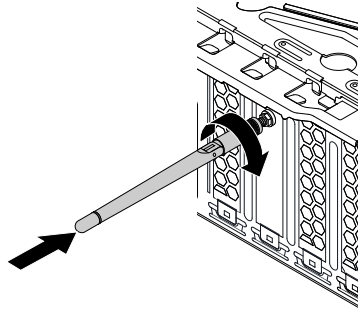
Figure 60. Installing the rear Wi-Fi antenna

7. Adjust the angle of the rear Wi-Fi antenna to reduce the risk of breaking the antenna by accident.

What to do next:

- To work with another piece of hardware, go to the appropriate section.
- To complete the installation or replacement, go to "Completing the parts replacement" on page 129.

Replacing a memory module

Attention: Do not open your computer or attempt any repair before reading and understanding the Chapter 1 "Read this first: Important safety information" on page 1.

The following table provides information about the memory module installation rules. The "X" mark indicates the memory slot(s) into which the memory module(s) should be installed in different situations. The numbers 1, 2, 3, and 4 indicate the installation sequence. To locate the memory module slots, see "Parts on the system board" on page 37.

Memory modules	DIMM 1	DIMM 2
One memory module	X	
Two memory modules	X	X

To replace a memory module, do the following:

1. Remove any media from the drives and turn off all connected devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.

2. Remove the computer cover. See "Removing the computer cover" on page 88.

3. Remove the front bezel. See "Replacing the front bezel" on page 88.

4. Remove the optical drive. See "Replacing the optical drive" on page 91.

5. Pivot the drive bay assembly upward. See "Pivoting the drive bay assembly upward and downward" on page 93.

6. Locate the memory module you want to replace. The memory modules are installed in the memory slots on the system board. See "Parts on the system board" on page 37.

7. Remove any parts that might prevent your access to the memory module. Depending on your computer model, you might need to remove the PCI Express x16 graphics card for easier access to the memory module. See "Replacing a PCI Express card" on page 116.

8. Open the retaining clips and gently pull the memory module out of the memory slot.
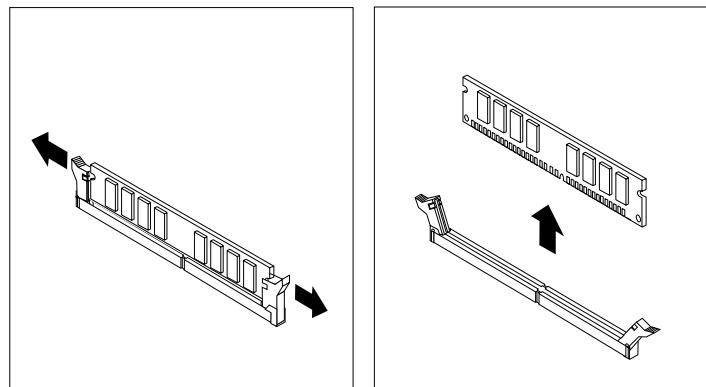

Figure 61. Removing a memory module

9. Position the new memory module over the appropriate memory slot. Ensure that the notch **1** on the memory module aligns correctly with the slot key **2** on the system board. Push the memory module straight down into the slot until the retaining clips close.
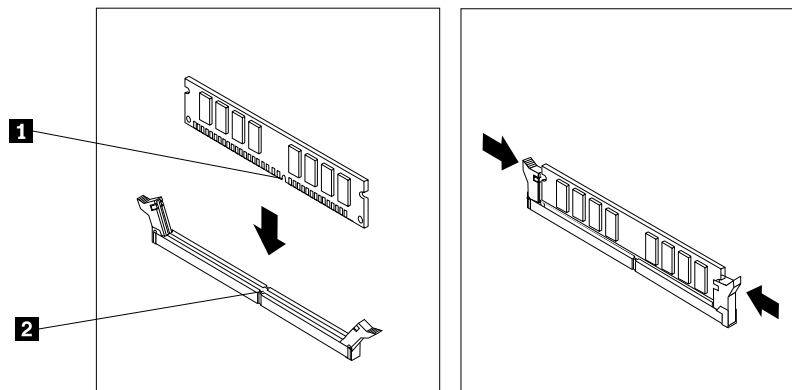
Figure 62. Installing a memory module

10. Reinstall the PCI Express x16 graphics card if you have removed it. See "Replacing a PCI Express card" on page 116.
11. Pivot the drive bay assembly downward. See "Pivoting the drive bay assembly upward and downward" on page 93.
12. Reinstall the optical drive. See "Replacing the optical drive" on page 91.
13. Reinstall the front bezel. See "Replacing the front bezel" on page 88.

What to do next:

- To work with another piece of hardware, go to the appropriate section.
- To complete the installation or replacement, go to "Completing the parts replacement" on page 129.

Replacing the coin-cell battery

Attention: Do not open your computer or attempt any repair before reading and understanding the Chapter 1 "Read this first: Important safety information" on page 1.

Your computer has a special type of memory that maintains the date, time, and settings for built-in features, such as parallel-connector assignments (configuration). A coin-cell battery keeps this information active when you turn off the computer.

The coin-cell battery normally requires no charging or maintenance throughout its life; however, no coin-cell battery lasts forever. If the coin-cell battery fails, the date, time, and configuration information (including passwords) are lost. An error message is displayed when you turn on the computer.

Refer to the "Lithium coin-cell battery notice" in the *Safety, Warranty, and Setup Guide* for information about replacing and disposing of the coin-cell battery.

To replace the coin-cell battery, do the following:

1. Remove any media from the drives and turn off all connected devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See "Removing the computer cover" on page 88.
3. Remove the front bezel. See "Replacing the front bezel" on page 88.

4. Remove the optical drive. See "Replacing the optical drive" on page 91.

5. Pivot the drive bay assembly upward. See "Pivoting the drive bay assembly upward and downward" on page 93.

6. Locate the coin-cell battery. See "Computer components" on page 32.

7. Remove the coin-cell battery as shown.
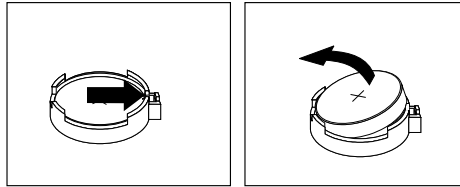
Figure 63. Removing the coin-cell battery

8. Install the new coin-cell battery as shown.
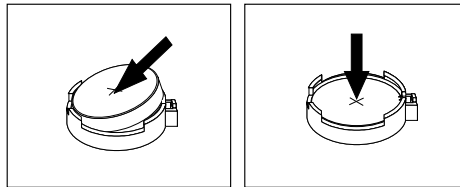
Figure 64. Installing the coin-cell battery

9. Pivot the drive bay assembly downward. See "Pivoting the drive bay assembly upward and downward" on page 93.

10. Reinstall the optical drive. See "Replacing the optical drive" on page 91.

11. Reinstall the front bezel. See "Replacing the front bezel" on page 88.

12. Reinstall the computer cover and connect the cables. See "Completing the parts replacement" on page 129.

13. Turn on the computer and all connected devices.

   Note: When the computer is turned on for the first time after replacing the coin-cell battery, an error message might be displayed. This is normal after replacing the coin-cell battery.

14. Use the Setup Utility program to set the date, time, and any passwords. See "Using the Setup Utility program" on page 63.

Replacing the heat sink and fan assembly

Attention: Do not open your computer or attempt any repair before reading and understanding the Chapter 1 "Read this first: Important safety information" on page 1.

CAUTION:

The heat sink and fan assembly might be very hot. Before you open the computer cover, turn off the computer and wait several minutes until the computer is cool.

To replace the heat sink and fan assembly, do the following:

1. Remove any media from the drives and turn off all connected devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.

2. Remove the computer cover. See "Removing the computer cover" on page 88.

3. Locate the heat sink and fan assembly. See "Computer components" on page 32.

4. Pivoting the two plastic retaining clips that secure the heat sink fan duct outward, lift the heat sink fan duct out of the chassis.
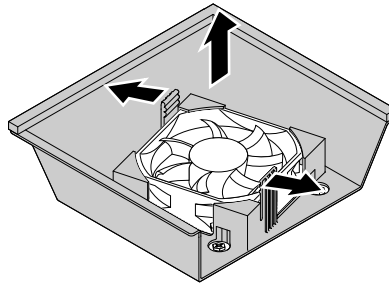
Figure 65. Removing the heat sink fan duct

5. Disconnect the heat sink and fan assembly cable from the system board.

6. Loosen the four screws that secure the heat sink and fan assembly to the system board in the following sequence:

   a. Partially remove screw **1**, fully remove screw **2**, and then fully remove screw **1**.

   b. Partially remove screw **3**, fully remove screw **4**, and then fully remove screw **3**.

   Note: Carefully remove the four screws from the system board to avoid any possible damage to the system board. The four screws cannot be removed from the heat sink and fan assembly.
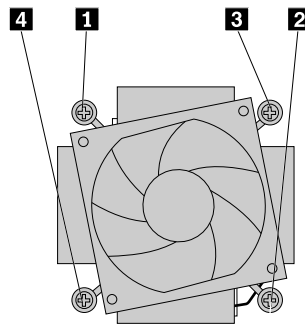
Figure 66. Removing the heat sink and fan assembly

7. Lift the heat sink and fan assembly off the system board.

   Notes:

   • You might have to gently twist the heat sink and fan assembly to free it from the microprocessor.

   • Do not touch the thermal grease while handling the heat sink and fan assembly.

8. Position the new heat sink and fan assembly on the system board so that the four screws are aligned with the holes in the system board. Ensure that the heat sink and fan assembly cable faces toward the microprocessor fan connector on the system board.

9. Tighten the four screws to secure the new heat sink and fan assembly in the following sequence. Do not over-tighten the screws.

   a. Partially tighten screw **1**, fully tighten screw **2**, and then fully tighten screw **1**.

   b. Partially tighten screw **3**, fully tighten screw **4**, and then fully tighten screw **3**.

10. Connect the heat sink and fan assembly cable to the microprocessor fan connector on the system board. See "Parts on the system board" on page 37.

11. Position the heat sink fan duct over the new heat sink and fan assembly. Then, press the heat sink fan duct straight down until it snaps into position.
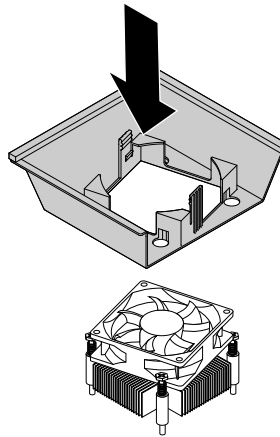
Figure 67. Installing the heat sink fan duct

What to do next:

- To work with another piece of hardware, go to the appropriate section.

- To complete the installation or replacement, go to "Completing the parts replacement" on page 129.

Replacing the microprocessor

Attention: Do not open your computer or attempt any repair before reading and understanding the Chapter 1 "Read this first: Important safety information" on page 1.

CAUTION:

The heat sink and microprocessor might be very hot. Before you open the computer cover, turn off the computer and wait several minutes until the computer is cool.

To replace the microprocessor, do the following:

1. Remove any media from the drives and turn off all connected devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.

2. Remove the computer cover. See "Removing the computer cover" on page 88.

3. Remove the heat sink and fan assembly. See "Replacing the heat sink and fan assembly" on page 123.

   Note: Place the heat sink and fan assembly on its side so that the thermal grease on the bottom does not touch anything.

4. Locate the microprocessor. See "Computer components" on page 32.

5. Disconnect all cables connected to the system board.

6. Press the small handle downward to release it from the retainer, and then open the retainer to access the microprocessor.
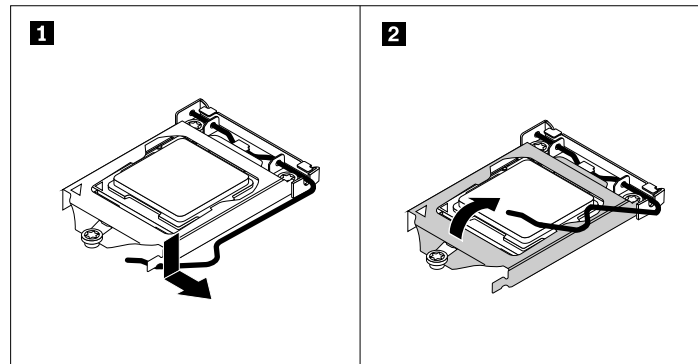
Figure 68. Accessing the microprocessor

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

   Notes:

   - Your microprocessor and socket might look different from the one illustrated.
   - Touch only the edges of the microprocessor. Do not touch the gold contacts on the bottom.
   - Do not drop anything onto the microprocessor socket while it is exposed. The socket pins must be kept as clean as possible.
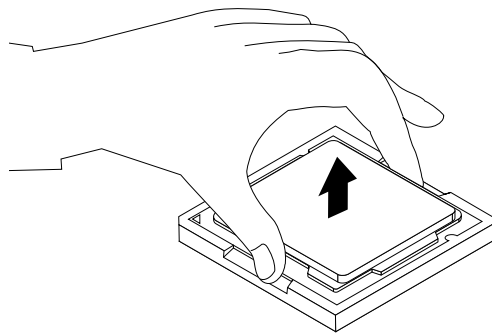
Figure 69. Removing the microprocessor

8. Ensure that the small handle is in the raised position and the microprocessor retainer is fully open.
9. Remove the protective cover that protects the gold contacts of the new microprocessor.

10. Note the orientation of the new microprocessor. Hold the new microprocessor by its edges and align the notches **1** on it with the tabs **2** in the microprocessor socket. Then, carefully lower the new microprocessor straight down into the microprocessor socket.

   Note: The small triangle **3** on one corner of the new microprocessor is the microprocessor orientation indicator. The new microprocessor is in the correct orientation when this indicator points to the beveled corner **4** of the microprocessor socket.
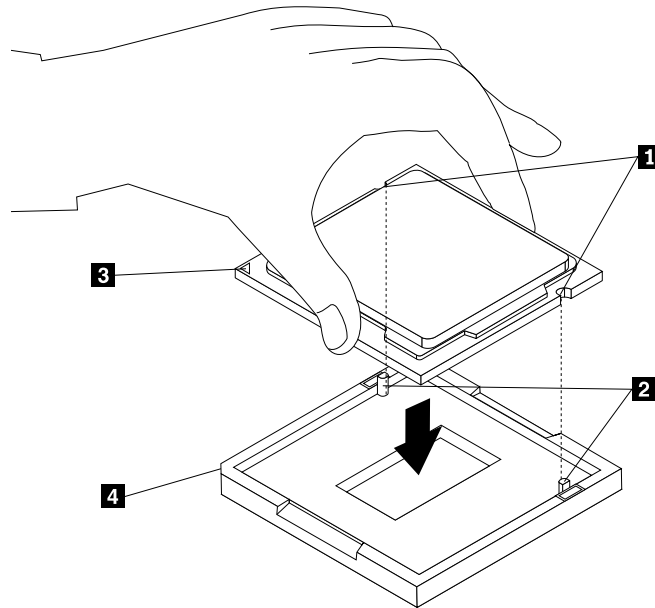
Figure 70. Installing the microprocessor

11. Close the microprocessor retainer and lock it into position with the small handle to secure the new microprocessor in the socket.
12. Reinstall the heat sink and fan assembly. See "Replacing the heat sink and fan assembly" on page 123.
13. Reconnect all cables that were disconnected from the system board.

What to do next:

• To work with another piece of hardware, go to the appropriate section.
• To complete the installation or replacement, go to "Completing the parts replacement" on page 129.

Replacing the system board

Attention: Do not open your computer or attempt any repair before reading and understanding the Chapter 1 "Read this first: Important safety information" on page 1.

Note: Each computer has a unique Vital Product Data (VPD) code stored in the nonvolatile memory on the system board. After you replace the system board, the VPD must be updated. To update the VPD, see "Updating the BIOS" on page 67.

To replace the system board, do the following:

1. Remove any media from the drives and turn off all connected devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See "Removing the computer cover" on page 88.

3. Remove all PCI Express cards. See "Replacing a PCI Express card" on page 116.

4. Remove all memory modules. See "Replacing a memory module" on page 120.

5. Remove the heat sink and fan assembly. See "Replacing the heat sink and fan assembly" on page 123.

6. Record the cable routing and cable connections, and then disconnect all cables from the system board. See "Parts on the system board" on page 37.

7. Remove the eight screws that secure the system board, and then carefully lift the system board out of the chassis.

   Note: Carefully handle the system board by its edges.
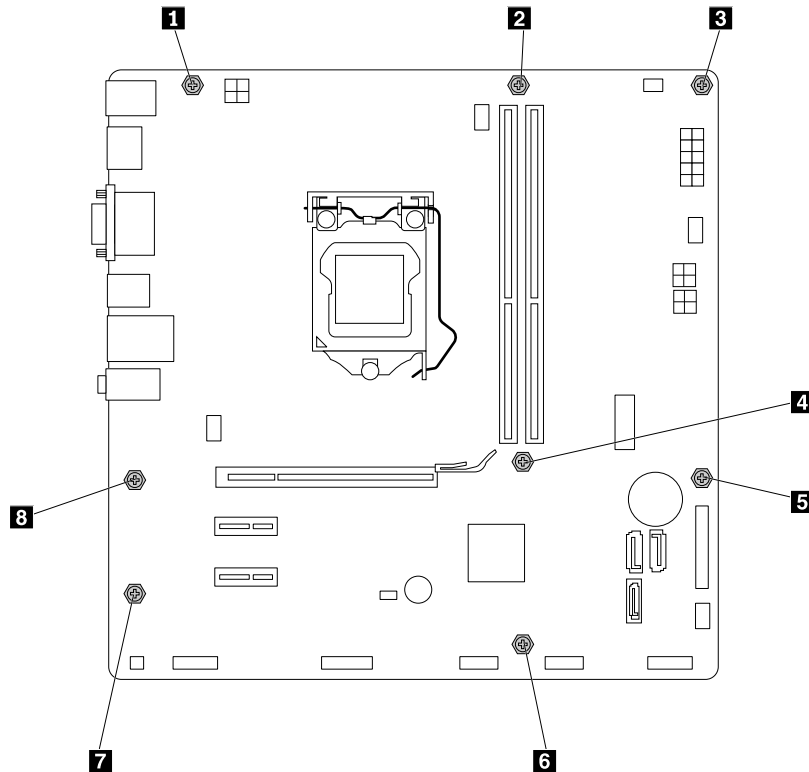
Figure 71. Removing the system board

8. Remove the microprocessor from the failing system board, and then install it onto the new system board. See "Replacing the microprocessor" on page 125.

9. Align the eight holes in the new system board with the corresponding screw holes in the chassis. Then, install the eight screws to secure the system board to the chassis.

10. Route all the cables that you disconnected from the system board, and then reconnect the cables to the system board. See "Parts on the system board" on page 37.

11. Reinstall the heat sink and fan assembly. See "Replacing the heat sink and fan assembly" on page 123.

12. Reinstall all memory modules. See "Replacing a memory module" on page 120.

13. Reinstall all PCI Express cards. See "Replacing a PCI Express card" on page 116.

14. Reinstall the computer cover and reconnect cables to your computer. See "Completing the parts replacement" on page 129.

The failing system board must be returned with a microprocessor socket cover to protect the pins during shipping and handling.

To install the microprocessor socket cover, do the following:

1. After you have removed the microprocessor from the failing system board, close the microprocessor retainer. Then, put the lever to the locked position to secure the retainer in place.

2. Note the orientation of the socket cover, and install one side of the socket cover into the microprocessor socket. Carefully press the other side of the socket cover downward until the socket cover snaps into position.

3. Carefully check the four corners of the socket cover to ensure that the cover is seated securely.

4. Follow any additional instructions that are included with the replacement part you received.

Completing the parts replacement

After completing the installation or replacement for all parts, reinstall the computer cover and reconnect cables. Depending on the parts you installed or replaced, you might need to confirm the updated information in the Setup Utility program. Refer to "Using the Setup Utility program" on page 63.

To reinstall the computer cover and reconnect cables to your computer, do the following:

1. Ensure that all components have been reassembled correctly and that no tools or loose screws are left inside your computer. See "Computer components" on page 32 for the locations of various components in your computer.

2. Ensure that the cables are routed correctly before reinstalling the computer cover. Keep cables clear of the hinges and sides of the computer chassis to avoid interference with reinstalling the computer cover.

3. Position the computer cover on the chassis so that the rail guides on the bottom of the computer cover engage the rails on the chassis. Then, push the cover to the front of the computer until it snaps into position. Install the two screws to secure the computer cover.
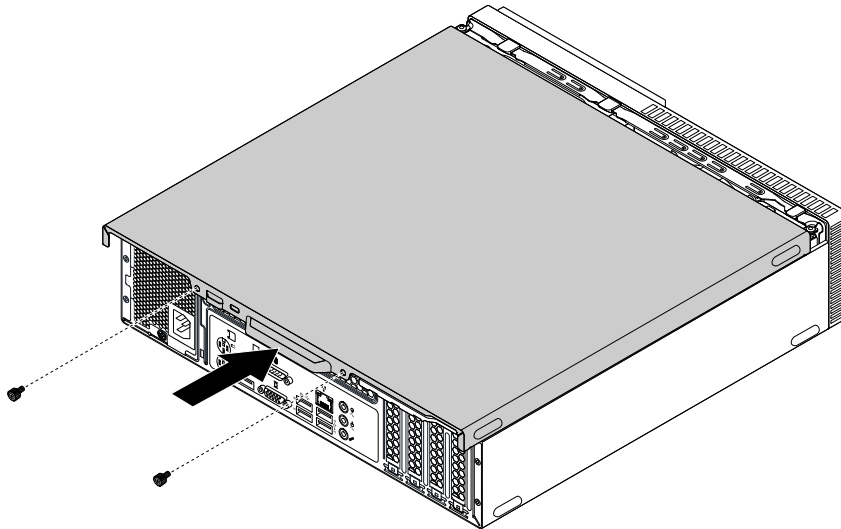
Figure 72. Installing the computer cover

4. Place the computer in an upright position.

5. If a locking device is available, use it to lock the computer. See "Locking your computer" on page 57.

6. Reconnect the external cables and power cords to the corresponding connectors on the computer. See "Hardware locations" on page 27.

7. Update your configuration. See "Using the Setup Utility program" on page 63.

8. If a newly installed hardware component does not work normally, update the device driver. See "Keeping your computer current" on page 54.

Chapter 10. Getting information, help, and service

This chapter contains the following topics:

- "Information resources" on page 131
- "Help and service" on page 132

Information resources

You can use the information in this section to access useful resources relating to your computing needs.

Accessing the user guide in various languages

To access the user guide in various languages, go to:
http://www.lenovo.com/UserManuals

Windows help system

Note: If you use the online help for Windows 7 or the help for Windows 10, ensure that your computer is connected to the Internet.

The Windows help system provides you with detailed information about using the Windows operating system.

To access the Windows help system, do the following:

1. Click the Start button to open the Start menu.
2. Depending on your Windows version, do one of the following:

   - For Windows 7: Click **Help and Support**. You can choose to use the online or offline help at the bottom of the screen.
   - For Windows 10: Click **Get started**.

Safety and warranty

The *Safety, Warranty, and Setup Guide* provided with your computer contains important safety information, product warranty terms, initial setup procedure, and legal notices. Ensure that you read and understand all safety information in the *Safety, Warranty, and Setup Guide* before using your computer.

In addition, read and understand Chapter 1 "Read this first: Important safety information" on page 1 before using your computer. This preface provides additional safety information that applies to topics and tasks described in this *User Guide*.

Lenovo Web site

The Lenovo Web site (http://www.lenovo.com) provides up-to-date information and services to help you buy, upgrade, and maintain your computer. You also can do the following:

- Shop for desktop and notebook computers, monitors, projectors, upgrades and accessories for your computer, and special offers.
- Purchase additional services, such as support for hardware, operating systems, application programs, network setup and configuration, and custom installations.
- Purchase upgrades and extended hardware repair services.
- Access troubleshooting and support information for your computer model and other supported products.

- Find a Service Provider located near you.

Lenovo Support Web site

Technical support information is available on the Lenovo Support Web site at:
http://www.lenovo.com/support

This Web site is updated with the latest support information such as the following:

- Drivers and software
- Diagnostic solutions
- Product and service warranty
- Product and parts details
- User guides and manuals
- Knowledge base and frequently asked questions
- Lenovo Support phone numbers

Frequently asked questions

For the answers to frequently asked questions about your computer, go to:
http://www.lenovo.com/support/faq

Help and service

This section provides information about obtaining help and service.

Calling for service

During the warranty period, you can get help and information by telephone through the Customer Support Center. For the warranty period of your computer, go to http://www.lenovo.com/warranty-status. For a list of Lenovo Support phone numbers, go to http://www.lenovo.com/support/phone.

Note: Phone numbers are subject to change without notice. If the number for your country or region is not provided, contact your Lenovo reseller or Lenovo marketing representative.

The following services are available during the warranty period:

- **Problem determination** - Trained service personnel are available to assist you with determining a hardware problem and deciding what action is necessary to fix the problem.
- **Hardware repair** - If the problem is caused by hardware under warranty, trained service personnel are available to provide the applicable level of service.
- **Engineering Change management** - There might be changes that are required after a product has been sold. Lenovo or your reseller will make selected Engineering Changes (ECs) that apply to your hardware available.

These items are not covered by the warranty:
- Replacement or use of parts not manufactured for or by Lenovo or non-warranted Lenovo parts
- Identification of software problem sources
- Configuration of BIOS as part of an installation or upgrade
- Changes, modifications, or upgrades to device drivers
- Installation and maintenance of network operating systems (NOS)
- Installation and maintenance of application programs

If possible, be at your computer when you call. Have the following information available:

- Machine type and model
- Serial numbers of your hardware products
- Description of the problem
- Exact wording of any error messages
- Hardware and software configuration information

Using other services

You might travel with your computer or relocate it to a country or region where the machine type for your desktop or notebook computer is sold. In such a situation, your computer might be eligible for International Warranty Service, which automatically entitles you to obtain warranty service throughout the warranty period. Service will be performed by service providers authorized to perform warranty service.

Service methods and procedures vary by country, and some services might not be available in all countries. International Warranty Service is delivered through the method of service (such as depot, carry-in, or on-site service) that is provided in the servicing country. Service centers in certain countries might not be able to service all models of a particular machine type. In some countries, fees and restrictions might apply at the time of service.

To determine whether your computer is eligible for International Warranty Service and to view a list of the countries or regions where service is available, go to http://www.lenovo.com/support.

For technical assistance with the installation of or questions related to Service Packs for your preinstalled Microsoft Windows product, go to the Microsoft Product Support Web site at http://support.microsoft.com. You also can contact the Lenovo Customer Support Center for help. Some fees might apply.

Purchasing additional services

During and after the warranty period, you can purchase additional services. Examples of these additional services include:

- Support for hardware, operating systems, and application programs

- Network setup and configuration services

- Upgraded or extended hardware repair services

- Custom installation services

Service availability and service name might vary by country or region. For more information about these services, go to the Lenovo Web site at:
http://www.lenovo.com

Appendix A. Regulatory information

The latest compliance information is available at http://www.lenovo.com/compliance.

Export classification notice

This product is subject to the United States Export Administration Regulations (EAR) and has an Export Classification Control Number (ECCN) of 5A992.c. It can be re-exported except to any of the embargoed countries in the EAR E1 country list.

Electronic emissions notices

The following information refers to Lenovo personal computer machine types 10GS, 10GT, 10KN, and 10KQ.

Federal Communications Commission Declaration of Conformity

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult an authorized dealer or service representative for help.

Lenovo is not responsible for any radio or television interference caused by using other than specified or recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

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

Responsible Party:
Lenovo (United States) Incorporated
1009 Think Place - Building One
Morrisville, NC 27560
Phone Number: 919-294-5900

Industry Canada Class B emission compliance statement

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

European Union - Compliance to the Electromagnetic Compatibility Directive

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

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

Lenovo, Einsteinova 21, 851 01 Bratislava, Slovakia

German Class B compliance statement

Deutschsprachiger EU Hinweis:

Hinweis für Geräte der Klasse B EU-Richtlinie zur Elektromagnetischen Verträglichkeit
Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2004/108/EG (früher 89/336/EWG) zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse B ein.

Um dieses sicherzustellen, sind die Geräte wie in den Handbüchern beschrieben zu installieren und zu betreiben. Des Weiteren dürfen auch nur von der Lenovo empfohlene Kabel angeschlossen werden. Lenovo übernimmt keine Verantwortung für die Einhaltung der Schutzanforderungen, wenn das Produkt ohne Zustimmung der Lenovo verändert bzw. wenn Erweiterungskomponenten von Fremdherstellern ohne Empfehlung der Lenovo gesteckt/eingebaut werden.

Deutschland:

Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Betriebsmitteln
Dieses Produkt entspricht dem „Gesetz über die elektromagnetische Verträglichkeit von Betriebsmitteln" EMVG (früher „Gesetz über die elektromagnetische Verträglichkeit von Geräten"). Dies ist die Umsetzung der EU-Richtlinie 2004/108/EG (früher 89/336/EWG) in der Bundesrepublik Deutschland.

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Betriebsmitteln, EMVG vom 20. Juli 2007 (früher Gesetz über die elektromagnetische Verträglichkeit von Geräten), bzw. der EMV EG Richtlinie 2004/108/EC (früher 89/336/EWG), für Geräte der Klasse B.

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen. Verantwortlich für die Konformitätserklärung nach Paragraf 5 des EMVG ist die Lenovo (Deutschland) GmbH, Gropiusplatz 10, D-70563 Stuttgart.

Informationen in Hinsicht EMVG Paragraf 4 Abs. (1) 4:
Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 Klasse B.

Korea Class B compliance statement

B급 기기(가정용 방송통신기자재)
이 기기는 가정용(B급) 전자파적합기기로서 주로 가정에서 사용하는 것을 목적으로 하며, 모든 지역에서 사용할 수 있습니다

Japan VCCI Class B compliance statement

この装置は，クラスＢ情報技術装置です。 この装置は,家庭環境で使用するこ
とを目的としていますが, この装置がラジオやテレビジョン受信機に近接して使
用されると, 受信障害を引き起こすことがあります。
取扱説明書に従って正しい取り扱いをして下さい。 VCCI-B

Japan compliance statement for products which connect to the power mains with rated current less than or equal to 20 A per phase

日本の定格電流が 20A/相 以下の機器に対する高調波電流規制
高調波電流規格 JIS C 61000-3-2 適合品

Japan notice for ac power cord

The ac power cord shipped with your product can be used only for this specific product. Do not use the ac power cord for other devices.

本製品およびオプションに電源コード・セットが付属する場合は、
それぞれ専用のものになっていますので他の電気機器には使用し
ないでください。

Lenovo product service information for Taiwan

台灣 Lenovo 產品服務資訊如下:
荷蘭商聯想股份有限公司台灣分公司
台北市內湖區堤頂大道二段89號5樓
服務電話：0800-000-702

Keyboard and mouse compliance statement for Taiwan

本產品隨貨附已取得經濟部標準檢驗局認可之PS/2或USB的鍵盤與滑鼠一組

Eurasian compliance mark

EHC

Brazil audio notice

Ouvir sons com mais de 85 decibéis por longos períodos pode provocar danos ao sistema auditivo.

Mexico wireless-radio compliance information

Advertencia: En Mexico la operación de este equipo estásujeta a las siguientes dos condiciones: (1) es posible que este equipo o dispositivo no cause interferencia perjudicial y (2) este equipo o dispositivo debe aceptar cualquier interferencia, incluyendo la que pueda causar su operación no deseada.

Additional regulatory information

For additional regulatory information, refer to the *Regulatory Notice* shipped with your computer. Depending on the configuration of your computer and the country or region where the computer was purchased, you might have received additional printed regulatory notices. All regulatory notices are available on the Lenovo Support Web site in electronic format. To access electronic copies of the documentation, go to http://www.lenovo.com/UserManuals.

Appendix B. WEEE and recycling information

Lenovo encourages owners of information technology (IT) equipment to responsibly recycle their equipment when it is no longer needed. Lenovo offers a variety of programs and services to assist equipment owners in recycling their IT products. For information on recycling Lenovo products, go to http://www.lenovo.com/recycling. The latest environmental information about our products is available at http://www.lenovo.com/ecodeclaration.

Important WEEE information
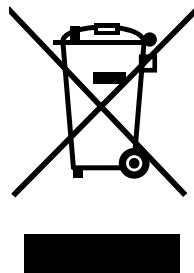
The WEEE marking on Lenovo products applies to countries with WEEE and e-waste regulations (for example, the European WEEE Directive, India E-Waste Management & Handling Rules, 2011). Appliances are labeled in accordance with local regulations concerning waste electrical and electronic equipment (WEEE). These regulations determine the framework for the return and recycling of used appliances as applicable within each geography. This label is applied to various products to indicate that the product is not to be thrown away, but rather put in the established collection systems for reclaiming these end of life products.

Users of electrical and electronic equipment (EEE) with the WEEE marking must not dispose of end of life EEE as unsorted municipal waste, but use the collection framework available to them for the return, recycle, and recovery of WEEE and to minimize any potential effects of EEE on the environment and human health due to the presence of hazardous substances. For additional WEEE information, go to: http://www.lenovo.com/recycling

Recycling information for Japan

Collecting and recycling a disused Lenovo computer or monitor

If you are a company employee and need to dispose of a Lenovo computer or monitor that is the property of the company, you must do so in accordance with the Law for Promotion of Effective Utilization of Resources. Computers and monitors are categorized as industrial waste and should be properly disposed of by an industrial waste disposal contractor certified by a local government. In accordance with the Law for Promotion of Effective Utilization of Resources, Lenovo Japan provides, through its PC Collecting and Recycling Services, for the collecting, reuse, and recycling of disused computers and monitors. For details, visit the Lenovo Web site at http://www.lenovo.com/recycling/japan. Pursuant to the Law for Promotion of Effective Utilization of Resources, the collecting and recycling of home-used computers and monitors by the manufacturer was begun on October 1, 2003. This service is provided free of charge for home-used computers sold after October 1, 2003. For details, visit the Lenovo Web site at http://www.lenovo.com/recycling/japan.

Disposing of Lenovo computer components

Some Lenovo computer products sold in Japan may have components that contain heavy metals or other environmental sensitive substances. To properly dispose of disused components, such as a printed circuit board or drive, use the methods described above for collecting and recycling a disused computer or monitor.

Disposing of disused lithium batteries from Lenovo computers

A button-shaped lithium battery is installed inside your Lenovo computer to provide power to the computer clock while the computer is off or disconnected from the main power source. If you need to replace it with a new one, contact your place of purchase or contact Lenovo for service. If you need to dispose of a disused lithium battery, insulate it with vinyl tape, contact your place of purchase or an industrial-waste-disposal operator, and follow their instructions. Disposal of a lithium battery must comply with local ordinances and regulations.

Recycling information for Brazil

Declarações de Reciclagem no Brasil

Descarte de um Produto Lenovo Fora de Uso

Equipamentos elétricos e eletrônicos não devem ser descartados em lixo comum, mas enviados à pontos de coleta, autorizados pelo fabricante do produto para que sejam encaminhados e processados por empresas especializadas no manuseio de resíduos industriais, devidamente certificadas pelos orgãos ambientais, de acordo com a legislação local.

A Lenovo possui um canal específico para auxiliá-lo no descarte desses produtos. Caso você possua um produto Lenovo em situação de descarte, ligue para o nosso SAC ou encaminhe um e-mail para: reciclar@lenovo.com, informando o modelo, número de série e cidade, a fim de enviarmos as instruções para o correto descarte do seu produto Lenovo.
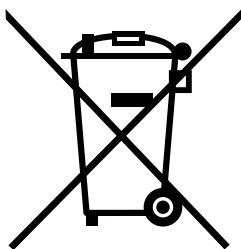
Battery recycling information for Taiwan

Battery recycling information for the European Union

EU

Notice: This mark applies only to countries within the European Union (EU).

Batteries or packaging for batteries are labeled in accordance with European Directive 2006/66/EC concerning batteries and accumulators and waste batteries and accumulators. The Directive determines the framework for the return and recycling of used batteries and accumulators as applicable throughout the European Union. This label is applied to various batteries to indicate that the battery is not to be thrown away, but rather reclaimed upon end of life per this Directive.

In accordance with the European Directive 2006/66/EC, batteries and accumulators are labeled to indicate that they are to be collected separately and recycled at end of life. The label on the battery may also include a chemical symbol for the metal concerned in the battery (Pb for lead, Hg for mercury, and Cd for cadmium). Users of batteries and accumulators must not dispose of batteries and accumulators as unsorted municipal waste, but use the collection framework available to customers for the return, recycling, and treatment of batteries and accumulators. Customer participation is important to minimize any potential effects of batteries and accumulators on the environment and human health due to the potential presence of hazardous substances. For proper collection and treatment, go to:
http://www.lenovo.com/recycling

Appendix C. Restriction of Hazardous Substances Directive (RoHS)

The latest environmental information is available at http://www.lenovo.com/ecodeclaration.

European Union RoHS

This Lenovo product, with included parts (cables, cords, and so on) meets the requirements of Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment ("RoHS recast" or "RoHS 2").

For more information about Lenovo worldwide compliance on RoHS, go to:
http://www.lenovo.com/social_responsibility/us/en/RoHS_Communication.pdf

Turkish RoHS

The Lenovo product meets the requirements of the Republic of Turkey Directive on the Restriction of the Use of Certain Hazardous Substances in Waste Electrical and Electronic Equipment (WEEE).

Türkiye AEEE Yönetmeliğine Uygunluk Beyanı

Bu Lenovo ürünü, T.C. Çevre ve Orman Bakanlığı'nın "Atık Elektrik
ve Elektronik Eşyalarda Bazı Zararlı Maddelerin Kullanımının
Sınırlandırılmasına Dair Yönetmelik (AEEE)" direktiflerine uygundur.

AEEE Yönetmeliğine Uygundur.

Ukraine RoHS

Цим підтверджуємо, що продукція Леново відповідає вимогам
нормативних актів України, які обмежують вміст небезпечних
речовин

India RoHS

RoHS compliant as per E-Waste (Management & Handling) Rules, 2011.

China RoHS

产品中有害物质的名称及含量

部件名称	有害物质					
	铅(Pb)	汞(Hg)	镉(Cd)	六价铬 (Cr(VI))	多溴连苯 (PBB)	多溴二苯醚 (PBDE)
印刷电路板组件*	X	O	O	O	O	O
硬盘	X	O	O	O	O	O
光驱	X	O	O	O	O	O
内存	X	O	O	O	O	O
电脑I/O 附件	X	O	O	O	O	O
电源	X	O	O	O	O	O
键盘	X	O	O	O	O	O
鼠标	X	O	O	O	O	O
机箱/ 附件	X	O	O	O	O	O

本表格依据 SJ/T 11364 的规定编制。
〇：表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。
×：表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求。
注：表中标记"×"的部件，皆因全球技术发展水平限制而无法实现有害物质的替代。
印刷电路板组件*：包括印刷电路板及其零部件、电容和连接器
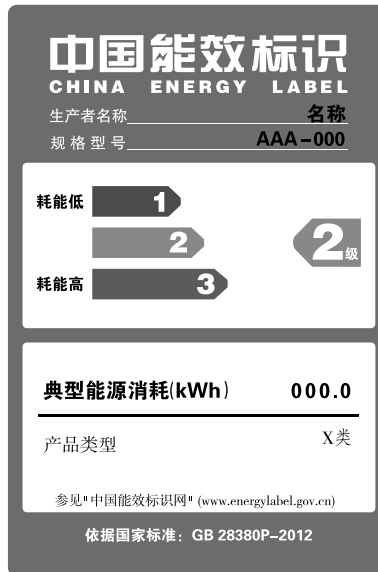根据型号的不同，可能不会含有以上的所有部件，请以实际购买机型为准

在中华人民共和国境内销售的电子信息产品必须标识此标志，标志内的数字代表在正常使用状态下的产品的环保使用期限

Appendix D. China Energy Label

微型计算机能效标识声明

为满足中国《微型计算机能源效率标识实施规则》和《微型计算机能效限定值及能效等级》的相关规定和要求，联想公司对其生产及销售的每一台微型计算机产品加施能效标识，声明如下：

1. 如果您的包装箱或者产品上贴有下图所示的标识，您所购买的机器就是经测试符合《微型计算机能效限定值及能效等级》规定的相应能效等级的产品。

> **Note:** 上图以2级能效标贴模板为例进行说明，具体规格型号、能效等级、产品类别和典型能源消耗等信息请以包装箱或产品上粘贴的实际能效等级标贴提供的信息为准，也可登陆"中国能效标识网"http://www.energylabel.gov.cn进行详细查询。

2. 如果您所购买机器的包装箱或者产品无上图所示的标识，请您忽略此部分。

《微型计算机能源效率标识实施规则》和《微型计算机能效限定值及能效等级》是由国家发展改革委员会所推行的能效标识制度，旨在通过开发节能产品和有效的节能方式来保护环境。通过使用符合能效标识制度要求的产品可以减少电源消耗、有助于节省开支、营造更清洁的环境并降低温室气体排放量。

联想很荣幸能为用户提供符合相应能效等级设计要求的产品，也鼓励用户购买高能效的产品。

有关能效标识制度的更多信息，请访问"中国能效标识网"http://www.energylabel.gov.cn。

Appendix E. ENERGY STAR model information

ENERGY STAR® is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy aimed at saving money and protecting the environment through energy efficient products and practices.

Lenovo is proud to offer our customers products with an ENERGY STAR compliant designation. Some models of the following machine types have been designed and tested to conform to the ENERGY STAR program requirement for computers at the time of manufacture: 10GS, 10GT, 10KN, and 10KQ. For more information about ENERGY STAR ratings for Lenovo computers, go to http://www.lenovo.com.

By using ENERGY STAR compliant products and taking advantage of the power-management features of your computer, you reduce the consumption of electricity. Reduced electrical consumption contributes to potential financial savings, a cleaner environment, and the reduction of greenhouse gas emissions.

For more information about ENERGY STAR, go to:
http://www.energystar.gov

Lenovo encourages you to make efficient use of energy an integral part of your day-to-day operations. To help in this endeavor, set the following power-management features to take effect when your computer has been inactive for a specified duration:

Table 1. ENERGY STAR power-management features

Windows 7 or Windows 10 operating system
Power plan: Default

• Turn off the display: After 10 minutes
 	
• Put the computer to sleep: After 25 minutes
 	
• Advanced power settings:
 	
  – Turn off hard disk drives: After 20 minutes
 	
  – Hibernate: Never

To awaken your computer from a Sleep mode, press any key on your keyboard.

To change power settings, do the following:
1. Open Control Panel by doing one of the following:
   • For Windows 7: Click the Start button to open the Start menu.
   • For Windows 10: Right-click the Start button to open the Start context menu.
2. Click **Control Panel**. View Control Panel using Large icons or Small icons, and then click **Power Options**.
3. Follow the instructions on the screen.

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